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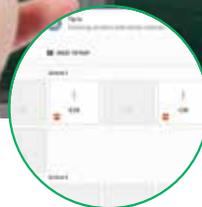
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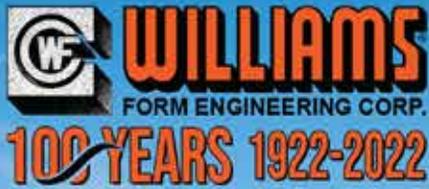
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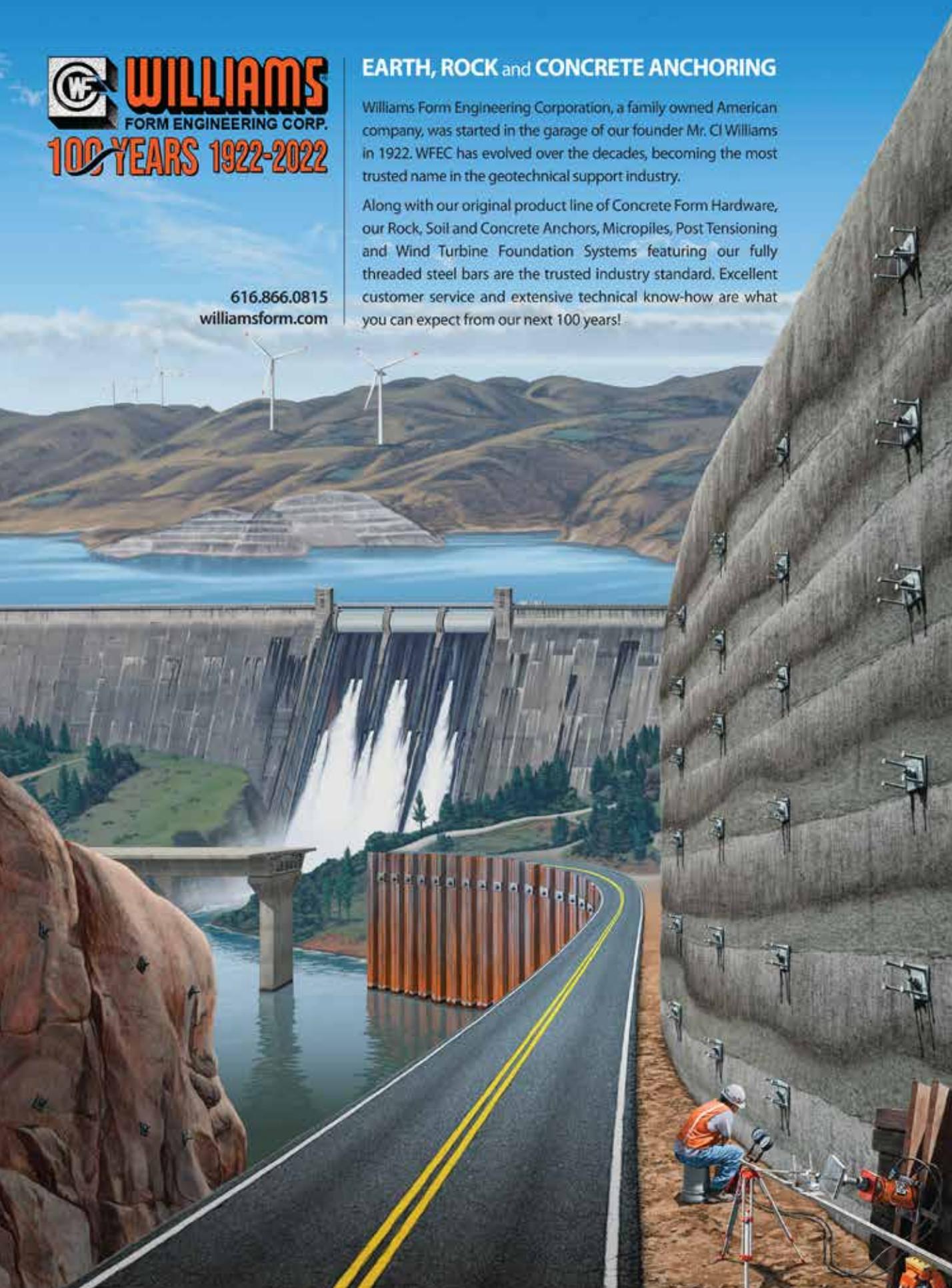


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Safety: A critical piece of turbine functionality

As wind turbines continue to grow (not only toward the sky, but off the coast) the importance of keeping safe the men and women who scale these metal behemoths is of paramount importance.

That's why one of the topics of focus in this issue is on safety, and we approach it from an interesting angle with one of our monthly features.



In the inFocus section, we have an article from PATRIOT Industrial Solutions' Dan Erickson on how to increase safety in the workplace. In the article Erickson discusses how proper safety measures and training are critical to the advancement of the wind- and renewable-energy industries.

Our lead inFocus article, however, looks at the wires and cables that make up much of the guts of a wind turbine. In the article, Helukabel's James Moorman shares his insights on the need for retrofitting legacy wind turbines and maintaining current capacity

with UL-listed products in order to ensure systems comply with today's safety standards regulating the North American market.

In our company profile, you'll see how System Seals is using its innovative approach to offer unique sealing systems that are designed and manufactured based on the application.

As equally fascinating is the subject of this month's Conversation, where I discuss with Brent Kisling, the executive director of the Oklahoma Department of Commerce, the great strides in wind that Oklahoma has accomplished in 12 years.

And be sure and check out our Crosswinds feature where I share some of the exciting – and sometimes concerning – news that I gleaned from a special session at CLEANPOWER 2022.

All in all, some pretty fascinating news and information from the world of wind power.

You'll find that and much more in this issue. I hope you find it informative, and please feel free to send me any feedback about what you'd like to see in future issues. I'm always looking for contributors and good article ideas.

Thanks for reading!



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Offshore excitement continues to grow

From ACP

June 8th marked World Oceans Day, an annual global celebration raising awareness that together we can – and will – protect and restore our shared ocean and everything it sustains while addressing the climate crisis. The urgent need to reduce carbon emissions and transition to cleaner sources of energy is evidenced by the scientific community daily, most recently with news that the level of carbon dioxide in Earth's atmosphere reached its highest levels ever recorded. Fortunately, we already have an impactful and sustainable tool at our disposal to protect our oceans and achieve a cleaner energy future: offshore wind.

Harnessing the extensive offshore resources that blow across America's oceans and deploying them at scale is one solution to mitigate the negative effects of climate change and decarbonize our energy systems. With national goals to achieve 30 GW of offshore wind by 2030, a carbon-free electricity sector by 2035, and a net-zero emissions economy by 2050, U.S. offshore wind will play a vital role in driving our country toward the benefits that come with a clean energy future—and in the process, become America's newest domestic source of energy.

The Northeastern U.S. coastline has been nicknamed "The Saudi Arabia of Wind" due to its untapped potential to transform America's domestic energy production and boost our economy in ways previously unimagined. That vision became one step closer to reality earlier this year with a record-shattering offshore wind auction in the New York Bight. Winning bids for the six lease areas of the New York Bight totaled \$4.37 billion, demonstrating the interest, confidence, and demand for this new industry.

Using our nation's untapped offshore wind resources will not only be beneficial to our planet, but it will create thousands of high-skilled U.S. jobs and deliver reliable, clean energy to more Americans. The lease areas in the New York Bight alone could accommodate up to 7,000 MW of new offshore wind development – enough to power more than 2 million homes.



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



The Department of the Interior announced the next steps for offshore wind lease sales in two regions on the Outer Continental Shelf offshore California. (Courtesy: energy.ca.gov)

First offshore wind sale proposal set for California Outer Continental Shelf

The Department of the Interior announced the next steps for and welcomed public comment on offshore wind lease sales in two regions on the Outer Continental Shelf offshore California. This is the first-ever offshore wind lease sale proposed on America's West Coast.

"The demand and momentum around our work to build a clean energy future is undeniable. The Biden-Harris administration is moving forward at the pace and scale required to help achieve the President's goals to make offshore wind energy a reality for the United States," said Secretary of the Interior Deb Haaland. "Today, we are taking another step toward unlocking the immense potential of offshore wind energy offshore our nation's West Coast to help combat the effects of climate change while creating good-paying jobs."

In May 2021, Haaland, White House National Climate Adviser Gina McCarthy, Under Secretary of Defense for Policy Dr. Colin Kahl, and California Gov. Gavin Newsom announced an agreement to advance areas for wind-energy development offshore the northern and central coasts of California. The proposed sale is part of the leasing path announced last year by Haaland to meet the Biden-Harris administration's goal to deploy 30 GW of offshore wind energy by 2030.

The Proposed Sale Notice (PSN) includes three proposed lease areas in the Morro Bay Wind Energy Area off central California and two proposed lease areas in the Humboldt Wind Energy Area off northern California, totaling about 373,268 acres that have the potential to unlock more than 4.5 GW of offshore wind energy, power more than 1.5 million homes, and support thousands of new jobs.

"Today's action represents tangible progress toward achieving the administration's vision for a clean-energy future offshore California, while creating a domestic supply chain and

good-paying union jobs," said Bureau of Ocean Energy Management Director Amanda Lefton. "BOEM is committed to robust stakeholder engagement and ensuring any offshore wind leasing is done in a manner that avoids or minimizes potential impacts to the ocean and ocean users. The Proposed Sale Notice provides another opportunity for local communities, Tribes, ocean users, developers and others to weigh in on potential wind energy activities offshore California."

The PSN, which published in the Federal Register May 31, 2022, opens a 60-day public comment period and provides detailed information about the proposed lease areas, proposed lease provisions and conditions, and auction details.

BOEM is seeking feedback on several lease stipulations that will reaffirm its commitment to create good-paying union jobs and engage with Tribal governments, underserved communities, ocean users, and other stakeholders.

Comments received by the end of the public comment period will be made available on the BOEM California website and considered before deciding whether to publish a final sale notice, which would then announce the time and date of the lease sale, as well as list the companies qualified to participate in it.

Prospective bidders, not previously qualified for a California lease sale, are required to submit mandatory qualification materials to BOEM. Qualification materials must be postmarked no later than August 1, 2022.

MORE INFO www.doi.gov/news

Oregon assigns first floating wind sites

Oregon is assigning its first floating wind sites following progress in Cal-

ifornia, but power authorities must work with fishing groups and upgrade transmission to minimize costs.

In April, U.S. federal authorities launched a call for interest for two offshore wind areas off the coast of Oregon. The Bureau of Ocean Energy Management (BOEM) set out areas in the deep waters of Coos Bay and Brookings in southern Oregon, more than 12 nautical miles from the coast.

The calls form part of the Interior Department's plan to hold up to seven offshore wind lease auctions by 2025 and follow similar calls in California that have led the state to announce the sale later this year of five offshore wind leases.

The Brookings area lies next to the California border while Coos Bay is situated 100 miles farther north. Coos Bay offers some of the strongest offshore wind resources in Oregon and could supply power at \$53/MWh, the U.S. National Renewable Energy Laboratory (NREL) said. The Oregon state government is studying installing 3 GW of offshore wind by 2030 and this could reduce annual power generation costs by \$86 million, NREL said. Offshore wind developers in Oregon will be boosted by recent progress in California but local opposition and a lack of grid and port infrastructure remain a risk.

"BOEM plans to lease the areas in late 2023. There will be calls to delay development, but the imperatives of addressing climate change and the obvious benefits of [shifting to] renewables will likely help keep us on track," said Pacific Ocean Energy Trust executive director Jason Busch.

Earlier this year, developers bid a record \$4.4 billion to secure six offshore wind leases in the New York Bight in the largest U.S. lease tender to date. The allocated leases require engagement with Tribes, fishermen, and other local stakeholders.

BOEM is at the early stages of offshore wind leasing in Oregon but is

“committed to working with all ocean users, including the fishing community,” a BOEM spokesperson said.

Designated sites would undergo environmental review before leases are allocated under commercial tender.

Busch expects the environment assessments in Oregon to “read somewhat similarly.” Additional concerns in Oregon include migratory routes for whales and ocean birds and the preservation of the coast’s natural beauty, he noted.

The state of Oregon will support “responsible” offshore wind energy development that factors in the natural resources of the area and its existing uses, said Andy Lanier, Marine Affairs Coordinator at the Oregon Department of Land Conservation and Development.

“Offshore wind deployment in Coos Bay and Brookings will require significant investment in grid transmission, including subsea cabling and shore-side structures. Now, the southern Oregon grid could “absorb approximately 1 GW of new generation,” Busch said.

MORE INFO www.reutersevents.com/renewables

Clean power report shows slow growth

The American Clean Power Association’s Clean Power Market Report Q1 showed that wind, utility-scale solar, and battery storage sectors installed 6,619 MW of utility-scale clean power capacity – enough to power 1.4 million American homes. The record capacity is largely due to gains in battery storage installation, with storage installations up 173 percent, solar installations up 11 percent, and wind installations down 3 percent, as compared to the first quarter of 2021.

While these gains contributed to a record first quarter for clean power installations, the rate of growth slowed to 11 percent in the first quarter of 2022, compared to the 50 percent

year-over-year growth rate reported between 2019 and 2021.

“The record-breaking quarter for clean power is encouraging, but the industry still faces many hurdles that are stalling growth,” said ACP CEO Heather Zichal. “Ongoing uncertainty from the Department of Commerce’s unwarranted solar tariff case, the unsettled fate of clean energy tax credits, supply chain issues and inflation are all making investment and planning decisions a difficult challenge.

The industry needs resolution and policy clarity if we are to meet the Biden administration’s clean power goals of reaching a net zero grid by 2035.”

Cumulatively, operating clean-power capacity in the country is now nearly 208 GW – enough to power 57 million homes in America. The 90 new projects added to the grid represent \$9.3 billion in capital investments.

Growth in battery storage helped to propel the first quarter to record territory. Storage capacity additions grew 173 percent compared to the first quarter of 2021.

The Q1 report shows 56 new utility-scale solar projects came online in 2021, for a total of 2,997 MW; 10 new wind projects came online, totaling 2,865 MW.

Finally, the industry installed 24 new battery storage projects with a

total capacity of 758 MW/2,537 MWh.

While the industry sits on a record volume of clean-power capacity in the pipeline, the rate of growth of that pipeline is also slowing. The pipeline grew by just 4 percent during the first quarter – much lower than the 12 percent quarterly expansion experienced throughout 2021. The largest projects to come online in the first quarter include:

► Traverse Wind Energy Center in Oklahoma owned by AEP and developed by Invenery (998 MW).

► Slate Solar + Storage in Kings County, California was the largest hybrid project (300 MW of solar capacity and 140 MW/561 MWh of battery storage capacity).

► Valley Center Battery Storage Project, owned and developed by Terra-Gen, in California (140 MW battery system with 560 MWh of energy storage capacity).

MORE INFO cleanpower.org

ACP announces diversity award winners

The American Clean Power Association (ACP) announced the winners of ACP’s new awards that recognize achievements in diversity, equity and



Traverse Wind Energy Center in Oklahoma is one of the largest projects to come online in the first quarter. (Courtesy: American Electric Power)



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From left: Kathy Presperin (Blattner Company), Kim Hughes (American Electric Power), Rebecca Glazer (AES), and Heather Zichal (ACP CEO). (Courtesy: American Cleanpower)

inclusion during CLEANPOWER 2022.

The awards were announced as part of ACP's Energy Transition for All initiative, an industry-wide program to ensure that workers, communities, and those historically left behind stand to benefit from the rapid growth of the clean-power sector in the United States.

The awards recognize companies and individuals who have committed to and have seen success in creating programs and cultures that support diversity and inclusion for all genders, ethnicities, sexual orientations, disability status, and veteran status.

The Breakout Woman+ of the Year award winners were Rebecca Glazer, AES Clean Energy Senior Director of Growth Initiatives, who brought renewable energy projects online for Google, a leading AES customer. Those projects deliver greener, smarter energy, supplied by a fleet of renewables, including solar, wind, hydropower, and energy storage assets.

Based on the success of this project, Glazer now leads the evaluation of AES Clean Energy investments, supporting AES' industry-changing clean energy solutions.

Kathy Presperin, Blattner Company's Chief Supply Chain Officer, is recognized for her leadership in supply chain planning, procurement, and strategy where it benefits not only the organization but also its customers, community, and suppliers. Presperin and her team have created a foundation that allowed Blattner to continue

to build projects, even while the world experienced a supply chain crisis.

American Electric Power (AEP) received the Diversity, Equity, and Inclusion award for its commitment to creating a diverse and inclusive environment that supports development and advancement for all.

"Coming together to celebrate these industry leaders who are the face of the energy transition was one of the highlights of CLEANPOWER 2022," said Heather Zichal, ACP CEO. "Our Energy Transition for All initiative is more than just words in a report. These award winners demonstrate the commitment of the current leadership and of our industry toward the mission of creating an equitable transition for all."

Today, utility-scale solar, wind, and battery storage represent roughly 13 percent of electricity generation in the U.S. By 2030, the clean-energy industry could account for as much as 50 percent of the electricity produced in the U.S. — creating 500,000 jobs, attracting \$700 billion in new investment, and reimagining how power is generated and delivered across the United States.

American Clean Power's Energy Transition for All initiative is a multi-year program designed to expand opportunities for workers and to help spur local economic development by promoting diversity, equity and inclusion across the clean power sector. ↴

MORE INFO cleanpower.org

IN FOCUS

WIRES & CABLES ▾ SAFETY

UL 6141/UL 6142: ELECTRICAL STANDARDS FOR TURBINES IN THE U.S.





Retrofitting legacy wind turbines and maintaining current capacity with UL-listed products ensures that your systems comply with today's safety standards regulating the North American market.

By JAMES MOORMAN

Wind turbines are built to last an average of 20 years or more before they are either repowered — which requires a major component overhaul — or decommissioned and no longer deemed a viable operating wind turbine. Not only are the exteriors exposed to environmental extremes, but the mechanical components have to withstand even more, for example, cable abrasions in the drip loop from constant twisting as the hub rotates to maximize wind efficiency, exposure to fluids and oils from potential pitch system and/or yaw failures, and slip-ring cable assemblies that travel through the gearbox, which are exposed to extreme heat that can cause component degradation over time.

Legacy fleets operating today and approaching the end of their service life will be analyzed by asset owners and technicians on whether these aging turbines can be overhauled to continue operating or be decommissioned. For wind-farm operators who decide to overhaul and repower their existing machines, re-using their existing infrastructure is a possibility as long as the components put into the existing towers are compliant with the current standards.

MEETING TODAY'S STANDARDS FOR WIND TURBINES

Underwriters Laboratories (UL) standards 6141 and 6142, which were enacted in 2016/2017, aim to simplify the process of receiving final approval for wind turbines through local Authorities Having Jurisdiction (AHJ) inspectors. In the U.S., local AHJs need to certify that products are safe to use in accordance with general American installation regulations such as the National Electric Code (NEC), National Electrical Safety Code (NESC), and American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE) C2, among others. It is not always clear whether components that originally complied with the European CE standards also comply with American installation regulations. If there is any doubt, an AHJ inspector may shut down the project. UL 6141 and UL 6142 are the first

For many years, there were no national safety standards specifically for wind turbines in North America. (Courtesy: Helukabel)

American safety standards developed specifically for wind turbines. They provide a set of rules that help AHJ inspectors with the approval process, making it more transparent and predictable for everyone involved.

UL AIMS TO HARMONIZE WITH IEC 61400

For many years, there were no national safety standards specifically for wind turbines in North America. The only guidelines AHJs had for reference was IEC 61400, which is the international standard for wind turbines issued by the International Electrical Commission (IEC). However, the IEC standard has been criticized in North America since it was published. Critics claimed it did not include enough provisions regarding the electrical safety of components, controls, and protection devices.

Therefore, UL developed national standards to supplement IEC 61400. These standards refer directly to IEC 61400-1 (Design Requirements) and IEC 61400-2 (Small Wind Turbines) and add technical requirements primarily focused on electrical safety, control, safety devices, and fire protection within the wind turbine. These UL standards — 6141 and 6142 — bridged the gap between the IEC standards.

ANSI issued UL 6141 as an American National Standard for Wind Turbines Permitting Entry of Personnel. UL 6141 applies to large-scale wind turbines, typically 1 MW and above, that can or may be entered by operators or service technicians for operation or maintenance.

UL 6142 has been acknowledged as a national standard for small wind-turbine systems by ANSI since it was first proposed in 2012. It applies to smaller, commercial-kW wind turbines found closer to residential areas and typically have a nominal capacity up to 1,500 V AC. Due to their size, most smaller turbines aren't large enough for operators/technicians to enter inside to perform maintenance or inspections, so they are either hinged to be laid down or climbed externally. There are smaller turbine types large enough to be



Cables that have been exposed to oil and other lubricants for long periods can begin to crack as the plasticizers have been removed from the insulation, causing it to harden. (Courtesy: Helukabel)

entered and climbed by a tech, but they are still classified as a “small turbine.” For these turbines, there are lock-out/tag-out procedures for operators and technicians to enter the turbine to perform maintenance.



Cables used in the drip loop that have low abrasion resistance often show wear due to the constant rubbing that occurs as the nacelle rotates. Over time, abrasion can wear down the jacket and insulation, exposing the conductor and creating risk to technicians and the machine. It's important to use cables with high-abrasion resistance to maximize their longevity in this critical area of the turbine. (Courtesy: Helukabel)



The power and data cables within the tower should also be inspected and replaced, if needed, during the retrofit. (Courtesy: Helukabel)

Both UL standards apply exclusively to onshore wind turbines and only affect new constructions or the refurbishing of wind turbines with a capacity greater than 500 kW. Existing legacy fleets systems do not need to be refitted to meet the UL standards until their end-of-service-life date comes due.

HOW DOES UL 6141 AFFECT THE USE OF CABLES?

UL 6141 focuses primarily on electrical safety and introduces several restrictions on how cables may be used in the future. The bottom line is that appliance wiring material (AWM) – in other words, cable that is UL recognized but is not UL Listed – may only be used minimally within the turbine. Up until now, AWM cables were frequently used throughout the various sections of the wind turbines. UL 6141 stipulates all accessible cables need to be installed in cable ducts or trays. If this is impractical or impossible – for example, in the cable loop – only so-called tray-rated cables, more specifically cables that are approved for exposed run (TC-ER), are allowed. The ER or “exposed run” approval allows cable to come out of the cable tray unprotected for ≤6 feet (1.8 meters) if it passes crush and impact tests. Cables in the down tower and nacelle are usually accessible and, therefore, must be certified for exposed run as well.

Tray cables that are designed to be used for exposed run applications are oil and flame resistant and fulfill the increased safety requirements of UL 6141. In fact, cables need to be UL listed to be classified as tray cable. Tray cable rated for 600 V falls under UL 1277 (Electrical Power & Control Tray Cable), while wind-turbine tray cables (WTTTC), which are rated up to 1,000 V, are listed under UL 2277 (Flexible Motor Supply Cable and Wind Turbine Tray Cable). Unlisted AWM cables have not passed the specified tests and, therefore, are not suitable for exposed run applications. UL standards were already in place to regulate components in certain wind-turbine subsystems such as generators. These standards will continue to apply. Furthermore, UL 6141 will apply to areas not previously regulated by a standard.

Local AHJ inspectors already favored UL-listed components in the past because UL certification helps to standardize and accelerate approval processes. The recognition of UL 6141 as the national safety standard for American markets will make using UL-listed components even more prevalent in existing legacy fleets. While UL 6141 does not rule out the use of AWM cables completely, it does limit their use to such an extent that UL-listed cable products will be sought after more and more. ✎

ABOUT THE AUTHOR

James Moorman is vice president of sales for Helukabel USA. Moorman has an extensive background in electrical cable and connection system applications for the industrial, wind energy, and utility markets. Between 2009 and 2019, he worked almost exclusively in the wind industry directly supporting OEMs, ISPs, and asset owners on cable and connection solutions for both the U.S. and global wind markets.



Top and above: The cables replaced during an overhaul can vary based on what equipment is being upgraded or repaired. With thousands of components in an entire turbine, a majority of the cables replaced are in the nacelle and the drip loop, where cables experience millions of torsion cycles over their lifespan. (Courtesy: Helukabel)

INCREASING SAFETY IN THE WORKPLACE

Wind professionals deal with many systems and processes at all phases of the industry: manufacturing, transportation, construction, commissioning, regular O&M, re-powering, decommissioning, etc., and are exposed to a varied set of operational dangers in each phase. (Courtesy: Shutterstock)

Proper safety measures and training are critical to the advancement of the wind- and renewable-energy industries.

By DAN ERICKSON

It was about 4:45 a.m. in the summer of 1979. The sun was about to rise over the Atlantic Ocean. As a 17-year-old in my third year as a stern man working on a lobster boat, I thought I was indelible — burning the candle on both ends as my grandmother would remark. We loaded two 55-gallon drums of bait onboard using a cleated line and davit on the dock to lower each of the 400-pound drums to the deck of the boat. It was low tide, so the hoist down was about 12 feet farther than the typical 10 feet. The weight of the first drum caught me by surprise and descended just shy of a free fall — an unsafe and unexpected rate crashing hard onto the deck. The captain sidestepped the incoming drum of bait in time to avoid being crushed. He berated me and finished with the question, “Didn’t eat your Wheaties this morning?” Luckily, I avoided damage to the boat and, more importantly, avoided injury to my captain.

Unknown to the captain, I only had two hours sleep and was still — maybe — a “little” hung over. We headed out to open water and began hauling lobster pot strings. A string is a series of lobster pots connected by about 20 meters of line between each pot with another 30 to 40 meters of line to a buoy on either end of the string. When setting back, the lobster pots are pushed over the rail in sequence while the boat is moving at about 10 knots. Line is always paying out beside the stern man’s feet — the potential for line looping the stern man’s leg and hauling him overboard is a real danger all day, every day. Before we had hauled our sixth string, I had been looped twice; the second time dumped me on my backside on deck. The captain shut the boat down and told me to get my (act) together, or we go in and come back out when I could do my job. I got my (act) together and am still alive to prove it. The point is that I was not sound in mind and body for the day’s work. This is one aspect of safety that is not often thought about.

ADDRESSING SAFETY ISSUES

Wind professionals deal with many systems and processes at all phases of the industry: manufacturing, transportation, construction, commissioning, regular O&M, re-powering, de-commissioning, etc., and are exposed to a varied set of operational dangers in each phase. Identifying, understanding, and addressing these exposures in a preventative way is paramount in industry today.

In casual and pointed discussion with industry contacts, it is evident that technician acquisition and retention is one of the major issues facing this industry. It is more and more difficult to find hireable candidates with a good work ethic, with good basic skills, open to learning and being trained, and those who will follow processes and safety protocols. If we find them, it is even harder to retain them.

How do we make this situation better? In past years I was heavily involved with the Career Technology System

in Oklahoma. Some might know this as Vo-Tech, yet Career Tech is a more suitable name. It behooves us to reach further into the public, private, and trade schools, communicate to the administrations of these schools what it is that we are not getting in post-secondary candidates. All of industry needs to require more from our education systems.

SETTING UP SAFETY TRAINING

A more direct approach is to ask for and help set up needed training/safety curriculum in the career tech systems near you. This might have to include reviews of math, English, science, measurement, or other basics. It is a difficult reality; however, more and more companies are going to have to do more to generate the incoming candidates they seek. In addition, the workplace is increasingly a more competitive arena; employers need to find ways to add value to their job positions. One way is to increase safety in the workplace, including safer systems, better tools and equipment, and offer more thorough training and re-training on a wide range of topics, i.e. safety at height, first aid and rescue, high-voltage safety, in general best practices, safe driving, firefighting, and so much more.

Over the years, I have been involved in the training of hundreds of energy technicians mostly regarding controlled bolting, hydraulics, and height safety including emergency descent. Other than a few “attendees,” most students were attentive, were “participants,” and asked questions and demonstrated an effort to learn and understand. My hope is always that all walk away knowing something more about safety, equipment knowledge, technology, and best practices than they did prior to the classes, thus improving the safety aspect of the workplace. One point I have often stressed is most often technicians work as a team. An individual’s actions and decisions not only affect his or herself but, more importantly, others.

SAFETY TOOLS

Safety is the responsibility of both the employee and the employer. It is an unrealizable reach for employers to expect employees to just be safe without having the tools to be so. Those tools include formal training, set procedures, set expectations, and the provision of necessary tools and equipment for the employee to meet and set expectations and other job requirements. This covers employers’ liability and enhances the capability and performance of their employee base. There is a cost to this.

Of significant note is the growth and acceptance of GWO (Global Wind Organisation) training standards. More heavily adopted in Europe, GWO standards are rapidly gaining traction in North America. GWO members include many of the most recognized and well-known owners and manufacturers worldwide, i.e. Enel, Siemens Gamesa, E.ON, GE,



Safety is the responsibility of both the employee and the employer. (Courtesy: Shutterstock)

Vestas, and many others. Global members with footprints in the U.S./North America may drive a rapid expansion of acceptance and requirement of the GWO training standards. Some of the training standards include advanced rescue training and refresher, basic safety training and refresher, basic technical training, control of hazardous energies and refresher, enhanced first-aid training and refresher, and more.

GWO RECORDS

These standards are developed and agreed upon by GWO members, then courses and training providers are certified. Over time, standards are revised as members dictate to keep up with current needs and changes in industry. Wind-industry professionals' training records are kept in the GWO WINDA records database. This database helps employers verify the certification status of GWO certified training providers and the status of participants who have attended GWO training courses (see globalwindsafety.org). These standards are thorough and set necessary benchmarks for safety and best practices that affect quality and efficiency, ultimately leading to enhanced profitability.

With regard to safety, it is easy to address tangible exposure, i.e. high voltage, fire, falls, crushes, high-pressure injection, and countless others. Referring to my “not ready for duty” story in my opening, it is both management’s and employees’ responsibility to evaluate fitness of mind and/or body. We all know that most days we feel as usual. On other days, we may realize that we are “off.” Reasons are varied and may range from relationship problems, family illness, hangovers, or unreported injury from off hour activity or accident — mental or physical. Basically anything that life can throw at us humans — employees. Life happens. There is a level of being “off” that does not diminish our ability to do our job. Yet, the concern arises when that level of “off” might affect safety and regular operations. Individually we need to evaluate our capability to do our job safely and effectively and how that capability — or diminished capability — will affect others and potentially the assets of our employers. It is the employee’s responsibility to communicate personal concerns to management. It is also the workers’ responsibility to evaluate other co-workers for their own personal safety as well as others. No one wants to be a snitch or a rat; however, this is real life, and the risks, dangers, and job exposures

are tangible and warrant action.

Additionally, a good manager will intervene where he or she sees a possible problem by addressing and evaluating to make sure safety and operations aren't potentially at risk. If an employee is not up to the tasks, he or she might ask for shop work, paperwork, or even a day off. From a manager's side, the employee might be assigned a different set of tasks until they are capable of full duty. Of course, if a pattern arose with an employee where they are not prepared or capable of doing the job, that can trigger a different set of actions. Training that addresses safety should incorporate this intangible aspect of safety. The ultimate daily goal for both employer and employee is for everyone to return home safely. ✌

ABOUT THE AUTHOR

Dan Erickson is the president of PATRIOT Industrial Solutions, Inc. a provider of equipment and tooling solutions to the renewable energy industries. He has more than 30 years' experience in industrial sales and engineering of solu-



More heavily adopted in Europe, GWO training standards are rapidly gaining traction in North America. (Courtesy: Shutterstock)

tions for a wide range of applications. He was an EMT for seven years and places a high value on safety and training as well as tooling, equipment, and processes that make operations safer and more efficient for business.

An advertisement for WindSystemsMag.com. The background is a dark, cloudy sky with a wind turbine in the foreground. Overlaid on the image is a network of glowing blue lines and dots, representing a global or interconnected network. The text is white and reads: "GET CONNECTED", "WindSystemsmag.com is your online authority for information about the wind energy industry. You'll find topical articles, company profiles and interviews with industry insiders, and timely wind energy news.", "Giving Wind Direction", "WIND SYSTEMS", and "Get your FREE subscription, plus our online content, at www.windsystemsmag.com".

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PROFILE

SYSTEM SEALS

CHALLENGING THE STATUS QUO

System Seals was created to address a need that most industries were ignoring: Designing and manufacturing unique sealing systems based on the application. (Courtesy Shutterstock)

By designing and manufacturing unique sealing systems to protect wind-turbine bearings, System Seals has transformed sealing technology by maximizing the performance and longevity of essential systems and parts.

By **KENNETH CARTER** ▸ Wind Systems editor

Seals are an essential part of making sure the bearings in wind turbines stay properly lubricated and perform the way they should.

Until recently, those essential seals were generic, off-the-shelf items, largely designed for general industrial use. The result of using those seals was often main shaft damage leading to premature leakage, which, in turn, led to untimely maintenance and grease cleanup.

System Seals was created to address a need that most industries were ignoring: Designing and manufacturing unique sealing systems based on the application — not just what was available — with a goal of maximizing performance and reliability.

“After proving successful with OEMs, we quickly found out that this same approach had a profound impact on the repair markets and end users,” said Matthew Zalick, director of business development for System Seals. “It was not just for new equipment builds. And so, for aftermarket customers, these custom sealing systems ended up preventing costly leakage on existing equipment. The output of that is you’re saving thousands of dollars on either lost opportunity cost or frequent or unplanned maintenance. The System Seals approach has really helped transform sealing technology in a multitude of industries worldwide.”

BRANCHING OUT TO WIND

System Seals first started designing custom rotary seals for the steel-mill bearing industry, but it soon began to branch out into supplying its unique sealing systems to other industries, including wind, according to Zalick.

“We started developing some new seal technology with a bearing OEM quite some time ago,” he said. “That company was a major player in the steel industry, and at the time was exploring the possibility of entering into the wind-energy market with a unique bearing and sealing package. It was then that System Seals realized there was an opportunity for custom seals in the wind-energy market.”

That created an opportunity for System Seals, who began working with wind companies in 2008, according to Zalick.

“The seals used in wind turbines are typically off-the-shelf commodity parts, or metallic labyrinth seals,” he said. “Our partner was looking for extended seal life, which gave us permission to look outside of traditional elastomers and into lower-friction materials like urethane and PTFE, and it freed our engineers to think creatively with the design. We still have some of these early long-life seals made from PTFE running leak free after 14 years of operation. To my knowledge, these are the longest running main bearing seals out there.”

AN EXTENSIVE ARRAY OF PRODUCTS

In addition to the main bearing seals, System Seals also designs, manufactures, and supplies seals for pitch and yaw bearings, as well as a unique material used for the wear pads in the hydraulic yaw braking systems, according to Zalick.

“The VORTEX main bearing seals are definitely our latest disruptive technology in wind energy, but we do supply other unique components outside of just that,” he said. “With the turbine manufacturers, owners, and operators desiring more products designed specifically for their applications, we are able to push the boundaries of what the industry deemed as acceptable in performance.”

‘A SEAL THAT DOESN’T ACT LIKE A SEAL’

Zalick pointed out that System Seals believes in challenging the status quo, and the company’s VORTEX main bearing seal is a testament to that.

“That’s kind of the mantra of System Seals, and that plays out in wind with our VORTEX main bearing seal being a perfect example,” he said. “VORTEX is the first disruptive technology for main bearing seals in the history of wind energy. The way that the seal’s designed is it has a helical-shaped lip and, as the seal rotates with the housing or when the shaft rotates against the seal, that helical shape acts as an auger, like a pump. It’s just constantly pushing the grease back toward the bearing.”

“We’re using not just the newest technology as far as sealing profiles go, but also in the development of our polyurethane that we use to manufacture those seals,” Zalick said. “It’s a complete departure from what has typically been used in the past in the wind industry.”

LARGER PARTS NEEDING PROTECTION

As the wind industry continues to grow, Zalick pointed out that the industry’s assets are growing as well, which means larger parts that will need protection.

“With the growth in size of new wind turbines, we’re seeing bearings get larger, which means deflections are larger, clearances are larger,” he said. “And that comes with a whole host of issues related to lubricity and additive technology, which we need to consider from a sealing design and material standpoint. This is a major driver for continued growth in both manufacturing technology and our fluid-compatibility research.”

FOCUSING ON PROBLEM SOLVING

In addition to the growing size of assets, as existing turbines reach their end-of-life, the repowering of those turbines be-



System Seals VORTEX main bearing seal.
(Courtesy: System Seals)

comes a distinct possibility in order to increase the power output, according to Zalick.

With each job — especially when it comes to repowering or retrofitting — offering its own set of challenges, Zalick said System Seals' focus on problem solving becomes an essential part of getting a job done quickly and efficiently.

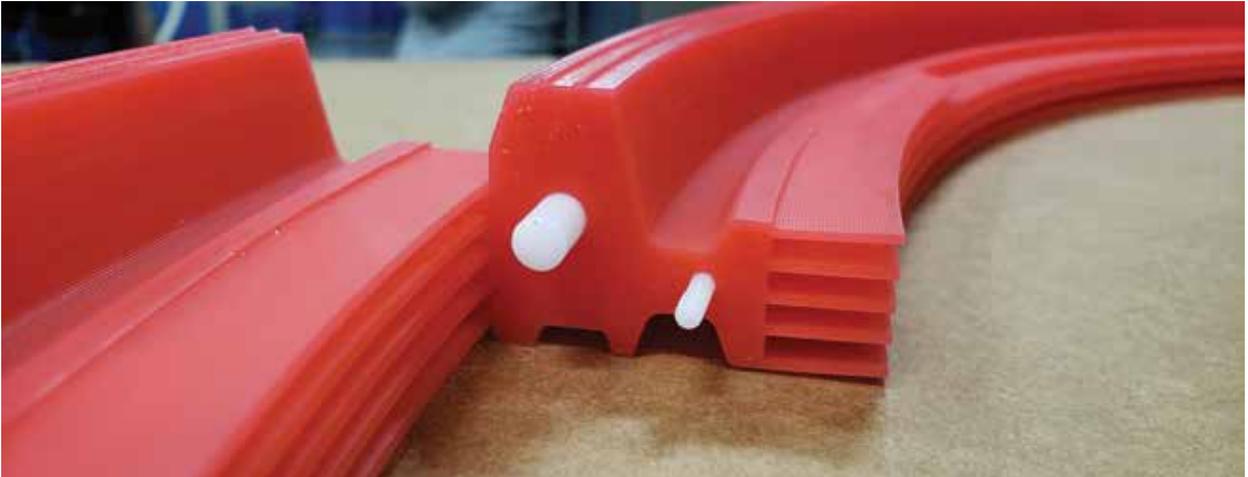
“Turbine operators are updating their equipment, and, so along with that, there’s this opportunity to either put in a higher-quality seal and to replace the traditional single lip type of seal, or, in a lot of cases, some of these turbines were not designed with the seal at all,” he said. “What we’ve done is we’re actually able to create custom-sealing solutions that fit into existing metal work where seals weren’t originally designed. That allows us to give some reliability to the turbine company, knowing that there’s actually a seal in there without having to add the cost of adjustments to existing metal work or design.”

“One of our biggest unique qualities as a company is our focus on problem solving,” Zalick said. “Typically, when



System Seals' first “Super VORTEX” seal with an inside diameter of 3.8 meters. (Courtesy: System Seals)

we’re courting a new potential customer, the first questions we ask are: What’s your biggest headache? Where are you having leakage issues? What’s the problem you can’t solve? Because we are structured in a way that we can develop unique solutions and develop custom seals to be able to help do that. Along with that open mindset of problem solving, our engineering group comes with over 25 years of this idea of developing and supplying custom-sealing solutions. We could address these customer challenges with a unique approach every time.”



A split VORTEX seal for aftermarket repair. The VORTEX seal is designed to be installed without gluing or bonding. (Courtesy: System Seals)

LOOKING TO THE FUTURE

With that main directive, Zalick said System Seals has carved out what has become a vital niche for wind-energy assets, and as wind-turbine capacity and component sizes continue to increase, the lubrication requirements are going to have to change in order to manage lubricity at that size.

“I know some companies are talking about a desire to change to oil lubrication for main bearings, which has always been a difficult undertaking, but they also want to operate in more extreme environments,” he said.

“For System Seals, we’re trying to work ahead of these trends by expanding our manufacturing capabilities. Currently, we’re able to manufacture endless seals at a little over five meters in diameter. We want to stay ahead of making sure that we can continue to grow those capabilities to match the needs of the generator and bearing manufacturers. We’re also constantly performing compatibility tests with our materials and the latest greases. Right now, we’re actually on the tail end of qualifying our VORTEX seal for oil-lubricated bearings.”

DESIGNING SEALS SINCE 1995

System Seals is a U.S.-based company with its headquarters in Cleveland, Ohio, where the company recently expanded to include a new facility in Brecksville, Ohio, according to Zalick.

“This new wind-energy division of System Seals is solely dedicated to the manufacturing of our VORTEX main bearing seal,” he said.

System Seals has its European headquarters in Hamburg,



System Seals molded pitch bearing seal. (Courtesy: System Seals)

Germany, and it recently acquired a manufacturing facility in Austria that had closed in 2021, so the expanded HQ and the Austrian facility have been big assets to the company, according to Zalick.

“That office has been critical in our day-to-day access to the largest wind-turbine manufacturers,” he said. “Most of the OEMs are there.”

Even though System Seals has been involved with wind for a little more than a decade, the company has actually been active since 1995, when it was founded by Arnold von Engelbrechten, a German-born engineer. With a career in seals, he started applying newer technologies to how seals were designed, because, at that time, hydraulic seals weren’t an off-the-shelf type of product.

By revolutionizing how industries looked at seals, System Seals was able to offer solutions to problems many industries had not, historically, been overly concerned about, according to Zalick. In doing so, it pushed many industries to address issues that ultimately saved them time and money. ↵

MORE INFO

www.systemseals.com



Brent Kisling

Executive Director ▸ Oklahoma Department of Commerce

“(In 12 years,) we went from basically zero kilowatts of production to now, depending on how you count it, second or third in the nation in installed wind-energy capacity.”

While most equate Oklahoma with oil and gas, the state is actually a leader within the renewable energy sector in the U.S., with nearly 40 percent of the state’s total electricity generated from renewable resources. Oklahoma also produces 68 percent more energy than it consumes. *Wind Systems* recently talked with Brent Kisling, executive director of the Oklahoma Department of Commerce, about Oklahoma’s renewable energy sector and how its growth has allowed the state to become a national leader in energy production and emissions reduction.

▸ How has Oklahoma’s approach to developing renewable energy differed from other states?

The biggest difference for us is the fact that we have historically been a hydrocarbon mining state. The fact that we have embraced all types of energy the way that we did is a little unique. The other thing that’s a little unique is, Oklahoma does best on recruiting businesses and industries to the state whenever we have a specific focus, and I’ll give you a couple examples: We did this with the aerospace industry probably 10 to 15 years ago, and we created some new incentives. We hired a bunch of staff to focus on it, and now aerospace is our second largest employer — behind energy — in our state.

But we did the same thing with wind energy about 12 years ago — around 2010 or 2011. We created a bunch of amazing incentives, hired a bunch of staff that went to every trade show, and met with every CEO. We went from basically zero kilowatts of production to now, depending on how you count it, second or third in the nation in installed wind-energy capacity. We do well whenever we focus on it, and we were definitely focused on wind energy.

▸ Nearly 40 percent of Oklahoma electricity comes from renewables. What steps did the state take in order to become a leader in the renewables sector?

It started with the incentives where we identified the production of electricity from wind generation to manufacturing in our state. We were able to do some specific exemptions on property taxes within the state. That helped us be very competitive early on, but the cool part of the story, and again, maybe something that’s unique about Oklahoma, is that we did create all of those 10 or 12 years ago, but none of those incentives exists anymore in Oklahoma. We used to have a whole hallway of staff focused on renewables. We don’t have to have them anymore because now we have an established, mature industry that is just building on itself. We put the infrastructure in first, and now the industry’s following.

▸ How do you think other states can emulate Oklahoma’s examples?

Oklahoma wants to electrify the nation. We produce 68 percent more electricity than we use here, so we already export a lot of that electricity. And with the way it looks like automobile propulsion is heading, the fact that everything in your house nowadays seems to be running off of electricity, I think the two most important things to produce in the country over the next several decades are going to be electricity and food. And we do both of those very, very well.

I want to make sure we continue to be competitive, but also, I know this is about wind energy and about renewables, but we want to maintain our leadership in the mining of hydrocarbons as well. We’re top five in natural gas and top five in crude oil production. We want to maintain that as well. We truly are an all-of-the-above state.

▸ Was it difficult to convince Oklahomans of the advantages of the renewable energy?

I would say early on it was difficult, but that changed fairly rapidly as well. The message that works for Oklahomans on renewables is not necessarily the discussion about climate

change or even emission reductions, even though we're one of the leaders in the nation on that. What folks in Oklahoma really understand is that early on, most of these wind farms were built with power purchase agreements. And so you had some of these major corporations that were coming in and doing 15- and 20-year power purchase agreements to take the flexibility of electric pricing out of their proforma. And when you can get a fixed-rate contract or close to a fixed-rate contract for 20 years on your electricity, then you're going to want to move your data center to Oklahoma. You're going to want to move your heavy manufacturing facility to Oklahoma. That was where the convincing really happened.

► **What effects has your energy growth had on the local environment and the economy?**

It's huge for rural Oklahoma and, specifically, for education. In our state, which is true in a lot of states, but for sure in Oklahoma, we fund education through local property taxes. We supplement that in some cases around the state with state-allocated dollars, but for the most part, most of our funding comes from ad valorem taxes. Wind energy, that's their thing, and if you're a school district and you can get a wind farm located in your school district, then you're probably going to get a new gymnasium. You're probably going to get some additional classrooms with better audio/visual capabilities. You're going to have higher paid teachers in that district. So on the taxes side, it was huge for local economies.

But the other part is the landowner payments. Every time one of those turbines is spinning, it's driving more revenue down into that dirt that's going to that local landowner. And the beauty of wind energy is that you can continue to farm that field; you can continue to raise cattle. You continue to have a net income off of that quarter section of land, and you can supplement it with those landowner payments. Those dollars end up going to the local convenience store. They go to the local retail shops. So, for the areas of Oklahoma where wind energy landed, it was revolutionary for them.

► **Since you don't have the incentives in place anymore, how do you continue to advance that part of renewables in the state?**

By being supportive of transmission coming to the state. We are very supportive, and that goes through our Oklahoma corporation commission. They have been very open to allowing for additional transmission to come here, so that we can generate those electrons and then move them to other population centers throughout this part of the United States.

I think one of the biggest things that's going on right now that will benefit Oklahoma's economy are some of these interchange agreements that are happening between the southwest power pool, for sure to the east and the west. We haven't seen a lot of that with ERCOT to Texas, but we have to the east and the west, and that way we can pump

an electron into the grid in Oklahoma and get it to St. Louis, get it to the Tennessee Valley Authority, and maybe you can get that out to the Atlantic and the East Coast. If we can get more of that to the west, as well, and get over the mountains, that really opens up a lot of opportunity for us in the state. I know we have agreements with Alabama Power, so there are some specific states we do, but most of those early power purchase agreements were with Anheuser-Busch and Ford Motor Company and, of course, Facebook and Google and some of those.

► **Have the net zero goals set by the Biden administration accelerated Oklahoma's push for renewables, or is the state already ahead of the game in comparison?**

We feel like we're already ahead of the game, and the fact that Oklahoma never did it with a mandate. We did it with a carrot rather than a whip, and that was very successful for us.

► **Anything else you'd like to mention that we didn't talk about?**

I think two points could be made that relate specifically to wind energy in Oklahoma. You asked about what was unique about our state, and we did a great job of attracting wind-energy generation of electricity. We haven't had a lot of the supply chain that has come in yet. We have the infrastructure in place, the offload facilities. We have an inland port here. We have all of the infrastructure in place to support that supply chain, but we haven't seen a lot of that come to the state yet. That's maybe an important point that we try to make all the time. It's one of our big pushes. The other part of wind energy that relates to the rest of our economy is that there are a lot of companies now that are wanting to reduce their carbon footprint. They want to be able to be secure that they're going to be using renewables for their operations, and unlike other states with that much production, like we do here, we can make that kind of a promise.

And that's why you see some of these battery manufacturers and automobile manufacturers moving here to the state. You see green hydrogen production. We had a huge announcement a couple weeks ago in the southern part of our state, an Australian company named Woodside that's looking to produce green hydrogen, which is going to be renewables, electrolyzing water in order to pull hydrogen.

We're getting a lot of attention for those, and who would've known 10 years ago, when we put together this focus on wind, that that would be one of the unintended consequences, but it certainly has been. And that's why Oklahoma's the 11th fastest growing state in the nation right now. That's why we have a top-10 unemployment rate. We have a lot of those jobs pouring in here, and it's because we focused on the right things 10 years ago. ✨

MORE INFO ► www.okcommerce.gov



The Blue Tern is headed for Neart na Goithe. (Courtesy: Fred. Olsen Windcarrier)

▀ CONSTRUCTION

Blue Tern to support jacket installation at Neart na Goithe

Fred. Olsen Windcarrier has won a contract with the Blue Tern, a jacket installation vehicle, to support the jacket installation campaign on the Neart na Goithe (NnG) offshore wind farm.

The contract is included in FOWIC's disclosed total backlog with a value of about 355 million euros. Blue Tern will support the jacket installation campaign by doing drilling and possibly piling works.

"We are delighted to have FOWIC and the Blue Tern engaged in what

will be an exciting phase in the development of NnG.

The Blue Tern is a fantastic asset, and we look forward to seeing her utilized in support of the jacket installation works," said a Neart na Goithe spokesperson.

"We are pleased to have been awarded the extra work on NnG and we look forward to working with them to safely deliver on this project," said a spokesperson for Fred. Olsen Windcarrier.

Neart na Gaoithe is a key U.K. offshore wind-farm project and located off the east coast of Scotland, 15.5 kilometers off the Fife coast and covers an area of about 105 square kilometers.

MORE INFO www.Windcarrier.com

▀ CONSTRUCTION

VelociWrapper gets patent for cable-wrapping machine

The VelociWrapper™ Company was recently awarded a patent by the United States Patent and Trademark Office for its flagship product, the VelociWrapper, a cable-wrapping machine that increases speed and efficiency while reducing costs for wind- and solar-farm installations in the renewable-energy construction sector.

The less it costs to install wind and solar farms, the less it costs consumers, the more consumers will make the switch to clean energy, and the faster



► CONSTRUCTION

Airpes provides blade-replacement system

Following acquisition by The Crosby Group, a leader in lifting, rigging, and load securement hardware, Airpes has widened delivery of innovative lifting, handling, and weighing solutions for the wind-energy and industrial market, including a craneless wind-turbine rotor blade exchange system.

As wind-farm operators meet demand for new turbines, they must also maintain installed towers, nacelles, and other components. Central to that work is removal and replacement of rotor blades, which can measure 80 meters (approx. 260 feet) in length and weigh more than 24 tons. With wind farms naturally being installed

Airpes has widened delivery of innovative lifting, handling, and weighing solutions for the wind energy and industrial markets. (Courtesy: Crosby Airpes)

that greenhouse gas emissions can be reduced worldwide.

The International Energy Agency (IEA) predicted in 2012 that global solar energy generation would reach 550 TW/h by 2030.

That number was exceeded in 2018, illustrating that the growth of solar and wind energy has not been linear, but exponential.

“Due to the demand for our machine, we have already outgrown our first facility and are currently moving our manufacturing operations into a facility five times the size to accommodate the growth,” said Torrance Bistline, the founder and inventor of the VelociWrapper. “We have more patents and innovations in the works as well, which we will be unveiling soon.”

The VelociWrapper requires no motorized power to run. Once the cables are laid in the ground using the system, it contributes 5 to 8 percent more efficiency in the transfer of energy through to its destination, which also reduces heat and extends the life of the cable.

The VelociWrapper Company is based in Hildale, Utah. Founded in 2021, the company’s mission is to recognize and fulfill the need for high-quality custom equipment for the construction industry, focusing on the renewable energy sector. The name comes from its flagship product,

the VelociWrapper™, which is a patented triplexing machine that is 100 percent green, reduces installation time, and saves money for clean-energy installations.

MORE INFO www.velociwrapper.com

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in remote, windy locations, this is a complicated, expensive process that involves large cranes and heavy rigging — until now.

“Our challenge was to develop a more cost-effective, faster solution to replace the logistical feat of getting big cranes, hoisting technology, and personnel onto remote sites, sometimes for multiple days. The wind-energy market is constantly evolving and innovating — and its suppliers must keep up or even pioneer new solutions. Our ground-level, winch-based system avoids the use of large cranes, immediately eliminating much of the time and costs involved with other solutions,” said Josep Compte, Airpes’ managing director and co-founder.

Combining winches at ground-level with a series of pulleys and shackles in the nacelle, Crosby Airpes can remove and replace blades in a 6 o’clock position. On the top of the tower, a rig is customized according to the turbine. For installation, a smaller mobile

crane provides the necessary support to the tip of the blade.

“The craneless system demonstrates innovative thinking and improvements in cost and time efficiencies for the customer,” Compte said. “It has given us clear competitive advantage in one of the world’s most vibrant markets, further increasing our market share and contributing to significant, long-term growth.

Leveraging The Crosby Group’s global footprint, technical field support and training teams, and world-class hardware, together we will bring this solution to more sites and make the lifting and renewables industries safer and more efficient.” Crosby Airpes is part of The Crosby Group’s Technology Solutions portfolio, along with Crosby BlokCam and Crosby Straightpoint. This portfolio combines technology and lifting and rigging hardware to deliver solutions that improve safety and productivity for customers.

Crosby Airpes’s craneless wind tur-

bine rotor blade exchange system is available for purchase or rental.

MORE INFO bridger-howes.prezly.com

INNOVATION

VinciVR receives \$200K DOE grant for VR training tool

U.S. Energy Secretary Jennifer Granholm recently announced that VinciVR Inc. will receive \$200,000 as part of 259 Department of Energy grants totaling \$53 million to 210 small businesses in 38 states.

“Supporting small businesses will ensure we are tapping into all of America’s talent to develop clean-energy technologies that will help us tackle the climate crisis,” said Steve Binkley, acting director of the DOE’s Office of Science.

“DOE’s investments will enable these economic engines to optimize and commercialize their breakthroughs, while developing the next generation of science leaders and ensuring U.S. scientific and economic competitiveness that will benefit all Americans.”

Through the Small Business Innovation Research/Small Business Technology Transfer program across the federal government, small business powers the U.S. economy and generates thousands of jobs, both directly and indirectly. The awards aim at transforming DOE-supported science and technology breakthroughs into viable products and services.

VinciVR Inc. will receive \$200,000 to work with offshore developers, disadvantaged communities, and training organizations to develop a portable virtual reality (VR) training tool for mariners that simulates offshore wind farms in various weather conditions. This will help mariners learn navigation/operations through a wind farm before construction begins.

“Offshore wind will create thousands of high paying jobs while fun-

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Massachusetts Lt. Gov. Karyn Polito experiences VinciVR's offshore wind VR software. (Courtesy: VinciVR)

damentally changing US energy, but ensuring a prepared workforce will be a significant challenge," says Eagle Wu, CEO of VinciVR. "We will make sure Americans are ready for this change through this DOE investment."

"Promoting diversity within renewable energy is a core internal initiative. We are excited for this partnership in building a dynamic and operationally ready workforce to meet offshore wind energy industry's needs," said Dr. Cynthia Brown, managing partner of IWNL.

MORE INFO www.vinci-vr.com

INNOVATION

Endangered whales tagged with digital acoustic tech

The Bureau of Ocean Energy Management (BOEM) and the National Oceanic and Atmospheric Administration's (NOAA) Stellwagen Bank National Marine Sanctuary recently announced the successful digital acoustic tagging of 14 sei whales in waters offshore Massachusetts. This is the first time researchers have successfully tagged an endangered species in the United States using an un-crewed aerial vehicle (UAV), or drone.

The collected data will shed light on the whales' acoustic behavior, which researchers will use to inform mitigation strategies — including pas-

sive acoustic monitoring — to protect this endangered species from the potential impacts of offshore wind-energy activities. "BOEM is pleased to be able to fund this important research. Our Environmental Studies Program looks for innovative solutions to resource management challenges," said Jacob Levenson, BOEM marine biologist. "Using UAVs allows scientists to collect data in a way that is safer for both the whales and researchers."

Very little is known about the sei whale, one of the most endangered large whales in the North Atlantic. Understanding how the whales behave and use their habitat is critical for BOEM to assess potential impacts resulting from bureau-permitted offshore activities and ensure responsible offshore wind energy development.

Digital acoustic tagging is a component of a larger BOEM study to address gaps in information on a variety of endangered large whale species — including sei, North Atlantic right, and fin whales — to better inform offshore

wind-energy area selection.

UAVs enable researchers to target specific animals in a group or conduct multi-group taggings, and the collected data will also aid in conservation efforts. "The use of UAVs to tag whales is the first major innovation related to attaching tags to whales," said Dr. David Wiley, research ecologist at Stellwagen Bank National Marine Sanctuary. Wiley has used various suction cup-based, computer-equipped tags to study the underwater behavior of whales for almost 30 years.

MORE INFO www.boem.gov

INNOVATION

Stora Enso partners with Modvion on wood for turbine towers

Mass timber product supplier Stora Enso and wood technology company



Very little is known about the sei whale, one of the most endangered large whales in the North Atlantic. (Courtesy: National Marine Fisheries Service)



Taller towers reach stronger winds, leading to more cost-efficient energy production.

“We are proud to enter into partnership with Modvion who, like us, strive to push boundaries and demonstrate the possibilities with wood,” said Lars Völkel, executive vice president, Division Wood Products, Stora Enso.

“As one of the largest sawn wood producers and private forest owners in the world, we play an important role in the transformation to a greener society.

By contributing our expertise to Modvion we can further help make a difference in mitigating climate change and supporting the EU’s drive to increase renewable energy production.”

Using wood, a renewable resource, can reduce the CO2 emissions for the tower by 90 percent while also storing carbon dioxide that has been taken up by trees during their growth.

The wood used for advanced con-

Using wood, a renewable resource, can reduce a tower’s CO2 emissions by 90 percent. (Courtesy: Modvion)

Modvion are partnering to establish wood as the material of choice for wind-turbine towers. The collaboration’s purpose is to demonstrate the possibilities in using wood in demanding constructions.

Modvion builds wind-turbine

towers with laminated veneer lumber (LVL), which proportionate to its weight, is stronger than steel. The towers are built in lightweight modules, enabling taller towers and easy transportation on public roads without permits or road reconstructions.

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structions such as wind-turbine towers can be reused in new wood-based products, which provides further long-term climate benefits.

“The commitment of Stora Enso to replace fossil-based materials with renewables is a perfect match for Modvion,” said Otto Lundman, CEO of Modvion.

“To solve the climate crisis, we need more renewable energy as well as increased use of sustainable, wooden constructions. Together with Stora Enso, we can enable both.”

MORE INFO www.storaenso.com/en/products/wood-products

MAINTENANCE

Snap-on introduces flat jaw locking pliers

Snap-on Industrial has introduced new flat jaw locking pliers with a patent-pending power ring that increases thread strength and delivers a clamping force up to 5,000 pounds.

The tool is made in the U.S. Features include a pinned and brazed upper jaw, an oversized adjustment screw, a textured body and lever that increases the grip when being used by oily hands, and a nickel finish for a classic look and feel. The pliers come in 10-inch and 7-inch lengths with optional cutters. The 10-inch pliers deliver a 5,000-pound clamping force, while the 7-inch version delivers 4,000 pounds of force.

MORE INFO b2b.snapon.com

MAINTENANCE

Bitbloom to supply wind-asset analytics in North America

Bitbloom, a provider of software and analytics services for the wind indus-



Cubico will benefit from Bitbloom’s proprietary Sift Monitor analysis platform, that provides automated analytics and reporting. (Courtesy: Bitbloom)

try, has signed a contract with Cubico Sustainable Investments (Cubico) for the supply of wind-asset analytics in North America. The contract will see an expansion of Bitbloom’s service provision to include Cubico’s first U.S. wind farm, the 46.5 MW Wind Fall 1 project in California.

“We’re delighted to be expanding our work with the Bitbloom team, not only is their service first-class, but we were really impressed by their ongoing agility and flexibility to optimize as new requirements and information are obtained,” said Charlie Plumley, Cubico performance manager. “The

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transparency of their insights mean that reports are easily shared and understood within our internal teams ensuring actions are made that can add value to our portfolio.”

Cubico will benefit from Bitbloom’s proprietary Sift Monitor analysis platform, that provides automated analytics and reporting. Bitbloom will deploy a range of automated and targeted analytics and ongoing monitoring services, to optimize both operating performance and the health of wind assets.

“As we enter the American wind market, we’re really pleased to be able to bring such a valued partner along with us,” Plumley said. “We’ve been delivering monitoring services for Cubico in Europe for around 12 months now, and we’re really excited to be expanding our remit with them in North America,” said Steffan Lindahl, Bitbloom co-founder. “Our ability to be responsive and deliver transparent insights in collaborative optimization

projects is what sets us apart. These qualities are the cornerstones in how we build our software and services for customers.” Bitbloom provides ongoing operational monitoring services for Cubico’s European wind-farm portfolio, and the American contract began in April.

MORE INFO bitbloom.tech

MANUFACTURING

Remee Wire expands line of renewable energy cables

Remee Wire and Cable, manufacturer of electronic wire and cable, has introduced Renewables by Remee, its expanded line of renewable energy cables.

The cables have been designed for power collection and distribution in



Remee’s cables have been designed for power collection and distribution in solar and wind power generation systems (Courtesy: Remee Wire and Cable)

solar- and wind-power generation systems. Remee’s experience in manufacturing rugged cables for use in harsh outdoor environments provides assurance of signal integrity and continued performance.

For wind towers, Remee provides cables for blade grounding, cabling from the nacelle to the intermediary collection point, and collection cable from the many intermediary collection boxes to the substation.

For solar power, Renewables by Re-

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mees include photovoltaic (PV) cables for interconnecting solar arrays, collection cables to connect the panels with intermediary collection points, and medium voltage cables in copper or aluminum to transmit power to substations.

Renewables by Remece includes the following cable families:

► **Solar array cables:** Copper PV wire rated at 2,000V with cross-linked polyethylene (XLPE) jackets for durability.

► **Collection cables:** Aluminum PV wire rated at 2,000V, also with cross-linked polyethylene (XLPE) jackets for durability.

► **Medium voltage cables:** Both the aluminum and copper MV Series are rated 35kv; they feature tree-retardant cross-linked polyethylene (TR-XLPE) insulation and a cross-linked polyethylene (XLPE) jacket.

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► **Fiber-optic cables:** Interference-free fiber-optic cables are available with loose tube construction featuring gel-free AquaLock; available with and without armor. Fiber in duct available upon request.

MORE INFO remece.com

► MANUFACTURING

Vestas gets 101-MW order in Italy

ERG, an Italian independent operator producing energy from renewable sources, recently placed a 101 MW order for the Mineo Militello Vizzini wind park in Sicily, Italy.

The contract includes the supply

and installation of 24 V136-4.2 MW wind turbines as well as a multi-year active output management (AOM 5000) service agreement.

“We are very happy to announce our partnership with ERG for this project, which is the largest one we have signed in the last 15 years in Italy,” said Francesco Amati, Vestas Head of Italy. “This signature highlights the versatility of our 4-MW platform and adds more than 100 MW of clean energy to the Italian energy mix, supporting, once again, the country’s energy transition toward a more sustainable future.”

Turbine delivery is planned for the second quarter of 2023 while commissioning will take place in the second half of 2023.

The project adds to more than 5.4 GW wind turbines installed or under construction by Vestas in Italy, a market share of more than 40 percent. ✎

MORE INFO www.vestas.com/en

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CROSSWINDS

THE FUTURE OF WIND

TACKLING THE HEADWINDS

Many renewable companies are leading the way to help make the goal of a net-zero grid by 2035 a reality. (Courtesy: Shutterstock)

Renewable energy – including wind, solar, and battery storage – has made amazing strides over the last decade, but there are still challenges to be overcome in order for the U.S. to make it to a net-zero-carbon grid by 2035.

By **KENNETH CARTER** ▸ Wind Systems editor

Looking at the growth record of wind energy and other renewables in the U.S. is an ideal way to see how far clean-energy alternatives have come.

The first wind turbines in the U.S. went in the ground more than 30 years ago in the 1980s, but it took until 2002 before 1 GW of operating wind and solar were on the grid.

There was gradual growth from that point, and the country would hit 100 GW in the next 14 years. But, in the latter part of the 2010s, the industry kicked into overdrive, and in five years, that number doubled to 200 GW.

To celebrate that 200-GW milestone, executives from renewable energy companies and the American Clean Power Association took time to discuss that achievement, as well as what future challenges the industry faces, during a press conference at CLEANPOWER 2022 in San Antonio, Texas, May 17.

“Low costs and demand have really been critical factors in that growth of this industry,” said John Hensley, the American Clean Power Association’s vice president of research and analytics. “Clean power is the top choice of new power capacity on the grid today; 81 percent of all new power plants added in 2021 were in the form of wind, solar, and battery-storage facilities. And that’s not a new trend. For the past five years, renewables and battery storage represent 63 percent of all new additions to our electric system.”

MORE GROWTH EXPECTED

That growth isn’t expected to stop as more than 90 percent of all projects in the interconnection queues – which is a good indicator of power plants being added to the grid – are in the form of wind, solar, and battery storage, according to Hensley.

“Now, clean power has become an integral part of the electricity system; today, over 13 percent of your electricity comes from wind and solar plants across the country,” he said. “In certain states, that percentage is even higher. States like Iowa, South Dakota, Oklahoma, and Kansas all generate more than 40 percent of their electricity from wind and solar projects. And Iowa leads the way at 56 percent of their generation mix coming from solar and wind.”

As much progress as the renewable energy industry has made over the last few years, a lot more will be needed if the U.S. is going to reach certain energy goals, according to Heather Zichal, CEO of the American Clean Power Association.

“Don’t get me wrong, 2021 marked a record year for clean power,” she said. “(But) we need to increase our project volume by 65 percent over 2021 to reach a net-zero grid by

2035. The headwinds our industry faces this year indicate that we may not be able to even maintain the momentum of the last two years in 2022. While installations and storage are similar to last year, supply chain woes, trade barriers, bottlenecks, and transmission and policy uncertainty all threaten future development.”

TRANSITIONING NEED

Hensley said this is a critical juncture for renewables.

“We need to be transitioning,” he said. “We need to be deploying more and more renewables every year. That’s what’s needed in order to enable the clean-energy transition that will help to push this country toward a net-zero emissions grid by 2035.”

The good news is that many renewable companies are leading the way to help make that 2035 net-zero goal a reality.

BHE Renewables, which is part of Berkshire Hathaway Energy, has invested more than \$35 billion in wind, solar, and geothermal projects that the company owns, and it has also provided about \$7 billion in financing for other wind-energy projects, according to BHE Renewables president and CEO Alicia Knapp.

“According to the 2021 Clean Power Annual Report that was just released, our investor-owned utilities have the most operating clean power,” she said. “Berkshire Hathaway Energy also has the second largest operating renewable fleet and is the top purchaser of renewable energy. We’re very proud to be leading the way to a sustainable energy future.”

Those BHE investments’ ultimate goal is to achieve zero greenhouse gas emissions, but Knapp said more will be needed.

“Part of that is generating more renewable energy, but to do it, we also have to expand our transmission system, and that’s key,” she said. “It’s not enough to just deliver more clean energy; it has to be reliable and affordable for our customers. So, let’s talk about reliability. This is a key priority for our organization and the industry. As we transition to cleaner energy, we need to be sure our customers can still count on us to meet the needs of their lives and their businesses. It means we have to advance energy storage, and we have to recognize the benefits of clean baseload geothermal energy. We’re constantly innovating and exploring new opportunities in these areas.”

AVANGRID RENEWABLES: A LEADING COMPANY

Another renewables company leading the charge is Avangrid Renewables.

“We’re incredibly proud to be a leading company in the



At CLEANPOWER 2022, executives from American Clean Power Association and leading renewables companies spoke about the progress and challenges ahead. From left: Jose Antonio Miranda, onshore president and CEO of Avangrid Renewables; Heather Zichal, CEO of the American Clean Power Association; Alicia Knapp, BHE Renewables president and CEO; and John Hensley, the American Clean Power Association's vice president of research and analytics. (Courtesy: Kenneth Carter)

effort to realize a sustainable energy future world," said Jose Antonio Miranda, onshore president and CEO of Avangrid Renewables. "We have the third largest portfolio of clean-energy assets in the country. And today, we operate 8,000 MW of wind and solar across 23 states. One of those states is Texas. It's our host for this year's conference and played an important role in the winter storm that caused significant power outages and extraordinary hardship for many residents. Even through that extreme weather, our agile and dedicated operation team safely maximized generation and delivered power to our customers under exceptionally challenging conditions when they needed it most."

Avangrid is also a leading offshore wind developer in the U.S. as well, according to Miranda, with about 5,000 MW of projects in the portfolio.

"That includes the first-in-the-nation, 800-MW Vineyard Wind project," he said. "And as we continue to grow our renewable portfolio, both onshore and offshore, we are laser-focused on positively impacting our society by creating new high-quality jobs across the U.S. To that end, we are committed to ACPS energy transition for our platform, which is focused to ensure workers, communities, and those historically left behind benefit from the transition to a clean-energy future. We are holding our commitment to these principles by broadening our recruitment to target workers from disadvantaged communities, founding college scholarships, and targeting critical investments in our offshore business to local communities like Bridgeport, Salem, Somerset, or New Bedford. But our industry also is facing some new challenges, by not only threatening the progress that we make, but also potential jobs for economic growth."

FACING POTENTIAL CHALLENGES

Miranda pointed out that, with increasing gas supply prices

caused by the war in Ukraine, the need for energy independence and affordable energy has never been more important than it is now.

Even though the Biden administration has pushed renewable energy efforts, some policies in the works may end up being counterproductive to meeting that zero net carbon goal that is only 13 years away.

A provision in the Coast Guard Authorization Act could affect U.S. vessel construction needed to advance offshore wind projects.

The original bill contained a maritime crew provision that requires crews on construction vessels to be citizens of the U.S. or the flag state of the ship itself.

That provision could cripple the blossoming U.S. offshore sector, according to Zichal, saying the provision would prevent the U.S. from achieving the administration's target of deploying 30,000 MW of offshore wind by 2030.

However, the good news is the current language in the bill that could be restrictive to offshore wind has been changed, hopefully for the better, but that still remains to be seen.

Another challenge from the Department of Commerce — the Auxin Solar Tariff Petition — is affecting the solar industry. This petition could affect the import of solar panels from countries that include Cambodia, Malaysia, Thailand, and Vietnam.

"Those tariff rates can go up to 250 percent," Zichal said. "Just the threat of that out there, and the requirement that an industry would have to carry that risk, has led to a major standstill in the deployment of clean energy. Today, I can point to many decisions where companies are faced with that and are delaying and scrapping solar projects across the country."

Those delays to renewable projects have sent many states and utilities into making decisions that would keep coal

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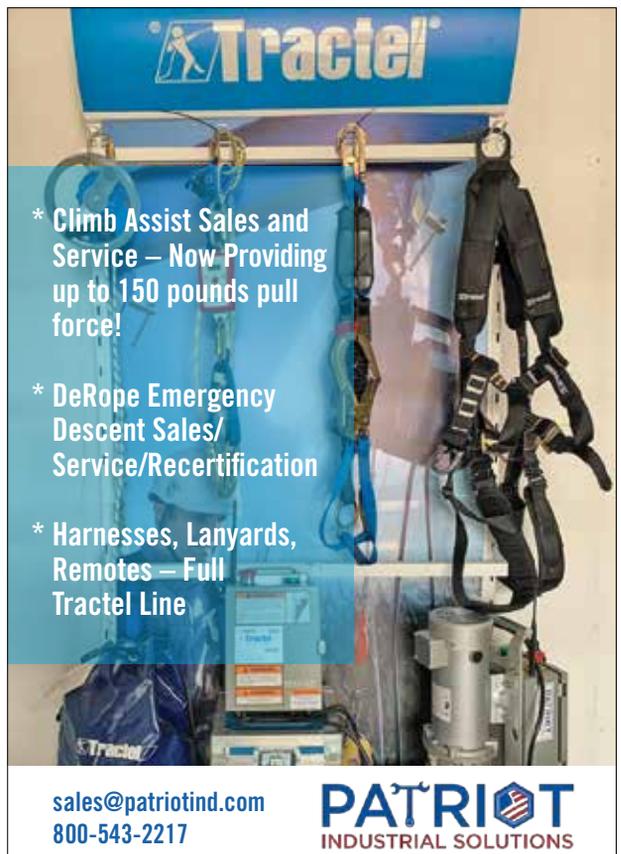
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CLEANPOWER 2022 brought more than 7,000 attendees to San Antonio, Texas, May 16-18. (Courtesy: Kenneth Carter)

assets generating longer than originally planned, according to Zichal.

“We’re seeing again, thousands and thousands of jobs impacted by the delays or potential scrapping of these solar investments and solar projects,” she said. “And I think the most frustrating piece of all of this is that this is a Department of Commerce decision that is 100 percent discretionary. We’ve got a Biden administration that says a lot of the right things about deploying clean energy, but then when you look at some of the policies, (it looks like) we’re actually going in the wrong direction.”

FEDERAL AND STATE POLICIES

Knapp also pointed out the need to look at how federal and state policies can play a major role in the pricing of projects before and after they are operating.

“We need to work together to properly value clean-energy investments and the values of energy security and reducing emissions,” she said. “As energy providers, we’re all dealing with some of the same challenges. We all rely on the (American Clean Power) Association’s policy efforts to help remove barriers to accelerate clean-energy growth, like working to create a more stable supply chain and working toward more efficient and affordable siting and permitting for new projects.”

KEEPING THE PROGRESS GOING

Challenges persist, but if they can be solved, then that will only help add to the progress that’s already in motion. For example, in Texas, the state generates 116 TW/hr of electricity from wind and solar projects, according to Hensley.

“That’s roughly equivalent to about 24 percent of the state’s electricity needs, so it’s certainly a big part of the grid ... in Texas,” he said. “Now, demand for clean energy also continues to rise.”

That clearly can be seen in how buyers — both utilities and commercial-and-industrial (C&I) customers — set a re-

cord in 2021 for new clean-power purchase agreements, according to Hensley, with more than 29 GW of new PPAs — a 28 percent increase from 2020.

“They captured about 54 percent of the market, and top buyers in the C&I space include companies like Amazon, Meta, Verizon, and TotalEnergies,” he said. “On the utility side, top buyers for the year include companies like Clean Power Alliance, American Electric Power, and the Tennessee Valley Authority. Now, besides generating clean electricity and delivering low-cost electricity, clean-power projects also delivered for the economy and the environment.”

GREEN GOALS, BOTH ECONOMIC AND ENVIRONMENTAL

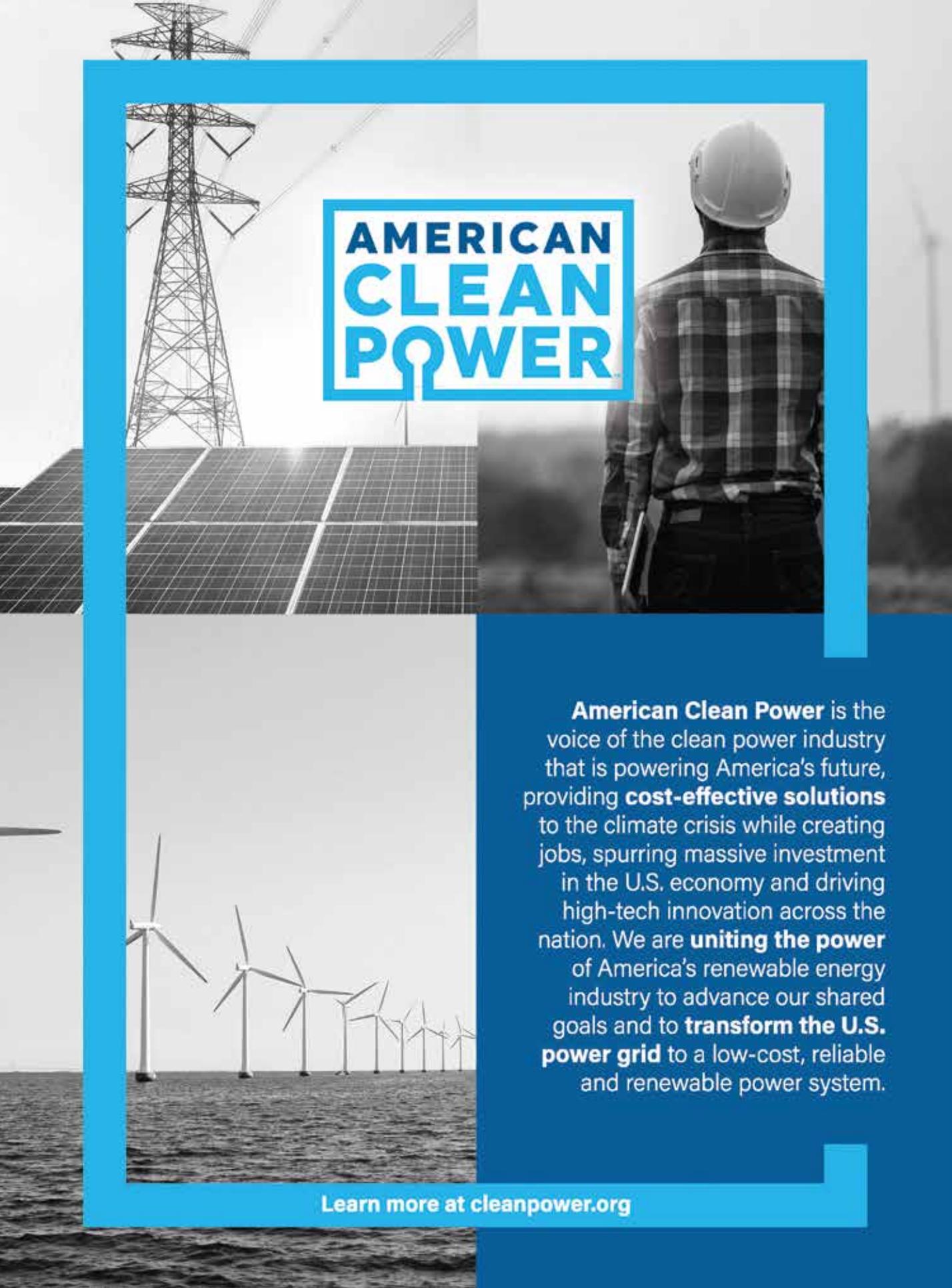
Renewable projects are often a crucial boon to low-income counties where projects pay more than \$2.5 billion to local communities that go to schools, local infrastructure, and other critical investment needs, while, on the emission side of things, clean-power projects are responsible for avoiding more than 398 million metric tons of carbon emissions, according to Hensley.

“That’s like taking 86 million cars off the road,” he said. “In addition, those clean-air benefits that we all benefit from as a lack of carbon being in the system and in the air, delivers between \$18 (billion) to \$47 billion in health benefits to Americans across the country, so there’s a lot to celebrate.”

But, as Knapp emphasized, “we definitely have a lot of work to do.”

Miranda also agreed.

“We are working with our colleagues in the industry to find a productive path forward with Congress that supports our national clean-energy and climate goals and the development of a U.S. offshore wind workforce,” he said. “We’re passionate about this incredible opportunity brought upon us — to build the clean-energy future for America. ... We look forward to working together to build on the progress that we have already made.”



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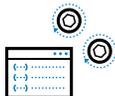
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