

*Giving Wind Direction*

# WIND SYSTEMS

IN FOCUS

Systems & Parts ▶ Turbine Inspection

## 3D PRINTING VS. CNC MACHINING FOR COMPONENT MANUFACTURING

PROFILE

Gateway Zero

MARCH 2024  
windsystemsmag.com



# Wave Hello to Oceantic Network

**The new name for  
Business Network  
for Offshore Wind.**

**We will inspire the world  
to harness diverse sources of  
clean, ocean-based energy.**

**Our members will continue  
building a robust offshore  
wind supply chain.**

**We will proudly host our  
world-renowned  
International Partnering  
Forum – the annual IPF.**

**Wave "Hello," and visit us at:  
[oceantic.org](http://oceantic.org)**



# AWG

AMERICAN WIRE GROUP

buyawg.com • sales@buyawg.com • TF: 800.342.7215 • Tel: 945.455.3050

Empowering your  
next wind project  
with nation's  
largest inventory  
of medium voltage  
cables



WIRE & CABLE • HARDWARE • ACCESSORIES • EQUIPMENT

## IN FOCUS

### 3D PRINTING VS. CNC MACHINING FOR COMPONENT MANUFACTURING

*While 3D printing has the potential to be an ideal solution in increasing turbine part production, it is crucial not to overlook the benefits of CNC machining.*

### TEST AND REPAIR 250 FEET IN THE AIR

*The importance of inspection, maintenance, and performance enhancements on wind turbines.* **18**

### PROFILE

**Gateway Zero** focuses exclusively on reimagining ports and coastal infrastructure for a clean-energy future, developing and investing in projects to unlock new economic opportunity for the world's energy gateways. **22**



### CONVERSATION

Miros' Lars Ivar Leivestad and Jonas Røstad discuss their company's work with real-time wave radar measurement for offshore operations. **26**



750+  
members

# Uniting the Clean Power Industry

We are stronger together by using our collective voice, resources, and influence to drive our industry forward. **ACP is proud to lead utility-scale clean power technologies of all types**, across the value chain and country, into this decade of opportunity.



## ▸ THE FUTURE OF WIND



DIRECTION

8

*PDE Offshore Corporation upgrades underwater acoustic positioning system ▸ Pacifico Energy Korea appoints K2M as owner's engineer ▸ BOEM designates two wind-energy areas in Oregon*



CROSSWINDS

44

## WHY IT'S TIME TO REBOOT RENEWABLE ENERGY DUE DILIGENCE

*While advisers possess significant expertise in assessing the feasibility and risk of projects, there is a significant opportunity for them to enhance their practice by embracing digital solutions.*

## TAILWINDS

### THE BUSINESS OF WIND



#### ▸ CONSTRUCTION

New Jersey awards offshore wind contracts **30**

#### ▸ INNOVATION

Ocean Winds, Zelim work to enhance offshore wind safety **33**



#### ▸ MAINTENANCE

GEV Wind Power launches Blade Team **40**

#### ▸ MANUFACTURING

US Forged Rings to invest \$700M in tower facility **43**



Canadian Renewable Energy Association

Association canadienne de l'énergie renouvelable

WIND, SOLAR, STORAGE.

ÉOLIEN, SOLAIRE, STOCKAGE.



# REGISTER TODAY

## **OCEANTIC NETWORK** **IPF24** INTERNATIONAL PARTNERING FORUM

**April 22-25, 2024** | New Orleans

**The International Partnering Forum (IPF) is the premier offshore wind energy conference in the Americas.**

Hosted by the Oceanctic Network, formerly the Business Network for Offshore Wind, IPF connects global leaders and businesses in the supply chain, offers unparalleled networking opportunities, and delivers the most timely and relevant updates on the industry. With the rapid expansion of offshore wind on a global scale, IPF attendance helps secure your place as a leader in the industry.

Located in the heart of America's offshore energy industry, New Orleans will host 2024 IPF just as the Gulf of Mexico begins developing its offshore wind market. Gulf companies are already hard at work building America's next energy industry and moving to integrate new technologies like green hydrogen into offshore wind. Embracing its offshore energy past and embracing the future of offshore wind, New Orleans and the state of Louisiana are emerging as a center of experience, expertise, innovation, and heart of this new industry.



**LEARN MORE &  
REGISTER TODAY**

**OCEANTIC NETWORK**

oceanctic.org

   Oceanctic Network

 @oceancticnetwork

**OCEANTIC**  
NETWORK 

## Piecing together a turbine

The days are getting longer, and the breeze is getting warmer as March ushers in spring (as well as daylight saving time).

At *Wind Systems*, we welcome the month of March by shining a spotlight on the literal bits and pieces that make up a turbine: systems and parts.

On the surface, they may not sound exciting, but they are vitally important to the life of a turbine — from its construction phase and into its daily operations.

That's why our March issue is full of interesting information about these essential, well, "parts" of the industry. This issue will also tackle turbine inspection.

There is a growing debate on manufacturing certain parts for turbines via 3D printing or CNC machining. Our cover story from Get It Made's Luke Smoothy looks at how exploring the pros and cons of CNC machining vs. 3D printing can help manufacturers select the right technology.

Our second inFocus article explores the area of turbine inspection. In the story, Megger's Mike Palmer shares his insights into the importance of inspection, maintenance, and performance enhancements on wind turbines.

In addition to these features, our company profile shines a spotlight on Gateway Zero. This relatively new player in the wind sector focuses exclusively on reimagining ports and coastal infrastructure for a clean-energy future, developing and investing in projects to unlock new economic opportunity for the world's energy gateways.

Our Conversation feature also explores an interesting offshore angle: the need for real-time wave radar measurements. In the feature, Miros' Jonas Røstad and Lars Ivar Leivestad discuss how continuous real-time wave monitoring generates valuable data for offshore wind operations, research, and analysis.

And in Crosswinds, LiveDiligence COO Joss Boxford looks at why it's time to reboot renewable energy due diligence. In the article, he shares his insights on how a centralized, digitalized due diligence approach offers the advantage of delivering faster and earlier insights, ultimately reducing the time it takes to reach financial close.

You'll find all that and more in this month's issue. I hope you enjoy discovering it as much as I did preparing it for you.

As always, thanks for reading!



**Kenneth Carter, editor**

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

**David C. Cooper**  
Publisher

### EDITORIAL

**Kenneth Carter**  
Editor

**Jennifer Jacobson**  
Associate Editor

**Joe Crowe**  
Associate Editor | Social Media

### SALES

**David Gomez**  
Vice President | Sales & Marketing

**Kendall DeVane**  
National Sales Manager

**Susan Heinauer**  
Regional Sales Manager

### CIRCULATION

**Teresa Cooper**  
Manager

**Jamie Willett**  
Assistant

### DESIGN

**Rick Frennea**  
Creative Director

**Michele Hall**  
Graphic Designer

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system without permission in writing from the publisher. The views expressed by those not on the staff of *Wind Systems* magazine, or who are not specifically employed by Media Solutions, Inc., are purely their own. All "News" material has either been submitted by the subject company or pulled directly from their corporate web site, which is assumed to be cleared for release. Comments and submissions are welcome, and can be submitted to editor@windssystemsmag.com.



**media  
solutions**

Published by Media Solutions, Inc.  
P.O. Box 1987 • Pelham, AL 35124  
(800) 366-2185 • (205) 380-1580 fax  
info@msimktg.com

**David C. Cooper**  
President

**Teresa Cooper**  
Operations Director

## ACP announces 2024 board of directors

From American Clean Power

The American Clean Power Association recently announced its 2024 officers, board of directors, and executive committee. The new board and officers were approved at ACP's February 5 board meeting and will serve a one-year term. They include:

✔ **Chair:** Susan D. Nickey, Executive vice president and chief client officer, HASI.

✔ **Chair-Elect:** Laura Beane, President, Vestas North America.

✔ **Treasurer:** Brian Van Abel, executive vice president and chief financial officer, Xcel Energy.

✔ **Secretary:** David Hardy, Group EVP and CEO Americas, Ørsted.

The newly elected executive committee members include:

✔ **AES Clean Energy:** Kleber Costa, chief commercial officer.

✔ **Avangrid Renewables:** Puneet Verma, vice president, Federal Government Affairs.

✔ **BHE Renewables:** Alicia R. Knapp, president and CEO.

✔ **Clearway Energy Group:** Craig Cornelius, president and CEO.

✔ **Dominion Energy:** Mark Mitchell, SVP of Project Construction.

✔ **EDF Renewables North America:** Tristan Grimbert, president and CEO.

✔ **Form Energy:** Mateo Jaramillo, CEO and co-founder.

✔ **GE Vernova:** Stephen Swift, chief commercial officer – Onshore Wind.

✔ **Intersect Power:** Sheldon Kimber, CEO, founder.

✔ **ITC Holdings Corp.:** Krista Tanner, senior vice president and chief business officer.

✔ **Leeward Renewable Energy, LLC:** Jason Allen, CEO.

✔ **NextEra Energy Resources, LLC:** Rebecca Kujawa, president and CEO.

✔ **Pattern Energy Group Services, LP:** Hunter Armistead, CEO.

✔ **Southern Power:** John L. Pemberton, senior vice president, chief compliance officer, and general counsel.



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](http://www.cleanpower.org)



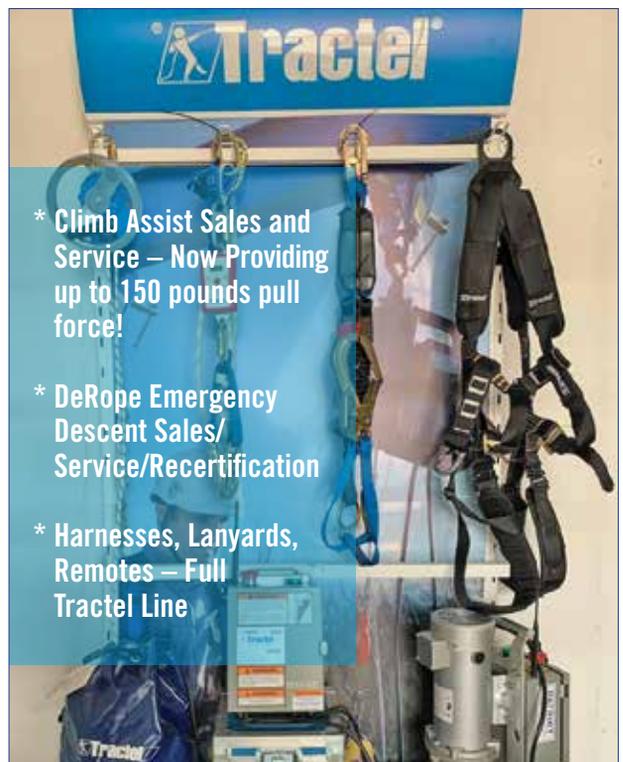
### SUPERIOR Wind Services, LLC

We repair blades, provide tower cleaning services and up-tower bolting services. Our technicians are fully trained and certified for climbing, up-tower rescue, confined space and first aid.

Contact Us  
800-359-0372  
[www.SuperiorBladeRepair.com](http://www.SuperiorBladeRepair.com)



[www.SuperiorBladeRepair.com](http://www.SuperiorBladeRepair.com)



\* **Climb Assist Sales and Service – Now Providing up to 150 pounds pull force!**

\* **DeRope Emergency Descent Sales/Service/Recertification**

\* **Harnesses, Lanyards, Remotes – Full Tractel Line**

[sales@patriotind.com](mailto:sales@patriotind.com)  
800-543-2217

**PATRIOT**  
RENEWABLES, INC.

# DIRECTION

THE FUTURE OF WIND



PDE Offshore Corporation has upgraded its underwater acoustic positioning system onboard MV Geo Energy to Sonardyne's Ranger 2 USBL system. (Courtesy: Sonardyne)

# PDE Offshore Corporation upgrades underwater acoustic positioning system

PDE Offshore Corporation, a Taiwanese offshore geophysical and geotechnical investigation company, has upgraded its underwater acoustic positioning system onboard MV Geo Energy to Sonardyne's Ranger 2 USBL system. This will further enhance its capability in the exploration of offshore renewable energy (ORE) in Taiwan.

Its new geotechnical vessel Geo Power, also equipped with Ranger 2 USBL system, is now under conversion work and will join the fleet in mid-2024. It will provide both seabed and downhole cone penetration testing services.

PDE Offshore has been conducting geotechnical and soil investigation in the shallow waters of the Taiwanese Strait since 2017 as the country looks to replace its coal-based energy with cleaner, sustainable alternatives such as offshore wind farms.

Working with most of the world's leading ORE developers, PDE Offshore wants to increase its capability. This required a trusted and proven USBL positioning system for its Geo technical vessel to work in greater water depths and challenging water conditions as their operations expanded.

Having already successfully used Sonardyne's Mini Ranger 2 for several years, investing in the full Ranger 2 system was a logical choice to provide the reliable dynamic positioning references essential for their operations, while also giving the capability for operating in greater depths and more challenging conditions.

Incorporating more than 30 years of USBL knowledge, Sonardyne's Ranger 2 system is anything but standard. It can be used to track anything, in any depth, from any vessel.

It can track a subsea asset, position or communicate with an underwater vehicle, dynamically position your vessel – or do all of this simultaneously. It can be used for both survey and construction phases of ORE and supports complex tracking scenarios such as

structures and vehicles with multiple transponders and multiple remote offsets.

"We have been working with Sonardyne since 2017 using their Mini Ranger 2 system," said Huang Hsin-chih, PDE Offshore president. "The system is proven, reliable, and our engineers are familiar with its operation. It was a simple and logical choice to go ahead and upgrade to the Ranger 2 system to improve our capability to take on greater projects in the region."

"Taiwan's ambitions of becoming a green island means it is fast becoming

MyeongRyang Offshore Wind project, a venture led by Pacifico Energy Korea (PEK), subsidiary of American renewable energy developer Pacifico Energy.

The MyeongRyang Offshore Wind project is the first phase of a larger 3.2-GW offshore wind complex off the coast of Jindo-gun, Jeollanam-do, in South Korea. The MyeongRyang Offshore Wind project involves the construction of a fixed offshore wind farm with an installed generation capacity of approximately 420 MW. Set to commence construction in 2028, the wind farm is poised to play a pivotal role in



K2M will provide pre-construction analysis and technical support on the first 420-MW phase of the offshore wind complex in South Korea. (Courtesy: K2 Management)

ing a leading player offshore wind in Asia Pacific," said Dan Tan, Sonardyne in Singapore regional sales manager. "We're pleased to be a part this energy transition through PDE Offshore's continued confidence and investment in our products. We look forward to supporting them in their future operations."

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

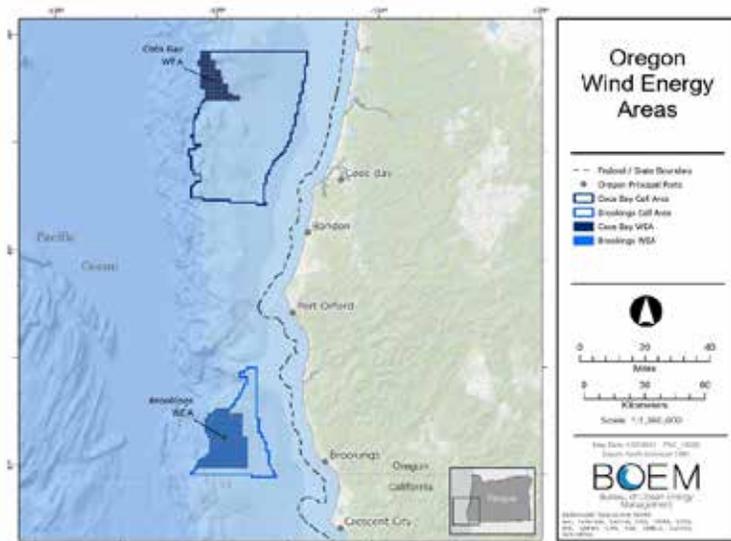
## Pacifico Energy Korea appoints K2M as owner's engineer

K2 Management (K2M), an energy transition project management and engineering consultancy, has been selected as the Owner's Engineer for the

South Korea's target of installing 14.3 GW of offshore wind by 2030.

K2 Management's role as Owner's Engineer for the MyeongRyang Offshore Wind project encompasses support in overall project management. This includes conducting wind analysis, met-ocean studies, conceptual designs, and preparing and selecting contractors for site investigation. K2M will continue to offer technical support throughout the site investigation process, as well as assistance in obtaining permits. Work began in December 2023, and K2M is expected to be actively involved until 2025.

"South Korea continues to build a strong offshore wind market, and the recent auctions last year are a positive reflection of the nation's goals," said Jake Jung, K2's country director for



The two Oregon WEAs total about 195,012 acres. (Courtesy: BOEM)

South Korea. “We are incredibly proud to be able to contribute to that growth by supporting PEK in the first phase of their major 3.2-GW wind complex, a project that will play a crucial role in helping the country decarbonize. By leveraging our international consultants, local expertise and collaborating closely with PEK’s team, we are well-positioned to ensure the successful development of this project.”

“The MyeongRyang Offshore Wind project is a significant development that demonstrates the vast potential of offshore wind power in South Korea,” said Seoung-Ho Choe, representative director/CEO of PEK. “This marks our inaugural venture into offshore wind in the country, and one of the largest offshore wind projects in Korea, and we’re excited to initiate the first phase of this project. Drawing upon K2 Management’s expertise and extensive experience in global offshore wind projects, we are confident in ensuring its success.”

**MORE INFO** [www.k2management.com](http://www.k2management.com)

## BOEM designates two wind-energy areas in Oregon

In support of the Biden-Harris admin-

istration’s goals for deploying 30 GW of offshore wind energy capacity by 2030 and 15 GW of floating offshore wind energy capacity by 2035, the Bureau of Ocean Energy Management has announced the designation of two final Wind Energy Areas (WEAs) offshore Oregon. The WEAs were developed following extensive engagement and feedback from the state, Tribes, local residents, ocean users, federal government partners, and other members of the public. The final WEAs are based on reducing potential conflicts of ocean users, particularly on commercial fishing.

The two WEAs total about 195,012 acres, and they avoid 98 percent of the areas recommended for exclusion due to their importance as commercial fishing grounds. The Coos Bay WEA is 61,204 acres and is 32 miles from shore. The Brookings WEA is 133,808 acres and is about 18 miles from shore.

“BOEM values its close coordination with the State of Oregon as we continue to work together to maintain a robust and transparent offshore wind planning process,” said BOEM Director Elizabeth Klein. “We will continue to work closely with Tribal governments, federal and state government agencies, ocean users, coastal communities and all interested stakeholders as we move

forward with our environmental review.”

BOEM’s Federal Register notice will initiate a 30-day public comment period. Another public comment period would occur if BOEM decides to move forward with a lease sale in either of the WEAs.

In addition to engaging with the State, Tribes, coastal communities and ocean users, BOEM partnered with the National Oceanic and Atmospheric Administration’s National Centers for Coastal Ocean Science (NCCOS) to assess opportunities for wind-energy development and reduce or avoid impacts on other important ocean uses in Oregon. The agencies developed a comprehensive, ecosystem-based ocean planning model that leverages the best available data on natural resources, ocean industries such as fisheries and energy production, and areas of national security activities to identify areas with high wind-energy resource potential and fewer potential impacts to other ocean users and sensitive environmental resources. This approach provided valuable insights about the seascape and its uses and facilitated greater transparency and positive coordination with government partners and ocean stakeholders through direct engagement and incorporation of their feedback into the NCCOS model.

Since the start of the Biden administration, the Department of the Interior has approved the nation’s first six commercial-scale offshore wind energy projects. BOEM has held four offshore wind lease auctions, which have brought in almost \$5.5 billion in high bids, including a sale offshore New York and New Jersey and the first sales offshore the Pacific and Gulf of Mexico coasts. BOEM is exploring opportunities for offshore wind energy development in the U.S., including in the Gulf of Maine and the U.S. Central Atlantic coast. The Department also continues to take steps to evolve its approach to offshore wind to drive towards union-built projects and a domestic-based supply chain.

**MORE INFO** [www.boem.gov/newsroom](http://www.boem.gov/newsroom)



"The latest revision of DNV-ST-N001 further reinforces its position as the de-facto standard used to safely undertake marine operations all over the world," said Lucy Craig, DNV's director of growth, innovation and digitalization, energy systems. (Courtesy: DNV)

## DNV revises marine operations standard

DNV, the independent energy expert and assurance provider, has published a substantial revision to DNV-ST-N001, for the design and planning of marine operations for the transport, installation, and removal of offshore wind farms, subsea cables, and oil and gas assets.

The major changes reflect the changing nature of the offshore industry in line with its support of the energy transition, ensuring that the standard remains relevant and supports the development of cost-effective marine operations during a fast-evolving energy transition. DNV estimates that offshore wind will rise globally from 8 percent of total wind production in 2020 to 34 percent in 2050, totaling almost 2,000 GW.

Through continuous engagement with industry, DNV-ST-N001 has been regularly updated and enhanced since it was created in 2016. This revision follows an external hearing exercise, during which more than 400 comments from the industry were received, of which more than 350 were technical in nature. The standard first came

about after DNV and Noble Denton legacy standards from the 1970s and '80s were combined into one substantial and comprehensive document.

The standard can be applied to all marine operations and all key engineering requirements relevant to load-out, construction afloat, voyages, and installation, as well as the loads that should be addressed in the design of these marine operations. It also lays out the requirements from the perspective of the marine warranty surveyor, who reviews the marine operations.

"Following a high level of engagement from the industry, the latest revision of DNV-ST-N001 further reinforces its position as the de-facto standard used to safely undertake marine operations all over the world providing the needed assurance in the implementation of the energy transition," said Lucy Craig, DNV's director of growth, innovation and digitalization, energy systems. "Since the standard was first established, it has been vital that it has

remained at the forefront of changes to the industry, and these updates will ensure that our customers continue to receive the highest possible standard of assurance."

Industry engagement drove DNV to update a body of work that spans almost 800 pages, with collaboration spanning across the organization's global network of marine operations and marine warranty survey experts, working in DNV's Noble Denton marine services area.

"It was particularly encouraging to note the number of industry comments stemming from developers and contractors engaged in offshore wind-farm construction activities, which demonstrates the importance of the standard to the industry and also influenced updates to numerous areas of the standard," said Ankor Raithatha, DNV's global service area leader for Noble Denton. ↵

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

**DON'T BE LET DOWN BY AN ELEVATOR**

Installation and preventative maintenance by IUEC elevator mechanics will keep your elevators moving SAFELY and more efficiently.

27,000 trained craftspersons using more than 119 training centers.

Contact Carisa Barrett at [cbarrett@eiwopf.org](mailto:cbarrett@eiwopf.org) or 410-701-2206 or Vance Ayres at [vayres@iuec.org](mailto:vayres@iuec.org) or 540-490-0476

We represent more than 450 elevator companies ready to serve your Elevator Lift needs



IN FOCUS

SYSTEMS & PARTS ▼ TURBINE INSPECTION

# 3D PRINTING VS. CNC MACHINING FOR COMPONENT MANUFACTURING

What is particularly alluring about 3D printing's multiple benefits is its customization capabilities, a strong selling point for the technology in the wind sector. (Courtesy: Get It Made)



*While 3D printing has the potential to be an ideal solution in increasing turbine part production, it is crucial not to overlook the benefits of CNC machining.*

By **LUKE SMOOTHY**

In the face of rising pressure to meet sustainability goals, manufacturers are urgently seeking the most energy efficient ways to produce parts for demanding applications without compromising on strength or performance. Exploring the pros and cons of CNC machining versus 3D printing can help manufacturers select the right technology.

### **NETZERO NOW OR NEVER**

The industrial sector is responsible for 24 percent of emissions in the U.S., according to the US Environmental Protection Agency (EPA), a figure that doesn't even factor in the huge environmental impact of shipping parts across the globe. In the renewables sector, the race to NetZero combined with increasing demand for wind energy is placing growing pressure on companies to seek out more efficient processes and materials for manufacturing wind-turbine parts and components.

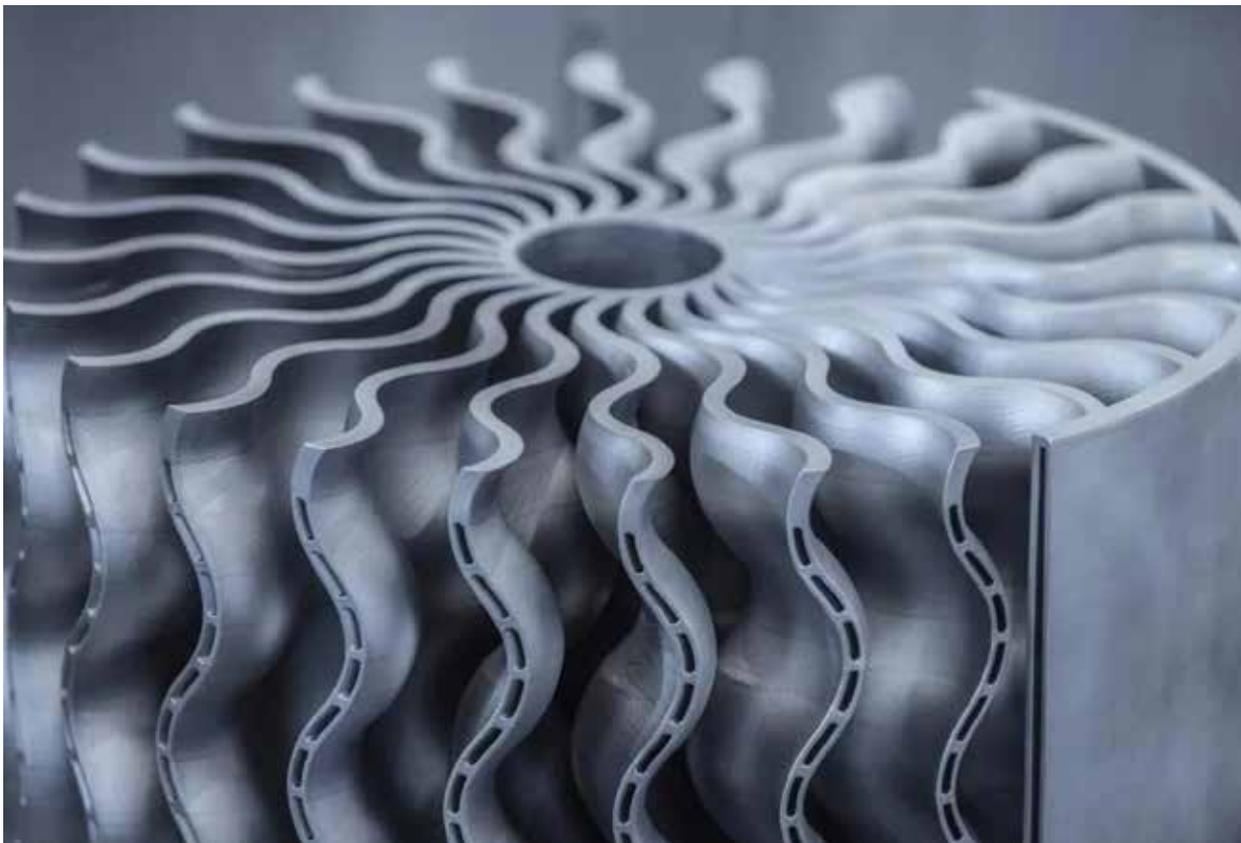
Harnessing renewable energy itself doesn't come without its own challenges, but there is also the manufacturing of renewable energy components, which often requires complex processes and high precision. Added to this are extreme environmental conditions, rigorous industry regulations, keeping operational costs low, as well as powering society continuously — all elements that must be carefully considered when manufacturing parts for energy-industry applications.

### **THE GAME-CHANGING BENEFITS OF 3D PRINTING**

It is becoming clear that additive manufacturing (AM), or 3D printing, has merely scratched the surface of its potential and is poised to be a game changer for the future of the energy generation industry. It has the potential to bring a step-change in cost and performance competitiveness in the wind industry, while contributing to decarbonization efforts.

Major trends in supply chain and sustainability are driving demand for a global market estimated to reach more than \$50 billion by 2025, as a growing number of manufacturers are embracing the benefits of this rapidly emerging technology.

Its rise presents a compelling proposition to the energy sector, ensuring fast turnaround times and enabling customization through design flexibility while improving energy



As AM or 3D printing does not require a tool or mold, producers may create more efficient, high-strength, lightweight structures where traditional manufacturing procedures fail. (Courtesy: Get It Made)

efficiency and eliminating expensive tooling costs. Moreover, it allows for cost-effective rapid prototyping, speeding up the development of new energy technologies. As a result, manufacturers are employing online 3D printing to accelerate the deployment of new renewable energy sources.

As AM or 3D printing does not require a tool or mold, producers may create more efficient, high-strength, lightweight structures where traditional manufacturing procedures fail. This is especially essential considering that raw material costs are rising around the world, making material consumption reduction an increasingly vital factor in product development and manufacturing. For most components, excess material from conventional manufacturing may be removed during the design stage, making 3D printing more cost effective over the whole lifecycle of the part.

What is particularly alluring about 3D printing's multiple benefits is its customization capabilities, something which is a strong selling point for the technology in the wind sector. It means more efficient designs can be customized to specific locations and applications; for instance, while the standard design for a wind turbine at a given location may call for towers to be 90 meters tall, more precise evaluations onsite may reveal that towers of 120 meters tall are a more logical solution in one specific section. What this also translates to

is the possibility of 3D printing 30-meter tower components onsite to add to the existing, standard 90-meter base in order to achieve optimal performance. This strategy is more sustainable than traditional practices for two reasons: Firstly, it would increase the overall quantity of clean, renewable energy that may be generated, and, secondly, it would reduce the carbon footprint by lowering the number of components that need to be produced and transported for many miles.

### KEY IP CHALLENGES

However, there are a few areas where the technology currently falls short: Increasing public focus on the energy industry, pandemic-related volatility, and recent events in Ukraine are all contributing to market disruption. During difficult times, businesses frequently turn to their intellectual property to safeguard their position in existing markets and create new opportunities. Because additive manufacturing is playing an increasingly essential role in facilitating these transformations, it is critical that IP strategies and portfolios be appropriate for the 3D-printing environment.

Perhaps the most serious intellectual property danger confronting the energy business as additive manufacturing grows is how to regulate the spread of digital files needed to additively manufacture products. To address this risk, or-



A prototype of a wind-turbine base 3D printed from concrete. (Courtesy: GE)

ganizations must establish patents and other intellectual property rights with an understanding of how to protect each phase in the additive manufacturing value chain.

### AM INNOVATION: GE'S HALIADE-X OFFSHORE TURBINE

One use case demonstrating the renewable energy transition with 3D printing is General Electric's joint project to develop the world's largest 3D printer for offshore wind applications. The technology is aimed to speed up and optimize the production of casting components of GE's Haliade-X offshore turbine.

In 2021, the U.S. Department of Energy (DoE) granted GE a \$6.7 million project to investigate the design and manufacturing of 3D printed wind-turbine blades. Working with Oak Ridge National Laboratory (ORNL) and the National Renewable Energy Laboratory (NREL), GE sought to boost the competitiveness of onshore and offshore wind energy by leveraging 3D printing to lower production costs and improve supply chain flexibility. The turbine blade tips that were fabricated using 3D printing and thermoplastic composites have various advantages, including being lighter than traditional counterparts. Lightweighting permits larger turbine rotors to create more power while also decreasing pressure on the

turbine's gearboxes, drivetrains, bearings, and foundation, as well as lowering turbine operators' lifetime expenses.

Not only that, but when 3D-printed thermoplastic blade tips approach the end of their useful life, they may be melted down and recycled, which is an important feature of GE Renewable Energy's initiative. The team is also looking into how other elements of the turbine blade might benefit from 3D printing technologies and thermoplastic materials to improve component time-to-market, quality, and sustainability. Through its adoption of 3D printing, GE is aiming to not only improve cost and performance competitiveness in the wind industry, but sees it accelerating the energy transition even more rapidly.

### THE GAINS IN CNC MACHINING

CNC machining plays a crucial role in overcoming the challenges found in manufacturing, allowing for high-precision manufacturing of components, which is key to improving the efficiency and functionality of wind-energy systems. Additionally, CNC machining offers other advantages by helping reduce costs and waste in the production process, making renewable energy solutions more affordable and accessible.

Wind-turbine blades, often comprised of composite mate-



rials, must be manufactured with great precision to ensure optimal performance. These blades can be precisely carved and shaped using CNC machining, allowing them to catch wind energy more efficiently and to withstand wind pressure without disintegration; specialist metals and carbon fiber are crucial for ensuring the blades remain lightweight. Furthermore, CNC machining can be used to manufacture other wind-turbine components such as gearbox housings and generator frames. In fact, the majority of the critical driving components and blades found inside the turbine's nacelle housing are among the most common wind-turbine parts manufactured with CNC machining. Other driving components include gears, rotors, main shafts, braking com-

ponents, hubs, and YAW system components.

Aside from generating driving components, CNC machining makes it easier to manufacture the massive pitch bearings necessary for the wind turbine's blade angle adjustment mechanism.

Additionally, the use of CNC machining in wind-energy production can assist in waste reduction as more precise cutting means less material use. This not only assists in lowering costs but also helps to ensure the long-term viability of wind-energy generation.

Harsh environment applications call for robustness and durability, another reason why CNC machining is the manufacturing method of choice as it can produce long-lasting parts that are critical to endure enormous stress and the wear of consistent use while maintaining dimensional stability.

## DESIGN AND COST CHALLENGES

While CNC machining provides greater dimensional accuracy than 3D printing, the quickly evolving innovation being seen in additive manufacturing means that perhaps it is only a matter of time before this changes and 3D printing technology matches, or even surpasses, CNC machining's precision in this respect. And while CNC machining produces products with superior mechanical characteristics in all three dimensions, this makes the method frequently more expensive, particularly for smaller batches of items.

There are also a few other potential barriers to CNC machining adoption in the energy business. Certain design challenges related with CNC operations come into play; without additional tools, CNC machines struggle to produce parts with inner corners, hollow features, and undercuts. When making parts for the energy industry using these design elements, the machine would need to do additional setups, secondary operations, or tool changes, which would affect production costs and time.

## THE FUTURE LANDSCAPE

Moving forward, the renewable energy sector is only going to increase and expand. As renewable energy manufacturers continue to look for ways to increase product capabilities and performance while simultaneously meeting ambitious goals for efficiency and sustainability, 3D printing offers an ideal solution. However, it is crucial not to overlook the benefits of CNC machining before making the right choice. ✎

## ABOUT THE AUTHOR

Luke Smoothy is the founder and director of Get It Made, a leading manufacturing business providing an unrivaled suite of manufacturing services from CNC machining to injection molding and 3D printing. Smoothy has worked on thousands of complex projects for customers across various industries, including aerospace and medical, working with Hitachi, Airbus, and the Imperial College of London. For more information, go to: [get-it-made.co.uk](http://get-it-made.co.uk).

# SHARE YOUR EXPERTISE WITH OUR READERS



**Have a wind-energy article with an informational or educational angle? Let Wind Systems publish it.**

Each issue, Wind Systems offers its readers the latest, most valuable content available from companies and institutions, as well as critical thoughts on what this information means for the future of the wind-energy industry.

Our readers want your expertise and we want to share it.

**Wind Systems is your trusted source for information and technical knowledge about the wind-energy industry.**

**Contact the editor, Kenneth Carter, at [editor@windssystemsmag.com](mailto:editor@windssystemsmag.com) for how you can share your expertise with our readers.**

*Giving Wind Direction*

**WIND**  
SYSTEMS

# TEST AND REPAIR 250 FEET IN THE AIR



Wind technicians, who evaluate the turbine and its blades and get the turbine back up and running, are a vital part of the process that helps to generate wind power. (Courtesy: Shutterstock)

# The importance of inspection, maintenance, and performance enhancements on wind turbines.

By MIKE PALMER

Over the years, the use of wind power has created a great deal of well-paying jobs, including everything from technicians, researchers, and designers to workers on new wind-energy farms and those that create the latest wind-energy gadgets and discover the latest technology to make wind power even better. Currently, there are more than 125,000 people working in the wind industry across the United States, and that number continues to grow. According to the U.S. Bureau of Labor Statistics, wind-turbine service technicians are the fastest growing U.S. job of the decade, and with good reason.

Each year in the United States, 380 billion kW/h are generated by wind turbines that convert kinetic energy from the wind into electrical power. But what happens when these \$2-million to \$4-million wind turbines that stand 280 feet in the air with blades ranging in length from 40 feet to 250 feet, experience some sort of mechanical malfunction? What happens if a blade becomes damaged due to a bird strike, lightning strike, blade detachment, leading-edge erosion, or blade crack? Skilled technicians are needed to correct the problem.

These technicians, who evaluate the turbine and its blades and get the turbine back up and running, are a vital part of the process that helps to generate wind power.

Rope Partner, in Centennial, Colorado, is a provider of at-height maintenance, inspection, and performance enhancements for wind-turbine operations that require specialized access approaches. For more than two decades, the company's WindCorps® technicians have completed several thousand projects for every major manufacturer of wind turbine, as well as for the majority of wind-farm owners across the United States. They are experts in testing these massive structures when there is a malfunction or complete failure.

## TROUBLE WITH THE LIGHTNING PROTECTION SYSTEM

Recently, a client of Rope Partner's was having an issue with its wind-turbine blade lightning protection system (LPS). This system is particularly important to a turbine because it prevents physical damage to the structure by redirecting a lightning strike from the blade to ground. If lightning strikes an unprotected blade, an explosive expansion of the air within the blade can occur, resulting in severe damage to the blade surface and downtime of the turbine. Because this system is so crucial to protecting the wind turbine, Rope Partner was asked to examine, test, and diagnose what was going on with the LPS and how it could be remedied.

Testing wind turbines can be very tricky if you don't have the right test equipment, as they reach extremely high elevations, and their movement through the air causes ionization, which creates a target for cloud charge that can develop in the atmosphere, making the blades susceptible to lightning

strikes. The only protection the blades have against these strikes is a properly working LPS.

## EXAMINE, TEST AND DIAGNOSE

To figure out what the exact problem was with the LPS and why it wasn't working properly, technicians needed to test the system while it was installed on the turbine.

The most common way to start the assessment is to test from the root of the blade to each receptor on the blade. If this test fails, then technicians try to diagnose the connectivity issue by using different test points on the blade. This not only requires a technician to test between receptors on the blade, but it also requires the technician to bring various



Figure 1: A wind turbine on a wind farm. (Courtesy: Megger)

pieces of equipment out on the blade. This is not an easy task when hauling big, bulky equipment such as an ohmmeter, voltage tester, multimeter, oscilloscopes, infrared testers, and fiber optic equipment while climbing a wind-turbine tower and going out on a rope to perform an inspection and repair.

For the technician to pick up these potential faults, what is needed is a higher test current of 1A or more. This is because blades can be up to 100 meters long and are tested tip to hub. Test leads that can reach that length must be designed with low enough resistance to not overwhelm the instrument's capabilities and invalidate the test. Most instruments cannot be used to perform this task.

For years, Rope Partner used a Digital Low Resistance Ohmmeter (DLRO) that measured low resistance values in micro-ohms at specified currents. However, the unit they were using encountered frequent issues with setup, causing incorrect readings.

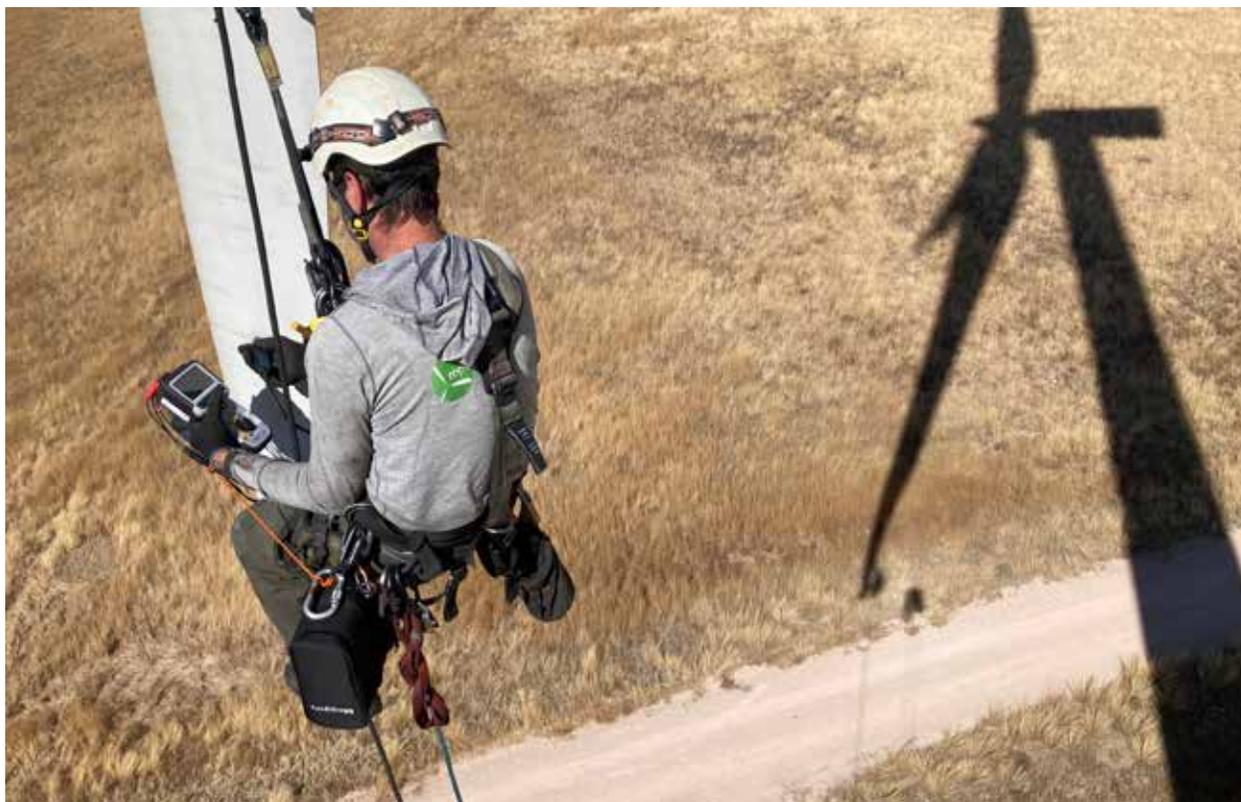


Figure 2: Technician out on a rope using DLRO on a blade. (Courtesy: Megger)

This was a problem for our techs whose primary scope is blade repair,” said Lucas Llado, vice president, business development, Rope Partner. “It is extremely important for techs to have a device that is foolproof to set up, as LPS testing is not a scope of work that is performed frequently — maybe just once or twice a month. Since LPS testing isn’t performed often, it is important to have a device that is easy to use and completes the task accurately. It is also essential to have a reliable device when an open circuit is found.”

### A BETTER TESTING TOOL

With technicians getting frustrated, and results not being what they should be, Rope Partner decided to look for a new tester. With industry references and doing some research on its own, the company learned about the DLRO2 from Megger.

“This unit is easy for a single technician to handle while out on the rope during inspection,” Llado said. “Previous models we used were big and bulky and required more than one person in the air.”

Given the small footprint of the DLRO2 and the ability to use long test leads with it, all LPS testing can be performed quicker and easier with one tool.

The compact, handheld design of these 2A low resistance ohmmeters provides relative high output, accuracy, and repeatability. They fit easily in a toolbox and be used in tight and hard-to-reach spaces.

When a technician has limited space while hanging from a rope, having a tester that has a small footprint and is lightweight greatly improves workflow.

“Being able to just plug the leads in with banana connectors helps to make setup easier and more efficient,” Llado said.

“This unit also makes attaching leads with banana connectors much easier than trying to attach with lugs that often come loose when leads are moved.”

The unit can also display the results of the last three readings, take timely photos, and has the ability to take one photo to be included with the report.

“By using the DLRO, we were able to detect the non-conductivity and realized that the LPS was damaged,” Llado said. “Once this was identified, we were able to repair it quickly.”

LPS systems are tested in accordance with the IEC 61400-24 standard. By partnering with these clients and using the correct tools, while applying safe, cost-effective, and environmentally appropriate solutions, Rope Partner has been successful in reducing turbine downtime, increasing production-based availability as well as the lifespan of its clients’ turbines. ↴

### ABOUT THE AUTHOR

Mike Palmer is the western regional sales manager for Megger US Distribution.

# Technical Education. Career Development. International Networking.

Log on to  
[www.stle.org/  
annualmeeting](http://www.stle.org/annualmeeting)  
for registration and  
hotel information.

**Early Birds!** Register by  
**March 22** and save \$100  
on your meeting fee.



## 78th STLE Annual Meeting & Exhibition

May 19-23  
Minneapolis Convention Center  
Minneapolis, Minnesota (USA)



MINNEAPOLIS

78th STLE ANNUAL MEETING & EXHIBITION | MAY 19-23, 2024

Whether you work in the field or lab—in industry, academia or government—STLE's Annual Meeting has programming designed specifically for you. Please join your peers from around the globe for five unique days of technical training and industry education that could change your career.

### Program Highlights:

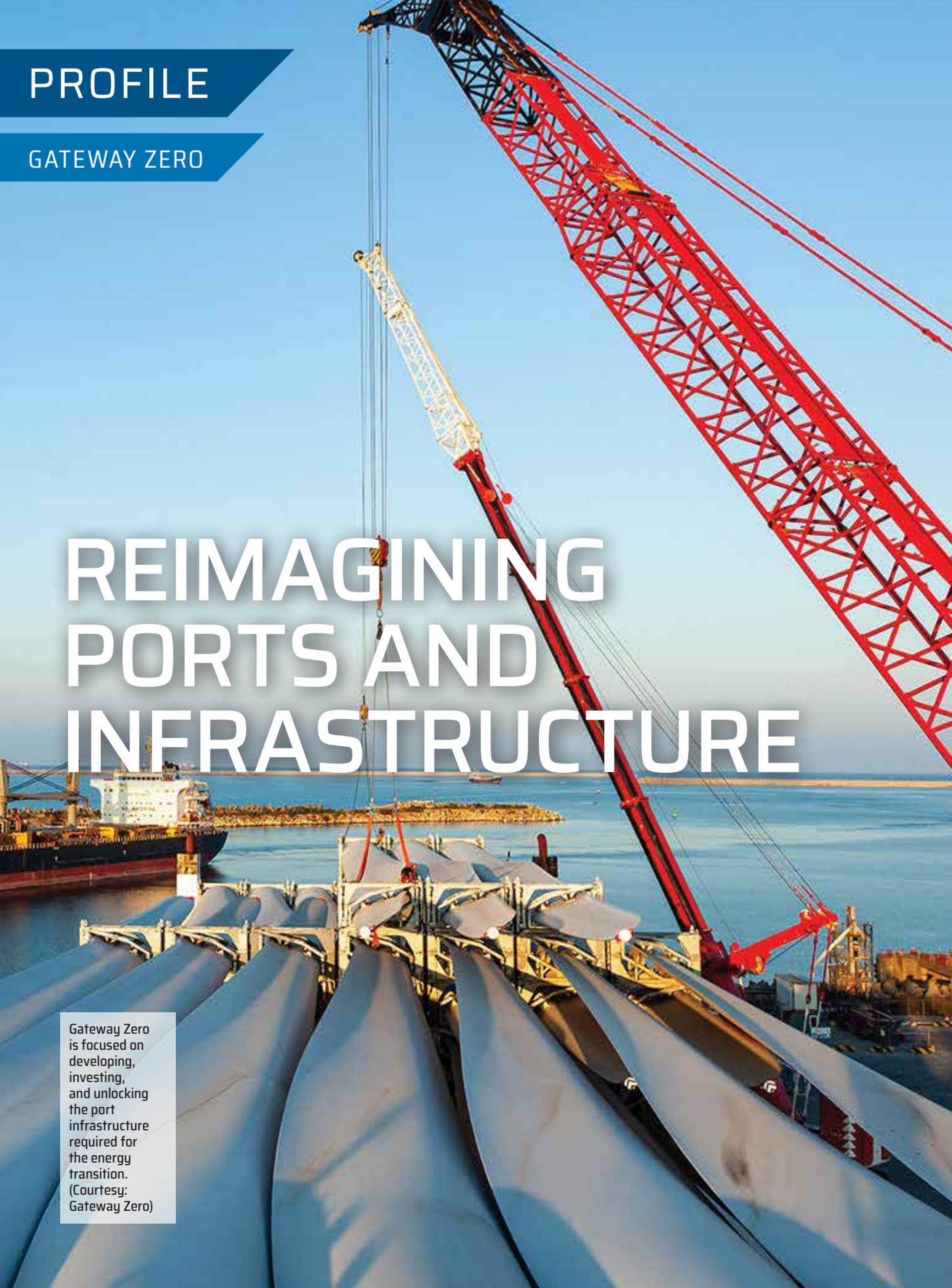
- 500 Technical Presentations and Posters
- 13 Lubrication-Specific Education Courses
- Sustainable Power Generation Track including Fossil Fuels, Hydropower, Nuclear, Solar and Wind
- Discussion Round Tables - An Idea Exchange Event
- Electric Vehicles Track and Course
- Trade Show
- Commercial Marketing Forum
- Business Networking



Society of Tribologists and Lubrication Engineers  
840 Busse Highway, Park Ridge, Illinois 60068 (USA)

P: (847) 825-5536 | F: (847) 825-1456 | [www.stle.org](http://www.stle.org) | [information@stle.org](mailto:information@stle.org)

Follow us on: [f](#) [t](#) [v](#) [in](#)



PROFILE

GATEWAY ZERO

# REIMAGINING PORTS AND INFRASTRUCTURE

Gateway Zero is focused on developing, investing, and unlocking the port infrastructure required for the energy transition. (Courtesy: Gateway Zero)

*Gateway Zero focuses exclusively on reimagining ports and coastal infrastructure for a clean-energy future, developing and investing in projects to unlock new economic opportunity for the world's energy gateways.*

By **KENNETH CARTER** ▸ Wind Systems editor

**W**ith all the moving parts — including policy, infrastructure, supply chains, even the very turbines themselves — being juggled during the creation of a wind farm, it becomes vital that someone must ensure all those constantly changing assets are managed properly and efficiently.

Managing these projects to completion can take years, and the experts behind Gateway Zero have made it their duty to assist these monumental projects in reaching their directive — to produce clean, renewable energy.

“We are really focused in developing, investing, and unlocking the port infrastructure required for the energy transition more holistically,” said João Metelo, founder and CEO of Gateway Zero. “Wind energy — both onshore and offshore — plays quite a large role in that.”

### MANAGING THE SUPPLY CHAIN

Part of that surrounds supply chain development, which entails investing in new elements of demand that will exist for the wind-energy port infrastructure. This could involve storing, importing, and exporting components for onshore wind, as well as supply chain development for the construction, operation, and maintenance of offshore wind, according to Metelo.

“Wind energy — given how large the components and the infrastructure required — does indeed take a major chunk of those needs,” he said.

All that involves the supply side, but there is also much work to be done with the demand side as well, according to Metelo. And this involves new markets that wind energy will serve.

“Historically they’ve been onshore power demand, but where we are going to go next is going to be creating molecules, liquids, and H<sub>2</sub> in all its derivatives,” he said. “It will be new parts of the transportation, whether that’s air, whether that’s maritime, whether that’s on the ground with heavy duty, that’s still a major part to be developed. All those parts really link back to the major transportation areas, and certainly port infrastructure is at the nexus of all those. That’s a little bit of how I see wind very much in the middle of what we intend to invest in.”

Gateway Zero will be a developer and investor in this asset class, according to Metelo.

“We will be working with port operators, port landlords, and energy developers to really focus on developing this infrastructure with all that is required for a future energy transition,” he said. “That can be anywhere from developing a port for onshore wind import and export to offshore wind supply construction and operation and maintenance. But

that can also be full decarbonization of the infrastructure associated with ports and serving with new clean-energy sources and liquids, things like maritime fuels and transporting those new clean fuels across the world. We really think about these asset classes holistically and operating as a partner and developer to existing operators and investors and to really develop business plans that can be financed and where we can add in private capital to develop the asset class even further.”

### DEVELOPING A PLAN

To get to that point first involves a lot of meetings, according to Metelo.

“It involves really sitting down, in many cases, with the local cities, the local port owners and operators, and really identifying what the gaps are of each asset, and they can vary quite a bit,” he said. “Some assets are largely dedicated to offshore renewables. Some assets are completely focused just on maritime transport and re-identifying what the energy transition needs are of these asset owners. They come in and develop business plans together with them that can be financeable and where we can crowd in private capital to invest in those. It’s also working with existing and future tenants of those assets, because obviously tenants are a very important part of what a port does — both onshore tenants and offshore users — and really sitting down and trying to understand their needs and prepare the infrastructure for the future needs of those tenants.”

This will involve a team from Gateway Zero bringing together competencies from renewable energy, including ports and engineering challenges to try and address the needs of not only existing and future tenants and users, but also existing port asset owners in order to develop financeable business plans, according to Metelo.

“They can be quite different depending on what specific projects we’ll need to develop in each asset and in each location,” he said. “Because the needs and the demand will be looking for different things in each asset.”

### THE GOAL: ENERGY TRANSITION

All those come together for the benefit of energy transition, and that is the essence of what Gateway Zero does, according to Metelo.

“That means anything related to wind energy, clean fuels, hydrogen, clean maritime fuels, and even decarbonization of the activities at those assets themselves,” he said. “These are large assets, and you need major decarbonization happening, whether that’s power shoring for vessels or EV charging for trucks — really decarbonizing large areas that



Wind energy — given how large the components and the infrastructure required — needs a reliable and robust infrastructure. (Courtesy: Gateway Zero)

often times are the large high pollution areas. That will play a role in development. It really is an opportunity to build new business plans around those infrastructures that will require major transformation.”

That means Gateway Zero sees itself as an investor that is working to unlock the next 20 or 30 years of large volume deployment that will be required, according to Metelo.

“The last two or three decades of growth in renewables dealt with existing onshore demand,” he said. “Now, we’re moving to a place where there are different sides of demand; there are different places of demand. In many parts of the world, there are different places where wind is being produced, namely offshore.”

And with that offshore development, Gateway Zero will be involved in developing the coastal infrastructure assets needed to connect the dots, according to Metelo. That could be anything from accelerating deployment on the supply side, allowing import and export, or allowing offshore renewables to come to shore and be deployed.

“But that can also be on the demand side, allowing for molecules to be exported or imported, allowing for these new markets such as maritime fuels to be served,” he said. “It’s really a connector and an ‘un-locker’ of this infrastructure that will allow these new hubs of energy to be developed. We believe that these are very critical infrastructure. This asset class will really serve as the gateway of energy of the future. The whole point is for these assets to allow us to get to the

2050 net-zero goals. It’s really to serve the next 20, 30 years of large volumes of clean energy across the world.”

### METICULOUS PLANNING IS KEY

But getting to that point will require a lot of planning while working with existing asset and port owners and cities that may already have a plan, according to Metelo.

“What they need is to develop a business to bring in investors and develop a business plan,” he said. “In those cases, we’ll try to develop with them, together with the demand side and potential tenants, a business plan that can be financeable, and then crowd-in private capital to support those. In other cases, it can be really sitting down with them and identifying all the opportunities of development in these assets.”

Metelo brings up an example of everyone wanting a hydrogen electrolyzer, which can be used to create hydrogen using renewable energy as a power source.

“However, that may not be the need; that may not be what fits that market,” he said.

“It’s really sitting down with existing cities and authorities and understanding what the needs are of the market and how we can develop a local strategy and a business plan that can be financed by private capital. It can vary quite a bit, but the common theme is that we definitely always sit down with port asset owners and port operators that are already active in the business.”



Gateway Zero will work with port operators, port landlords, and energy developers to focus on developing the necessary infrastructure for wind. (Courtesy: Gateway Zero)

## MEETING THE NEEDS

Massive projects like the ones implemented for wind energy take time to develop and turn into reality, so constant planning and vigilance are a necessity from start to finish, according to Metelo.

“The reality is for most energy projects, when they need a port, it’s already too late,” he said. “It’s already when they need an infrastructure like this. I really see over the next 10 years, 15 years, is a largely interconnected global industry where the word ‘renewables’ will probably disappear. Renewables equals energy. Energy equals renewables.”

And just as the oil and gas sector has done for the last 150 years, Metelo said renewables is moving toward that worldwide interconnectedness, whether that means by transmission, electrons, or liquid forms over land, sea, or air. These interconnecting points will link supply and demand and push for a deployment that will move, store, and process energy.

“We’re going to be developing new energies that will be coming from different places and going to different places,”



Massive projects like the ones implemented for wind energy take time to develop and turn into reality. (Courtesy: Gateway Zero)

he said. “That’s where I believe a major re-imagining of these infrastructures will be required. We expect Gateway Zero to be right in the middle of that interconnected world and where we’ll hopefully be a leading investor and asset owner in this space where we can really develop these energy gateways of the future on a global scale.”

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

## Jonas Røstad

Chief Commercial Officer ▸ Miros

## Lars Ivar Leivestad

Sales Manager Offshore Wind ▸ Miros



*“Continuous real-time wave monitoring generates valuable data for offshore wind operations, research and analysis.”*

### ▸ What about Miros' technology makes it important to the offshore wind industry?

There is a raft of benefits to having real-time wave radar measurements, and it is fast becoming a must for all offshore operations, including the wind sector. Wave radars provide accurate measurements and detailed information about the sea state conditions at an offshore wind farm, becoming an invaluable addition and supplement to the weather forecasts that have been in use for years.

Offshore wind projects are highly dependent on weather conditions across all phases, from installation right through to operations and maintenance. Real-time wave monitoring provides critical data for decision-making related to maintenance schedules, personnel transfers, and overall project planning. Accurate wave monitoring also enables offshore wind operators to optimize their O&M activities by giving them a picture of real-time sea conditions, meaning decisions can be made to enhance operational efficiency and reduce downtime. Up-to-the-minute information can act as an early warning system, too, allowing for timely responses to adverse sea conditions. This is crucial for the safety of personnel and the protection of equipment.

There is also a cost incentive for offshore wind developers to invest in real-time wave monitoring systems early. Unplanned downtime due to adverse weather conditions can be costly, but with the right sea state, data operators can mitigate risks and be proactive to reduce the amount of time a wind turbine is out of operation. Turbines are exposed to varying sea conditions and thorough information can help to assess the impact of waves on their structural integrity, meaning measures can be put in place to prevent damage. This leads to better asset management strategies and allows for the prediction of potential wear and tear on equipment, facilitating more responsive maintenance operations and extending the lifespan of wind farms.

Continuous real-time wave monitoring generates valu-

able data for offshore wind operations, research and analysis. In addition to the great value real-time wave data brings to the offshore wind operations, it also contributes to a better understanding of the offshore environment, improving future project planning and design. Moreover, regulatory authorities often require adherence to safety standards, including monitoring sea conditions.

Miros' wave radar technology is dry-mounted, avoiding the harsh conditions typically faced by sensors that are submerged in water, leading to less or no maintenance. Miros' sensors are also of high quality and the result of 40 years of technological development. Developed for harsh weather conditions in the North Sea, Miros' technology is suitable for use anywhere.

IoT-enabled sensors also means that data can be sent to the cloud, and the system can communicate and interact over the internet, allowing it to be remotely monitored and controlled. All interested stakeholders can access the data and use it to support decisions. All this hardware is backed up by Microsoft Azure and its world-class cybersecurity.

Real-time wave data is important both in the installation phase and the operational phase. As soon as the first foundation is in the water, a Miros wave radar can be installed, providing real-time wave data to support operational decisions for the installation of the remaining OW foundations and WTGs.

### ▸ What are the risks for offshore developers of not having accurate, real-time sea state monitoring?

First of all, there are safety concerns to consider. Accurate sea-state monitoring is crucial for the protection of offshore operations as unpredictable or severe sea conditions can pose a threat to personnel, equipment, and structures. Without real-time monitoring, there's also a risk of exposing turbine structures to conditions they are not designed for, potentially leading to structural damage or failure.

Weather and sea state can change quickly and can disrupt offshore operations. For example, high waves or rough seas may hinder the transfer of personnel, equipment, or supplies, affecting project timelines and productivity. Wind turbines and other offshore equipment, such as cranes or gangways used for walk-to-work operations, may also be susceptible to damage in adverse sea conditions. Real-time monitoring allows for timely adjustments or shutdowns to prevent equipment damage.

More broadly, without real-time sea-state information vessel navigation becomes more challenging, increasing the risk of collisions, groundings, or other accidents. Moreover, if operators base their operational windows on weather forecast and not on accurate real-time measurements, operations can be stopped earlier or later than necessary. If stopped earlier, it can result in project delays and affect the overall budget.

If they are stopped too late, you risk exposing personnel and equipment to unnecessary threats. Also, when starting operations after weather down time, real-time measurements will be an objective decision for when operations can start up again.

#### ▀ What is the “as-a-Service” business model, and what are the benefits to offshore wind operators?

By subscribing to Miros’ technology, rather than buying it outright, clients receive premium support and guaranteed uptime inclusive, increasing the operational output of wind turbines. Under as-a-Service, an advantageous sensor warranty, and the latest Microsoft Azure cybersecurity are included as a standard. If any matters or questions arise, Miros experts are ready to address them.

Should any barriers occur, we usually solve them quickest remotely; in the rare case that is not possible, we’ll send an expert to do the job in person. However, if a client decides to solely buy hardware from us or any other competing brands without a cloud subscription, they will also need to manage any hiccups themselves or send the equipment for repair. That takes more time and might have a significant impact on the operations and safety of their asset. Also, if we own and monitor the equipment, we make sure that it is future-proof. We will regularly upgrade the software remotely, so it always holds the highest standards. That way, it will not become outdated as technology progresses, and performance interruptions will be avoided.

Then there are co-creation and the ability for multiple users to benefit from the same interface. Measurements from the wave radars are sent right to the cloud, meaning they can be viewed wherever and whenever on any device, and shared with other companies that are working on the wind farm.

Having this first-hand access to both the technology and the data, we facilitate a close and powerful cooperation with our customers that allows us to continuously improve the applications as well as immediately take necessary measures should any data irregularities be spotted.

#### ▀ What trends do you anticipate being important for wave measurements in 2024?

Wave Prediction is high on the agenda for many offshore vessel owners and operators. Knowing the waves and the corresponding vessel movement up to two minutes ahead of time will help to ensure safer operations and optimal timing for operations such as crew transfers, cable laying, anchor handling, etc. Miros’ wave prediction is developed and tested in cooperation with key customers and the initial results are very promising.

The use of multiple wave sensors at offshore wind farms for optimizing O&M operations and enhancing safety will also continue to increase. Many of the wind farms currently going into the operational phase, as well as those that have been spinning for many years, will start to look at how they can optimize their maintenance scheduling and operations. Miros’ WaveFusion is already well received by the offshore wind market and more and more companies see the benefits of this sensor in combination with the as-a-Service business model.

Miros ensures high quality and accurate wave data is sent to the cloud and is accessible by all the customer’s stakeholders, anywhere and on any device, further assisting the planning and delivery of O&M operations.

Full scale floating offshore wind farms will soon become a reality with multiple projects in the pipelines. These wind farms will, in most cases, be located further offshore, where there is more variability in weather, rougher conditions, and more storms. Operators will need a better understanding of the changing weather conditions, which means even more accurate data and more measurement points will be needed at wind farms.

There will also be a need for wave monitoring to ensure the safety of the assets in high seas. The automatic shutdown of the turbines solely based on wind speed is no longer sufficient, platform movements will also be important and must be taken into consideration when asset safeguarding systems are developed.

#### ▀ How does Miros collaborate with its customers to provide its solutions?

Miros consistently works with its customers to address their challenges. We engage in close partnerships with numerous clients to ensure that we create solutions tailored to their specific needs, rather than presuming what they might require. This can involve modifying existing products and adapting solutions for new applications, continually expanding our product portfolio, and developing innovative solutions. Our goal is to support our customers in operating safely and efficiently at sea.

#### ▀ What technologies are Miros developing to further support operators’ understanding of the offshore environment?

Wave prediction is one of Miros’ latest developments, and it involves forecasting the behavior of ocean waves over a

# CONVERSATION

specific period. Utilizing accurate wave radar data, this process provides valuable information for maritime activities and offshore operations, aiding in decision-making for safety and efficiency at sea.

Miros Heading Advisor is a navigation tool designed to provide guidance on the optimal heading or direction for vessels. It assists marine operators in making informed decisions to navigate efficiently, avoid obstacles, and reach their destinations safely. This technology incorporates Miros' real-time wave data, weather conditions, and navigational parameters to offer accurate heading recommendations for improved maritime operations.

Recently launched, Miros Forecast is an indispensable application where the ocean condition forecast vs. measured real-time conditions is visualized in an easy and intuitive dashboard in Miros Cloud. The application helps to elevate maritime safety and operational efficiency due to the integration of forecasts with real-time measured ocean data. In the ever-evolving landscape of maritime and offshore operations, staying vigilant and ahead of environmental conditions is paramount for ensuring safety, efficiency, and cost-effectiveness.

With Forecast, you get forecasted ocean-state data together with real-time measured data integrated into the easy and intuitive Miros Cloud dashboard.

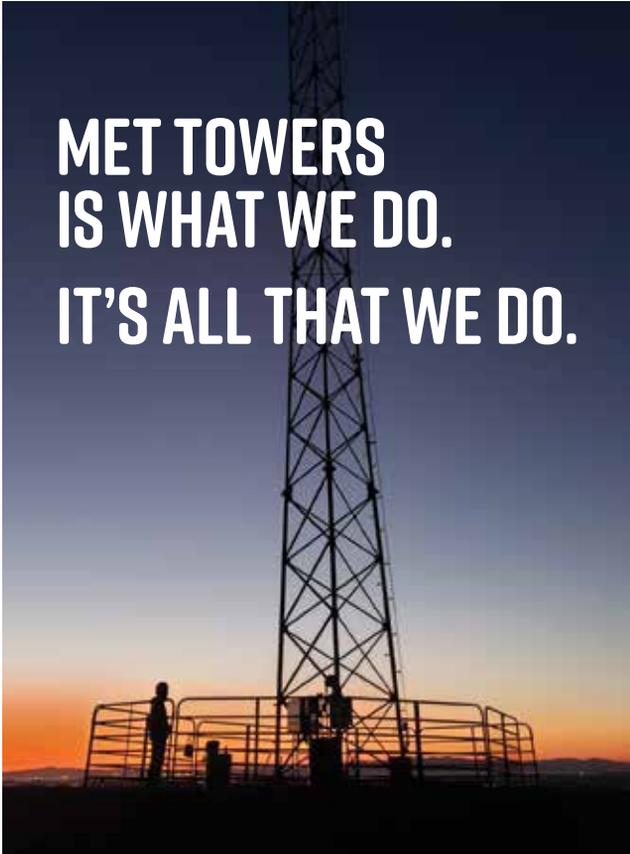
Marine Operations teams can make data-led decisions by leveraging both forecast and real-time data in one simple dashboard.

Enhanced by visual alarms, operations teams can stay up-to-date when specific wave conditions surpass predefined limits keeping the operations safe and efficient. Real-time measurements combined with forecast data empower site managers to optimize the site efficiently. This optimization extends to various offshore activities on vessels, platforms, wind-farm ports, and coastlines, ultimately enhancing the ability to meet the project targets and within the regulatory safety policies.

We are also working to assist control room operators in the continuous assessment of both real-time and forecasted wave and weather data, enabling them to dynamically adjust their strategies.

Miros Forecast is also beneficial for diving and ROV technicians. In the challenging conditions of high seas with substantial waves, potential risks to ROVs are significant, particularly during deployment, maneuvering, or retrieval. Having precise information about both current and forecasted sea states empowers technicians to make well-informed decisions. ↘

**MORE INFO** [www.miros-group.com](http://www.miros-group.com)



**MET TOWERS  
IS WHAT WE DO.  
IT'S ALL THAT WE DO.**

**COLDSNAP TOWERS HAS BEEN OPERATING  
IN THE WIND INDUSTRY FOR 17 YEARS.**

**WE SPECIALIZE IN MET TOWER MAINTENANCE  
ON WIND FARMS ACROSS THE U.S.**

- Nationwide fleet maintenance
- Quick response for urgent repairs
- Tower commissioning
- FAA obstruction lighting
- Lidar leasing and maintenance
- Remote power supply leasing
- Thorough documentation
- Troubleshooting
- Risk mitigation and QC
- Safety compliant



FOR MORE INFORMATION  
[info@coldsnaptowers.com](mailto:info@coldsnaptowers.com)



# GET CONNECTED

WIndSystemsmag.com is your online authority for information about the wind energy industry.

You'll find topical articles, company profiles and interviews with industry insiders, and timely wind energy news.

*Giving Wind Direction*

# WIND SYSTEMS

Get your FREE subscription, plus our online content, at  
[www.windssystemsmag.com](http://www.windssystemsmag.com)



The New Jersey Board of Public Utilities said two wind projects would bring about \$6.8 billion in economic benefits to the state. (Courtesy: Attentive Energy)

## CONSTRUCTION

### New Jersey awards offshore wind contracts

New Jersey has awarded offshore wind contracts to the 1.3-GW Attentive Energy Two and the 2.4-GW Leading Light Wind projects in an accelerated auction round.

Attentive Energy Two is a joint venture between TotalEnergies and Corio Generation. Leading Light, which is expected to start producing power in 2031, is a partnership between U.S. energy firms Invenergy and energyRe.

“Today’s Third Solicitation awards are undeniable proof that the future of offshore wind in New Jersey is as

strong as ever,” said Gov. Phil Murphy.

The New Jersey Board of Public Utilities said the two projects would bring about \$6.8 billion in economic benefits to the state and provide enough clean energy to power about 1.8 million homes.

The projects will support the construction of a turbine tower factory at the New Jersey Wind Port and invest in the expansion of the EEW monopile facility at the Port of Paulsboro, the board said in a statement.

The awards came after a tumultuous year that saw the cancellation of several offshore wind projects in the northeast U.S. due to higher costs. In October, Orsted canceled Ocean Wind 1 and 2 off the coast of New Jersey, citing soaring inflation, rising interest rates, and delays in securing ships

needed to build the projects.

New Jersey, which plans to build 11 GW of offshore wind energy by 2040, is slated to launch another offshore wind solicitation this year and expects to award those new contracts in early 2025.

**MORE INFO** [www.reutersevents.com/renewables/wind](http://www.reutersevents.com/renewables/wind)

## CONSTRUCTION

### American Wire names renewable energy sales VP

American Wire Group (AWG) has appointed Scott Taylor as vice president

of regional sales for its renewable energy division. Taylor will be responsible for serving AWG's customers engaged with new construction, repower, operations, and maintenance within the wind, solar, and battery energy storage industries. He will report to Norman Russell, chief revenue officer at AWG.

"We are excited to welcome Scott to our growing renewables team of seasoned professionals," Russell said. "His diverse experience in the industry will prove to be a valuable asset for our company, contributing insights and driving business success in every collaborative endeavor."



Scott Taylor is AWG's new vice president of regional sales for its renewable energy division. (Courtesy: American Wire Group)

Scott is based in Houston, Texas, and brings more than 20 years of experience in electrical engineering, regional sales management, and business development within the wire and cable manufacturing and distribution sectors. He holds

an electrical engineering degree from the University of Tennessee.

American Wire Group (AWG) is a leading material supplier of wire and cable, hardware, equipment, and accessory solutions for the utility and renewable-energy market.

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

## CONSTRUCTION

# Clearway partially repowers 55-MW wind farm in Texas

Clearway Energy Group recently announced it completed a partial repower of the Ocotillo Windpower wind farm ("Ocotillo") in Howard County, Texas.

The 55-MW wind farm will generate enough electricity each year to power more than 19,000 homes for another decade. In addition, the wind-project repower will provide an additional \$2 million in property taxes to Howard County and extends landowner lease payments over the same period.

"The industry has reached a point of maturity where some of the windiest places in the country already provide clean, reliable energy for Americans," said John Martinez, SVP of Operations at Clearway. "The innovation of repowerings like this one proves that renewable energy projects don't need to have a shelf life. By upgrading components with the latest state-of-the-art technology on the market, we're able to keep wind farms generating power for decades longer than anyone could have imagined."

The repower replaced major components across the site's 26 turbines, including blades, generators, gearboxes, and drive-train parts for some turbines, and upgraded operating systems for all turbines.

The wind farm began its original commercial operations in 2008. Clearway's public affiliate, Clearway Energy, Inc., acquired the project in 2020 to extend the life of the project, leveraging prior repowering experience.

A portion of the renewable attributes from Ocotillo were purchased on behalf of eight corporate buyers through Ever.green, a marketplace for high-impact Renewable Energy Certificates ("REC"). The RECs will go toward supporting Ever.green's corporate customers in achieving their respective decarbonization goals through REC purchases.

This is Clearway's fourth wind farm repower in Texas and fifth across its portfolio. Research firm Wood Mackenzie estimates that repowerings will be performed on 20 percent of the country's existing wind fleet by 2028.

Clearway Energy Group is leading the transition to a world powered by clean energy. Along with its public affiliate Clearway Energy, Inc., it owns



## HEICO FASTENING SYSTEMS



### HEICO-LOCK® COMBI-WASHERS

The improved version of the standard HEICO-LOCK® wedge lock washers

- Quick and easy assembly
- Combine with all commercially available bolts
- Can be supplied as a pre-assembled part - ready made SEMS fastener
- Permanent connection thanks to the inset tabs
- Re-usable



### HEICO-TEC® TENSIONING SYSTEMS

The simple, fast and reliable way to tighten large bolted joints!

**NEW:**  
HEICO-TEC®  
MULTI-TOOL



**HEICO-LOCK**

888-822-5661  
Hickory, NC  
[WWW.HEICO-GROUP.COM](http://WWW.HEICO-GROUP.COM)



**Main bearings  
got you down?**

**Upgrade your  
main bearing  
material with  
Super Tough!**



#### **SUPER TOUGH OFFERS**

- Optimal performance in non ideal lubrication
- Wear and debris damage resistance
- White etching cracking resistance
- Optional DLC rollers

**NSK**

Scan to visit website



**800-366-3693**

**Wind@MalloyElectric.com**

**MalloyWind.com**



Ocotillo Windpower wind farm will generate enough electricity each year to power more than 19,000 homes for another decade. (Courtesy: Clearway Energy Group)

and operates more than 8 GW of renewable and conventional energy assets across the country. As it develops a nationwide pipeline of new renewable energy projects for the future, Clearway's 5.6 GW of wind, solar, and energy storage assets offset the equivalent of more than 10.5 million metric tons of carbon emissions for its customers. Clearway Energy Group is headquartered in San Francisco with offices in Carlsbad, California; Scottsdale, Arizona; Houston, Texas; and Princeton, New Jersey.

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

#### **CONSTRUCTION**

### **BOEM approves construction plan for offshore project**

In support of the Biden-Harris administration's goal of deploying 30 GW of offshore wind energy capacity by 2030, the Bureau of Ocean Energy Management (BOEM) recently announced its approval of Empire Wind's Construction and Operations Plan (COP), which authorizes construction and operation of the wind-energy project offshore.

This is the project's final approval from BOEM, following the agency's Record of Decision approving the project in November 2023.

"We are proud to announce BOEM's final approval of the Empire Wind offshore wind project," said Director Elizabeth Klein. "This project represents a major milestone in our efforts to expand clean-energy production and combat climate change. The Biden-Harris administration is committed to advancing offshore wind projects like Empire Wind to create jobs, drive economic growth, and cut harmful climate pollution."

The approved plan includes construction and operation of two offshore wind facilities, known as Empire Wind 1 and Empire Wind 2. The lease area is about 12 nautical miles south of Long Island, New York, and about 16.9 nautical miles east of Long Branch, New Jersey. Together these projects would have a total capacity of 2,076 MW of clean, renewable energy that BOEM

estimates could power more than 700,000 homes each year.

On Nov. 21, 2023, the Department of the Interior announced its approval of the Empire Wind offshore wind project, which is the sixth commercial-scale offshore wind project approved by the Biden-Harris administration. It is expected to generate significant economic benefits for New York and the surrounding region, including supporting more than 830 jobs each year during the construction phase and about 300 jobs annually during the operations phase.

Since the start of the Biden-Harris administration, the Department of the Interior has approved the nation's first six commercial-scale offshore wind-energy projects. BOEM has held four offshore wind lease auctions, which have brought in almost \$5.5 billion in high bids, including a record-breaking sale offshore New York and New Jersey and the first-ever sales offshore the Pacific and Gulf of Mexico coasts. BOEM has

also advanced the process to explore additional opportunities for offshore wind-energy development in the Gulf of Maine, Gulf of Mexico, offshore Oregon, and the Central Atlantic coast. The Department has taken steps to evolve its approach to offshore wind to drive toward union-built projects and a domestic-based supply chain.

**MORE INFO** [www.boem.gov/renewable-energy/state-activities/empire-wind](http://www.boem.gov/renewable-energy/state-activities/empire-wind)

### INNOVATION

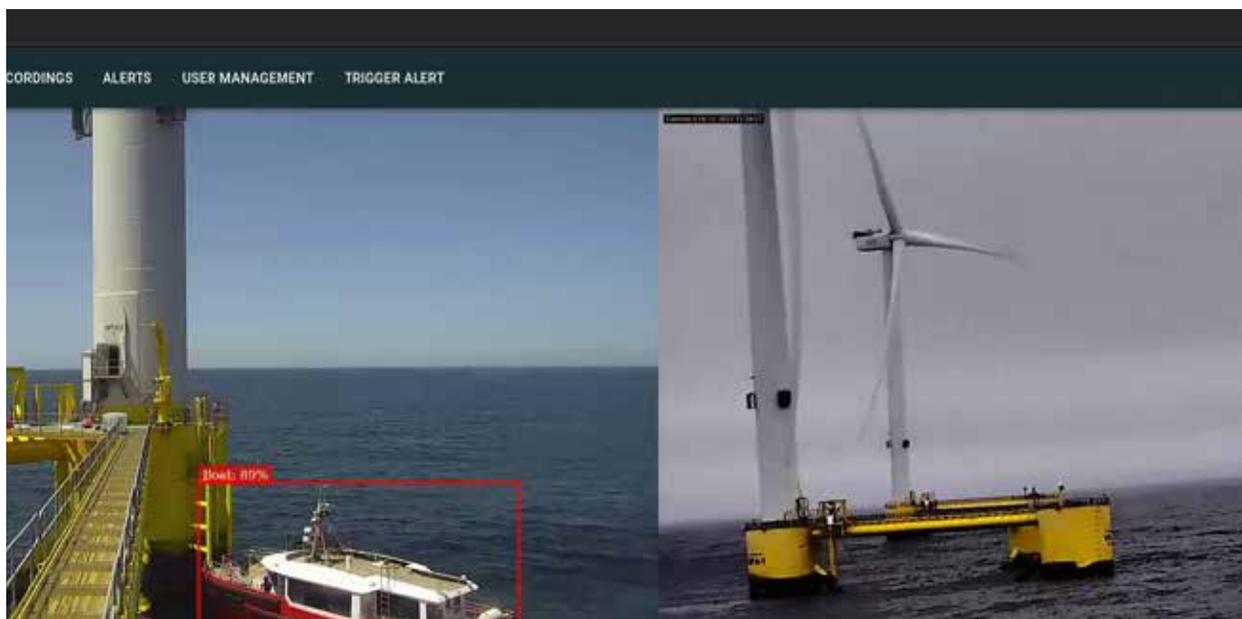
## Ocean Winds, Zelim work to enhance offshore wind safety

Zelim, a U.K.-based startup developing search and rescue solutions, is joining forces with Ocean Winds, an international company dedicated to offshore wind energy and 50-50 joint venture

**TURBINE HANDLING SOLUTIONS**

CALL US AT (217) 423-6001

[WWW.ALIGNPROD.COM/WIND](http://WWW.ALIGNPROD.COM/WIND)



Zelim has been developing its AI-enabled person detection software for floating offshore wind farms for the last three years. (Courtesy: Zelim)

between EDP Renewables and ENGIE, in a pilot project to test AI-enabled person detection software for floating offshore wind farms. The objective is to test and prove Zelim's ZOE technology, AI-enabled software dedicated to person overboard detection and capable of finding and tracking people, vessels, and other objects in real time and in harsh maritime conditions.

During the collaboration, Zelim will offer continuous monitoring of ZOE's live feed from cameras installed on two turbine foundations on Ocean Winds' WindFloat Atlantic project. The project will serve to train and improve the ZOE detection models whilst proving its capability.

ZOE will be detecting people and objects in the waters surrounding the turbines, providing direct alerts to the operation and maintenance control center in the case of a person falling overboard or an external vessel approaching the windfarm. By proving this capability, ZOE will support the site's operation and effectiveness by providing an additional layer of health and safety support.

"Finding someone in distress at sea is often a game of chance, especially when you factor in waves, sea spray,

darkness, and how quickly people can drift in the current," said Doug Lathan, Zelim chief technology officer. "Couple that with the limitations of a human searcher's eyesight and concentration. We have been developing ZOE over the last three years to increase certainty in search, even in challenging conditions. We see ZOE providing a safety net around offshore assets, where if somebody ends up in the water, they will be detected and an immediate alert sent, thereby enabling a fast and efficient rescue. We are thrilled to be working with the team at Ocean Winds to create a new benchmark in safety for offshore workers."

"As a pure offshore wind developer and operator of over 1.5 GW in the world, a key focus at Ocean Winds is the increase of the safety and health of our workers and communities, which always come first," said Elena Caja, HSSEQ director. "We are very excited for the implementation of this project and are looking forward to the results, and potential deployment throughout our projects already in operation or under construction."

**MORE INFO** [www.zelim.co/find](http://www.zelim.co/find)  
[www.oceanwinds.com](http://www.oceanwinds.com)

## INNOVATION

### Weidmuller introduces smallest crimping tool

Weidmuller USA, a provider of smart industrial connectivity and automation products and solutions, has developed and launched the PZ 2.5 S, the smallest professional crimping tool on the market for wire end ferrules.

In control cabinet construction, cables of the most diverse cross-sections are fitted with wire end ferrules. On average, 90 percent of these connections are in a cross-section range of AWG 14 (2.5 square millimeters) and smaller. A focus on this cross-section range makes the PZ 2.5 compact and ergonomic – the small handle width and the opening angle, as well as the weight, make the tool easy to use without incurring fatigue in the hand, wrist, or arm.

The PZ 2.5 tool features a length of 160mm with a small grip width so it can easily fit in the palm of the hand. Weighing about 10 ounces, this compact tool is light to carry around for ergonomic advantage.

The trapezoidal crimp in the cross-section range of AWG 26 to AWG 14 (0.14-2.5 square millimeters) complies with all current standards. The practical universal die prevents incorrect insertion and ensures error-free work. The focus on small cross-sections also reduces wear, leading to a doubling of the service life of the PZ 2.5.

“By focusing on small cross-sections, it was possible to keep the size, weight, opening width, and actuating force of the PZ 2.5 small, without compromising on crimp quality,” said Niklas Bode, business development manager for workplace solutions in Weidmuller USA’s Cabinet Products Division.

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

## INNOVATION

### Siemens certifies Pfisterer’s Connex system

The Connex pluggable connection system from Pfisterer has been certified by Siemens Energy for use in 420 kV Clean Air switchgears. Clean Air is an environmentally friendly, non-polluting insulating medium as an alternative to the well-known insulating gas sulphur hexafluoride (SF6). Clean Air consists of natural components of ambient air, such as oxygen and nitrogen. The use of Clean Air is intended to help minimize the environmental effects of electrical switchgears.

Pfisterer’s Connex product family is the first pluggable connection technology for switchgear to be certified by Siemens Energy for 420 kV Clean Air applications. The socket forming the interface with the switchgear passed the dielectric type test with Clean Air according to IEC 62271- 203. The design of the socket was tested under increased pressure conditions, among other things.

“If electric power is generated in an environmentally friendly way, transmission and distribution must follow suit,” said Alejandro Escobin, head of



Weidmuller USA’s PZ 2.5 S is the smallest professional crimping tool on the market for wire end ferrules. (Courtesy: Weidmuller USA)



Pfisterer is the first manufacturer to be certified for Clean Air switchgears. (Courtesy: Pfisterer)

product management HV cable accessories at Pfisterer. “Because our technology is used at the interfaces, it plays an important part in this. The successful testing confirms its reliability for Clean Air, which is an important step toward climate-friendly energy transmission.” “The pluggability of the Connex system allows it to be installed

quickly and easily, with a minimal space requirement and maximum flexibility,” said key account manager Norbert Fink. “We are delighted that this technology will in future be contributing even more to improving sustainability.”

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



THInK will offer a personal and customizable approach to development, offering in-person, virtual, and hybrid training sessions. (Courtesy: DNV)

## INNOVATION

# Emerson's PC built to connect industrial floor to cloud

Emerson recently announced the new PACSystems™ IPC 2010 Compact Industrial PC (IPC), a rugged industrial computer designed to handle a wide range of machine and discrete part manufacturing automation applications. The new solution is designed to serve manufacturing sites and OEM machine builders that need a ruggedized, compact, durable IPC to cost-effectively support their Industrial Internet of Things (IIoT) and other digital transformation initiatives.

The IPC 2010 addresses this by pre-loading the PACEdge™ industrial edge platform and elements of Movicon.NEX™ SCADA software, helping users run applications quickly using browser-based configuration. Provisions are included for keeping the software platform current and passively maintained, minimizing user effort,

while maximizing reliability.

Running an industrial version of Linux and including serial and Ethernet connectivity, the IPC 2010 can be used as a communications gateway in a variety of topologies and simultaneously or separately as an edge computing device.

Users can implement the IPC 2010 as a flexible protocol converter — and for many other computing functions — in many IIoT, edge, OT/IT convergence, HMI visualization, SCADA connectivity, and digital transformation roles.

Both the hardware and software are designed to be adaptable, universal, and scalable, providing a standardized and unified user experience that is easy-to-use, powerful, and supported by Emerson's lifecycle services.

The compact form factor IPC 2010 features the widest operating temperature range of any passively cooled IPC, with a low power consumption of just 4 watts and tough packaging, so it can be installed virtually anywhere.

The IPC 2010 offers an advantageous price/performance ratio, with no ongoing annual licensing costs, or charges for general and cybersecurity



Emerson's PACSystems™ IPC 2010 Compact Industrial PC is designed to serve manufacturing sites and OEM machine builders who need a ruggedized, compact, durable IPC. (Courtesy: Emerson)

updates. Additional features, such as Movicon Connex™ or WebHMI, can be activated or added at any time.

“Many customers undergoing a digital transformation want to start small and earn trust as they seek out value from edge-enabled applications,” said William Paczkowski, product manager for the IPC 2010 for Emerson's discrete automation business. “The IPC 2010 is specifically designed as a pre-packaged and economical solution so they can get running quickly and cost effectively.”

Emerson is already building the IPC 2010 into a range of larger offerings for leak detection, compressed air monitoring, batching systems, cloud enablement services, and other packaged solutions.

This flexible industrial technology will enable customers of all types to benefit from their advanced capabilities.

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

# BRIGHT IDEA

Wind Systems magazine is the place to plug in to information about the wind-energy industry.

You'll find topical articles, company profiles, and interviews with industry insiders, and timely wind energy news.

*Giving Wind Direction*

# WIND SYSTEMS

Get your FREE subscription, plus our online content, at [www.windsystemsmag.com](http://www.windsystemsmag.com)





METIS has developed a way of visualizing SOV operations which correlates the full range of vessel activities to fuel efficiency and emissions in the context of a five-day forecast for weather conditions. (Courtesy: METIS)

## INNOVATION

### METIS, ESVAGT join forces to bring analytics offshore

METIS Cyberspace Technology is expanding its portfolio of data acquisition, real-time performance monitoring, and intelligent analytics solutions to include the needs of service operation vessels (SOV). The move follows a collaborative project covering fleet performance optimization with leading offshore service provider for wind/oil & gas industries, ESVAGT.

The SOV fulfils multiple roles — as transport ship, accommodation vessel, warehouse and workshop — presenting a challenge when it comes to assessing overall efficiency. Following an ESVAGT initiative, METIS has developed a portfolio of applications to enhance SOV operations. Leveraging ESVAGT’s operational expertise and data, METIS utilized its high-frequency data acquisition and advanced performance evaluation analytics to provide transparency in the performance of SOVs.

“The result is an exciting example of how advanced analytics deliver a competitive edge, in this case creating the opportunity for SOVs to offer

added value services to end clients,” says Panos Theodossopoulos, chief executive officer, METIS Cyberspace Technology. “I would like to thank ESVAGT for its cooperation in taking our product and service development in a new direction.”

METIS has developed a way of visualizing SOV operations, which correlates the full range of vessel activities to fuel efficiency and emissions in the context of a five-day forecast for weather conditions, according to Theodossopoulos.

Features include a new depiction of total fuel oil consumption by activity across multiple scenarios, including transit, personnel transfer, time-in-port, etc., which takes account of different weather conditions. The enhanced software functionality also introduces a heightened level of transparency to dynamic positioning (DP) operations taking into consideration that DP systems play a critical role in maintaining positions and ensuring the safe transfer of technicians to offshore installations using “walk-to-work” gangways.

DP systems use a vessel’s propellers and thrusters to maintain a position and heading, taking account of external conditions. The new METIS DP Motion Analysis App analyses the performance of the vessel’s power system during DP to deliver a visualization of aggregated SOV performance based on fuel and energy efficiency, environmental conditions and motion dynamics.

Also new is METIS functionality harvesting weather forecast and vessel performance data with the transparency to help site managers and vessel operators work together to schedule maintenance most effectively. The “Smart Scheduler” refines existing METIS voyage routing optimization to take account of planning for wind farm operations, including safety requirements.

“The new functionality supports better voyage planning and performance at sea during the key tasks which define SOV utilization,” said Kristian Ole Jakobsen, DCEO, ESVAGT. “In doing so, AI-based analytics is helping vessel

operators to contribute to a more efficient and sustainable offshore wind industry.”

**MORE INFO** [www.metis.tech](http://www.metis.tech)

## MAINTENANCE

### DNV opens training hub in Abu Dhabi

DNV, the independent assurance and risk management provider, has formally opened THInK, its new Training Hub for Industrial Knowledge, in Abu Dhabi, United Arab Emirates.

The dedicated training facility, the first of its kind in the region, will offer a range of comprehensive programs, underscoring DNV’s commitment to enhancing the abilities of those entering, and already in, multiple industry

sectors. Ensuring that workers have the latest skills and knowledge is essential for businesses to create a competitive advantage in a rapidly evolving and challenging industry.

THInK will offer a personal and customizable approach to development, offering in-person, virtual, and hybrid training sessions. DNV will also make use of virtual reality (VR) technology to safely replicate hands-on experiences in high-risk industries.

The hub will allow access to a variety of internationally accredited courses on safety, lifting, Mobile Elevating Work Platforms (MEWP), earth-moving machinery, and scaffolding, among others. Fully customized classes can be developed and adapted to meet the specific needs of clients or industries.

Each course is designed to cater to different areas of expertise and will be taught by trainers with years of field experience and are still involved in real-life projects on a daily basis.

“THInK will become a repository of industry knowledge that will truly allow people to realize their full potential and accelerate their development,” said Mohamed Houari, DNV Inspection’s global managing director. “This will be done through a combination of traditional training methods as well as innovative methodologies such as virtual reality and artificial intelligence. THInK is the latest testimony of our investment in UAE and our commitment to In-Country-Value.”

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

## MAINTENANCE

### Newhaven receives pontoon upgrade

As part of the refurbishing of the op-



**EVIDENT**

### New IPLEX™ G Lite-W Videoscope

A better way to inspect wind turbines

- Optics built for wind tower gearbox inspections
- 4 mm scope fits into tight spaces
- Sealed, oil-clearing tip adapter
- Oil-resistant insertion tube coating for easy scope cleanup
- Optional bright LED guide tube

Learn more at:  
[olympus-ims.com/iplex-g-lite](http://olympus-ims.com/iplex-g-lite)

**OLYMPUS**

IPLEX is a trademark of Evident Corporation or its subsidiaries



Blade Team will bring additional maintenance support to the region by providing in field-deployed rotor blade maintenance. (Courtesy: GEV Wind Power)

erations and maintenance (O&M) base for the Rampion Offshore Wind Farm, Inland and Coastal Marina Systems (ICMS) has installed a floating concrete breakwater within the Port of Newhaven to provide safe berthing facilities for crew transfer vessels (CTVs).

Working with civil engineering firm Knights Brown, ICMS designed and installed a 90-linear-meter concrete breakwater with 1-meter freeboard, suitable for berthing CTV vessels up to 140-metric-ton displacement. The floating structure, with external pile guides, has a width of 4.5 meters, providing ample space for the associated electrical, water, lighting, and fuel services required.

“Working closely with the team at Knights Brown, we were able to install the new access system and pontoon without disruption of the 24/7 operations and maintenance activities of the wind farm,” said Jon Challis, ICMS sales manager.

“We also worked alongside sub-contractors for the pontoons’ services to ensure full compliance with health, safety and quality management procedures as we installed the new berthing facility, which will benefit vessel

operators for years to come.”

Rampion was the first offshore wind farm off the south coast of England and is owned and operated by RWE Renewables. The O&M base is a permanent structure within the Port of Newhaven, comprising offices, warehousing, and berthing and quayside facilities for the wind-farm commissioning and maintenance vessels.

Manufactured in ICMS’ highly controlled pre-cast facilities in Banagher, Ireland, the concrete pontoon has a 200mm rubber D-fender and one-meter freeboard to match that of the vessels using it, creating a comfortable berthing facility for the CTVs serving the Rampion Offshore Wind Farm.

With a durable, textured decking designed for commercial use, the crews have continuous safe access to their vessels night and day, year round, whatever the weather.

“I can truly say it’s been an absolute pleasure working with Inland and Coastal’s project team from the start of the design stage to the delivery of the breakwater and the successful hand over to our client,” said Arron Dolan, contracts manager at Knights Brown. “We have found the project team to be

user friendly and always on hand to support the team with any queries. We found their on-site team helpful and accommodating at all times. I would personally highly recommend them.”

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

## ► MAINTENANCE

### GEV Wind Power launches Blade Team

GEV Wind Power, a turbine blade repair and maintenance company, has further bolstered its services with the launch of a division called Blade Team.

Dedicated to the U.K. and Ireland onshore market, Blade Team will bring additional maintenance support to the region by providing in field-deployed rotor blade maintenance, using powered access platforms and associated services. Five permanent roles have been created as a result of the new division.

Stephen Robinson has been appointed Head of Operations at Blade Team and will lead the management team. Robinson, who was previously a director of U.K.-based Blade Wind Services, brings a wealth of experience and knowledge within the industry.

“I’m excited to be partnering with a global blade maintenance provider, supported by such an experienced team and comprehensive infrastructure,” Robinson said. “The integration of Blade Team’s expertise with GEV’s extensive industry knowledge and operational excellence, creates a dynamic and appealing collaboration.”

“As experts in rotor blade maintenance, it is important for us to identify the optimal method for executing routine and unplanned maintenance that best addresses the window to complete blade works,” said David Fletcher, GEV Group’s CEO. “The launch of Blade Team underlines this and will further enhance GEV’s service offerings.”

GEV has evolved as a leader in blade maintenance and repair through growth and acquisitions that build on



North Star's new SOV has been tailored to meet EnBW's specific requirements (Courtesy: North Star)

its blade competence capabilities and in-house expertise across complex repairs, upgrades and maintenance combined with specialist blade advisory, risk and technology solutions.

Most recently, the Group acquired Rigcom Group, Australia's largest domestic independent service provider (ISP), which specializes in field deployed rotor blade maintenance and a range of height safety services.

GEV has more than 1,000 technicians worldwide, believed to be the world's largest blade-focused talent pool, and supports more than 200 projects across Europe, North America, and Asia with a network of operational bases in the U.K., U.S., Australia, Poland, and Denmark.

In the Group's 2023 financial year alone, 1,122 blades were maintained by GEV, enough to annually power 320,000 homes and save more than 1million tons of CO2 emissions.

**MORE INFO** [www.Bladeteam.co.uk](http://www.Bladeteam.co.uk)

## MAINTENANCE

### North Star secures first German contract

North Star has secured a contract with energy utility giant EnBW to deliver a new hybrid-electric service operations vessel (SOV) on a decade-long minimum charter to service the He Dreiht wind farm off the coast of Germany.

The agreement marks the firm's first offshore wind win outside the U.K. market, a milestone step in its European growth strategy to add 40 new SOVs to its fleet by 2040.

The newbuild is of VARD 407 design that has been tailored to meet EnBW's specific requirements. To drive high performance and efficiencies, the high-specification vessel includes Voith Schneider eVSP propulsion and is prepared for the use of methanol as a fuel.

The ship is also equipped with a height adjustable motion compensated gangway and 3D compensated crane. In addition, it supports decarbonization, including North Star's Decision Support system.

Scheduled to commence long-term charter with EnBW at the end of next year, the walk-to-work vessel will provide accommodation in field for up to 34 wind technicians as they maintain the development's 64 wind turbines, about 90 kilometers northwest of the island of Borkum and 110 kilometers west of Helgoland. The SOV will also act as a logistics hub and warehouse.

"He Dreiht is currently one of Europe's largest energy-transition projects and once operational, will supply green power to 1.1 million homes," said Caspar Blum, North Star European renewables lead. "Following the highly regulated EU tendering process, we are thrilled to be selected by EnBW as part of their maintenance solution to ensure once completed, the wind farm



Nearthlab has been redefining drone solutions since 2015, pushing practical boundaries beyond industry norms. (Courtesy: Nearthlab)

remains consistently operational and generating renewable electricity. With high operability a key component to providing fast, safe and efficient personnel transfers, we worked closely with EnBW and our partners VARD to develop a robust and superior SOV to mitigate sea state and wave height challenges.”

“This vessel will be the backbone of our service and logistics operations at our He Dreiht wind farm,” said Michael Splett, EnBW’s global head of O&M Wind Offshore. “Working with North Star, we were able to specify its setup to ideally meet the requirements of our operations teams. Its innovative, methanol-based propulsion system helps us to further decarbonize our industry’s operations. This perfectly aligns with EnBW’s strategy of continually optimizing the operation of its offshore wind farms through the deployment of new technologies in the field.”

This contract for North Star marks the seventh newbuild SOV for the com-

pany since entering the renewables market in 2021.

**MORE INFO** [www.northstarshipping.co.uk](http://www.northstarshipping.co.uk)

#### ▀ MAINTENANCE

### Gutiérrez will lead RES’ asset management and O&M services

RES recently enhanced its global asset management and operations and maintenance (O&M) services for customers through the appointment of Juan Gutiérrez as CEO of its global services business unit.

Gutiérrez brings a wealth of experience and expertise to RES, having spent 19 years in the energy industry including 12 years at a global wind-turbine manufacturer. With a proven track record of leadership and a deep understanding of what customers need

to maximize the performance and returns from renewable assets, Gutiérrez is well-positioned to drive RES’ continued growth in this area.

“We are thrilled to welcome Juan to RES,” said Eduardo Medina, RES CEO. “His experience of leading complex, international projects with a focus on operational excellence will be invaluable as we continue to develop and grow our services business to meet the evolving needs of our customers across the world.”

“It’s an exciting time to be taking up this position as RES continues to expand its global footprint and enhance its service offerings as a leader in this fast-growing industry,” Gutiérrez said. “I look forward to building on that and working with our customers to provide the solutions they need.”

The news follows the announcement of RES’ planned acquisition of Ingeteam’s Service division, which, upon completion, will make RES the largest renewable energy support services provider in the world with circa 41 GW of assets under management across 23 countries. Gutiérrez will join RES’ Group Executive team, reporting to Global CEO Eduardo Medina and taking up the appointment May 1, 2024.

**MORE INFO** [www.res-group.com](http://www.res-group.com)

#### ▀ MAINTENANCE

### Nearthlab, PowerCurve team to streamline O&M

Nearthlab, a leading provider of autonomous drone solutions, and PowerCurve, a pioneer in annual energy production (AEP) loss analysis, recently signed a memorandum of understanding (MoU) aimed at optimizing wind-farm operations and maintenance (O&M).

Under the agreement, Nearthlab’s cloud-based analytics platform, Zomable, will integrate aerodynamic performance calculation capabilities from PowerCurve’s flagship AEP anal-

ysis tool, AeroVista, into its framework. The integration will enable site managers to understand AEP loss attributed to each blade surface defect, such as leading-edge erosion identified through Zoomable.

Surface degradation on the leading edge often leads to significant power output reductions. With AeroVista integrated into Zoomable, site managers will be able to determine the impact of each defect on turbine performance, facilitating targeted maintenance and resource allocation.

“Spotting defects is one thing; understanding their financial impact is another,” said Jay Choi, co-founder and CEO of Nearthlab. “Teaming up with PowerCurve marks a significant step towards fostering an environment where wind farms can operate at their best.”

Niels Bruhn Brønnum, CEO of PowerCurve, echoed Choi’s sentiments.

“Driven by the shared commitment to a sustainable future, our partnership will redefine how the wind industry approaches O&M,” he said.

**MORE INFO** <https://www.nearthlab.com>  
[www.powercurve.dk](http://www.powercurve.dk)

## MANUFACTURING

### US Forged Rings to invest \$700M in tower facility

US Forged Rings Inc. has announced a \$700 million investment in the U.S. offshore wind industry to construct a tower fabrication facility and a steel forging plant. The U.S.-based company will use the two facilities to service the growing domestic offshore wind market, filling a supply chain gap for offshore wind components and alleviating bottlenecks for a market with goals of deploying 30 GW by 2030 and 110 GW by 2050.

Through its strategic supply chain partnerships with Nucor, North America’s largest steel producer and recycler, providing sustainable steel for offshore



US Forged Rings is investing \$700 million in the U.S. offshore wind industry to construct a state-of-the-art tower fabrication facility and a steel forging plant. (Courtesy: US Forged Rings)

wind-tower construction, and Ellwood Quality Steels, North America’s leading ingot caster, USFR is committed to producing final products that are 100 percent made in the U.S.

The tower fabrication facility will produce 100 fully coated towers annually that include internally produced flanges, eliminating potential delays and logistics issues, lowering the overall cost.

The facility is designed from its inception to be expandable up to 200 towers annually, depending on demand. The new steel forging facility will produce large flanges up to 40 feet in diameter, making it the largest ring rolling facility in North America and Europe.

The facility will also produce forged components required in other heavy industries including nuclear energy, construction, shipping, and mining.

“This substantial investment serving U.S. offshore wind was spurred by our confidence in the medium and long-term prospects of the U.S. market, which is in its early phases of development and needs a local supply chain to rely on,” said Giacomo Sozzi, president of USFR. “These facilities will enable

U.S. developers and OEMs to have predictable costs and a reliable supply of vital components. Equally important, the investment will result in direct environmental benefits including the reduction of significant pollution emitted by otherwise shipping these huge components from overseas.”

Once all permits and regulatory approvals are secured, construction of the facilities is expected to take 16-20 months, with first towers beginning production in Q1 2026. The two facilities will create more than 500 U.S. full-time employment positions. The facilities will also limit carbon footprint by using 77 percent recycled content, making it a fraction of the global average.

“We are currently in the final stages of evaluating several potential locations on the East Coast,” said Slavko Zurovac, USFR’s managing director. “All potential sites are strategically positioned with access to required waterways, rail, and utilities, providing significant logistical benefits and making it competitive to supply large components.”

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

A photograph of an offshore wind farm at sunset. The sky is a warm orange, and the sea is dark blue with whitecaps. Several white wind turbines are visible, their towers and nacelles silhouetted against the sky. The text is overlaid on the left side of the image.

CROSSWINDS

THE FUTURE OF WIND

# WHY IT'S TIME TO REBOOT RENEWABLE ENERGY DUE DILIGENCE

The surge in demand for renewable energy, driven by a global commitment to sustainability, has fostered significant growth in the sector. (Courtesy: Shutterstock)

*While advisers possess significant expertise in assessing the feasibility and risk of projects, there is a significant opportunity for them to enhance their practice by embracing digital solutions.*

By JOSS BOXFORD

The success of any big investment, whether you are buying a house or acquiring a wind farm, hinges on thorough due diligence (DD). Nobody dives into a purchase without a solid understanding of what they're getting themselves into.

Renewables DD requires an intricate interplay between the asset owner, their lenders and investors, and the specialist legal, technical, insurance and financial advisers engaged to assess project risks.

These expert advisers play a pivotal role in giving capital providers the confidence to back vital wind, solar, and storage projects, boasting impressive long-term track records in the sector.

However, the efficiency with which they can impart their hard-won knowledge is hampered by traditional approaches in the DD process, which tend to be time-consuming, resource intensive, and ultimately place an unnecessary burden on their clients.

DD doesn't need to be this hard — and, as pressure grows to accelerate capacity growth worldwide, it's clear that now is the time for a “reboot.”

## MARKET FORCES DRIVE ADVISERS TO FOCUS ON STREAMLINING DUE DILIGENCE

The surge in demand for renewable energy, driven by a global commitment to sustainability, has fostered significant growth in the sector. As nations and industries transition toward cleaner energy sources, investors are confronted with an expanding array of opportunities.

In the U.S. market, the Inflation Reduction Act (IRA) is driving significant interest, resulting in investor appetite far exceeding the availability of high-quality projects. In the U.S., as is the case globally, there is a pressing need to expedite the capital flow into new projects. This acceleration is crucial to ensure projects move through the pipeline as quickly as possible, ultimately enabling developers to reinvest elsewhere and bring more capacity online.

With increased competition in the market, fueled by the growing attractiveness of sustainable investments, the race to secure high-quality projects has intensified. As ESG considerations intertwine with investment decisions, companies find themselves not only competing for projects based on financial metrics but also on their ability to meet ESG standards, bringing additional intricacies.

Additionally, rapid technological advancements, such as innovations in floating wind, energy storage and green hydrogen, coupled with new financing and offtake structures, demand a DD process that is not only efficient but also capable of keeping pace with the latest industry innovations.

In the dynamic landscape of DD, advisers must focus on putting into operation their unique institutional knowledge to provide swift insights derived from specialist industry expertise. Simultaneously, the demand for faster and earlier insights underscores the importance of effective, more transparent collaboration with clients' full advisory teams to navigate complex deals and shorter transaction timeframes.

▼ In the U.S. market, the Inflation Reduction Act (IRA) is driving significant interest, resulting in investor appetite far exceeding the availability of high-quality projects. In the U.S., as is the case globally, there is a pressing need to expedite the capital flow into new projects. ▼

## TACKLING DUE DILIGENCE BOTTLENECKS

So, how can this be achieved in practice?

Streamlining due diligence will require a concerted effort to identify and address a number of key bottlenecks — but the simple solution lies in bringing together disparate forms of transaction communication and reporting into one place.

► **Adoption of modernized reporting practices:** Lengthy and intricate reports, often 300-plus pages long, can be replaced with digital tools that allow advisers to provide more timely, manageable updates.

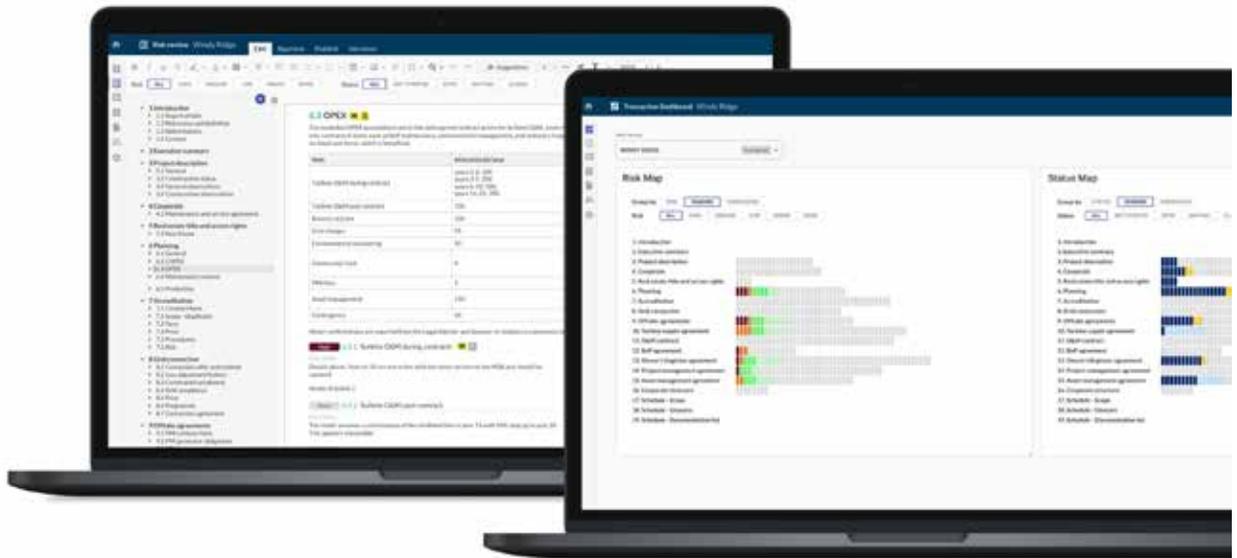
► **Enhancing communication through collaborative platforms:** Real-time communication is needed to foster more seamless inter-adviser cooperation. Utilizing a single

platform that brings all advisers under one roof streamlines operations and reduces administrative burdens. By automatically collating systems, this eliminates unwieldy Q&As and reduces the risk of missing critical points.

► **Deal visibility:** Establishing a centralized platform for monitoring progress and timelines ensures a coordinated workflow. This enables teams to track risks, status and Q&A, and maintain an organized and informed approach throughout the due diligence process.

► **Centralizing information:** Consolidating all project-critical information into one platform addresses the challenge of fragmented or siloed data, providing a unified, source of truth accessible to involved parties.

► **Integration of advanced tools:** Incorporating tools serves to streamline routine tasks, enhancing efficiency and accuracy. Gone are the days of lengthy documents compiled



Streamlining due diligence will require a concerted effort to identify and address a number of key bottlenecks — but the simple solution lies in bringing together disparate forms of transaction communication and reporting into one place. (Courtesy: LiveDiligence)

from various inputs and disconnected information.

## GAINING A COMPETITIVE EDGE THROUGH BETTER KNOWLEDGE MANAGEMENT

Due-diligence advisers have been grappling for some time with how to use technology to improve their services and move away from outdated and burdensome approaches to DD. While advisers possess significant expertise in assessing the feasibility and risk of projects, there is a significant opportunity for them to enhance their practice by embracing digital solutions. This will ensure that their hard-won knowledge and experience is readily accessible throughout their organizations, contributing to more streamlined and efficient processes and enhanced client offering.

A number of frontrunners are emerging in the race by advisers to put into operation their institutional knowledge. Global law firm DLA Piper and global technical consultancy Wood, are taking a leading role in the “reboot” of due diligence, having recently agreed to long-term deals with LiveDiligence to improve the transaction experience for their clients.

This ensures valuable expertise is not only retained within their organizations but actively put to use in decision-making. There is a pressing need to speed up processes to reduce the lag between renewable-energy project con-



Rapid technological advancements, such as innovations in floating wind, energy storage and green hydrogen, coupled with new financing and offtake structures, demand a DD process that is not only efficient but also capable of keeping pace with the latest industry innovations. (Courtesy: Shutterstock)

ception and the deployment of investor and lender capital. It's important to realize this goal can be achieved without compromising the quality of service and insight provided.

A centralized, digitalized DD approach offers the advantage of delivering faster and earlier insights, ultimately reducing the time it takes to reach financial close. In a sector where timely decision making is paramount to speeding up transaction timelines, streamlining due diligence emerges as a strategic necessity to navigate the changing requirements of the modern clean-energy landscape. ↵

## ABOUT THE AUTHOR

Joss Boxford is COO of LiveDiligence.

# SHARE YOUR EXPERTISE WITH OUR READERS



**Have a wind-energy article with an informational or educational angle? Let Wind Systems publish it.**

Each issue, Wind Systems offers its readers the latest, most valuable content available from companies and institutions, as well as critical thoughts on what this information means for the future of the wind-energy industry.

Our readers want your expertise and we want to share it.

**Wind Systems is your trusted source for information and technical knowledge about the wind-energy industry.**

**Contact the editor, Kenneth Carter, at [editor@windssystemsmag.com](mailto:editor@windssystemsmag.com) for how you can share your expertise with our readers.**

*Giving Wind Direction*

**WIND**  
SYSTEMS

# AD INDEX

Align Production Systems .....	33
American Clean Power .....	3
American Wire Group .....	1
ColdSnap Towers .....	28
Elevator Industry Work Preservation Fund .....	11
Evident Scientific .....	39
HEICO Fastening Systems .....	31
ITH Engineering .....	BC
Malloy Electric .....	32
NTC Wind Energy .....	48
Oceantic Network .....	IFC,5
Patriot Renewables, Inc .....	7
Society of Tribologists and Lubrication Engineers .....	21
Stahlwille Tools LLC .....	48
Superior Wind Services, LLC .....	7
TORKWORX LP .....	IBC

## EXTEND YOUR COMPANY'S REACH

Present your company's message to the wind-energy industry in print and online through Wind Systems magazine. For 10 years, Wind Systems has served as a leading authority on the wind-energy industry. We offer a variety of media to connect you with potential customers. For details, contact:

**David Gomez, National Sales Manager**

@ dave@windssystemsmag.com

📞 800-366-2185 ext. 207

Giving Wind Direction  
**WIND**  
SYSTEMS



## BOLT TENSIONING



- Tensioning equipment is customized for any bolt configuration or clearance
- Our customized equipment can be modified or repaired in the field, reducing downtime
- Certified pump gauges are recalibrated with each foundation
- Professional reports routinely provided for each foundation tensioned
- Free bolt cap installation with tensioning service



800.359.0372  
JWBRUCE@NTCWIND.COM

**NTCWIND.COM**

**RELIABLE IN ALL conditions**

**MANOSKOP® 730 Quick**  
Experience integrated tool solutions for maintaining wind turbines. Experience the »Made in Germany« difference.  
info@stahlwille-americas.com

**STAHLOWILLE®**

MADE IN GERMANY



# TORKWORX.com

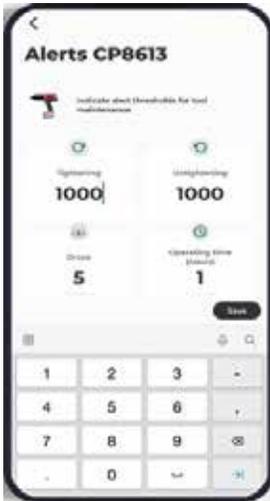
info@torkworx.com

888.502.WORX

torkworx.com

**NEED BATTERY TORQUE & ANGLE?  
NEED SMART DATA COLLECTION?  
NEED IT FAST & COMPACT?  
NEED IT RIGHT NOW?**

**I KNOW A GUY!!**



## WIND ENERGY SOLUTIONS

- COMPLETE TURBINE SPECIFIC TOOL KITS FOR RENT
- ONSITE TOOLING SUPPORT SERVICES
- COMPLETE OEM TORQUE AND TENSION SYSTEMS
- ISO 17025 ACCREDITED MOBILE CALIBRATION SERVICES
- REPAIR SERVICES FOR MOST TOOL MODELS
- TORQUE CONTROL SYSTEMS WITH ONBOARD TRANSDUCER
- BATTERY OPERATED BOLT TENSIONING SYSTEMS
- BATTERY OPERATED HYDRAULIC WRENCH SYSTEMS
- ELECTRIC & BATTERY GEAR TURNING SYSTEMS
- SMART TENSIONING SYSTEMS
- ONSITE DEMO TOOLS AVAILABLE

sales  
rental  
service  
consulting  
engineering



**BOOTH# 3140**



**BOOTH# 1500**

## Tension & Torque tools

Installation • Maintenance • Service  
of wind turbines



## Tension & Torque bolting tools

### Special features for offshore

Lifting devices, High-Speed Turn-On, NIOX coatings,  
offshore-specific packaging.

### Digital Documentation & Measurement

Easy application, traceable results, ultrasonic bolt  
measurement optional.



[www.ith.com](http://www.ith.com)  
[info@itheng.com](mailto:info@itheng.com)  
815-363-4900