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HEADWINDS FOR OFFSHORE CONSTRUCTION

Development of the offshore wind industry in the United States faces some hurdles, but reasons for hope remain.

HOW SPIRAL WELDING IS REVOLUTIONIZING WIND-TURBINE MANUFACTURING

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Canadian Renewable Energy Association
WIND, SOLAR, STORAGE

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2023 – another year in the books

The end of 2023 is here before, it seems, it even started. On a positive note, it looks like the wind-energy industry continues on its journey to return to normal.

But as we enter 2024 and beyond, let this not only serve as a season's greeting, but also as a promise that *Wind Systems* will continue to explore ways to enhance our products with the ultimate goal being to get the best and latest information about the wind-energy industry in your hands — whether that be virtually or literally — just as we did this year and in many years' past.

As we have for the past three years, we will continue with our commitment to reduce our overall carbon footprint by only physically printing six of our 12 issues.

We believe in the industry, and this has been our way of playing just another — albeit small — part in contributing to a greener future for our planet.

As promised, this has in no way affected the quality of *Wind Systems*' content. We work very hard to bring you the best information in the industry, and that commitment has never changed — and it never will.

But before we say a final goodbye to 2023, make sure you take some time to discover this month's issue of *Wind Systems*, which contains quite a bit of information.

With a focus on construction and transportation, December's issue looks at several challenges that the industry will face in the coming years.

Offshore wind construction has encountered a few recent obstacles, and our cover article takes a look at this issue. E. Carter Chandler Clements, Counsel with Hunton Andrews Kurth LLP in Washington, D.C., shares her insights on the hurdles faced by offshore wind development in the U.S. and what will be needed to overcome them.

Speaking of offshore wind, there has been a major development within the Business Network for Offshore Wind. The 10-year-old organization recently went through a major rebranding initiative. It is now known as the Oceanic Network. In our December Conversation, I had the opportunity to talk with Liz Burdock, president and CEO of the Oceanic Network. She shared the newly branded organization's goals and the positive opportunities behind the rebranding effort.

You'll find that and more in this issue, but before you dive in, let me take this opportunity to say how proud I am to be a part of sharing the industry's accomplishments with you, and I hope you will continue to take this journey with us as we report on the exciting innovations yet to come for the industry.

Have a happy holiday season, stay safe, and, as always, thanks for reading!



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ACP adds two new vice presidents

From American Clean Power

The American Clean Power Association recently announced two new additions to the organization, one to run state affairs and the other to lead campaign communications.

Sarah Cottrell Propst, New Mexico's Cabinet Secretary of the Energy, Minerals and Natural Resources Department, will join ACP as vice president of state affairs to lead a team of dedicated state affairs directors. In this role, Cottrell Propst will direct state advocacy strategy for the association during a time when record amounts of clean energy are being deployed in states across the U.S.

"I have known Sarah for many years, and I am excited for her to bring her considerable policy and political expertise to ACP," said JC Sandberg, ACP's chief advocacy officer.

Cottrell Propst will bring her policy acumen to ACP from her current role as cabinet secretary of the Energy, Minerals, and Natural Resources Department in New Mexico. Her leadership in renewable energy policy at the Interwest Energy Alliance and in state government positions her as a natural fit to lead ACP's state affairs. She assumes the role in January.

In addition, Sabrina Fang joined ACP as the new vice president of campaign communications. In this newly created role, Fang will lead campaign communications efforts aimed at shaping the narrative around the benefits of clean energy. She will work closely with Cottrell Propst and her team and stakeholders around the country to tout the benefits of the industry.

Fang comes to ACP with an extensive background in media relations, crisis communications, and strategic campaign management. In her previous roles at Patomak Global Partners, the National Venture Capital Association, the U.S. Chamber of Commerce, and the American Petroleum Institute, Fang led communications efforts through high-profile national events. The additions of Fang and Cottrell Propst will support ACP's mission to drive the clean-energy expansion, marking a boost to the association's capacity for national advocacy and state-level policy development.



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

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DIRECTION

THE FUTURE OF WIND



GCube will use
Renew Risk's
cutting-edge
catastrophe risk
models for offshore
wind assets.
(Courtesy: Renew
Risk)

GCube, Renew Risk partner to boost offshore wind risk analytics and modeling

GCube Insurance, an underwriter for renewable energy projects, is partnering with Renew Risk, a Software-as-a-Service (SaaS) risk analytics provider, which will strengthen GCube's capability in offshore wind risk analytics and modeling, benefiting its offshore wind clients.

GCube will use Renew Risk's catastrophe risk models for offshore wind assets, which are based on advanced physics, data analytics, and simulation techniques. The models will help GCube better understand and quantify the factors that affect the risk and liability of offshore wind assets, such as extreme weather events, natural disasters, inter-connected component damage probabilities, operational failures and expected losses – allowing GCube to offer more tailored and competitive pricing.

"This partnership will enable us to enhance our offshore wind services by using Renew Risk's pioneering catastrophe models," said Fraser McLachlan, GCube Insurance CEO. "Renew Risk's models will help us better understand and quantify the complex catastrophe risks of offshore wind assets, which will allow us to offer more tailored and competitive pricing."

Renew Risk's models are being integrated with Nasdaq Risk Modeling for Catastrophes, a SaaS platform providing access to a broad range of catastrophe risk models and services to (re)insurance firms, brokers, and financial institutions. Incorporating Renew Risk onto Nasdaq's platform will enhance users' ability to assess risk associated with offshore wind farms, estimate losses, compare project risk-return profiles, and allocate capital.

Renew Risk's models provide more comprehensive risk analysis for offshore wind assets than traditional methods, which typically use generic or onshore models. Such methods do not account for the specific characteristics of different regions or the nuances of offshore wind infrastruc-

ture, which can lead to suboptimal insurance pricing. Instead, Renew Risk's models consider a broad range of factors that affect risk and liability, such as the location, age, size, power, and gearbox system of the turbines, the cost and availability of replacement parts and vessels, the downtime and reliability of the operations, and the Business Interruption (BI) losses. These models also offer comprehensive coverage of high-risk regions, encompassing Northeast U.S. hurricanes, Taiwan earthquakes, and typhoons, as well as Japan earthquakes and typhoons.

"The extraordinary growth of the offshore wind industry demands an increasingly sophisticated insurance ecosystem to serve it," said James Lay, senior director of Nasdaq. "This is driving a critical need for advanced models capable of accurately assessing risk. As the first models of their kind available in the Oasis format, integrating Renew Risk with Nasdaq's platform will provide seamless access to the tools necessary to support the continued growth of the sector."

"Collaborations will enable us to showcase our innovative catastrophe models platformed on Nasdaq, rooted in cutting-edge advanced physics, data analytics, and simulation techniques," said Ashima Gupta, Renew Risk co-founder and CEO. "Our models will assist GCube in enhancing its ability to evaluate and handle intricate catastrophe risks associated with offshore wind assets, ultimately translating into amplified advantages for GCube's esteemed clients."

MORE INFO www.gcube-insurance.com
enew-risk.com

Electricity Transformation Canada succeeds in new site

Electricity Transformation Canada (ETC), Canada's largest and most in-

fluential renewable energy event, was a success in its new location, Calgary, Alberta. ETC 2023 attracted more than 2,500 attendees from across North America and featured a diverse and informative lineup of keynote speakers, engaging panel discussions, multiple networking events, and cutting-edge exhibitions.

More than 160 exhibitors populated the expo hall, which featured for the first time an Indigenous Business Pavilion with 10 Indigenous companies and organizations from across Canada, supporting Canada's electricity transformation that will be important for many generations to come.

The conference's educational program doubled this year, including a full roster of thought-provoking sessions about today's utilities and ISOs, community engagement, supply chain, responsible land use, green-hydrogen potential, energy storage, unlocking corporate PPA possibilities, building Canada's clean electricity future, behind-the-meter solar, delivering electricity through a changing grid, permitting Canada's green transition, building Canada's renewable energy workforce, and cross-Canada markets and policy updates.

Attendees and exhibitors were welcomed by the chair of the Board of Directors of the Canadian Energy Association (CanREA), Jason Chee-Aloy, managing director of Power Advisory LLC, and with a blessing from Doreen Bergum, Region 3 Elder of the Metis Nation of Alberta, and a welcome from the mayor of Calgary, Jyoti Gondek, followed by opening remarks from CanREA's president and CEO, Vittoria Bellissimo, and a special keynote address by the Hon. Danielle Smith, premier of Alberta.

"As the annual conference of the Canadian Renewable Energy Association, ETC's educational program presents the latest innovations in wind energy, solar energy, and energy storage, looking even more broadly to the full



ETC 2023 attracted more than 2,500 attendees from across North America. (Courtesy: Electricity Transformation Canada)

transformation of the electricity sector in Canada,” Bellissimo said.

A special networking event with the Canadian Francophonie was also on the agenda, as was a launch of Can-REA’s new Clean Energy Jobs Canada website, aiming to help build Canada’s renewable energy future.

“Electricity Transformation Canada continues to be a tremendous success,” said Stephen Miner, president and CEO, RE+ Events. “Together, with our partners, we were once again able to deliver an outstanding event that has been valuable to the market in Alberta, as well as Canada as a whole. We look forward to returning next year.”

Electricity Transformation Canada 2024 will be October 21-23, in Calgary, Alberta.

MORE INFO electricitytransformation.ca

LiveDiligence platform calls for reboot of renewable market

Traditional approaches to due diligence, alongside fragmented knowledge management, are slowing down the flow of new capital into renewable

energy projects worldwide, leading to missed opportunities for advisers delivering valuable expertise to their clients, according to LiveDiligence, a software platform that delivers insights to renewables investors and lenders.

The firm is calling for the renewable energy market to “reboot” its due diligence processes to ensure projects are financed and built at the rate needed to meet global growth targets.

“Historically we haven’t seen a lot of cross pollination of ideas between due diligence advisers and the tech world, leading to a lack of innovation in the sector,” said Joss Boxford, Chief Operating Officer, LiveDiligence. “Advisers haven’t been offered compelling alternatives to the status quo, despite widely recognized deficiencies in the current tools and processes.”

LiveDiligence has pinpointed four areas of focus for renewable energy due diligence advisers over the next five years:

➤ **1) Knowledge management:** Those companies with institutional knowledge will consistently deliver higher value with fewer resources, and scale faster through efficient knowledge sharing and accelerated upskilling of new employees. Delivering insights derived from specialist knowledge

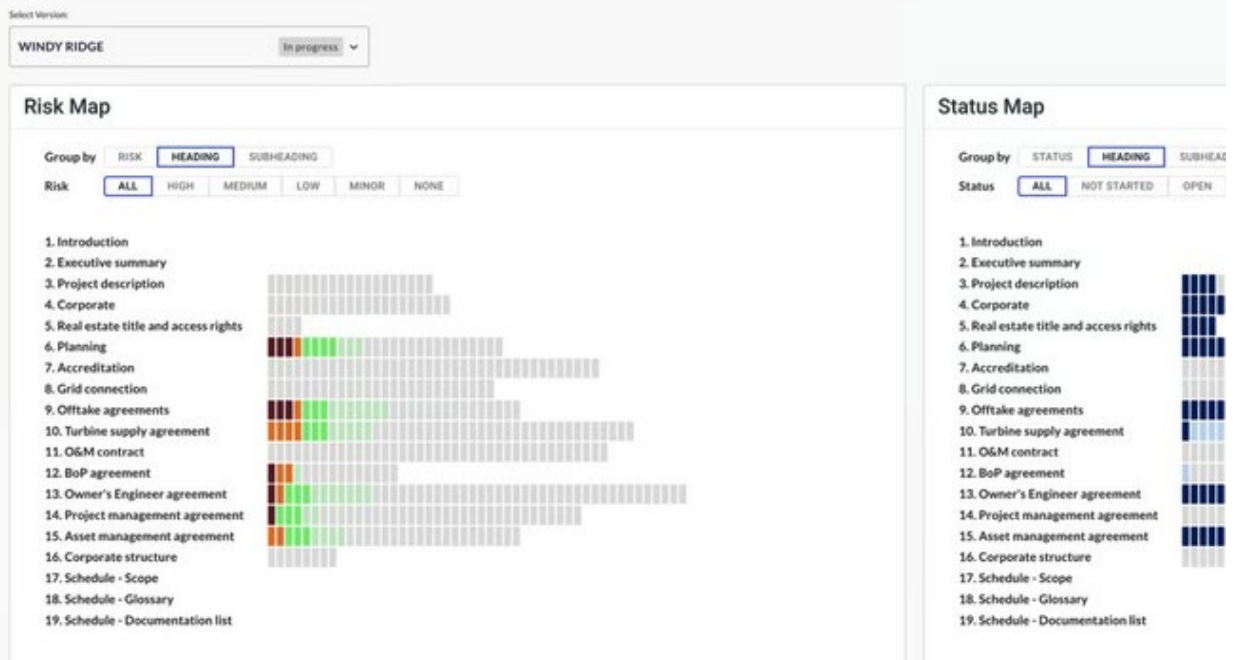
at speed and scale is vital to expedite clean-energy investment.

➤ **2) Client centricity:** With more complex deals and shorter transaction time frames, traditional static deliverables, often delivered late in the day, will no longer cut it. Deal teams are demanding faster and earlier insights to critical issues and effective interactive collaboration with their full advisory team.

➤ **3) Emerging regulatory requirements:** New requirements for climate risk assessment and other forms of ESG assessment will be increasingly high on the agenda of capital providers, bringing further complexity to the due diligence process.

Advisers have an opportunity to start on the front foot by adopting digital tools that can adapt to changing requirements, while simplifying the reporting process for clients.

➤ **4) Technological and market complexity:** Investor scrutiny on emerging technologies such as storage, floating wind, and green hydrogen, coupled with new financing and offtake structures, are driving a focus on technical and financial risk management. The ability to support decision making will be a competitive advantage to advisers supporting the deployment of complex new projects.



New requirements for climate risk assessment and other forms of ESG assessment will be high on the agenda of capital providers. (Courtesy: LiveDiligence)

LiveDiligence has been designed to simplify the process of removing investment risk to speed up project financing and deployment, while preserving the specialist knowledge that experienced advisers bring.

The platform creates a collaborative, single source of truth for technical, legal, insurance, and financial due diligence providers – streamlining traditional due diligence processes.

To date, the platform has been used to support more than 400 renewable energy transactions, by more than 700 professionals across 170 different organizations.

MORE INFO www.livediligence.com

Vestas appoints new people and culture officer

Vestas recently appointed Anne Pearce to the position of chief people and culture officer. Beginning in January, Pearce will become executive vice president of people & culture and will join Vestas' executive management team.

Pearce comes from a position as vice president of human resources at Shell plc, one of the world's energy majors.

In the role, Pearce will lead the continued development of Vestas' P&C organization and efforts to attract, develop, and retain employees.

Prior to joining Shell, Pearce built her international profile through HR leadership roles within industrial companies in North America, EU, and Asia Pacific.



Vestas recently named Anne Pearce as its new chief people & culture officer. (Courtesy: LinkedIn)

"We're excited to welcome Anne to Vestas to lead People & Culture organization, services, and operations as well as leadership across the company to the next level," said Henrik Andersen, Vestas President and CEO. "The energy transition requires us to have the right people at the right time and place and elevating our P&C

organization further is key for us to create the organization and operations that allow us to grow sustainably in the future.

Anne is a seasoned international profile that brings a wealth of experience from leading companies, including an energy major like Shell, and we look forward to having her on team Vestas."

"I am delighted to be joining Vestas as CPCO and excited to be part of the Vestas' journey to become the global leader in sustainable energy solutions," Pearce said. "I look forward to working closely with executive management and the People & Culture management team and organization on building Vestas' organizational capability and leadership to thrive in the energy transition." Pearce was born in New Zealand before moving to Australia and now lives in the United Kingdom.

Prior to joining Vestas, she had leadership positions in AXA, Bluescope Steel, ArcelorMittal, and Shell.

As part of joining Vestas, she will relocate to Denmark.

MORE INFO www.vestas.com

AMSOIL maintains EcoVadis silver medal

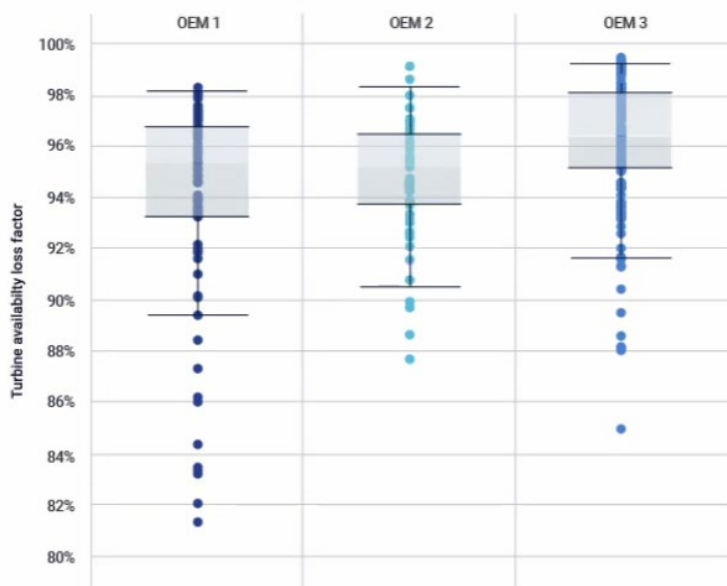
AMSOIL maintains its silver medal from EcoVadis, a leading evaluator of corporate sustainability. The EcoVadis assessment evaluates 21 sustainability criteria across four core themes: environment, labor and human rights, ethics, and sustainable procurement. AMSOIL was awarded a silver rating, an achievement earned by only the top 25 percent of more than 100,000 companies rated by EcoVadis worldwide.

“Ranking in the top 25 percent is an excellent accomplishment,” said Dave Meyer, AMSOIL senior VP, Industrial Business. “We complete a thorough assessment of our business sustainability practices and environmental management systems on an annual basis. EcoVadis helps us identify areas where we are succeeding, and areas where there’s room for improvement.”

EcoVadis’ ratings are based on international business sustainability standards, including the Ten Principles of the UN Global Compact, the International Labor Organization (ILO) conventions, the Global Reporting Initiative (GRI) standards and the ISO 26000 standard. The ratings provide an evidence-based analysis on performance and an actionable roadmap for continuous improvement.

The EcoVadis award indicates to partners and customers that AMSOIL is committed to evaluating and improving on environmental principles and long-term sustainability. The EcoVadis silver rating confirms the sustainability performance of AMSOIL. More than 100,000 businesses rely on EcoVadis to monitor and improve the sustainability performance of their business for environmental, social and ethical practices across 200 industry categories and 175 countries.

AMSOIL specializes in developing custom lubricants designed to achieve maximum protection, performance and efficiency in consumer and industrial applications. In 1972, AMSOIL



Clir Insight for Asset Development leverages 200 GW of data to improve technology selection and operation and ensures mitigation of risk. (Courtesy: Clir Renewables)

10W-40 Synthetic Motor Oil became the first synthetic motor oil in the world to meet American Petroleum Institute service requirements.

MORE INFO www.amsoilindustrial.com

Clir Renewables launches Insight for Asset Development

Clir Renewables, the market intelligence platform for wind and solar, has announced the launch of Clir Insight for Asset Development, a product that leverages 200 GW of data to improve technology selection and operation, and ensure mitigation of risk.

In an increasingly competitive market, developers are faced with a dynamic risk profile, considerable practical challenges, and uncertainty for successful execution of renewables projects. Leveraging more than 200 GW of industry operations and risk data, Clir’s new offering supports developers throughout asset development to evidence major technology selection and contracting decisions, improve accuracy of energy yield loss assump-

tions, and guide future operations and maintenance strategies.

Clir Insight for Asset Development navigates equipment selection and contracting by identifying technical manufacturer issues, timelines for operational maturity, relative attritional loss risk by technology type, controllable availability by manufacturer, and expected loss factors given site conditions.

Site loss factors and production vary by region and manufacturer, affecting energy yield loss assumptions. By employing new technologies with access to environmental and extreme weather data, grid and technology availability, degradation metrics, trends in equipment failure rates and repair intervals, and sub-optimal performance, developers can gain access to bespoke, accurate, and extensive market intelligence to ensure greater certainty in their financial and operational decision-making.

By leveraging data for accurate assumptions, renewables developers are able to create a more transparent and reliable project trajectory. This can support them in the process of securing the necessary initial funds for project construction, while ensuring positive



The Crowley enterprise has invested more than \$3.2 billion in maritime transport. (Courtesy: Crowley)

returns on investment in the operational phase.

“Clir Insight for Asset Development builds upon our existing product line, creating unparalleled insights

for pre-construction and early operational projects,” said Craig McCall, Clir Renewables chief revenue officer. “By arming developers with over 200 GW of industry data, we provide

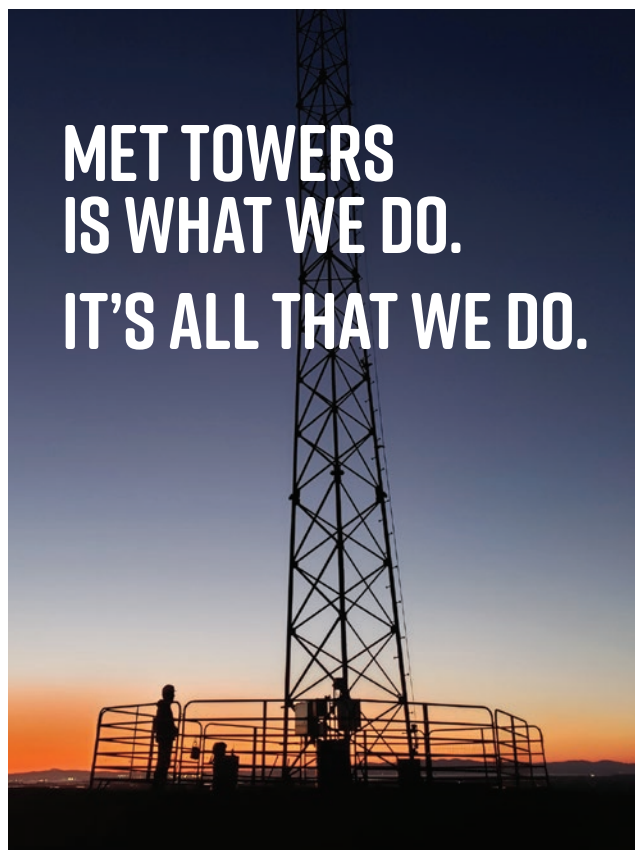
direct comparisons between existing technologies and strategies, giving clients the precise guidance they need to confidently design, build, and operate their assets. This enables improved decision-making to maximize project returns.”

Clir accelerates renewable energy production, improving the economics of projects and ultimately reducing the human impact on the planet by further incentivizing the shift away from fossil fuels. Founded in 2017, the company works with renewable energy investors and their asset managers across Europe, Africa, the Americas, and Asia.

MORE INFO www.clir.eco

Crowley praises Humboldt marine terminal grant

Crowley, a U.S.-owned and operated maritime, energy, and logistics solu-



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- Troubleshooting
- Risk mitigation and QC
- Safety compliant



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tions company, praised the announcement of a nearly-\$8.7 million federal grant to secure funding for the Humboldt Heavy Lift Marine Terminal for offshore wind. This grant provides funds to progress the project to “shovel ready” status including design and permitting preparation costs.

“With the help of the Port Infrastructure Development Program grant secured by the Humboldt Bay Harbor District, Crowley looks forward to advancing our collaboration in the development of the Humboldt Heavy Lift Marine Terminal in close collaboration with the Harbor District, County, Tribal Nations, and other key organizations and stakeholders,” said Bob Karl, senior vice president and general manager, Crowley Wind Services. “We also thank U.S. Rep. Jared Huffman for his support of the project. We are thrilled to have supported the Harbor District in the grant process. This marks another milestone in our path toward giving the county, state, and the nation a new source of energy that respects the environment and reduces greenhouse gas emissions. We take the great responsibility of delivering sustainable and positive economic impact for this community to heart.”

Crowley serves commercial and government sectors with \$3.4 billion in annual revenues, more than 170 vessels mostly in the Jones Act fleet and approximately 7,000 employees around the world — employing more U.S. mariners than any other company. Crowley serves customers in 36 nations and island territories through five business units: Crowley Logistics, Crowley Shipping, Crowley Government Solutions, Crowley Wind Services, and Crowley Fuels.

MORE INFO www.crowley.com

MET Group hires new CEO adviser

Swiss-based energy company MET Group has hired Alexander Alting von Geusau as adviser to the group CEO.



MET Group has hired Alexander Alting von Geusau as Group CEO adviser. (Courtesy: MET Group)

In this newly created role, he will be a member of the executive board of MET Holding and report directly to MET Group’s chairman and CEO, Benjamin Lakatos.

Alexander Alting von Geusau is an accomplished corporate finance executive with more than 25 years of experience across Asia and Europe.

Von Geusau has been managing director utilities and renewable since 2003 at ING Bank in London and played a role in various sector projects in the context of energy transition developments. In his capacity as Global Head for the Utility Sector at ING, he was responsible for the management of a multi-billion-euro lending portfolio and led numerous strategic transactions for most major utilities.

Von Geusau joined ING in 1997 in the project and structured finance department in Singapore, then moved to Corporate Finance in Hong Kong in 1999 to become the head of the utilities sector in Asia.

Prior to joining ING, he worked for 10 years as a corporate lawyer in an international law firm in Singapore, Rotterdam, and New York. He holds a Master of Laws degree from Leiden University in the Netherlands.

MET Group is an integrated European energy company, headquartered in Switzerland, with activities and assets in natural gas and power markets. MET is present in 15 countries through subsidiaries, 30 national gas markets, and

22 international trading hubs. MET has extensive experience in operating green (renewable) and flexible (conventional) energy assets, thus providing the widest possible support to energy transition. In 2022, MET Group’s consolidated sales revenue amounted to 41.5 billion euros, with a total traded volume of natural gas amounting to 109 BCM and total traded electricity of 67 TWh.

MORE INFO www.met.com

Oceantic Network hosts Ventus Award gala

The Oceantic Network (formerly Business Network for Offshore Wind), in partnership with Recharge, hosted its annual Ventus Gala in Boston November 9, honoring former Bureau of Ocean Energy Management Director Amanda Lefton and the 2023 Ventus Award finalists. The Ventus Gala is the offshore wind’s premier celebration, bringing together the industry to celebrate the year’s accomplishments, connect with peers, and honor those moving the industry forward.

The 10 categories, selected based on their significant contributions to the offshore wind industry, range from supply chain and workforce develop-



Former BOEM director Amanda Lefton was presented the Heronemus Award for Outstanding Achievement in Offshore Wind. (Courtesy: Oceantic Network)



ZTZ creates cloud-enabling server solutions that help the world's leading companies turn their ideas into realities. (Courtesy: ZTZ Services)

ment to engineering and technical innovation. Finalists' projects include digital tools, engineering solutions, and targeted initiatives to advance the industry and its supply chain.

This year, the Heronemus Award for Outstanding Achievement in Offshore Wind was presented to former Bureau of Ocean Energy Management (BOEM) Director Amanda Lefton for her work to streamline the federal permitting process and accelerate offshore wind development during her tenure at BOEM from 2021-2023.

"The Ventus Gala is a celebration of the offshore wind industry's collective achievements over the past year—and there's a lot to celebrate in 2023, from the first turbine blades in the sky to new vessel announcements and a series of supply chain firsts," said Liz Burdock, founder and CEO of Oceanic Network. "It's also a time for us to come together to recognize the groundbreaking work being done by individuals, companies, and organizations to push our industry forward."

A portion of all Gala ticket and table

sales went toward funding the Rising Star Offshore Wind Scholarship, which awards college-bound high school seniors who are interested in pursuing a career in offshore wind with funding toward tuition.

MORE INFO www.oceanic.org

ZTZ Services opens new HQ in Florida


ZTZ Services International had its ribbon cutting, reception, and open house at its new world headquarters December 15 in north Miami, Florida. The new ZTZ World Headquarters provides modern conference space for meetings and classroom training, space for additional production lines to meet the growing demand for its products, and a secure space for a planned monitoring operations center serving clients in the electric utility industry.

"On December 15, we will launch a new building not just with modern fa-

cilities but as a launch pad for further growth well into the future," said Daniel Berler, ZTZ CEO. "This new facility includes ample parking, is handicap accessible, and is well located near two international airports, making it easier for our clients."

ZTZ is a world leader for on-line continuous diagnostic monitoring for electric utility equipment—primarily high-voltage substation transformers and related high-value transmission assets. ZTZ serves utility clients in North America, Europe, China, and former Soviet states.

In addition to traditional electric utility clients, ZTZ also serves many renewables (solar & wind) operators and operators of data centers. ZTZ systems provide the same benefits to all, reduction of failure risk.

Transformer failure interrupts electric power to customers, can cause vast environmental damage, and cost operators millions of Dollars in unnecessary replacements. 

MORE INFO ztsystems.com/zts-services

IN FOCUS

CONSTRUCTION & TRANSPORTATION

HEADWINDS FOR OFFSHORE CONSTRUCTION

Installation and maintenance of offshore wind projects requires highly specialized equipment and labor. (Courtesy: Shutterstock)



Development of the offshore wind industry in the United States faces some hurdles, but reasons for hope remain.

By E. CARTER CHANDLER CLEMENTS

Renewable energy development in the United States has grown significantly in recent years. That development is driven by governmental requirements, including renewable portfolio standards; financial incentives, including renewable energy tax credits and the Inflation Reduction Act (IRA) of 2022; and corporate demand for clean-energy alternatives. Total annual U.S. electric generation from wind energy increased from approximately 6 billion kWh in 2000 to approximately 380 billion kWh in 2021. Most renewable energy in the U.S. comes from land-based wind and photovoltaic solar installations, and in 2022, land-based wind turbines provided more than 10 percent of total U.S. utility-scale electricity generation.

The offshore wind industry in the U.S. has been slower to develop, despite being well-established in Europe and taking off quickly in China. In 2021, President Joe Biden announced a goal of developing 30 GW of offshore wind generating capacity by 2030, but the nascent U.S. offshore wind energy industry has a long way to go in order to reach that ambitious target.

U.S. OFFSHORE PROJECTS

Currently, there are seven wind turbines spinning off the U.S. coast with a combined generating capacity of 42 MW: five of which comprise the 30-MW Block Island Wind Farm and two of which make up Dominion Energy's 12-MW Coastal Virginia Off-shore Wind Pilot Project. According to the U.S. Department of Energy's (DOE) Offshore Wind Market Report for 2023, which covers U.S. projects in various stages of development through May 31, 2023, another 932 MW of offshore wind generation is under construction. This total includes the 132-MW South Fork Wind Project off the coast of New York and the 800-MW Vineyard Wind Project, located approximately 14 nautical miles south of Nantucket and Martha's Vineyard, off the coast of Massachusetts. Vineyard Wind began construction in late 2021 after years of permitting delays and legal challenges from coastal residents and the fishing industry. The project developers announced installation of the first of the project's 62 planned turbines in October 2023. The same DOE report cites another nearly 21,000 MW of offshore wind projects undergoing permitting and more than 30,000 MW in pre-permitting stages of development, including planning and site control.

In late September, the Bureau of Ocean Energy Management (BOEM) approved the Construction and Operations Plan for Ocean Wind 1, a project that Danish wind developer



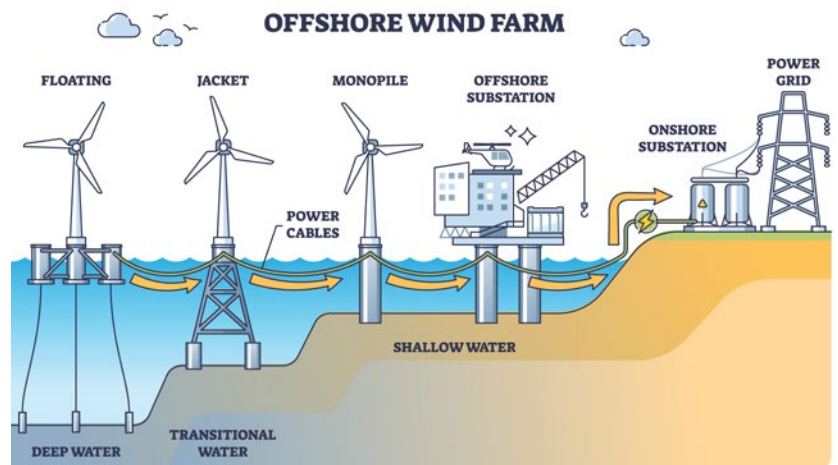
Currently, there are seven wind turbines spinning off the U.S. coast with a combined generating capacity of 42 MW: five of which comprise the 30-MW Block Island Wind Farm and two of which make up Dominion Energy's 12-MW Coastal Virginia Off-shore Wind Pilot Project. (Courtesy: Shutterstock)

Orsted planned to construct approximately 15 miles off the coast of New Jersey. On October 17, 2023, the County of Cape May, New Jersey, together with several business with interests in the tourism and fishing industries, filed suit in federal district court challenging the adequacy of BOEM's environmental review of the project, alleging that development of the project will cause significant adverse impacts to the endangered North Atlantic right whale and other marine mammals, as well as the local tourism and fishing industries, and other harms. Then, in late October, Orsted announced it was ceasing development of Ocean Wind 1, as well as Ocean Wind 2, another similarly-sized project that was planned off the New Jersey coast, citing rising interest rates and rising inflation.

DEVELOPMENT CHALLENGES

There are many reasons for the slow development of the offshore wind industry in the U.S.

First, the energy market in the U.S. is much different



The offshore wind industry in the U.S. has been slower to develop, despite being well-established in Europe and taking off quickly in China. (Courtesy: Shutterstock)

from the markets in Europe and Asia where the offshore wind industry has been quicker to develop, with less expensive fossil-fuel-fired generation and more onshore wind and solar options available, as well as additional legal requirements, environmental review obligations, and opportunities for legal challenge by opponents of an offshore wind project.

Second, installation and maintenance of offshore wind projects requires highly specialized equipment and labor that are not readily available in the U.S., making these projects expensive to construct and operate. Further compli-



The International Energy Agency projects increased growth in offshore wind development globally over the next several years, with the United States becoming a sizeable market by the end of 2027. (Courtesy: Shutterstock)

cating matters, under the Jones Act, only U.S.-flagged ships that were built in the U.S. and crewed by Americans may move cargo between U.S. ports. This precludes developers from bringing in large, specialized ships and crews from Europe and Asia to assemble the massive turbines on the outer continental shelf, and there are currently few Jones Act compliant vessels capable of doing that work.

Projects that have been built and are under construction have been forced to develop work-arounds, which include transporting project equipment and components out to specialized assembly vessels brought in from outside the U.S.

► Third, given the nascent state of offshore generation, there is little existing transmission infrastructure in the U.S. to get energy to shore and onto the electric grid. As a result, the cost of transmission – including installation of hundreds of miles of undersea cables – is added to the already-high cost of project development.

► Fourth, as with Vineyard Winds and Ocean Wind 1, offshore wind projects often face legal challenges from coastal residents who do not want wind turbines in their viewshed and from the fishing industry. Recent challenges have also included claims that development of offshore wind projects harm whales and other marine life.

PATH TO CONSTRUCTION

The costs associated with construction, combined with the availability of relatively inexpensive and abundant energy available from other sources, often threaten the economic viability of off-shore wind projects. In recent months, there have been reports of offshore wind developers considering writing off previous investments due to supply chain problems and other economic issues and seeking to cancel power

purchase agreements that were negotiated when economic conditions appeared more favorable. That BOEM held a lease sale in August for development opportunities in the Gulf of Mexico and received no bids for two of the three available lease areas provides more than anecdotal support to these reports.

Despite the headwinds facing America's incipient offshore wind industry, there are reasons for hope. The Biden Administration stands by its target of developing 30 GW of offshore wind capacity by 2030, and significant progress may be made even if industry falls short of that goal. Earlier this year, BOEM issued a proposed rule that would update and modernize the regulations governing offshore wind energy development. According to the most recent Unified Agenda of Regulatory and Deregulatory Actions, a final rule is expected in the first quarter of 2024. Additionally, the IRA offers energy investment tax credits for investment in offshore wind projects that begin construction by January 1, 2026, which are expected to accelerate development efforts over the next several years.

The International Energy Agency projects increased growth in offshore wind development globally over the next several years, with the United States becoming a sizeable market by the end of 2027. While current legal and economic conditions in the United States are less favorable to the development of the offshore wind industry than in other parts of the world, many remain cautiously optimistic. ✍

ABOUT THE AUTHOR

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HOW SPIRAL WELDING IS REVOLUTIONIZING WIND-TURBINE MANUFACTURING

The technique requires only one machine to construct a tower section, and it can produce towers up to twice as tall and 10 times faster than conventional towers. (Courtesy: Keystone Tower Systems)

Designed to use coiled steel, the manufacturing process behind spiral welded turbine towers will enable a new segment of highly efficient domestic steel mills to supply the wind industry.

By WIND SYSTEMS STAFF

Manufacturing costs and logistics are two challenges to rapidly integrating more renewable energy into the U.S. power system. This is especially true for tall land-based wind turbines, but Colorado-based Keystone Tower Systems is changing how wind turbines can be manufactured, transported, and installed.

Taller land-based wind turbines harness and generate more power than shorter ones, because they can access faster wind speeds at greater heights. But larger wind turbines are harder to construct and require more steel to build. They're also difficult and costly to transport from the manufacturing plant to the wind farm, because the tower is often too large to fit under highway overpasses or across bridges.

DOE ASSISTANCE

With more than \$7 million from the U.S. Department of Energy (DOE), Keystone Tower Systems has developed a solution: a spiral-welding technique, borrowed from the steel-pipeline industry, to build some of the largest turbine towers on the market. Spiral welding is when the steel used to make the tower is curled into a cylinder; essentially, these towers are built from meters-wide steel plates.

The technique requires only one machine to construct a tower section, and it can produce towers up to twice as tall and 10 times faster than conventional towers. These towers are produced using less steel, so they could be more affordable than conventional towers, too. They can even be manufactured on site at the wind farm, eliminating transportation issues.

Keystone's cofounder and CEO Eric Smith, an expert in machine design and the wind industry, and his 75 staff members built Keystone's first spiral-welded tower for a 2.98-MW GE wind turbine. This is the first spiral-welded wind tower in commercial use, representing a significant advancement in overcoming key obstacles to bringing affordable wind energy to more locations throughout the United States.

MULTI-YEAR COLLABORATION

The installation was the result of a multi-year collaboration between Key-

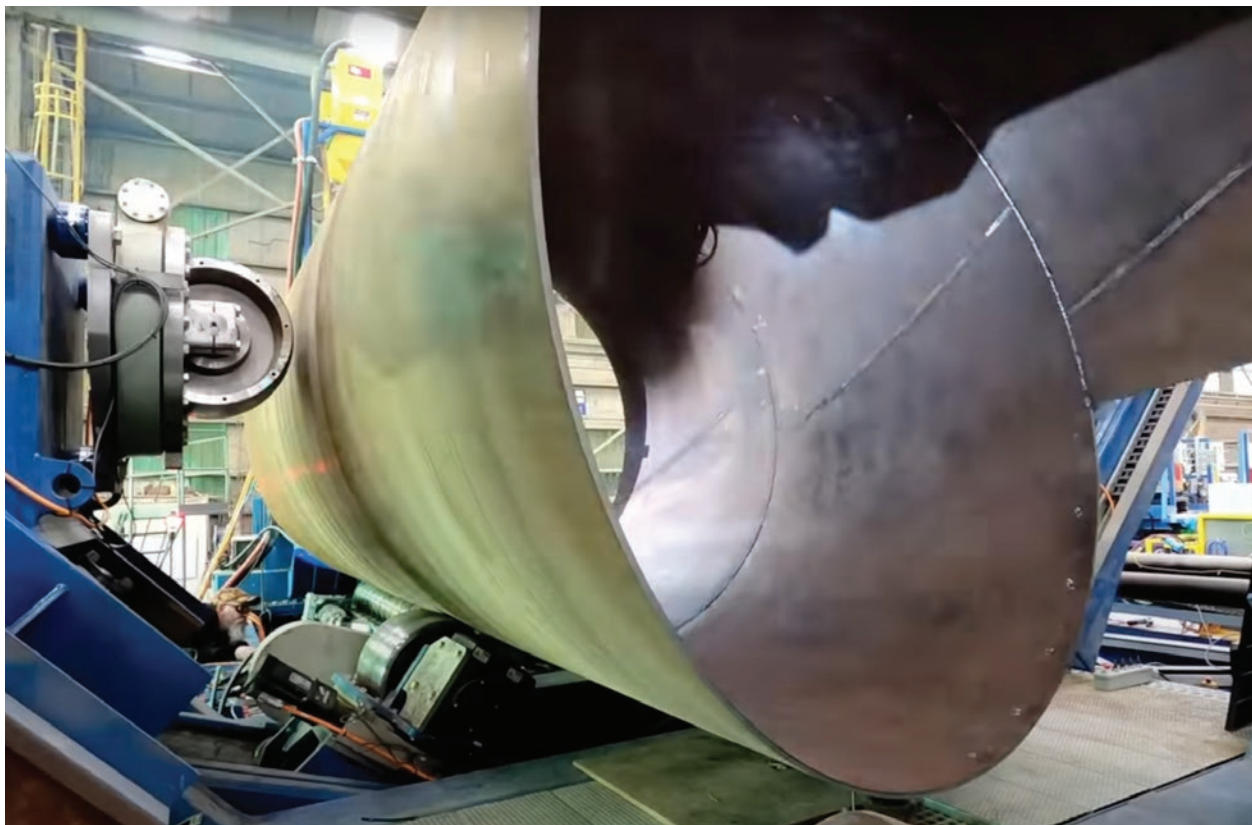
stone and GE to design and produce spiral-welded towers for GE wind turbines.

The tower was manufactured at Keystone's factory in Pampa, Texas, in the Texas Panhandle. The brownfield factory was built at an idled facility that formerly made drilling equipment for the oil-and-gas industry and will ultimately bring back nearly 200 manufacturing jobs to the region. When at full capacity, the factory will be capable of producing about 1 GW of towers per year. This increase in domestic manufacturing capacity is coming online at a critical time with a significant expansion in need for wind-turbine components driven by the passage of the Inflation Reduction Act.

Keystone's tapered spiral welding process brings the speed, quality, and consistency of automated manufacturing to wind-tower manufacturing. Keystone designs and builds its own custom spiral welding manufacturing equipment. The manufacturing process is designed to use coil steel, en-



Keystone's tapered spiral welding process brings the speed, quality, and consistency of automated manufacturing to wind-tower manufacturing. (Courtesy: Keystone Tower Systems)



These towers are produced using less steel, which can make them more affordable than conventional towers. (Courtesy: Keystone Tower Systems)

abling a new segment of highly efficient domestic steel mills to supply into the wind industry.

Before the Keystone team could even dream of building tall wind-turbine towers, they successfully competed for funding through the Small Business Innovation Research program. From 2012 to 2019, they were awarded \$3.7 million to design the manufacturing process and show the company's potential for cost-effective expansion.

Then, in 2019, DOE's Wind Energy Technologies Office awarded Keystone \$5 million to demonstrate its 160-meter spiral-welded tall wind-turbine tower. Keystone worked with wind-turbine manufacturing partners to design a commercial-scale tower ready for installation.

Smith said it hasn't been easy being a small business in the wind industry.

"There's no way to be competitive unless your business is super large, so it's difficult to start from nothing, which is why support from DOE has been integral," he said.

PRODUCTION RAMPING UP

Keystone is now ramping up production of spiral welded towers, with additional deliveries scheduled for the first quarter of 2023. The first product is an 89-meter-tall spiral welded tower for the GE 2.8-127 turbine, designed to be used interchangeably with GE's conventional 89-meter-tall tower.

The spiral tower received a component certification from T V NORD for a 40-year lifetime. Keystone and GE have also collaborated on a tower design for the GE's 3-MW turbine platform and have signed a multi-year supply agreement for spiral towers from Keystone's Pampa factory.

"This is the culmination of a dream we had to bring advanced manufacturing to the tower industry to help drive down the cost of wind energy and expand where wind is competitive into new regions," Smith said. "I'm very proud of the years of hard work our team has invested in developing and scaling up tapered spiral welding."

Keystone Tower Systems is just one example of the importance of funding innovative small businesses as the nation transitions to a clean-energy economy.

"This collaboration with Keystone is an example of GE's commitment to working with partners to bring new and innovative technology to the wind industry and advance domestic manufacturing," said Vic Abate, GE Renewable Energy's CEO, Onshore Wind. "We are delighted to be a part of this exciting opportunity for our workhorse products, with the goal of providing affordable, sustainable renewable energy to our customers and helping to deliver on the energy transition." ✎

MORE INFO

keystonetowersystems.com

REGISTER TODAY

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 Oceanic 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.



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PROFILE

ALL METALS & FORGE GROUP

MANUFACTURER OF OPEN DIE FORGINGS AND SEAMLESS ROLLED RINGS

All Metals & Forge Group is an ISO 9001:2015 and AS9100D manufacturer of custom and standard open die forgings and seamless rolled rings. (Courtesy: All Metals & Forge Group)

For more than 50 years, All Metals & Forge Group has produced custom and standard open die forgings and seamless rolled rings in a host of different alloys for a wide range of industries.

By **KENNETH CARTER** ▀ Wind Systems editor

It's no small testament to be able to say a business has been going strong for more than half a century, but All Metals & Forge Group has been manufacturing and selling open die forgings and seamless rolled rings to a variety of industries for 51 years.

And if Lewis Weiss, the company president and CEO, has anything to say about it, that success will continue for another 50 years.

All Metals & Forge Group is an ISO 9001:2015 and AS9100D manufacturer of custom and standard open die forgings and seamless rolled rings in carbon steel, alloy steel, stainless steel, tool steel, nickel alloys, cobalt, aluminum, copper, and titanium. Forged shapes include large flat and hex bars, blocks, gear blanks, all flange shapes, flanged shafts, step shafts, discs, hubs, rings, cylinders, and sleeves. Industries that use the company's services include aircraft, aerospace, automotive, chemical, construction, defense, energy, engine and turbine, food processing, hydro, metalworking, mining, oil and gas, petroleum and power generation, pulp and paper, and shipbuilding.

SERVING GEAR-RELATED BUSINESSES

To that end, about 60 percent of All Metals & Forge Group's business is gear related, according to Weiss.

"Seamless rolled rings is a primary product and is used in the gear industry for manufacturers to produce gears," he said. "We can make rings up to a 200-inch diameter and down to about a 4-inch diameter. We do some things that other forge shops don't do. We always supply rough machines parts with an RMS finish — sometimes designated by the customer. But typically, we do a 250 RMS or 125 RMS. Sometimes, if a customer wants 64 RMS, we'll do that. We drill holes; we can do contour forgings."

When it comes to the gear industry, those businesses typically want a clean finish, according to Weiss.

"Some of the forge shops don't do this; they'll give them a raw unmachined part," he said. "We give them a rough machine part. It saves them time, and it saves them wear and tear on their equipment because we've already taken off the first rough cut of the ring. All-inclusive in our pricing is that we will do ultrasonic testing, which obviously is checking the parts internally for cracks, pits, voids, and so on. We do that as a matter of course. If somebody buys 1,000 rings from us, every part gets ultrasonically tested, and we don't charge extra for it. It's in the price, but our price is so competitive that we can give them a machine-ultrasonically-tested part for less money than a raw forged ring."

UNIQUE CUSTOMER APPROACH

That extra mile of service has made All Metals & Forge Group quite competitive in the industry, according to Weiss.

But the company offers an even more unique approach with its customers. With every new customer, Weiss and his team sends them a sample, but it's not just any sample. It is a physical, hands-on example that is able to demonstrate a variety of All Metals & Forge Group's skills.

"We send this out to a new customer who knows nothing about us and maybe doesn't understand or can't appreciate what we supply," he said. "This is clearly rough machined with drill holes and with every one of the corners, the chamfer is all different."

The chamfered edge examples serve to show how fine that can be. The sample is also engraved with heat numbers (and the company's name and phone number, obviously). It also includes several RMS finish examples — 250 RMS on one side and 125 RMS on another, according to Weiss.

"The customer gets a real good idea of what they're going to get," he said. "This has been a very successful tool for us to send out to our clients. I like doing things that are different."

MORE THAN JUST CUSTOMERS

All Metals & Forge Group takes a vested interest in its customers, so much so that Weiss said he sees them as more than just customers.

"We like to partner with our customers; I don't just want a client; I want a partner," he said. "I want to help them get an order so that we can get an order; 80 percent of our business is legacy business."

And as the company's business continues to grow, that means that the 20 percent of those new customers end up being legacy accounts as well, according to Weiss.

"That's been our philosophy, and it's worked extremely well for us," he said.

All Metals & Forge Group has been registered as an ISO company since 1994, which includes an ISO 9000 rating. Since 1998, the company has achieved its AS 9100 rating, which is the aerospace version of ISO.

RENEWABLES SECTOR

Another growing industry that All Metals & Forge Group supplies products to is the wind-energy industry, according to Weiss.

"We are also involved with wind, and with wind, there are turbines, and inside the turbines are gears that are forged," he said. "We supply those parts for wind energy as well."

Weiss is quick to point out that his company has always been an early adopter in a variety of ventures, which makes renewable energy customers a foregone conclusion.

"For example, All Metals and Forge Group was the first metals company in the United States that had its ISO registration in 1994," he said. "I got a lot of pushback from employees, but the day that we got our certificate in the mail, one of the



All Metals & Forge Group has been registered as an ISO company since 1994. (Courtesy: All Metals & Forge Group)

salesmen got a phone call from a company in Wisconsin, and they said, 'I have an inquiry. I need to buy this product; however, my customer has required that I only buy it from an ISO-registered company, and I can't find anybody.' And that was the first order — the first day that we got the registration. Once that one salesman got it, we got a \$60,000 order. And I never got pushback after that. Everybody got it."

So what started out as a marketing tool became an integral part of the company's essential offerings as industries eventually made ISO certifications standard operating procedures, according to Weiss. That's just one example of how Weiss and his team have tried to stay ahead and competitive throughout its long history.

'MANUFACTURING TALK RADIO'

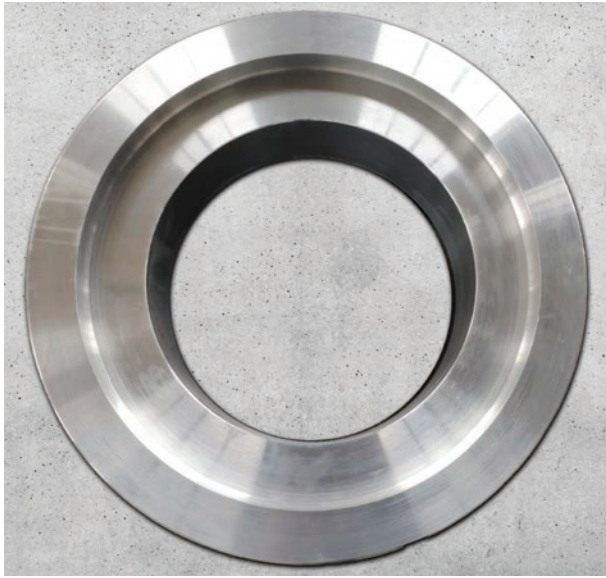
All Metals & Forge Group's recent history has pushed the company into the popular podcast space.

"I come from, as my age indicates, the radio era, and I constantly listen to radio; I love radio," Weiss said, who recently turned 80. "In 2013, I came up with an idea about getting more of a message out to the manufacturing sector about manufacturing. So, we created a podcast called 'Manufacturing Talk Radio.'" Since its inception, "Manufacturing Talk Radio" has done more than 750 shows, and at the beginning of the year, Weiss said they started syndicating AM and FM radio stations throughout the country.

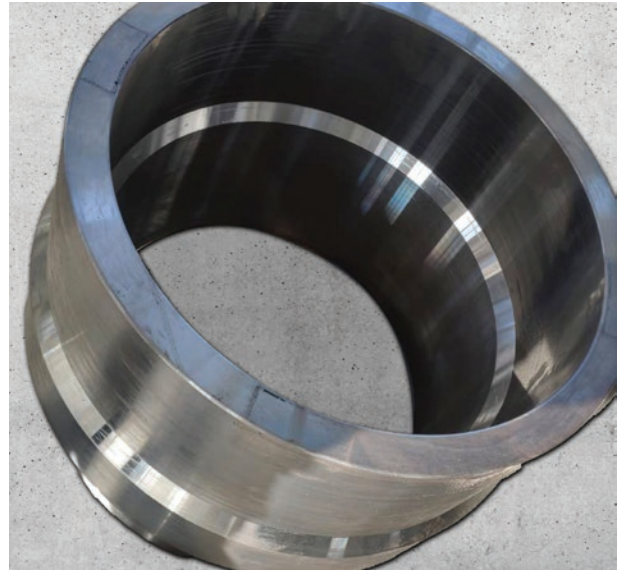


Every new customer receives a physical, hands-on example that is able to demonstrate a variety of All Metals & Forge Group's skills. (Courtesy: All Metals & Forge Group)

"We are on one radio station in upstate New York, and the numbers are amazing of the people that we are reaching, as well as the messages that we are getting out to the audience — the audience mainly being manufacturing, including a lot of students, universities, research labs, and publications such as yourself," he said. All Metals & Forge Group's podcast is just one way Weiss said the company is embracing tech-



Forgings are a custom-made product with specific ultrasonic and machining requirements and made of different alloys. (Courtesy: All Metals & Forge Group)



All Metals & Forge Group open die forgings and seamless rolled rings can be manufactured with carbon steel, alloy steel, stainless steel, tool steel, nickel alloys, cobalt, aluminum, copper, or titanium. (Courtesy: All Metals & Forge Group)

nology and staying at the forefront of the latest innovations.

“AI is the big thing now — machine learning,” he said. “We’re involved in all of these things, and from two aspects: We’re a supplier of parts forgings involved in these various industries as well as supplying to other companies and manufacturers about how to improve, how to run your business, how to deal with the skills gap, how to deal with new technology, and software.”

MANUFACTURING OUTLOOK E-ZINE

In addition to the “Manufacturing Talk Radio,” All Metals & Forge Group has been publishing a monthly e-zine for the past several years to replace its email newsletter established in 1988.

Manufacturing Outlook is a publication educating, informing, and alerting its subscriber base about the “outlook” for all things manufacturing in a looking forward approach, according to Weiss.

CHALLENGING WORK

Even with all the company offers, Weiss said every job is still a challenge — one that he welcomes.

“Forgings are a custom-made product: They have specifications; they have ultrasonic requirements; they have machining requirements; they’re different alloys,” he said. “The past three years have been particularly a challenge with regards to COVID disruption in the supply chain. Now we have issues with inflation, which has really gotten out of hand but seems to be improving a bit. And there are other issues that don’t necessarily directly involve the customer, but we do have geopolitical issues, China issues, Russia is-

sues, and all of these things in one way or another do affect us. And not only us at All Metals & Forge Group, but us as in our manufacturing sector in this country. So, to that extent, we do work with, talk to, and engage with our customers.”

With all its offerings, both physical and virtual, All Metals & Forge Group has been able to carve out quite a significant niche within the forging industry and the manufacturing sectors that need its products, according to Weiss. And that success always comes back to keeping an eye on the future.

“We sometimes have our customers on our show,” he said. “It’s a video podcast, and it can be seen on YouTube, Spotify, and all the rest of the platforms, and the numbers that we’re seeing are of people who are interested in manufacturing, including kids.

The college thing is getting to be old school almost; 40 percent of college kids don’t graduate, but they still wind up with a \$200,000 debt. But with manufacturing, three years ago, four years ago, you never heard about manufacturing in the news media — never heard of it. Now you hear about it pretty regular.”

To be sure, Weiss’ tenacity also plays a large part in his company’s success, as well at what comes next.

“As an early adopter, I’ll be there; I’ll be 90, but I’ll be there,” he said. “I love dealing with people in the manufacturing sector, and I’ve been doing it for over 50 years. It’s extremely educational. The people are really terrific. They’re hard workers, particularly the people who own businesses. They appreciate things like (our podcast), which is educational to them.”

MORE INFO steelforge.com



Liz Burdock

President & CEO ▀ Oceanitic Network (formerly Business Network for Offshore Wind)

“Offshore wind is still the cornerstone and the foundation of our organization; we’re broadening our mission to reflect how the industry is evolving.”

▀ **The Business Network for Offshore Wind has gone through a recent rebranding campaign. What is the new name and the significance behind this new identity?**

The new name is Oceanitic Network. We wanted to make sure that we kept “network” in our name because we’re not moving away from the fact that this organization, since its inception, has been about bringing people together to establish the business relationships they need. Initially, it was the offshore wind supply chain, but now, with Oceanitic, it is the ocean renewables supply chain. What we mean by ocean renewables are those sectors that are connected to offshore wind in some way, including green hydrogen produced from offshore wind, floating solar, wave, and tidal. What we’re seeing in Europe are hybrid wind parks, essentially, where they are combining technologies. They’re looking at the viability of floating solar, along with wave, and offshore wind to produce 100 percent sustainable energy.

This is great for a couple of reasons: One, it maximizes the ocean space and makes sure there is room for shipping and fishing. Then, there are also cost savings mechanisms. We can use a shared grid. We can use the same supply chain.

There are a lot of synergies by coming together under the brand of Oceanitic Network. We want to bring the passion, commitment, and dedication that we’ve brought to offshore wind for the last decade to these other ocean renewables, because together we all know that we’re going to need a lot more energy by 2050. We felt like offshore wind was the tip of this spear, so to speak. We did a good job with offshore wind, and we’ve been an effective organization for the offshore wind industry and supply chain. Now, let’s bring along these other technologies that are nascent, as well.

▀ **Have you introduced your name to the offshore wind industry, and what’s been the reaction to that?**

The reaction has been overwhelmingly positive. I have to be honest with you; I was a little concerned. We have some very

dedicated members who have been with us for 10 years and just truly love us, and we love them. I was afraid they would think we were going to move away from offshore wind, but we have assured them we’re not. Offshore wind remains the cornerstone and the foundation of our organization; we’re just broadening our mission to reflect how the industry is evolving. Our members recognize this offers more opportunities and have been extremely positive about that.

I think it gave a renewed sense of excitement to the industry. When I see people talking on LinkedIn, it’s that renewed commitment to looking forward and pushing yourself. They see more opportunities and a way they can expand, which, of course, they see as a good thing.

▀ **Other wind-energy organizations have expanded in recent years: AWEA, which became the American Clean Power Association, and CanWEA, which has become CanREA. Did that factor into your reasons for the rebranding and the expansion?**

It didn’t. All the technologies that we are now focused on are all complementary to one another. We’re looking at hybrid offshore wind parks. We’re not looking at, for example, advocating for floating solar completely on its own. There has to be an integration to offshore wind; that’s the difference. We’ve continued to keep a narrower focus than other organizations that include onshore, batteries, etc.

▀ **Will this rebrand change how your organization interacts with the offshore wind sector?**

No, we continue to advocate for U.S. market policies as well as educate, train and — most importantly — continue to connect people to build the offshore wind and other ocean renewables supply chain. What this means is we’ll now continue on a broader journey of educating our members about floating solar, wave and tidal, how it can be green hydrogen, how green hydrogen can be produced from offshore wind,



how floating solar and wave and tidal can be combined with offshore wind to produce that 100-percent renewable power. We'll continue to help that supply chain evolve. Again, these are all the same. If you're looking at wave or tidal, you're looking at floating solar. It's the same supply chain that's going to supply offshore wind. It's offshore construction. It's going to be the same companies just with an expanded scope.

A good example of that is IPF (International Partnering Forum), coming up in April in New Orleans. It shows how we see the industry growing. We're still committed to IPF. We're growing it each year. It grows and grows. It will be mostly focused on offshore wind, but we're going to add a Floating Summit (FloatOn) in 2024. There's also going to be a track that focuses on power-to-X, which will bring in those other ocean renewables that reflect where the market is currently.

▀ Speaking of the supply chain, how will becoming the Oceanic Network help build the offshore supply chain?

It will allow new entrants into the sector — maybe people that we haven't worked with before. It will help build it out and make it a deeper supply chain. It's no secret offshore wind, right now, is going through some headwinds, and there are some cost factors that we're seeing. But I'm hopeful that, by combining these technologies together into hybrid parks, it will help reduce costs. It will also provide a better energy profile that helps increase revenue for the developers. This will allow projects to be planned a little bit differently than they had before. It's not a solution that we're going to see anytime soon in the U.S., but it is something I hope to see in the next five to seven years.

▀ You talked about the International Partnering Forum. How will this affect that going forward?

We host somewhere between 72 and 79 workshops at IPF. A

portion of those will be dedicated to these ocean renewable technologies. We already had a track with green hydrogen, power-to-X, but we'll be looking at having more educational opportunities at the IPF to explain the other ocean renewables to the industry as we move forward and to hear the lessons learned from Europe. Europe is already doing pilots, with one in Portugal and one in the Netherlands. Learning from those lessons early — much earlier than we did with offshore wind — is going to be extremely beneficial to the industry overall. IPF will be the vehicle where we deliver that information.

▀ How do you see the rebranding being a positive force to the future of offshore wind?

It creates excitement; it generates new life. I really think it creates so many more opportunities for our members. This is a positive force for offshore wind, and it shows offshore wind isn't sitting out there in isolation anymore. It is now combined — or could be combined — with other technologies that help maximize the ocean base, cut costs, and employ the supply chain in new and additional ways. It's really beneficial, overall, for the industry. That's the feedback we've been getting.

▀ Is there anything else you'd like to mention that we didn't talk about?

It's important to note that this was our 10-year anniversary, so we were thinking, "What's going to happen for the next 10 years?" It became very clear that it was time to start expanding. As we're closing the 10-year celebration anniversary, it's exciting to be able to announce this new name and the expanded mission. ✌

MORE INFO

oceanic.org



The Eco Cable Protect wrapping system applies an extruded high density polyethylene mesh wrap to power cables, which delivers reduced project costs. (Courtesy: McGowan Environmental Engineering)

CONSTRUCTION

SSEN approves McGowan cable wrap

Scottish and Southern Electricity Networks recently approved McGowan Group's patented Eco Cable Protect for use on future projects. The cable wrapping system applies an extruded high density polyethylene mesh wrap to power cables, which delivers reduced project costs and an 85 percent reduction in CO₂e emissions compared to using traditional fine fill surround.

"This is a great example of how thinking sustainably can actually improve traditional project drivers like cost and time," said Shirley Rob-

ertson, SSEN head of strategic planning and sustainability. "Planning in enough time to think about the actual problem at the start of a project and all parties being open to doing things differently has delivered impressive results. Proving it's not one or the other, true sustainability thinking drives improvements across the board and for the long term."

The Eco Cable Protect cable wrapping system works with traditional open cut or, more environmentally friendly, trenchless cable burial methods were recently showcased at SSE's Burn of Whilk project. Comprising the installation of 21 kilometers of 33kV circuit in trefoil over predominantly unmade ground, including deep peat, the original design required providing a fine fill sand surround to the cable.

Using traditional fine fill surround would have generated an estimated 244 tons of CO₂e with more than 13,500 metric tons of fine fill required, equating to well over 700 HGV tipper movements, 21 kilometers of temporary roads required and large excavators and dumpers operating continuously to distribute the fine fill.

In contrast, the manufacture, delivery to site, and application of McGowan's proprietary cable wrap system generated just 37 metric tons of CO₂e with the wrap applied by a single machine similar in size to a 3-ton mini excavator and one operator and no requirement for temporary roads. By opting for Eco Cable Protect cable wrapping system, emissions at Burn of Whilk were reduced by 207 metric tons of CO₂e, or 85 percent.

Following the success of recent projects for SSEN, McGowan Group director Derek Mackay, was invited to deliver a presentation on the cable wrapping system at SSEN Distribution Sustainability supplier conferences in Reading and Perth.

“We love nothing more than working with partners like SSEN who share our passion for reducing the environmental impact of their projects and to have our new cable wrap technology accepted by SSEN for use on future projects is a game changer for both McGowans and how the industry approaches power line cabling in the future,” Mackay said.

With more than 80 kilometers of cable installed to date, CO2e emissions on these projects have been reduced by hundreds of metric tons and cost savings in the millions of pounds, and there have been no in-service cable faults and the cable wrap has had no

negative impact on cable performance. Sheath faults are almost eliminated when cable wrap system is used.

MORE INFO mcgowanltd.co.uk

CONSTRUCTION

DNV concludes first phase of joint industry project

DNV, the independent energy expert and assurance provider, has concluded Phase 1 of its joint industry project (JIP) aimed at establishing offshore substation standards for the floating wind sector. The collaborative industry effort has brought together 38 participating companies (including transmission operators, developers, component suppliers, engineering, procurement,

construction and installation contractors, and yards) to tackle the challenges associated with floating offshore substations.

With a focus on closing gaps in existing technology and standards applicable to floating substations, the JIP will help the wind industry meet its potential and contribute to the evolution of the global energy system.

The JIP's Phase 1 outcomes include affirming the feasibility of floating offshore substations (FOSS) and export cables, identifying technology gaps requiring attention, and highlighting the maturity of AC solutions compared to DC. The project also carried out a feasibility analysis for generic floater types and dynamic export cable concepts. Emphasizing a robust design process for integrated floating substations, DNV plans to incorporate the JIP's findings in the next update of DNV-ST-0145 for floating substations



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A collaborative industry effort has brought together 38 participating companies to tackle challenges associated with floating offshore substations. (Courtesy: DNV)



CIP manages 11 funds and has to date raised around 26 billion euros for investments in energy and associated infrastructure. (Courtesy: Copenhagen Infrastructure Partners)

and of DNV-ST-0359 for dynamic cables, both scheduled for 2024.

“Standards are important in emerging industries as they encourage innovation and competition while ensuring safety and reliability,” said Claus Christensen, Ørsted senior chief specialist. “It has been very valuable to work alongside 38 leading companies covering all scopes and disciplines in this project, and we look forward to floating substations being integrated to DNV-ST-0145. As the industry gains real project experience from designing and building floating substations, lessons learned need to be incorporated into the standard.”

“DNV, in collaboration with industry partners, had previously developed the widely used standard DNV-ST-0145 for offshore substations, primarily focusing on bottom-fixed installations,” said Kim Sandgaard-Mørk, executive vice president, Renewables Certification, Energy Systems at DNV. “During the past 10 years, this standard had played a crucial role, serving as a foundation for certifying electrical offshore substations. Through our predictive ETO research models, we recognized the growing trend toward floating wind. DNV initiated this joint industry project to develop standards specifically applicable to floating substations.”

“The JIP contributed to a joint understanding of the challenges in floating offshore substations, which are key components for the evolving renewable energy landscape,” said Kristin Berg, senior principal consultant, energy systems at DNV. “Our call for partners garnered significant interest, meeting the objective of establishing a joint understanding of best industry practice and technical requirements. Collaboration among industry experts is always instrumental in technology and standards development, and this will ultimately be beneficial for the whole renewables sector, as we facilitate the scaling of floating offshore wind projects.”

DNV is now initiating Phase 2 of this JIP, where Phase 1 participants and new participants will be invited to join. Phase 2 will build on Phase 1 deliverables and input received from the contributors.

MORE INFO www.dnv.com

CONSTRUCTION

Copenhagen begins Buffalo Plains construction

Copenhagen Infrastructure Partners (CIP), on behalf of its Copenhagen Infrastructure IV (CI IV) fund, has begun construction on Buffalo Plains, a 495-MW wind farm consisting of 83 Siemens Gamesa turbines in Vulcan County, Alberta.

CIP acquired Buffalo Plains in 2022 from ABO Wind. During construction, the project will create about 250 full-time jobs and, once operational, will produce enough clean energy to power more than 240,000 homes, providing economic and environmental benefits to the province of Alberta.

Borea, a leading Canadian renewable energy construction company, will be responsible for the construction of the project. Amazon, the technology company based in Seattle, Washington, has signed a power pur-



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Windscope is developing tools to enable asset managers to pair their inventory data with predictive maintenance data. (Courtesy: Windscope)

chase agreement to procure 415 MW of output from Buffalo Plains.

"We are pleased to announce the start of construction on the Buffalo Plains wind project, an important step in expanding our portfolio of best-in-class renewable energy projects in North America," said Tim Evans, partner and Head of North America at CIP. "This premier project demonstrates CIP's unique ability to execute on large and complex infrastructure projects that will provide local jobs and clean, renewable wind energy for many years to come."

Buffalo Plains represents CIP's second successful investment in Canada, following its investment in Travers Solar, Canada's largest solar project, which completed construction in 2022. Buffalo Plains is an important part of the 29-GW-plus portfolio of renewable generating assets (including offshore wind, onshore wind, solar PV, battery storage, pumped storage hydro, and transmission) that CIP has in development, construction or operation across North America.

Founded in 2012, Copenhagen Infrastructure Partners P/S (CIP) is a dedicated fund manager within greenfield renewable energy investments and a global leader in offshore wind. The funds managed by CIP fo-

cus on investments in offshore and onshore wind, solar PV, biomass and energy-from-waste, transmission and distribution, reserve capacity, storage, advanced bioenergy, and Power-to-X.

MORE INFO www.cip.com

INNOVATION

Windscope: More data integration will help with supply chain

More effective integration of predictive maintenance data and inventory data from component suppliers will be central to mitigating the impact of supply chain challenges on operational wind-energy projects. This is according to Windscope — a hardware-free platform for maximizing wind-turbine health and availability. At present, the wind industry faces a multitude of pressures in the face of inflation and the after-effects of the COVID-19 pandemic, which has disrupted manufacturing and stretched supply chains.

"To further the goals of the industry in a challenging economic climate, we need to create a more transparent environment in which predictive an-

alytics can be used to optimize maintenance of assets, taking into account lead times for components and supply shortages," said Joe Donnelly, Windscope CEO. "Ability to understand component condition is the keystone around which an optimized supply chain can start to form."

"The immediate benefits of such an approach are clear, but there is also huge potential for exciting innovations, such as live tracking of component prices for asset owners, enabling them to make well-informed procurement decisions and secure components at the most favorable pricing," he said. "In the future, we could even see automated ordering of components based on condition, further streamlining the procurement process, and reducing the administrative burden on stretched asset management and engineering teams." Windscope is developing tools to enable asset managers to pair their inventory data with predictive maintenance data.

"By creating stronger connections between operators and their supply chain, we can help overcome the challenges posed by aging fleets, increased lead times, and rising costs, ultimately ensuring the continued growth of renewable energy," Donnelly said. To address these challenges and promote efficient management of tight inventory schedules, Windscope has called for closer partnerships in the third party and OEM supply chains, in particular between asset managers and their component suppliers, facilitated by predictive maintenance software platforms.

By gaining access to component health data from operational fleets, suppliers will be able to anticipate when these components require replacement, enabling more efficient inventory management and procurement planning. In turn, keeping asset owners updated on a live basis about component stocks and their availability can help to reduce unplanned downtime, and enable asset managers to better prioritize maintenance.

MORE INFO www.windscope.com



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Katrick's Wind Panels can be fitted to existing structures, greenfield sites, and microgrids. (Courtesy: Katrick Technologies)

INNOVATION

Katrick wind panel tech shows promising energy capture results

Glasgow-based greentech company Katrick Technologies has developed a new form of wind-power technology that does not use rotary parts. Katrick Technologies' Wind Panel instead uses the ducting effect and converts mechanical oscillations into clean energy. The principles of the ducting effect used to develop DWTs apply to the Wind Panel and have been instrumental in the development, patenting, and validation of the technology.

The Wind Panel uses several channeling ducts containing aerofoils. These aerofoils convert the kinetic energy of wind to mechanical oscillations, which are then converted to energy.

The aerofoils operate independently from one another, in contrast to the rotary blades of a turbine. Energy is collected in smaller pockets, meaning that unlike traditional rotary tech-

nology, the Wind Panel can capture instantaneous changes in wind speed and direction. This makes the panels sensitive to gust winds and a higher range of speeds and frequencies than turbines. Thanks to the unique design and ability to capture a wider variety of winds, the panels can be fitted to existing structures, greenfield sites, and microgrids. They can be installed at ground level to capture ground-effect winds and benefit from the increased flow rate found in previous research.

The Wind Panels provide a new solution for wind energy in locations where traditional turbines are not viable.

MORE INFO www.katricktechnologies.com

INNOVATION

Airborne Motorworks' turbine design moves forward

Airborne Motorworks, Inc., (AMW) an innovator in sustainable technol-

ogy, recently announced the success of software developer Maya HTT's independent analysis of its patented wind-turbine design. This technology marks a leap forward in the quest for high efficiency, clean and localized wind-power generation.

AMW's Wind Turbine offers a host of features that promises to reshape the emerging renewable energy landscape:

With an innovative aerodynamic design and advanced materials, the AMW Wind Turbine captures more wind energy through its airfoil designs, circumferential shroud, and two-stage contra-rotating rotors to generate electricity with remarkable efficiency.

Using low friction technology, AMW has prioritized noise and vibration reduction in its wind turbine. By using noise-reduction technology, the wind turbine produces minimal noise disturbance in the 40-50 dB range at a distance of 25 meters making it an ideal choice for virtually any environment, e.g., high density urban and suburban environments as well as rural applications. The sleek and modern design of the AMW Wind Turbine allows for easy integration into various landscapes. Its compact and low-profile features ensure minimal impact on the environment while delivering maximum energy output.

While AMW is focused on the fast-growing microgrid market, the product confirmation analysis by Maya HTT suggests a broad spectrum of turbine sizes and potential applications giving way to future expansion of this technology into additional markets.

Built to withstand harsh weather and corrosive conditions, the AMW Wind Turbine is engineered with durable materials such as carbon fiber, titanium, and stainless steel. Its low friction design ensures longevity, consistent performance, and its low maintenance costs are enabled by the absence of a gearbox and traditional power generator module often found in legacy designed wind turbines. Also, the AMW design is air washed thereby eliminating the need for oil-based lubricant and coolant systems that

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X1 Wind reports successful PivotBuoy project results that boost new commercial interests. (Courtesy: X1 Wind)

hold 400 to 700 gallons of oil in large wind turbines and require scheduled replacement.

The AMW Wind Turbine is equipped with advanced smart grid digital AI technology in accordance with the International Energy Agency's (IEA) Smart Grid initiative. This global initiative is aimed at introducing sustainable economic development, energy security and interdependence-enabling seamless integration into existing energy infrastructures, thus improving grid stability at a local level, and expanding the collective of renewable energy sources.

AMW is committed to sustainability throughout the product lifecycle. The AMW Wind Turbine is manufactured using eco-friendly recyclable materials and processes, reducing its carbon footprint.

"Our goal is to contribute to high efficiency electric power generation, and greater power generation diversity through microgrids to achieve a cleaner more sustainable and reliable energy future; with the AMW Wind Turbine now validated, we believe

we have taken a significant step toward achieving that goal," said AMW executive chairman and CEO Hugh McElroy.

"This groundbreaking technology is expected to play a vital role in increasing the availability of primary and backup power generation in the 100 KW to 500 KW range with the ability to extend power output above 1 MW by synchronizing a bank of our units to power key industrial infrastructure, large buildings, universities, government facilities, and residential communities.

The AMW microgrid wind turbines' close proximity to the energy user can significantly reduce wasteful transmission line loss, while its highly efficient design minimizes global dependence on fossil fuels and produces virtually no greenhouse gases."

The AMW Wind Turbine is soon to enter the final stages of its durability testing and is expected to be ready for production manufacturing by the end of 2024.

MORE INFO www.airbornemotorworks.com

INNOVATION

X1 Wind platform reports testing success

The PivotBuoy project, developed by X1 Wind in collaboration with nine industry and R&D leaders, finalized its offshore demonstration with results that promise to revolutionize the floating wind industry.

The Spanish firm's X30 platform was tested in full operational conditions at PLOCAN from October 2022 to May 2023. During the seven-month demonstration, the device became the world's first fully functional floating wind TLP (Tension Leg Platform). The unit fed its electricity to PLOCAN's Platform via a 1.4-kilometer 20kV subsea cable.

"The PivotBuoy Project marked an important phase in the development of our innovative technology," said X1 Wind CEO Alex Raventos. "It allowed us to retrieve large amounts of data for a sustained period of time in full operational conditions. These findings have provided crucial insights, which are now being incorporated into X1 Wind's ongoing commercial-scale projects, including the NextFloat Project."

The most striking result is that data showed very good alignment with the wind using its passive orientation system. The platform showed better alignment than publicly available data for traditional active yaw systems for strong winds (>7.5m/s) and similar alignment for lower wind speeds (<7.5m/s). In terms of power production, energy generated by the modified Vestas V29, which operates in a downwind configuration, was well aligned with theoretical models, with no sign of power loss or increased 3P vibration due to the tripod shadow. The results confirm that X1 Wind's streamlined tripod arrangement eliminates the known drawbacks typically associated with downwind operation.

In addition, the platform overcame several harsh storms, with maximum wave heights reaching 6.7 meters,



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Lars Hohmeier (right), a cabinet products manager at Weidmuller USA, provides hands-on instruction about cabinet box products for attendees at a Distributor Connect training session. (Courtesy: Weidmuller USA)

equivalent to more than 20 meters in full-scale. During these extreme events, the unit behaved well with motions and accelerations matching the predictions in simulation models.

“This is another milestone for the industry, especially taking into account that we use a TLP mooring (which provides many advantages but historically was very difficult to hook and unhook),” Raventos said.

“By proving that our PivotBuoy mooring system can be easily hooked and unhooked, we’ve shown that TLPs can easily be installed, decommissioned, or maintained at port in case a tow-to-port maintenance operation is needed.” The PivotBuoy Consortium comprised of nine partners from five different countries (X1 Wind, EDP, DNV, INTECSEA, DTU, WavEC, PLO-CAN, ESM, and DEGIMA).

The project aimed to demonstrate the innovative PivotBuoy mooring system configuration, which com-

bines the advantages of a SPM (single point mooring) with a small TLP (Tension-Leg Platform) mooring system, allowing the platform to reach deeper waters and minimizing the footprint and impact on the seabed.

MORE INFO www.x1wind.com

MAINTENANCE

Weidmuller debuts distributor training program

Weidmuller USA recently introduced Distributor Connect, a highly customized distributor training experience. This program is designed to elevate training for Weidmuller USA’s partner distributors to an unprecedented level of immersion into the company’s extensive lines of smart industrial con-

nectivity products and solutions.

Distributor Connect sessions are at The Weidmuller Application & Training Center at the company’s U.S. headquarters in Richmond, Virginia.

The monthly, multi-day interactive training experience is structured to provide distributors with a deeper understanding of Weidmuller’s products, automation technology and solutions.

“The distributors meet and interact in-depth with our product managers and skilled trainers who present all the products and solutions their customers need,” said Caroline March-Long, director of marketing and market intelligence for Weidmuller USA. “Attendees participate in hands-on demonstrations of our automation and connectivity products. Also, this unique master class for distributors simulates real-world problem solving that will enhance their knowledge and professionalism.”

“The Distributor Connect training program adds tremendous value to the relationship that we have with our distributors in North America,” said Tom Neff, director of distribution sales. “We want them to experience for themselves that Richmond, Virginia, is the destination for a deep dive into the application-specific solutions and future-oriented products that have made Weidmuller a pioneer and global leader in smart industrial connectivity and automation technology.”

March-Long said a new advanced track will be launching in 2024 as part of the company’s investment in providing opportunities for product training.

“The Advanced track is even more technical and will focus on automation and Industrial IIoT for automation engineers,” she said.

The Weidmuller Application and Training Center is a smart connectivity and automation training program for employees, customers, and other partners across North America.

MORE INFO www.weidmuller.com/en/index.jsp

MAINTENANCE

KASK releases safety helmets for U.S., Canada markets

KASK, a designer and manufacturer of head protection, recently introduced its Primero series of safety helmets for the U.S. and Canadian markets.

After the successful launch to the EU market, KASK introduced two new Primero versions, one compliant with the American National Standard for Industrial Head Protection ANSI/ISEA Z89.1-2014 and the other with the Canadian standard for Industrial Protective Headwear CSA Z94.1-15.

“The strategic launch of Primero expands our product portfolio, allowing KASK to support even more users’ needs for upgraded head protection,” said Fabio Cardarelli, KASK America CEO. “As we move forward, Primero will be an important part of the KASK mission to enhance safety and performance in the workplace.”

The new Primero series is the result of 20 years of KASK helmet design and manufacturing innovations. This history enabled KASK to develop a helmet that optimized key components, making manufacturing more efficient, while maintaining comfort and safety that has become the brand’s calling card.

Primero was developed to provide advanced head protection that was easy to use for a wide variety of wearers



The new Primero series is the result of 20 years of KASK helmet design and manufacturing innovations. (Courtesy: KASK)



RIGCOM will operate with a global footprint across four continents and a field workforce in excess of 500 technicians. (Courtesy: GEV)

in a wide variety of applications. To aid in this goal, Primero series helmets are ready-made to accept a range of KASK safety accessories, including many that are used with the well-known Zenith X series helmets. Primero safety helmets are available in vented and closed shell and in a variety of colors.

“Companies told us they wanted a helmet that provided an easy path to upgrade their level of protection from a hardhat,” said Alex Dabelstein, VP of Sales, KASK America.

“The Primero provides this path, in a lightweight helmet that utilizes proven KASK comfort and design technologies, while maintaining KASK’s commitment to worker safety and performance.”

MORE INFO www.kask-safety.com

MAINTENANCE

GEV acquires height safety specialist Rigcom

GEV Wind Power, a wind-turbine repair and maintenance provider, recently acquired Australia-based Rigcom Group. Australia’s largest domestic independent service provider, RIGCOM, specializes in field deployed rotor blade maintenance, together with a range of height safety services. The current management team, led by Chairman Gary Flowers and CEO Michael Biddle, will continue to lead RIGCOM, supported by the existing team.

GEV provides high-value blade repair and maintenance services to wind-



The order for Vestas consists of 60 V163-4.5 MW wind turbines. (Courtesy: ENGIE North America)

farm manufacturers and operators in the U.K., Europe and the U.S., operating both onshore and in complex offshore environments. With wind-turbine blades being susceptible to erosion and weather damage, which affects aerodynamic efficiency and reduces energy production (and sometimes stops the turbine operating altogether), GEV provides turnkey solutions to repair blades, reducing downtime and maximizing production.

The company has repaired and installed retrofit solutions to more than 5,000 turbines to date — and with turbines increasing in size and rotating faster, making them more prone to damage, GEV has a vital role to play in supporting the growth and resilience of the sector.

RIGCOM is the Australian ISP providing in-field rotor blade solutions, which is complementary to the existing GEV business. The organization will operate with a global footprint across four continents and a field workforce in excess of 500 technicians. The group will be able to deploy resources for blade-maintenance solutions and provide services to a client base that operates globally, ensuring alignment across all markets in key areas such as health and safety, quality, and project execution. “Over the last few years GEV has established itself as a global market-leader in wind-turbine blade repair and maintenance,” said David Fletcher, Group CEO of GEV.

“We are excited to be partnering with Gary, Michael, and the RIGCOM team, as we look to lead the consolidation in our sector and provide clients with a consistent and reliable globally delivered solution. We’re also looking forward to learning more about RIG-

COM’s wider expertise in the at height safety market and supporting the growth in this business by leveraging GEV’s global footprint.”

“Our enhanced ability to deliver global blade repair knowledge, coupled with dedicated local services and support, will ensure our customers get the very best outcomes for their projects,” said Michael Biddle, RIGCOM CEO. “The ability to leverage our height safety expertise further into the wind sector will also provide clients with world class statutory inspection capabilities and solutions to common height safety problems.”

MORE INFO www.gevgroup.com

MANUFACTURING

Vestas wins 67-MW order in Sweden

Vestas recently received a firm order from Vattenfall Vindkraft AB, part of the Vattenfall AB group, to power the 67-MW Velinga wind project in Sweden. The order consists of 12 V150-6.0 MW wind turbines in 5.6 MW operating mode and includes supply, delivery, and commissioning of the turbines. Upon completion, Vestas will service the turbines under a long-term Active Output Management 5000 (AOM 5000) service agreement designed to ensure performance of the assets.

“Vestas have been working closely together with Vattenfall on this project from an early stage, and we are happy to see the Velinga project now being built, delivering clean energy in the

south of Sweden,” said Anna Schlasberg Wachtmeister, vice president NCE Sales North and West at Vestas. “We are grateful for the partnership we have with Vattenfall, and now we look forward to deliver the turbines so they can start producing fossil-free electricity.”

The project site is in the municipality of Tidaholm in Västra Götaland County. Turbine delivery is expected to begin in the second quarter of 2025 with commissioning scheduled for completion in the second half of 2025.

MORE INFO www.vestas.com/en

MANUFACTURING

Vestas gets order for 60 wind turbines

Vestas has received a 270-MW order to power an undisclosed wind project owned by a subsidiary of ENGIE North America in the U.S. The order consists of 60 V163-4.5 MW wind turbines.

The order includes supply, delivery, and commissioning of the turbines, as well as a 20-year Active Output Management 5000 (AOM 5000) service agreement, designed to ensure optimized performance of the asset.

“We look forward to working with ENGIE as it expands its wind energy portfolio across the United States and continues to advance the clean energy transition,” said Laura Beane, president of Vestas North America. “The V163-4.5 MW is our newest high-capacity factor turbine and is optimized for low to medium wind speeds making it ideally suited for the U.S. market.”

“We are excited to collaborate with Vestas as we both focus on the acceleration of the energy transition in North America,” said Dave Carroll, chief renewables officer and country head, ENGIE North America. Turbine delivery is expected to begin in the third quarter of 2024 with commissioning scheduled for the first quarter of 2025. ↘

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CROSSWINDS

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PROTECTING ASSETS AGAINST NEW THREATS

Even on wind-farm projects today, the implications of a drone attack onshore or offshore are not always incorporated into risk assessments. (Courtesy: Shutterstock)



Wind-farm physical security is critical in a cyber-focused world.

By NELSON DURAN

In today's technology-driven world, where cyber threats dominate headlines and organizations invest significant resources in safeguarding their OT and IT infrastructure from digital threat vectors, the importance of the physical security of a wind-power farm can sometimes be overlooked. However, it remains an essential component of a wind operator's enterprise risk mitigation.

PGE plans to build offshore wind farms with a total capacity of 6.5 GW by 2040, while Orlen has a license to build a farm with a capacity of up to 1.2 GW, the construction of which would be completed in 2026. Depending on the investor, they will be from 23 to 80 kilometers from the shore, which is often beyond the line of the radar or optical horizon. The location of these facilities, which could result in extended response times for the services responsible for the security of the state, means they could become the target of terrorist acts once they become operational. The wide range of possible activities and the complexity of the maritime environment makes offshore critical infrastructure, such as offshore farms, extremely difficult to protect and secure from potential destabilizing attacks.

Indeed, earlier this year, the Dutch government warned of potential targeting of offshore wind for sabotage, amid mounting concern over the security of renewable energy assets.

Like many industrial assets, wind farms are designed first and foremost for functionality. A comprehensive security strategy should therefore prioritize and address both cyber and physical vulnerabilities. After all, a malicious actor in either area can cause significant undesirable outcomes (e.g., compromised employee health and safety, damage to wind-turbine equipment, lost production time, etc.).

OLD THREATS, NEW TECHNOLOGY

Despite advancements in technology, some hazards will continue to exist. Insider threats, for example, always pose a significant risk to wind-farm operations. Typically, these types of attacks are orchestrated by individuals (e.g., employees, contractors, trusted partners, etc.) who have authorized access to systems, data, or facilities but misuse that access for malicious purposes. The threat they present can range from accidental breaches due to negligence or lack of awareness, to deliberate acts of sabotage, espionage, or data theft.

Insider threats can be particularly challenging to detect and mitigate because the individuals often have legitimate access and can exploit their privileges without raising suspicion. Some of the best prevention methods for this type of risk are implementing robust access controls, regular monitoring, and employee awareness programs. Promoting a culture of security and vigilance can minimize the potential impact of insider threats, and valuable assets such as sensitive information can be better safeguarded.

Vandalism, theft, and flammable substances are also an ever-present risk to onshore facilities. In recent years, many organizations across the renewables sector have upgraded

their assets to include the latest digital monitoring equipment, promoting the rapid uptake of industrial cybersecurity measures. However, this doesn't eliminate the risk of physical attempts at vandalism, theft, or purposeful releases, nor does it negate the need to defend against such attempts. Organizations operating in the wind industry should remain vigilant of these threats, even in a cyber-focused world.

EVOLVING PHYSICAL THREATS

Cyberattacks are typically the first thing that come to mind when discussing the impact of increased digitalization on power plants and wind-farm security. However, physical attack vectors have also evolved with technology.

One prominent physical attack vector example involves the use of unmanned aerial vehicles (UAVs) or drones. Several high-profile drone attacks on critical infrastructure outside the U.S. have raised questions about how facilities can protect against aerial attacks. While most of these incidents originate from nation-states or designated terrorist groups with military-grade UAVs, access to recreational drones is now ubiquitous.

Whether operating within the bounds of the plant incidentally or with malicious intent, even the most unsophisticated of UAVs can easily penetrate traditional physical security measures (e.g., fences, gates, perimeter cameras, etc.). Most enterprises did not have to consider this when their plant was originally built, thus potentially leaving them exposed to such modern-day threats. Even on wind-farm projects today, the implications of a drone attack onshore or offshore are not always incorporated into risk assessments. Part of this is attributable to the perception that nothing can proactively be done to prevent such an occurrence from happening. However, this is only true in some cases, as certain critical areas of a wind farm and its facility can be hardened.

By incorporating the threat into a risk assessment, personnel will be forced to think about reactive measures if an event does occur, which is important to help minimize its impact and better preserve safety after the fact.

Embracing the concept of "Security-By-Design," which prioritizes integrating security features into the wind farm and its land-based power facility during its development, is also important. By addressing physical threats as early as possible with the same rigor and focus as those in the digital space, wind-farm operators and utility providers can enhance their overall security posture, mitigate threats, and help ensure business continuity. Requirements should be mapped to relevant standards that are applicable to generating assets operational requirements — for example, ISA 62443, NERC CIP, EPCIP, etc.

THREAT, VULNERABILITY, AND RISK ASSESSMENTS

To help better ensure that all physical security risks are addressed, it is beneficial for organizations to perform ei-



Like many industrial assets, wind farms are designed first and foremost for functionality. A comprehensive security strategy should therefore prioritize and address both cyber and physical vulnerabilities. (Courtesy: Shutterstock)

ther Security Vulnerability Assessments (SVAs), Threat and Vulnerability Risk Assessments (TVRAs), or both. Each constitutes a comprehensive approach to risk mitigation and can help wind-farm facilities develop an effective physical security strategy by:

► **Better understanding the unique threats they face:**

When conducting a threat assessment, wind-farm operators can start by identifying potential adversaries, their intent, and capability, then review tactics from past attacks at similar locations to estimate the threat to the organization.

► **Assessing vulnerability:** Understanding the threat is essential, but the ability to deter attack onshore or offshore is amplified by understanding vulnerability. Vulnerability can be considered as the psychological, sociological, or physical characteristics that leave an asset – such as a wind turbine – unprotected or exploitable for attack. Typically, the emphasis is on physical security vulnerabilities, but the human factor can make or break security efforts. Thinking, “It will never happen here,” or, “It will never happen to us,” can add to vulnerability.

► **Quantifying risk:** Risk is defined in the basic form as “ $R = L \times C$,” where R is risk, L is the likelihood of the event occurring, and C is its consequence. When it comes to performing

risk calculations, most organizations operating across the renewable energy industry focus heavily on the consequence term of the equation without measuring it against its associated likelihood. This makes it difficult to accurately prioritize risks and efficiently allocate resources toward mitigation measures. It also shifts the focus away from identifying critical vulnerabilities in wind-farm infrastructure and can leave onshore or offshore operations unprotected from “low probability” events. To develop a complete risk profile, both the consequence and likelihood terms of the risk equation should be thoroughly evaluated.

After quantifying the risk, organizations can begin to take preventative action by physically hardening wind-farm infrastructure, such as using perimeter protection, blast analysis and design, facade strengthening, disproportionate collapse mitigation, local hardening of security command centers, and more. Another important step is security systems evaluation and design (i.e., intrusion detection, monitoring and surveillance, access control systems, security policies and procedures, redundancy evaluations, etc.), along with the implementation of dependency mitigation measures related to emergency backup power, spare parts, supply chains, emergency response, and so on.

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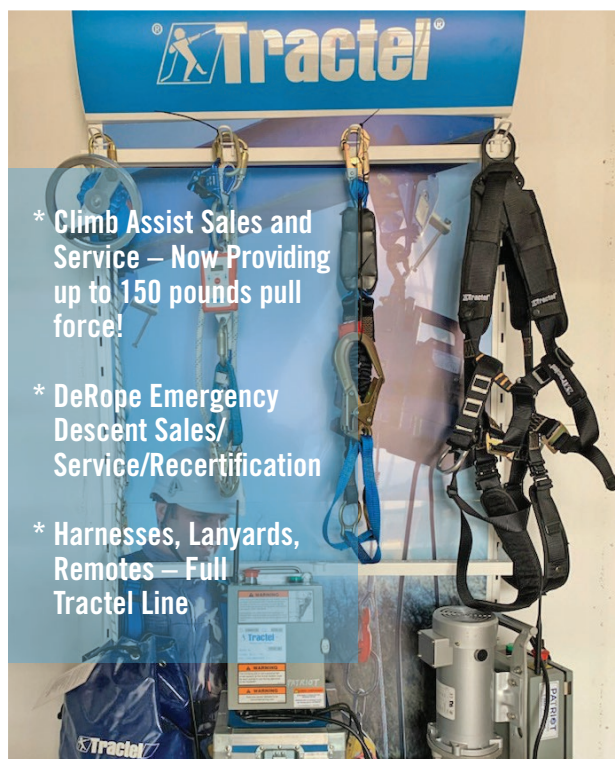
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CONCLUSION: AN INVESTMENT, NOT A COST

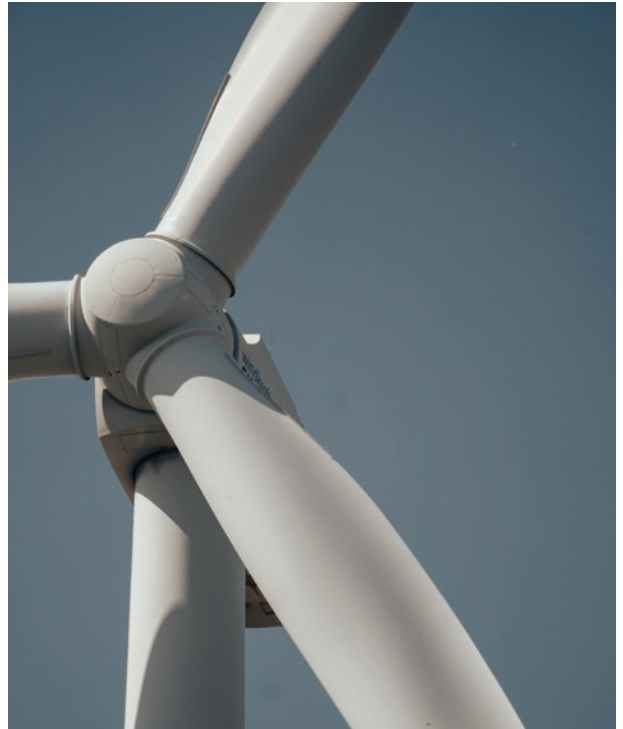
Adversaries will continually seek the weakest link in their target's security. Therefore, a balanced and well-thought-out security profile that includes both cybersecurity and physical security can be vital for effective wind-farm facility protection and safety.

In the ever-evolving landscape of cybersecurity threats, physical security continues to play an indispensable role in protecting organizations operating across the renewables industry. While cybersecurity measures are vital and growing in importance, they should be accompanied by robust physical security measures to provide comprehensive protection.

In both the physical and cyber worlds, security should not be viewed as a cost but as an investment to improve the overall safety of a wind-farm facility. As wind energy continues to develop into an important sector, contributing to more of the energy mix, organizations should remember that one of the primary goals of any security measure is to preserve the safe, reliable operation of its physical infrastructure. ↗

ABOUT THE AUTHOR

As the director of Operations for the Protected Design Group within ABS Group, Nelson Duran heads up a highly talented team that spans the world, helping customers mitigate the threat potential of both man made and natural disasters.

A large advertisement for American Wire Group (AWG). The background is a landscape at sunset or sunrise, featuring several wind turbines in the distance and a complex network of high-voltage power lines and transmission towers in the foreground. The sky is a mix of orange, yellow, and blue. Overlaid on the image is the text "EMPOWERING A BETTER WORLD" in large, bold, white capital letters. Below this, in a smaller font, is "Wires • Cables • Hardware • Equipment • Accessories". At the bottom center, there is a logo consisting of a blue globe with white lines, next to the letters "AWG" in large, bold, white capital letters, with "AMERICAN WIRE GROUP" in smaller white capital letters underneath. At the very bottom, the website "buyawg.com" and email "sales@buyawg.com" are listed, along with the phone number "800.342.7215".

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