The Haystack project includes the supply of 51 SG 5.0-145 wind turbines and 18 safe harbor turbines. (Courtesy: Siemens Gamesa)

CONSTRUCTION

Siemens Gamesa, Ørsted sign first U.S. onshore project

Siemens Gamesa has signed a milestone wind-power agreement with Ørsted to supply the 298-MW Haystack wind farm in Nebraska as the two companies embark on a new stage in their onshore partnership following nearly 30 years of offshore projects together.

The Haystack project includes the supply of 51 SG 5.0-145 wind turbines and 18 safe harbor turbines. The first deliveries are expected to begin in the summer of 2021 with commissioning expected in fourth quarter 2021.

The order also includes a 30-year full-scope service and maintenance agreement covering primary activities related to the service and maintenance of the units. This agreement is the longest ever service contract for Siemens Gamesa in North America and evidences trust not only in Siemens Gamesa's technology but also the company's strong and flexible service capabilities.

"Ørsted is a key partner in our offshore business. and we are excited to expand that partnership into onshore wind power. The Haystack project will provide clean energy to nearly 85,000 average U.S. homes," said Shannon Sturgil, CEO of Onshore North America at Siemens Gamesa Renewable Energy. "We achieved an important milestone over the summer with the Coastal Virginia Offshore Pilot Project, and we are thrilled to add Haystack to our list of firsts."

The SG 5.0-145 wind turbine from Siemens Gamesa, to be used at the Haystack project, has proven to be a very successful product in the U.S. Its new state-of-the-art control system and enhanced blade aerodynamics optimize power generation. Thanks to its OptimaFlex technology, the wind turbine also features a flexible power rating ranging between 4.0 and 5.0 MW, thereby providing a uniquely tailored solution that fits the specific conditions of each site. The turbine features a modular design for increased mechanical capacity and optimal adaptation to logistics and construction requirements, providing greater efficiency and lower levelized cost of energy (LCOE).

The Coastal Virginia Offshore Wind pilot project, which came online

this summer, is owned by Dominion Energy and Ørsted is EPC contractor on the project. It is the first offshore wind project in U.S. federal waters and the first offshore wind project in the U.S. for Siemens Gamesa, located approx. 27 miles/43.5 km offshore.

Together, Siemens Gamesa and Ørsted have installed more than 1,300 offshore wind turbines. This order expresses confidence in Siemens Gamesa's technology and service.

In total, Siemens Gamesa has installed more than 23 GW in the U.S. and has a strong U.S. footprint consisting of manufacturing, service and offices. With nearly 72 GW under service globally, including more than 10 GW of multi-brand turbines, Siemens Gamesa is a leading service provider in the industry. In North America, Siemens Gamesa provides service and maintenance to wind projects with a total output capacity of more than 14 GW.

MORE INFO www.siemensgamesa.com

About 70 percent of current electricity consumption is expected to come from wind and solar energy in 2030, more than half of which will be produced by offshore wind farms. (Courtesy: DNV GL)

CONSTRUCTION

North Sea Energy establishes conditions for offshore growth

Offshore wind energy plays an important role in making Dutch energy supply more sustainable and achieving climate objectives. The 2030 Offshore Wind Energy Roadmap provides a blueprint on how and where new wind farms will be built in the period up to and including 2030. But what role will offshore wind energy play in the period after that? And under which conditions can offshore wind energy help to increase sustainability in the 2030-2050 period? The North Sea Energy Outlook (NEO) provides a scientifically based overview of the possibilities for using the North Sea to increase sustainability after 2030, while providing insight into opportunities for further growth of offshore wind energy and its consequences for the national energy system. The report was drawn up by DNV GL on behalf of the Ministry of Economic Affairs and Climate Policy.

About 70 percent of current electricity consumption is expected to come from wind and solar energy in 2030, more than half of which will be produced by offshore wind farms. The NEO concludes that due to its potential for wind-energy development and CO2 storage, the North Sea is also indispensable when it comes to achieving the climate target of a 95 percent reduction in CO2 emissions by 2050. Wind energy will have to grow significantly after 2030 to achieve that target. If offshore wind energy is to grow successfully after 2030, however, the right preconditions must be met.

ENERGY SYSTEM INTEGRATION

One important precondition for the growth of offshore wind energy after 2030 is the electricity generated must be properly integrated into the energy system. This means the required infrastructure (such as cables and substations must be available in good time. It is therefore important for the spatial planning of wind farms that the landfall and land-based infrastructure to be properly coordinated. This is why an analysis of landfall options for offshore wind 2030-2040 (the 'VAWOZ' project) was scheduled to start December 9. This project forms the link between the North Sea 2022-2027 program, which focuses on marine spatial planning and the National Energy Network Program, which focuses on the spatial planning for the main energy system on land. New areas for offshore wind energy will be designated (in line with the agreements from the North Sea Agreement) after careful consideration of all interests in the North Sea in the North Sea 2022-2027 program. An integral part of this assessment includes carrying out an environmental impact assessment (EIA Plan) and incorporating the results from the Offshore Wind Ecological Program (WOZEP).

SUFFICIENT DEMAND

The NEO also states the market will only be willing to make ongoing and scaled-up investments if there is a healthy and stable business case for sustainable energy producers. In concrete terms, this means more insight is required into the development of demand for renewable electricity and green hydrogen, and this demand must increase in good time. A signifi-

Georgia Tech and Logisticus will conduct research and development to commercialize mass-market architectural, engineering, and construction products from repurposed FRP composite of decommissioned wind turbine blades. (Courtesy: Georgia Tech)

cant part of the expected demand will be due to sustainability improvements being made in the industry. The European Emissions Trading System (ETS), minimum CO2 price, and National Sustainable Industry Infrastructure Program (PIDI) are initiatives designed to encourage industry to invest in sustainability. In addition, in response to the recommendation of the Industry Climate Agreement Infrastructure Task Force (TIKI), the government has announced an Electrification Roadmap (technology outlook) to be published in early 2021, which should provide more insight into the demand for green electricity from industry.

The approach to the rollout of new wind farms will be updated so the energy generated at sea can be linked to expected demand. Stakeholders will be involved in the development of this new approach and relevant insights will be used, including those from the Guidehouse report on integrated tenders for offshore wind energy and hydrogen production. The North Sea Energy Outlook by DNV-GL and the study into combined offshore wind and hydrogen production by Guidehouse are appendices to the letter to parliament about the NEO.

MORE INFO english.rvo.nl/topics/sustainability/offshore-wind-energy

INNOVATION

Logisticus teams with Georgia Tech for blade re-use project

Wind turbines are, by design, green solutions for the production of power. Wind turbines produce zero carbon emissions; however, the blades themselves pose an environmental challenge as the blades depreciate. To address this concern, the Georgia Institute of Technology in partnership with Logisticus Group was awarded the U.S. National Science Foundation (NSF) Partnerships for Innovation (PFI) grant.

The Partnerships for Innovation Program within the Division of Industrial Innovation and Partnerships (IIP) provides researchers from science and engineering disciplines funded by the NSF with the opportunity take their research and technology from the discovery phase to the marketplace for the benefit of society.

Russell Gentry, professor in the Georgia Tech School of Architecture, serves as the project's principal investigator. The three-year grant continues Gentry's research on the reuse of retired wind blades and builds on the proprietary technology developed as part of the Re-Wind Tripartite Research program funded by the U.S. NSF, Science Foundation of Ireland, and the Department for the Economy of Northern Ireland.

"In our foundational NSF grants, our team demonstrated the potential for wind-blade re-use and the positive environmental benefits that will come from the re-use of these amazing composite materials in civil infrastructure," Gentry said. "This potential is embodied in the two patents we are pursuing and in the follow-on Partnership for Industry grant from NSF. The team is now advancing our hardware and software technology and has partnered with companies in the wind energy and electrical transmission industries to pilot these technologies."

Logisticus Group joins the project as the key provider of transportation for the retired wind-turbine blades. As one of the largest wind-blade transporters, Logisticus Group brings supply expertise for the complex logistics of transporting decommissioned wind-turbine blades, which are approximately 50 meters in length.

"We are thrilled to partner with Georgia Tech on this project," said Will Stephan, founder of Logisticus Group. "Their team has always had a passion to conduct research and development on proprietary technology when it comes to reusing wind blades. We feel, as a company, that we need to be a part of the solution to find ways to recycle and repurpose these blades."

Wind-turbine blades are made from high quality fiber-reinforced polymer composite materials, which are not biodegradable or recyclable. Currently, turbine blades are landfilled or incinerated at their end-of-life stage. Georgia Tech and Logisticus will conduct research and development to commercialize mass-market architectural, engineering, and construction products from repurposed FRP composite of decommissioned wind turbine blades.

The team, comprised of Georgia Tech faculty, laboratory staff, and graduate and undergraduate students in architecture and engineering, will develop commercial products using Generative Design software, architecture studios and workshops, structural and Finite element analysis, life-cycle analysis, Lidar technology, and full-scale testing of prototypes in Georgia Tech's 20,000 sq. ft Digital Fabrication Laboratory.

"The success of our project comes from the diverse talents and viewpoints represented on the team," Gentry said. "It's rare to have architects, engineers, and social, geospatial, and environmental scientists working on the same fundamental problem. As we move to commercialize, we are building an entrepreneurial team and linking with industry. We look forward to seeing our re-use applications implemented in the next three years."

Prior to receiving the NSF PFI

In addition to the recyclability aspect, thermoplastic resin can enable longer, lighter-weight, and lower-cost blades. (Courtesy: NREL)

grant, researchers at Georgia Tech developed proprietary algorithms for a tool called the "Blade Machine" and created unique testing methodologies to rapidly characterize any wind-turbine blade currently in production for architectural and structural analysis and design purposes.

In October 2020, the team participated in the NSF's I-Corp Innovation Program.

MORE INFO www.logisticusgroup.com

INNOVATION

NREL research moves wind-turbine blades toward recyclability

A new material for wind blades that can be recycled could transform the wind industry, rendering renewable energy more sustainable than ever before while lowering costs in the process.

The use of a thermoplastic resin has been validated at the National Renewable Energy Laboratory (NREL). Researchers demonstrated the feasibility of thermoplastic resin by manufacturing a 9-meter-long wind-turbine blade using this novel resin, which was developed by Pennsylvania company, Arkema Inc. Researchers have now validated the structural integrity of a 13-meter-long thermoplastic composite blade, also manufactured at NREL.

In addition to the recyclability aspect, thermoplastic resin can enable longer, lighter-weight, and lower-cost blades. Manufacturing blades using current thermoset resin systems requires more energy and manpower in the manufacturing facility, and the end product often winds up in landfills.

"With thermoset resin systems, it's almost like when you fry an egg; you can't reverse that," said Derek Berry, a senior engineer at NREL. "But with a thermoplastic resin system, you can make a blade out of it. You heat it to a certain temperature, and it melts back down. You can get the liquid resin back and reuse that."

Berry is co-author of a paper titled, "Structural Comparison of a Thermoplastic Composite Wind Turbine Blade and a Thermoset Composite Wind Turbine Blade," which appears in the journal *Renewable Energy*.

The other authors, also from NREL, are Robynne Murray, Ryan Beach, David Barnes, David Snowberg, Samantha Rooney, Mike Jenks, Bill Gage, Troy Boro, Sara Wallen, and Scott Hughes.

NREL has also developed a technoeconomic model to explore the cost benefits of using a thermoplastic resin in blades. Current wind-turbine blades are made primarily of composite materials such as fiberglass infused with a thermoset resin. With an epoxy thermoset resin, the manufacturing process requires the use of additional heat to cure the resin, which adds to the cost and cycle time of the blades. Thermoplastic resin, however, cures at room temperature. The process does not require as much labor, which accounts for about 40 percent of the cost of a blade. The new process, the researchers determined, could make blades about 5 percent less expensive to make.

NREL is home to the Composites Manufacturing Education and Tech-

nology (CoMET) Facility at the Flatirons Campus near Boulder, Colorado.

"The thermoplastic material absorbs more energy from loads on the blades due to the wind, which can reduce the wear and tear from these loads to the rest of the turbine system, which is a good thing," Murray said.

The thermoplastic resin could also allow manufacturers to build blades on site, alleviating a problem the industry faces as it trends toward larger and longer blades. As blade sizes grow, so does the problem of how to transport them from a manufacturing facility.

This work was funded by the U.S. Department of Energy Advanced Manufacturing Office. NREL is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development. NREL is operated for the Energy Department by the Alliance for Sustainable Energy, LLC.

MORE INFO nrel.gov

ONYX InSight worked with EDF Renewables France to tailor the interface of the software platform to specifically support and align with its requirements. (Courtesy: ONYX InSight)

INNOVATION

EDF France adopts ONYX Insight inspection technology

French energy leader EDF Renewables France has equipped its asset managers working across all their wind assets with fieldPRO, an advanced cloud-based inspection and service tool from ONYX InSight, a leading provider of data analytics and engineering expertise to the global wind industry. This follows the partnership with EDF Renewables North America for ONYX InSight's Condition Monitoring solutions, including cloud-based system fleetMONITOR and retro-fit ecoCMS hardware installations.

The deal, initially for three years, covers all 1,675 MW of EDF Renewables' wind assets in France and is a first for the French wind market, further strengthening ONYX InSight's footprint in Europe. The use of fieldPRO circumvents the need for paper-based solutions, enabling EDF Renewables France's asset managers to digitally document and automate the inspection process, streamlining image categorization with indexed photos and auto-generated reports.

The application's cloud capability enables instant data sharing in a clean, consistent format, improving the availability, usability, and accuracy of the inspection and survey data. Inspection data is key to enabling successful, long term predictive maintenance strategies. Traditional offline inspections, despite delivering valuable information on turbine health, are often siloed and filed away on paper, making it difficult to access and extract insights; fieldPRO automatically stores and organizes inspection information in a digital format, resulting in improved oversight and better decision making.

The fieldPRO tool also provides critical health and safety support by enabling remote inspections and validation of procedures, particularly around personal protective equipment, which helps to ensure safety for technicians on site. More broadly, fieldPRO provides a useful checklist for on-site personnel, supporting safe working best practices and ensuring nothing is missed.

ONYX InSight worked with EDF Renewables France to tailor the interface of the software platform to specifically support and align with its requirements.

"FieldPRO has a huge potential to improve the way we work by setting best practices and automating a lot of our procedures," said Soraya Zobiri, asset manager for EDF Renewables France. "Our journey to provide clean energy at the lowest cost is ultimately driven by efficiency gains, and we are confident that, by partnering with ONYX InSight, we will continue to deliver ever-more affordable clean energy."

"We know from years of experience that the reality of collecting inspection data and managing field operations can be complex and time consuming," said Keiran Knowles, business development manager Northern Europe for ONYX InSight. "Our fieldPRO tool allows operators greater oversight of this crucial part of operations and maintenance, while removing the burden from technicians having to spend valuable time in sorting through hundreds of inspection points and photos and writing laborious reports. Instead, this technology facilitates scheduling and workorder assignment, while streamlining data collection for improved planning, safety, and logistics."

"Adopting mobile digitization tools unlocks the most accurate data analytics yet," he said. "Inspection data is the next frontier in the complete digitalization of the global wind fleet, and we are proud to support pioneers such as EDF Renewables France as they contin-

ue to drive down the cost of producing clean energy."

MORE INFO www.onyxinsight.com

MAINTENANCE

Sealing solution meets challenges of larger turbine designs

Global sealing technology expert James Walker has launched a new innovative version of its Walkersele® rotary lip seal, following an in-depth research and development project in collaboration with wind-turbine and bearing OEMs.

The new product, Walkersele® X-Gen, meets the challenges of the increasing size of turbine designs — maintaining effective sealing against deflected shafts or housings and increased offset, plus enhanced retention of sealing forces over the full circumference of the sealing face.

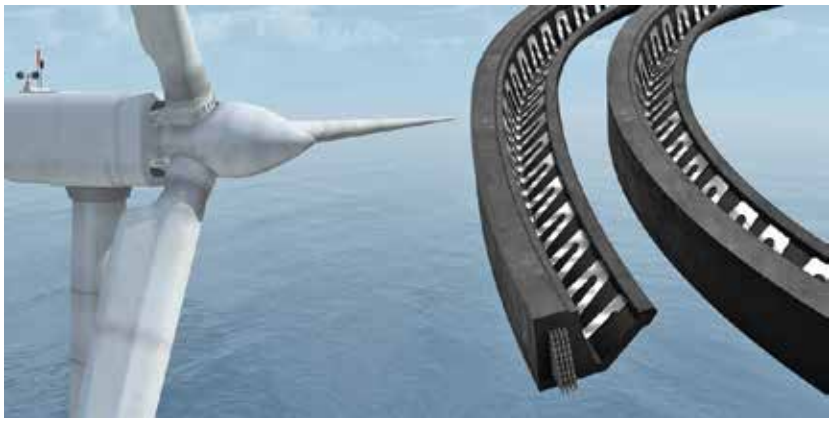
Walkersele X-Gen also addresses the issues created by the use of high-performance greases for lubrication rather than oil, which brings a new dynamic to the operation of the bearing seal and an additional challenge for any sealing solution.

In cooperation with bearing and turbine OEMs, James Walker has undertaken a comprehensive test program covering all elements of rotary seal design.

These include spring retention, lip loading, torque, friction, leakage and wear, plus sealing capability at a variety of significant offsets. Testing was focused on protecting and extending the service life of critical bearing applications and drive mechanisms.

The result is a new patented seal construction specifically configured to optimize sealing capability on large diameters where increased levels of offset from loaded bearings and out-of-round shafts and seal housings can create significant issues.

MORE INFO www.jameswalker.biz



The new patented design of the Walkersele X-Gen incorporates a refined lip design, molded-in finger spring, and innovative fiberglass-reinforced backing. (Courtesy: James Walker)

MAINTENANCE

Reygar to enhance tech safety, comfort at offshore projects

Reygar, a leading provider of advanced monitoring systems to the offshore renewable energy sector, has been commissioned to develop an industry-first motion comfort monitoring tool capability within BareFLEET, Reygar's innovative remote monitoring and reporting platform. The new tool will track and analyze motion, fuel consumption, and crew sickness in different cabin locations, with a specific focus on boosting safety and fitness to work aboard vessels supporting critical multi-day work at Siemens Gamesa projects.

The proliferation of large, remote offshore wind projects — particularly in regions characterized by challenging sea conditions — has only increased the need for greater granularity around vessel data. To service these projects, technicians are required to spend more time at sea — often multiple consecutive days. It is therefore crucial that offshore wind vessel operators are able to ensure the wellbeing of the crew and technicians they transport to these projects is protected.

The BareFLEET system Siemens Gamesa has commissioned automatically monitors the health and performance of critical equipment across each vessel, inclusive of engine health, CO2 emissions, fuel consumption, motion, and impact on the turbine. The system also allows the crew to manually input supplementary data and observations into a customer-specific digital reporting platform, with the resulting DPR form customized to bring Siemens Gamesa's own key performance indicators and priority data fields — such as crew comfort — to the fore.

"As wind projects move further offshore into areas of higher wind resource, it is paramount that charterers and vessel operators are equipped with the true understanding of vessel motions and personnel comfort they need to keep these projects — and the people constructing and maintaining them — performing at their best," said Chris Huxley-Reynard, managing director of Reygar Ltd. "Motion data measured across different cabin locations and different vessels, sourced via BareFLEET while in transit and while idling, will advise Siemens Gamesa's chartered vessel operators on how to guarantee the crew and technicians are housed and transported in such a way that they can continue do their jobs effectively across multi-day projects."

"With the global energy transition well underway, we are increasingly focused on how digitalization can power the efficient and safe roll-out of our

The BareFLEET system automatically monitors the health and performance of critical equipment across each vessel, inclusive of engine health, CO2 emissions, fuel consumption, motion, and impact on the turbine. (Courtesy: Reygar)

technology across projects in exciting, rapidly growing markets such as the U.S. and Taiwan," said René Wigmans, head of Offshore Service Logistics for Siemens Gamesa. "Our work with Reygar to further integrate BareFLEET's detailed motion reporting into our offshore activity will support our team in maximizing operational efficiency and reducing vessel CO2 emissions whilst securing the health and comfort of our crew as they work on these flagship — yet often remote — sites."

MORE INFO www.reygar.co.uk

MAINTENANCE

Guardian Fall Protection unveils cable lanyard

Pure Safety Group's Guardian® Fall Protection brand has introduced a new cable lanyard — compatible for leading edges — that combines the lightweight durability of a fixed-length lanyard that permits up to 12 feet of fall protection during the event of a free fall from an at-height working surface.

Through extensive research and development in Guardian's ISO/IEC:10725-compliant laboratory, the company established rigorous leading-edge verification testing procedures to ensure consistent performance of the lanyard over a wide range of extreme conditions. Drop-tested in both a perpendicular and offset orientation against 0.005-inch radius steel, the Guardian Cable Leading Edge Lanyard exhibited high performance and predictability — two characteristics mandatory when it comes to fall protection.

The Cable Leading Edge lanyards feature a vinyl-coated quarter-inch galvanized steel cable, combined with Guardian's proprietary high-efficiency external shock absorber that keeps maximum and average arrest forces low during fall deceleration.

Cable Leading Edge lanyards are available in single- or dual-leg configurations with steel rebar or snap hooks.

The Guardian Cable Leading Edge lanyards feature a vinyl-coated quarter-inch galvanized steel cable, combined with Guardian's proprietary high-efficiency external shock absorber. (Courtesy: Pure Safety Group)

A high-visibility orange shock pack cover helps confirm proper application suitability, even from a distance.

MORE INFO www.puresafetygroup.com

MANUFACTURING

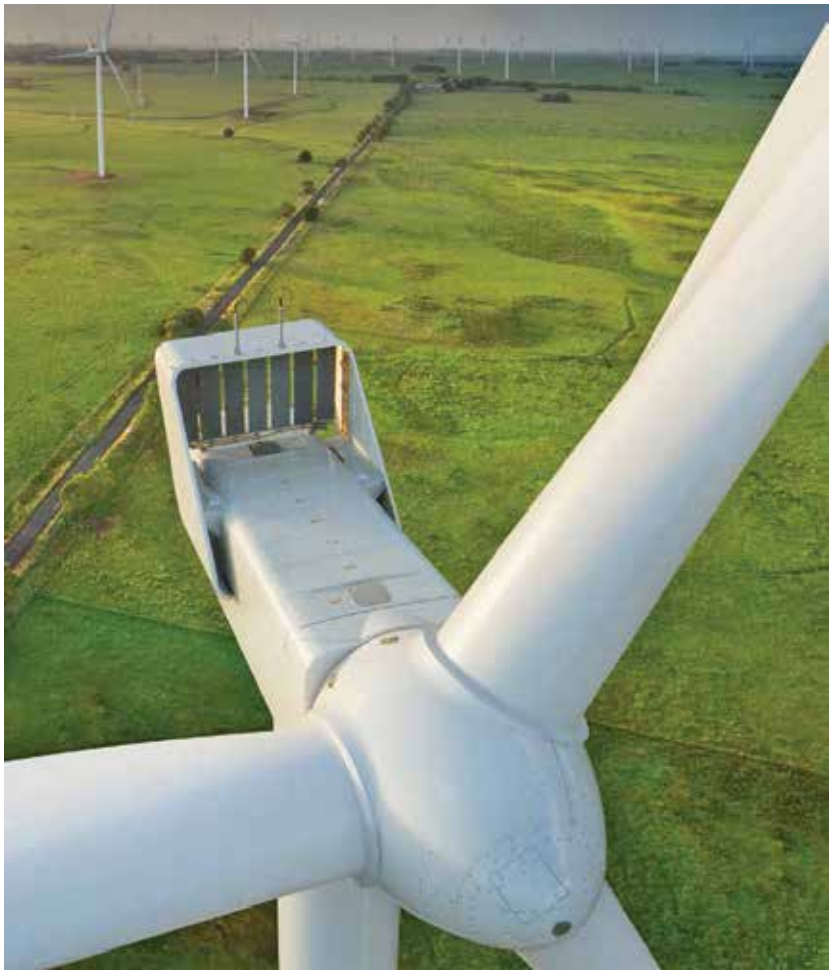
Vestas wins 234-MW order with EnVentus turbines in the U.S.

Vestas has received a 234 MW order for two projects in the U.S. The two projects consist of 32 V150-4.2 MW turbines delivered in 4.3 MW Power Optimized Mode, 15 V162-6.0 MW EnVentus turbines as well as eight V110-2.0 MW turbines, including 10 MW of previously purchased 2 MW PTC components.

The order includes supply and commissioning of the turbines as well as multi-year service agreements for both projects, designed to ensure optimized performance for the lifetime of the project. Turbine delivery is scheduled for the third and fourth quarter of 2021 with commissioning scheduled for the fourth quarter of 2021 and first quarter of 2022.

"We're glad to expand the EnVentus portfolio in the U.S.," said Eduardo Medina, president of Vestas' sales and service division in the United States and Canada. "The EnVentus platform builds on our proven technology from the 2-MW, 4-MW, and 9-MW platforms to leverage proven technology and increase customized solutions to extract wind value around the world."

This EnVentus order takes the glob-



Two U.S. projects will use of 32 V150-4.2 MW turbines. (Courtesy: Vestas)

al order intake for the platform past 1,200 MW.

The customer and projects are undisclosed per the customer's request.

MORE INFO www.vestas.com

MANUFACTURING

OM System launches software to aid COVID-19 response

OM System recently launched its cloud-based outbreak management software as the easiest way for businesses to manage COVID-19 response efforts and containment in a closed environment. The platform features a dynamic visualization called BirdsEye View™ enabling rapid assessments to spot and stop outbreaks. Born as COVID-19 altered the reality of workplace safety, the system empowers employers with a tool to optimize their outbreak management strategy and get back to work with confidence.

Essential businesses have continued to operate through the height of the pandemic and continue to do so. Running and resuming operations comes with risk, liability, and responsibility, and it is imperative that all businesses have a comprehensive and transparent COVID-19 strategy. Manual processes, spreadsheets, and uncoordinated solutions are insufficient.

"When the worldwide crisis of the COVID-19 pandemic descended upon us all, we at OM System saw an immediate opportunity to serve," said Chris Hawker, CEO of OM System. "We pivoted one of our existing solutions and created a powerful tool to visually manage and isolate infectious diseases, not just for the current pandemic, but for the upcoming flu season and beyond."

"OM System has three distinct parts: a communications system with the employees, a secure database, which stores and tracks information, and our BirdsEye View™ that allows employers to rapidly assess the health of the organization and save significant time anticipating and intervening in outbreaks," he said.

HOW OM SYSTEM WORKS

- **System setup:** Employee contact records are securely uploaded and organized in OM System by workgroups (shifts, departments, buildings, sites, etc.), implemented and ready to use in a matter of hours, not weeks.
- **Daily check-in:** Via centralized check-ins or mobile app, employee health statuses can be captured with notification of their approval to be onsite.
- **Case creation:** Once a company-defined health risk threshold is met, a case is created, ensuring visibility and follow-up.
- **Case investigation:** With simple entry of exposures and OM System's BirdsEye View™ visualization, outbreaks become easy to spot.
- **Employee outreach:** Employees who may have been exposed are alerted via text or email, with support and measures they can take while maintaining the privacy of all employees.
- **Outbreak managed:** OM System provides visualization, reporting, trends, and simplified communication to keep employees safe.
- **Risk managed:** The platform also helps employers manage risk and compliance as the tool has been developed with OSHA & CDC guidelines in mind.

MORE INFO www.omsystem.io