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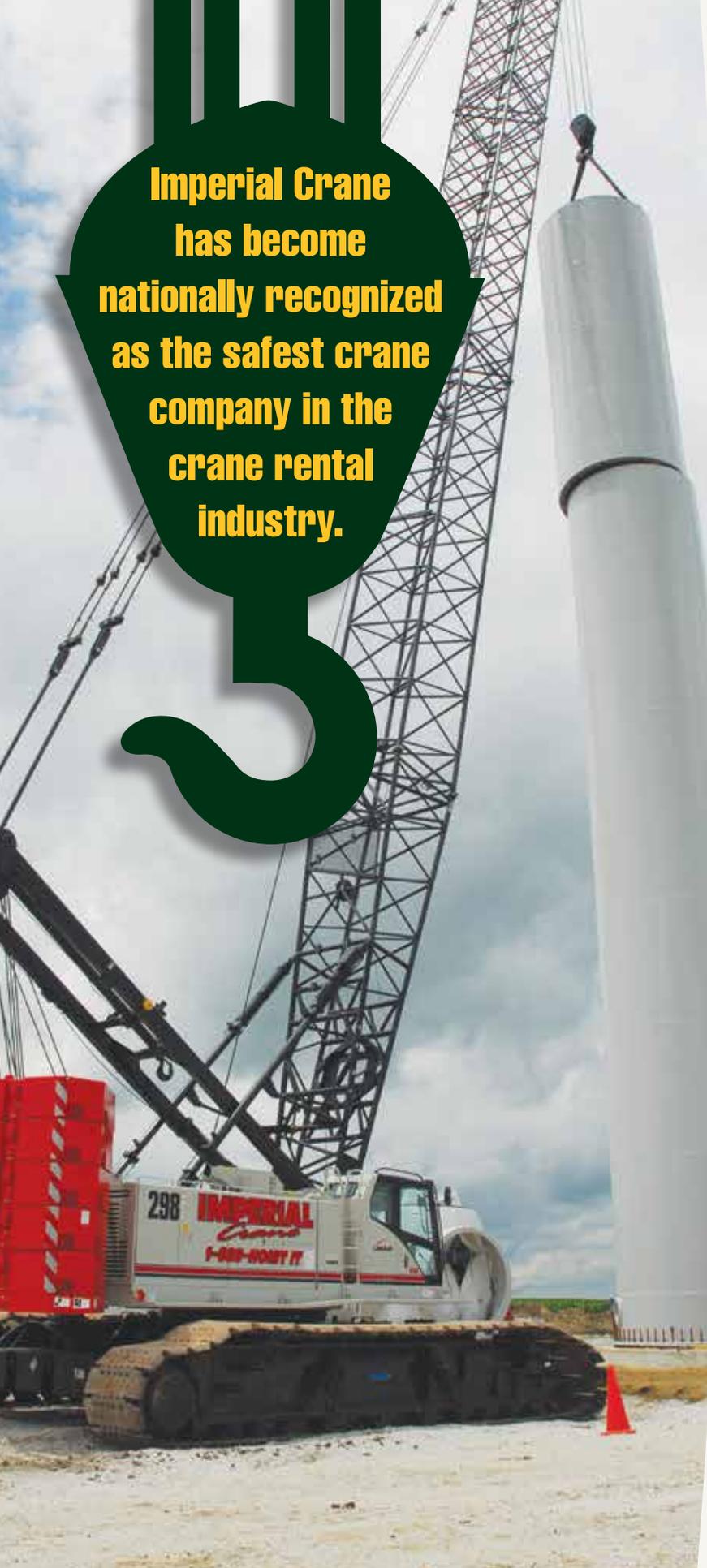
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The holiday season seems to sneak up on me earlier and earlier with each passing year.

Frankly, I don't know how that's possible, considering retailers roll out the holiday merchandise upwards of two months in advance.

Combine that with the constant Christmas music that flooded the FM airwaves immediately after Halloween, and I should have had all the advance notice I needed.

This year was different, though. It's been a busy — albeit productive — year... especially here at *Wind Systems*. I'll try and give you the short version.

This time last year, we were putting the finishing touches on our plan to overhaul *Wind Systems'* editorial content, structure, and design. Our goal was to serve our readers the best we possibly could.

We spared no effort in doing just that. After countless hours spent planning, brainstorming, arguing, and compromising, we devised our plan.

There were plenty of growing pains along the way, some of which threatened to evolve into chronic injuries, but all of that was to be expected.

Eventually, a plan was finalized. We knew what we had in mind. We knew what we wanted to accomplish. We knew how we were going to implement it. What we didn't know was how it was going to be received by our readers.

We unveiled our new vision with the January 2014 issue, without much fanfare. We didn't say much

about the changes we were making to the magazine — or about our motivations for making those changes.

That was intentional.

We wanted to give readers our absolute best effort, and then quietly observe their response in order to get an honest assessment of how well we were serving them. This issue marks a full year of *Wind Systems* operating under its new vision, structure, and design. I'm thrilled to tell you that the response to this point has been overwhelmingly positive.

Thank you. But we want to know more.

If we only sought a general consensus, we'd have the best excuse in the world to sit back and say to ourselves: "That's good enough." We're simply not satisfied with that.

In the upcoming months, you may receive an email invitation from *Wind Systems* to participate in a brief reader survey. When you get that email, I urge you to follow the link and invest a few minutes to tell us what you like, don't like, or would like to see more of in our magazine. Help us perform a true, transparent assessment of how well *Wind Systems* is serving its audience.

Much like in the political arena, every vote does count, and every voice will be heard. Up until this point, I've specifically chosen



to use the word "changes" when speaking about *Wind Systems'* new vision and structure.

Marketing strategists would tell you that was a mistake. Instead, they'd say, I should've used the word "improvements," because it serves to plant a positive image in the mind of the reader.

But we're not going to play that game. We're not interested in shaping your response. We're interested in your response shaping us. Besides, we don't get to decide if our changes are actually improvements. At least, not until we hear from you.

Thanks for reading,

A handwritten signature in black ink, which appears to read "Stephen Sisk". The signature is fluid and stylized, with a large, sweeping flourish at the end.

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Contributors



Carl Levesque is a clean energy communications consultant for AWEA and principal of Channel Wind Communications. He worked in AWEA's Public Affairs Department for six years, most recently as the association's editor and publications manager. In his role at AWEA, and as editor of AWEA's Wind

Energy Weekly industry newsletter, he writes about and performed communications work on a range of topics affecting the industry, which he continues to do today.

Jack Wallace started in the wind industry as a wind turbine technician in 1985. Since then he has trained hundreds of technicians in electrical troubleshooting, mechanical systems, composites, and wind energy related safety. He has deep understanding and experience of what it takes to run a wind farm and is always ready to help others in wind to successfully run their wind power plants. Jack is listed as an inventor on multiple patents related to wind energy improvements. He has been working with the same wind group for 20 years, currently Frontier Pro Services.



Paul Idziak is General Manager of Shermco Industries' Machine Services Division, which maintains, repairs, and remanufactures rotating electrical machines and other devices. Idziak holds a BS in Industrial Distribution from Texas A&M and an MBA from the SMU Cox School of Business.

Patrick Pletnikoff was born and raised on St. George Island, Alaska. He is the Mayor of St. George, the President of the St. George Fishermen's Association and serves on the Aleutian Pribilof Island Community Development Association (APICDA) Board. Patrick studied Political Science at the University of Washington and the University of Colorado. He is an avid reader and outdoorsman and loves hunting the reindeer on his home island when he isn't skippering the F/V Nightrider.



Kate Nation holds a BA in English from the University of Georgia and a BFA in Art and Design from Winthrop University. She is an in-house writer and graphic designer for Wanzek Construction, Inc.

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DIRECTION

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SUNEDISON AND TERRAFORM TO PURCHASE DEVELOPER FIRST WIND FOR \$2.4 BILLION

Acquisition would create world's largest renewables development company



Courtesy of First Wind

SunEdison, Inc., a leading global solar developer, and TerraForm Power, Inc., a global owner and operator of renewable energy power plants, recently announced that they have signed a definitive agreement to acquire First Wind, one of the leading developers, owners and operators of wind projects in the U.S.

With the purchase, SunEdison acquires the leading independent wind development and asset management company and becomes the leading global renewable energy development company. As a result, SunEdison raises its 2015 project installation guidance from 1.6-1.8 GW to 2.1-2.3 GW.

SunEdison will purchase over 1.6 GW of pipeline and backlog projects,

which have been added to TerraForm Power's call right project list and are expected to be operational in 2016-2017. Included in the transaction is an additional 6.4 GW of project development opportunities. SunEdison expects to accelerate the rate of project development and realize significant growth opportunities by integrating First Wind's wind platform into its own global project development and finance platform.

TerraForm Power acquires 521 MW of contracted wind generation assets from First Wind and adds 1.6 GW to its list of call right projects scheduled for drop down in 2016-2017. The acquisition increases the generation capacity of TerraForm Power's operating

portfolio by more than 50 percent and provides further geographic diversity in Maine, New York, Hawaii, Vermont and Massachusetts. In addition, after the acquisition, TerraForm Power's call right project list with SunEdison will double to 3.2 GW of solar and wind projects.

"The acquisition of First Wind transforms both SunEdison and TerraForm Power into diversified renewable energy companies and will make SunEdison the leading renewable power plant developer in the world," said Ahmad Chatila, president and chief executive officer of SunEdison.

"This acquisition is immediately accretive and establishes TerraForm Power as a leading asset owner in the

wind energy market while demonstrating the Company's commitment to delivering on TerraForm Power's diversified growth strategy," said Carlos Domenech, president and chief executive officer of TerraForm Power.

"We are excited to become part of the SunEdison team," said Paul Gaynor, chief executive officer of First Wind. "This new strategic organization will allow us to join with SunEdison to develop and invest in new, long-term-contracted, well-sited and well-run renewable energy projects that deliver clean energy to homes and businesses across the country and internationally. We will be able to leverage our strength in development and operations, proven during the completion of 1.5 GW of wind projects over eight years, with two world-class companies."

TRANSACTION DETAILS

Total consideration for the acquisition of First Wind is up to \$2.4 billion, comprised of \$1.9 billion in upfront consideration and a \$510 million earn-out.

SunEdison's portion of the total consideration is \$1.5 billion, comprised of an upfront consideration of \$1.0 billion and the earn-out. As part of its upfront consideration, SunEdison will issue a \$340 million seller note. The earn-out will be payable by SunEdison subject to completion of certain projects in First Wind's backlog. TerraForm Power will acquire First Wind's operating portfolio for an enterprise value of \$862 million.

Concurrently, SunEdison will put in place a \$1.5 billion non-recourse warehouse financing facility, for projects expected to be dropped down into TerraForm, that will provide certainty of financing for the Company to complete the build-out of its backlog and pipeline projects, including those acquired from First Wind.

TerraForm Power and SunEdison have secured fully committed bridge

financing to support the aggregate First Wind transaction consideration, refinance TerraForm Power's existing indebtedness, and fund future growth through the drop down warehouse facility.

The transaction is expected to close during the first quarter of 2015, subject to usual and customary conditions and regulatory approvals.



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IBERDROLA OPENS ITS FIRST OFFSHORE WIND FARM

Pioneering technology for the \$2.6 billion project in Irish Sea could help reduce costs of future offshore wind projects around the world

Iberdrola USA, the second-largest wind producer in the United States, recently announced that its sister company ScottishPower Renewables, in conjunction with Dong Energy of Denmark, has opened Iberdrola's first offshore wind farm — West of Duddon Sands, a 389 MW facility located in the Irish Sea, approximately 12.5 miles off the seaport of Barrow-in-Furness in North West England.

The joint owners officially commissioned the \$2.6 billion project on Oct. 30 at a ceremony hosted by the U.K. Secretary for Energy and Climate Change Ed Davey, Iberdrola Chairman Ignacio Galan, and DONG Energy Executive Vice President for Wind Power Samuel Leupold more than two months ahead of schedule.

“West of Duddon Sands is the first offshore wind farm in the U.K. to use such advanced construction methods,” Galan said. “The combination of two highly sophisticated installation vessels working in tandem, and the support of the excellent fabrication facilities at Belfast, Northern Ireland, made this one of the most efficient offshore projects ever delivered in the U.K.”

“Building the West of Duddon Sands wind farm was a significant engineering challenge,” said Bob Kump, chief corporate officer of Iberdrola USA. “There is value in the achievement beyond the immediate benefits of this project. We will share the knowledge we gained among Iberdrola companies like ours and throughout the industry to help advance the tech-



nology and cost competitiveness of future offshore wind projects.”

More than 1,000 workers spent the last two years erecting the 108 Siemens turbines, connected through a 125-mile web of under-sea cable in a 26-square-mile patch of the Irish Sea. Each turbine has a rating of 3.6MW, and the wind farm has enough total capacity to meet the annual electricity demands of approximately 280,000 homes.

Two big innovations in offshore wind project construction helped reduce the costs of this project and get it online ahead of schedule:

- A new \$80 million, custom-designed offshore wind terminal built at Belfast Harbor. The terminal employs up to 300 workers and can operate around the clock for continual delivery of turbine

and foundation components to the farm.

- Two of the world's largest and most advanced installation vessels: Pacific Orca and Sea Installer. Using the two vessels in tandem enabled construction crews to install all the foundations and turbine components during one of the most stormy winters in recent history.

Energy generated by the project connects to an offshore substation built by Iberdrola's engineering subsidiary, Iberdrola Engineering and Construction, and designed to withstand the area's extreme weather conditions. The substation boosts the voltage then routes it through two export cables to the onshore substation at Heysham where it enters the U.K. national grid. ↴

DEPARTMENT OF ENERGY PROMOTES WIND WORKFORCE WITH LAUNCH OF INTERACTIVE WIND CAREER MAP

Online tool allows prospective wind employees to explore industry jobs



Photo by Dennis Schroeder / NREL

A robust domestic wind industry requires a well-qualified and trained workforce to design, maintain, and install wind energy projects across the country. As wind becomes a larger part of our nation's clean energy mix, the need for skilled individuals to support this growing industry will increase. While the wind industry already employs over 50,000 people across the United States, the Department of Energy's National Renewable Energy Laboratory found in a recent study that at least 70% of industry members surveyed report some difficulty finding

Siemens' employees Israel Garay, left and Eric Eggleston work on the nacelle of a Siemens 2.3 MW, 80 meter wind turbine at NREL's National Wind Technology Center (NWTCC) in Boulder County, Colorado.

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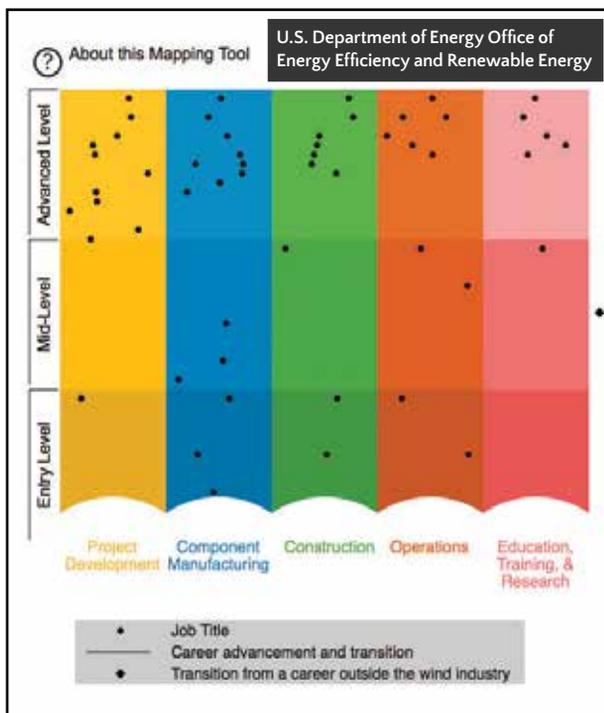
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qualified applicants for a variety of wind-related positions including wind technicians, managers in manufacturing and construction, scientists, regulators, product designers, educators, and trade workers.

In an effort to support the wind industry’s recruitment of skilled workers, the Energy Department has developed a - “Wind Career Map,” a web-based tool that highlights the broad range of careers and required skill sets across the wind power industry. The occupations featured in the Wind Career Map range from technicians who install and maintain wind turbines to educators who will train the next generation of wind engineers and business leaders. Information such as wages, experience expectations, and educational requirements are available for each mapped

occupation, and one of the most exciting features of the Career Map is an associated career pathway that can successfully lead to each position.

Utilizing the Career Map’s built-in matching feature, interested individuals can locate positions based upon relative skill sets and levels of knowledge. For instance, if you were to match your “moderate experience” with a career in “Installation and Operations,” you may find that you are qualified to be an assembler and fabricator. The Career Map informs you that people in this position “assemble both finished products and the parts that go into them,” and that a high school diploma is the preferred level of education to qualify for this role. If you are intrigued by the job description and think that it may be a good fit, the Wind Career Map points you to more detailed information. For example, the Career Map tells you that assemblers and fabricators must have color vision and be able to read detailed schematics or blueprints that show how to assemble a machine and use various electronic, robotic, computer, or hand tools to make adjustments to align and fit components together properly.

Developed by a working group of experts including industry representatives, educators, government agencies, and wind energy activists, the Wind Career Map will help develop the next generation of employees needed to support America’s growing land-based, distributed, and emerging offshore wind industries.

Interested in other renewable energy sources? The Energy Department also developed a Solar Career Map. To see if a renewable energy career may be right for you, visit the or Energy Department’s Clean Energy Jobs and Career Planning website, or visit the Wind Program website to learn more about wind energy trends, technology, manufacturing, educational tools, and ongoing research and development. ↴

— Source: U.S. Department of Energy

GE CELEBRATES INSTALLATION OF ITS 25,000TH TURBINE WORLDWIDE

GE recently celebrated its 25,000th wind turbine installation — a milestone for the company which now has more than 38 GW of installed wind turbines around the world.

Altogether, GE’s 25,000 wind turbines generate the equivalent energy needed to charge 25 billion smartphones or provide the electricity needed for approximately 28 million European households for a year.

“We are thrilled to be reaching this milestone alongside our customers,” said Anne McEntee, president and chief executive officer of GE’s renewable energy business. “Through continued technology investment and collaboration with global developers like Energiekontor, wind will continue advancing as a competitive source of renewable energy around the world.”

GE reached the milestone during the installation of a 2.75-103 wind turbine with wind developer Energiekontor at the Uthlede wind farm in Lower Saxony, Germany, earlier this month. The Uthlede wind farm will contain twelve 2.75-103 GE wind turbines—developed and manufactured at the European headquarters of GE’s renewable energy business in Salzbergen, Germany. ↴



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ELECTRICAL ACCEPTANCE TESTING FOR WIND ENERGY SITES

Good design and good construction means reduced maintenance costs

*By Paul Idziak
Shermco Industries*

The wind industry in North America is booming. Yes, it always seems like it's on a roller coaster, but 2015 looks to be the best year ever. The USA already has over 62GW on-line, but a further 14GW are under construction with completion expected by the end of 2105. An additional 5 GW are in the final stages of development. AWEA's best estimate is 80 GW by Jan 2016.

Any way you look at it, that's a lot of energy — requiring a lot of construction in a fairly short period of time. The race is now on to complete projects and get them commissioned and making power as soon as feasible.

That's all fine and good, but it is also critical that the sites are energized safely and with the best chance for reliable performance for the years to come.

At the end of the construction phase, all of the good work of the various contractors comes to a conclusion and it's time to assure it was all done according to specification. That's where site acceptance testing comes in. But which electrical components should be tested? What testing criteria should be used? Most importantly, who should perform the testing? Let's see...

WHAT SHOULD BE TESTED?

The high-voltage components of a wind project normally include everything outside of the turbine itself. In some designs, the step-up transformer is located inside the turbine, so that should be considered as well; but as those designs are always dry-type units, the testing has a different scope.

For our purposes, let's look at a traditional design where the step-up is an external oil-insulated pad-mount transformer at each turbine, feeding a collection system at high voltage through a series of collection points, and finally brought together at a utility-grade substation for transmission onto the grid.

Here, the critical elements are the multiple transformers, the collection cables and the related splices, terminations, as well as the ground scheme. Of course, the substation is a project in itself, and includes all of the typical utility equipment: GSU transformer, protective relays, switchgear, and grid reliability communications devices.

All of that is pretty obvious; what is really being tested falls into three distinct areas:

- Did the engineering firm design the system properly so it will be safe and reliable?
- Did the OEM of the equipment supply what was intended? Is it in proper working condition?
- Did the electrical contractor correctly assemble and install all of the components?





It is also critical that all one-line drawings be confirmed and/or updated to accurately reflect what was actually built. This is critical for future maintenance inspections and testing. One often-overlooked — but important — element of the acceptance process is the confirmation of any coordination studies, arc flash hazard analysis, and other safety-related component testing.

WHY TEST?

According to both the NFPA 70B Recommended Practice for Electrical Equipment Maintenance and the CSA Z463 Guideline on Maintenance of Electrical Systems, it is critical to safety compliance that the equipment work properly when energized. This can only be confirmed by initial testing as well as periodic

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testing. Establishing a solid baseline for trending analysis is also useful for Preventative (PM) and Predictive Maintenance (PdM) planning. So, reliable performance, reduced maintenance costs, and a safer work environment are all drivers for competent and thorough acceptance testing.

WHAT CRITERIA SHOULD BE FOLLOWED?

Of course, the manufacturer's specifications and recommendations should always be followed, but the overall system performance is evaluated based on visual and mechanical inspections, electrical testing, and comparison with expected testing values. To that end, industry consensus standards have been developed to assure proper consideration is given to this testing.

Since 1972, the International Electrical Testing Association (NETA) has published Standards for Acceptance Testing for Electrical Power Equipment and Systems (ATS), and, since 1975, the companion MTS Maintenance Testing Standards. In 2013, the ATS was approved as an American National Standard (ANSI). These documents provide both the test methodologies and expected results for testing most types of electrical equipment and serve as the basis for a good acceptance test plan.

Additionally, NERC/FERC guidelines provide critical information for substation settings and reliability expectations. Experienced engineering support and well-trained technicians should be very familiar with these standard procedures, and should be able to apply them to the unique requirements of a wind generation facility.

HOW DO I SELECT A QUALIFIED THIRD-PARTY TESTING COMPANY?

The value of testing by a true third party is that the scope of work and

the expected results are defined and managed by the hiring owner of the wind site. This assures a true, unbiased review of the engineering and construction before commissioning and take over. Many problems can be identified and rectified while the site is still offline, reducing incidental losses and allowing the responsible contractor address the issue safely and efficiently.

The technicians who perform the testing should be well-trained and experienced. Again, ANSI/NETA Standard for the Certification of Electrical Testing Technicians (ETT) is well established as a benchmark for qualifications.

Each testing crew should be led by a Level III or higher certified technician, and all crew members should be capable of completing the testing with a complete knowledge of the hazards involved as well as the ability to make decisions regarding the serviceability of the equipment and system.

A company that is designated as a NETA Accredited Company will meet all of these criteria. It is the site owner's responsibility to provide all of the engineering documentation such as short circuit analysis, coordination studies and protective device settings as well as drawings and equipment manuals.

Qualified testing companies can review the scope and jointly develop a plan for testing. They should notify the owner before any testing and report the results of any deficiencies as soon as practical so corrections can be made. A detailed final report including baseline results should also be provided in a timely manner.

SO WHAT ELSE?

Good electrical system design should always include consideration of the maintenance that must be performed over the life of the

system. Acceptance testing can be useful in confirming the effectiveness of this aspect, as well as establishing the baselines required for performance trending.

Wind generation sites do have a specific set of performance issues that should be addressed. Often, due to cost restrictions possibly based on short the financial goals, there is little consideration given to the future cost of maintenance.

Good examples include the current issues many sites face with oil-insulated transformers that were built and installed according to specification but are not proving reliable in the field. Knowing this is an issue, the testing company should provide trending oil analysis during the acceptance process.

There have also been many issues with faulty high-voltage cable terminations and splices within the collection system. These cables should be tested carefully using sensitive equipment to assure that no imminent faults exist, not just the typical high potential testing.

What about the turbines? Since turbine commissioning typically falls to the OEM, they hold the risk for any premature failures. Certainly, however, a full set of test results and warranty actions should be made available for each turbine before the responsibility is assumed by the owner at the end of warranty. All of these test results, especially those that can trended, should be utilized in conjunction with a condition based monitoring plan to form the basis for good maintenance planning.

Acceptance testing, therefore, should be more than just a final step of the construction phase of a project. It should be utilized to assure that the owner is getting what he is expecting: a well-designed, properly constructed, and safe power generation facility. ✎

CONSTRUCTION UNDERWAY AT EDF EN PROJECT IN QUEBEC

Following the Government of Québec issuance of the decree authorizing the construction and operation of Mont-Rothery, EDF EN Canada Inc., a subsidiary of EDF Energies Nouvelles, today announced that the construction phase of the 74 MW Mont-Rothery wind project has commenced.

Mont-Rothery Wind Project, consisting of 37 turbines supplied by Senvion, is expected to be placed into service at the end of 2015.

The wind farm will be located on public lands in the MRC of Haute-Gaspésie and MRC of Côte-de-Gaspé. Under the project, these MRCs will share a combined royalty payment of CAD \$185,000 annually. Construction Energie Renouvelable has been selected as the contractor to implement the project.

“EDF EN Canada welcomes the decree authorizing the construction and operation of the Mont-Rothery Wind Project and offers a sincere thanks to the Government of Québec for its permission to proceed with this project,” said Al Kurzenhauser, Chief Operating Officer for EDF EN Canada. “With an investment of close to CAD \$175 million, the project will create about 150 jobs during the construction phase, and seven permanent operation and maintenance jobs. We are proud to start this project and especially grateful to all of the stakeholders who contributed to achieving this milestone.”

“The wind industry has become in the last decade a key element for the energy industry in Quebec,” said the Minister of Energy and Natural Resources and Minister responsible for the Northern Plan, Pierre Arcand. “This development has allowed the emergence of a whole new sector of our economy. Mont-Rothery is a prime example of how wind projects benefit the regions and aboriginal communities where they are located.”

Mont-Rothery represents the final project of the seven awarded to EDF EN Canada in 2008 and 2010 through Hydro-Québec Distribution’s call for

tenders to commence construction. The company portfolio of projects represents 1 GW in Quebec.

— Source: EDF EN Canada



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INDUSTRY AT LARGE

RECORD LOW COSTS DRIVE OPPORTUNITIES FOR THE U.S. WIND ENERGY INDUSTRY

With fall comes the harvest of megawatts promised.

As would be expected by third quarter's end, wind energy project developers are cruising into the later stages of construction on many — but hardly all — of their record number of projects. The completed megawatts are beginning to add up.

In fact, the U.S. wind industry was at its busiest ever in the third quarter while completing more of the wind projects that were under construction at the start of the quarter. The American Wind Energy Association (AWEA) reported that 419 MW went online during the third quarter, bringing the 2014 total to 1,254 MW.

But while the construction cycle continues to mature, the biggest story remains what's still under construction — and the number of megawatts that can potentially begin construction. Some 13,600 MW across 105 projects were still being built as the fourth quarter began. The recent completion of the transmission lines developed under Texas's Competitive Renewable Energy Zone model continues to be a huge enabler of construction. Of the 13,600 MW under construction, 7,600 MW are in Texas. Nationally, the factors helping to drive construction activity are wind energy's record low costs and high demand from utilities for the clean, affordable energy source.

As of September 30, 46,400 wind turbines with a total generating capacity of 62,300 MW were operating in the U.S., according to AWEA's count.

Also of note, AWEA's third quarter numbers showed that another 3,700 MW of projects under pre-construction development have inked off-take agreements with power purchasers. Having a power contract in place, of course, is a good indication that a project will get built.

Those who have been in the wind industry for some time know that when it comes to project completion news, a given year typically starts quietly before ramping up by the third quarter and then going full steam as the year closes out. Typically, 60-70 percent of annual installations are completed in the fourth quarter. One reason for this is that during many years, developers are often pushing hard until Dec. 31 to finish projects before deadlines to qualify for the Production Tax Credit (PTC). This year's historic under-construction figure foreshadows not just a busy holiday season, but a strong 2015 as well, when the majority of the projects started under the last extension of the PTC are expected to finish construction.

The most recent PTC extension removed the typical year-end frenzy from the equation because it required that project construction need only start, rather than be completed and online, by the end of last year for them to qualify. This PTC language tweak was badly needed in order to give the industry's supply chain time to ramp back up in 2013 after grinding to a near halt in 2012 as a result of the threatened expiration coming at the end of that year. This time around, therefore, while the fourth quarter will be busy, don't expect the 13,600 MW currently under construction to all be completed by New Year's Eve.

Looking beyond 2015, a lot more construction could be on the way — that is, if there's an appropriate policy environment in place. The U.S. Department of Energy's Wind Vision report, in peer review since it was previewed at AWEA's WINDPOWER 2014 Conference & Exhibition, states that wind energy capacity



*By Carl Levesque
The American Wind Energy
Association*

can double by 2020, and provide 10 percent of America's electricity — and then double again by 2030, to 20 percent of the grid. It projects that by 2050, wind can provide as much as 35 percent of the nation's electricity. At that point, wind would be one of the leading sources of electric generation in the nation.

The Wind Vision becomes all the more compelling when considering that the U.S. industry is on pace so far to meet the 2030 goal, as outlined in an initial report produced by the George W. Bush administration in 2008.

In order to make that vision reality, it is crucial that the PTC is extended. AWEA CEO Tom Kieran has expressed optimism that Congress will extend the PTC and continue its success story, one that features a domestic wind industry supply chain of more than 500 factories in 43 states. AWEA is calling on industry members to contact their Members of Congress and urge them to take action on an extension. ✎

DEPARTMENT OF THE INTERIOR ISSUES TRANSMISSION RIGHT-OF-WAY FOR DEEPWATER WIND OFFSHORE PROJECT

Block Island receives first renewable energy transmission permit for federal waters

Secretary of the Interior Sally Jewell and Bureau of Ocean Energy Management Acting Director Walter Cruickshank recently announced that BOEM has offered a right-of-way (ROW) grant to Deepwater Wind Block Island Transmission System, LLC (Deepwater Wind) for the Block Island Transmission System (BITS).

“This is a major milestone for offshore renewable energy in the United States,” said Secretary Jewell. “This decision marks the first right-of-way grant offered in federal waters for renewable energy transmission, paving the way for Block Island, the only Rhode Island community not connected to the grid, to have access to clean, affordable renewable energy. Today’s announcement is an exciting development for Block Island, but it also represents a big step in our nation’s sustainable energy future.”

Deepwater Wind’s proposed project would entail the installation of a bi-directional submerged transmission cable between Block Island and the Rhode Island mainland. The transmission system would serve two purposes:

1) connect Deepwater Wind’s proposed 30 MW Block Island Wind Farm, located in Rhode Island state waters about 2.5 nautical miles southeast of Block Island, to the Rhode Island mainland; and 2) transmit power from the existing onshore transmission grid on the mainland to Block Island. The ROW corridor, which is about eight nautical miles long and 200 feet wide, comprises the portion of the transmission line that crosses federal waters.

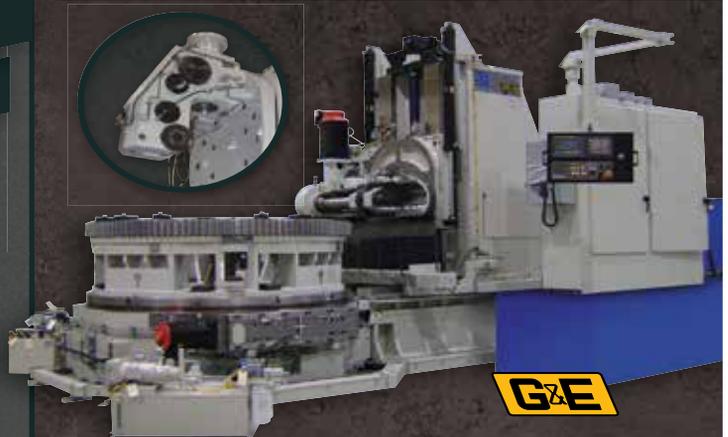
“Today’s announcement builds on Interior’s work to stand up a sustainable offshore wind program for the Atlantic Coast,” said Cruickshank. “We look forward to working with Deepwater Wind to bring this this offshore infrastructure project to fruition.”

Once both the agency and Deepwater Wind have agreed upon the terms and conditions of the grant, BOEM will send the grant to Deepwater Wind for execution, and the company will be required to pay the first year’s rent and provide financial assurance. Once executed, BOEM will finalize its review of Deepwater Wind’s General

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Interior issues transmission right-of-way to Deepwater Wind

Activities Plan, which describes proposed installation activities and conceptual decommissioning plans for the transmission system. The General Activities Plan would be the first approved for an offshore wind energy project for a transmission system in Federal waters.

The majority of the activities and permanent structures related to the Block Island Wind Farm will be sited in state waters and lands, making the U.S. Army Corps of Engineers the lead federal agency for analyzing the potential environmental effects of the project under the National Environmental Policy Act (NEPA). As a portion of the proposed project would be located on the federally managed Outer Continental Shelf, the project must secure a ROW grant from BOEM before proceeding. BOEM

has participated as a cooperating agency in the NEPA analysis and associated consultations led by the Corps.

In September 2014, the Corps completed an Environmental Assessment (EA) for the Block Island Wind Farm and BITS, and issued a Finding of No Significant Impact. Before adopting the EA, BOEM conducted an independent review of the EA and determined that no reasonably foreseeable significant impacts are expected to occur as the result of the preferred alternative, or any of the alternatives contemplated by the EA. On October 27, 2014, BOEM issued a Finding of No Significant Impact for the issuance of a ROW grant, and approval of the General Activities Plan, with modifications. ✎

BASF RECEIVES TYPE CERTIFICATION FOR OFFSHORE GROUT

High-strength, fast curing compound deemed suitable for offshore concrete structures



MasterFlow 9500 from Master Builders Solutions by BASF is the first product of its kind to receive a DNV GL (Det Norske Veritas Germanischer Lloyd) certificate for Offshore Concrete Struc-

tures. The Type Approval Certificate issued by the internationally acknowledged test and certification body, which specializes in oil, gas and maritime services as well as in energy and sustainability,

officially confirms the quality of the offshore performance grout. "Being the first to receive this certificate feels like having received an award," said Luc Westhof, global key account manager wind turbine grouts at BASF. "The certificate assures that MasterFlow 9500 has been developed, tested and produced to the highest standards applicable in the industry, and it also guarantees maximum reliability across the entire lifetime of the offshore wind farm."

MasterFlow 9500 is an ultra-high strength high-performance offshore grout, a so-called exa-grout, with documented fatigue performance for time saving and durably secure grouting of offshore wind turbine foundations. The fast curing feature of the grout and its tolerance to very low temperatures speeds up the installation process and prolongs the timeframe for installation.

During the certification process, experts from BASF and DNV GL were working on testing and documenting material properties, assessing quality control of relevant aspects during the manufacturing process, product application and related installation guidelines as well as quality assurance documentation.

"BASF has successfully completed an extensive certification program for their material MasterFlow 9500," DNV GL project manager Andreas Lervik said. "It is considered a suitable material for use in load carrying grouted connections when applied in accordance with the approved procedures and within the stated application limitations."

The evaluation of MasterFlow 9500 was conducted in

accordance with DNV-OS-C502 (Section 9E). DNV GL implemented the certification scheme for structural grouts in this standard for Offshore Concrete

Structures in September 2012 to provide a uniform approach for documenting material properties and performance for relevant applications. A detailed summary

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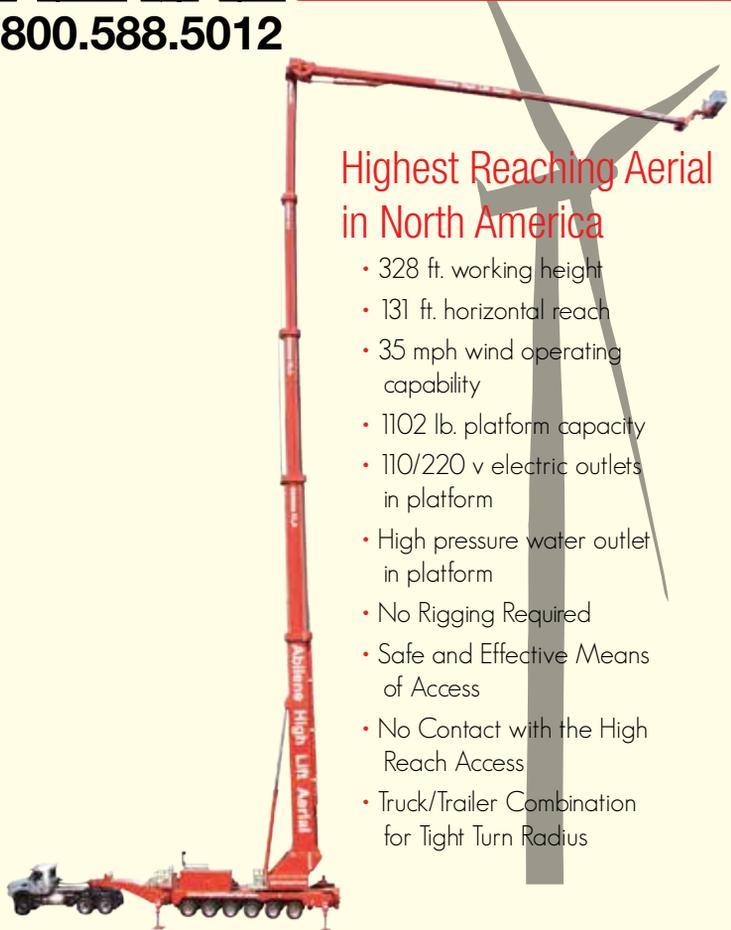
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BASF receives type certification for offshore grout

of the material properties and conclusions from the certifi-

cation process of MasterFlow 9500 is stated on the DNV Type

Approval Certificate (No. K-5944, issued 2014-08-05).

FASTER INSTALLATION, PROTECTED INVESTMENT

In addition, MasterFlow 9500 also reduces the overall costs of offshore installations. The material develops a high strength very early on and can be applied at lower temperatures compared to conventional products. Considering the total cost of implementation, the time MasterFlow 9500 can save is a big factor in lowering the costs.

Also, provided the product is applied correctly, MasterFlow 9500 ensures a maintenance free connection between the tubular steel members for offshore wind turbine foundations.

“Achieving Type Approval Certification for MasterFlow 9500 provides both FoundOcean as installation specialist and its clients with increased reassurance of the performance of this material. This is extremely helpful and protects the investment in offshore wind energy”, says Andrew Venn, Marketing Director at FoundOcean, a globally active specialized supplier of offshore wind turbine installations.

MasterFlow 9500 was recently used on the West of Duddon Sands wind farm project in the UK, where 108 monopile foundations were installed in a record breaking period of just five months. In 2013, the performance grout was used, for instance, on the Gwynt-Y-Môr project with 160 monopiles in the Irish Sea as well as in the grouting of numerous test and demonstration turbines from several manufacturers, including the world’s currently most powerful offshore turbine with a rotor diameter of 164m and a capacity of 8 MW. ✎



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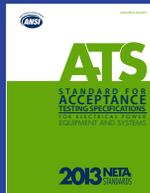
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PRODUCT

ZEROLIFT PAD RACK OFFERS SITE TRANSPORT OPTION FOR OUTRIGGER PADS



DICA® Outrigger Pads introduces the ZeroLift Pad Rack, a crane accessory offering safety benefits for crane operators. The Pad Rack eliminates the need for crane operators to manually lift and carry outrigger pads, and makes transport on the job site simple and safe.

ZeroLift Pad Rack has a carrying capacity of 1,000 pounds and is adjustable to fit pad sizes up to 48"x60". Made of high-strength steel, the Pad Rack easily installs on either the front or rear of rough-terrain cranes. A single hitch point allows ZeroLift Pad Rack to fold up and out of the way when not in use. When mounted correctly, the ZeroLift Pad Rack has minimal impact on crane ground clearance. At only 60 pounds, the Pad Rack does not affect crane load charts. In addition, ZeroLift Pad Rack is versatile enough to transport other equipment, such as tool boxes if needed.

Crane operators often haul outrigger pads on and off the fenders and decks of RT cranes while on the job site, leading to unintentional damage of the crane. In addition, lifting outrigger pads in this manner exposes operators to potential back, foot and hand injuries, as RT crane fenders and decks are typically more than 5 feet off the ground.

"The ZeroLift Pad Rack provides a reliable and convenient method to store outrigger pads. It can virtually eliminate lifting injuries because outrigger pads are stored at an easy-to-access height where they can be slid instead of lifted," said Kris Koberg, CEO of DICA.

Koberg further noted, "Crane owners understandably value any product that helps protect their EMR rating." Experience Modification Rate (EMR) is used by insurance companies to gauge both past cost of injuries and future chances of risk.

For more information about the ZeroLift Pad Rack, visit dicausa.com or call (800) 610-3422.

MORTENSON COMPLETES WINDTHORST II FOR OWNENERGY

OwnEnergy and Mortenson Construction recently announced the completion of construction on the Windthorst II Wind Farm located in Windthorst, Texas, approximately 110 miles northwest of Dallas.

OwnEnergy developed the project and a fund managed by BlackRock, the world's largest asset manager, purchased a majority interest in the project in December 2013.

The Windthorst II Wind Farm will provide \$1 million in property tax payments to Archer County and create 3 to 4 full time operation and maintenance jobs for the lifetime of the project.

"Completing construction on the Windthorst II wind project, which is our sixth wind farm to spin and our seventh completed

project overall, is a major milestone for OwnEnergy" said OwnEnergy Founder and CEO Jacob Susman.

"We are proud to demonstrate our construction and asset management capabilities with the completion of Windthorst II. What's more, we are thrilled to work with BlackRock and Mortenson to bring clean, cost-competitive wind energy to Texas. We appreciate the long-term support from the community leaders and residents of Archer County, and we are looking forward to continuing our commitment to Texas's clean energy economy."

Mortenson was responsible for the engineering, procurement and construction of the project, including, the erection of 28 2.4-MW Siemens turbines; foundations; underground collection; 69kv substation

and access roads. Approximately 160 jobs were created throughout the course of construction.

The Windthorst II project is the 26th wind facility the renewable energy contractor has built in the state to date out of a total of 140 wind projects completed or under construction throughout North America.

"We are very pleased to have entered into a relationship with OwnEnergy as they continue to grow their wind portfolio and make their mark in the industry," said Tim Maag, VP and general manager of Mortenson's Wind Energy Group. "We applaud their growing commitment to building projects with local ownership."

— Source: Mortenson

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Wanzek Construction, Inc.

Strong emphasis on project management drives wind industry success story

By Kate Nation

Wanzek Construction, Inc. has spent the past four decades building an organization that successfully erects infrastructure for strong sectors including power, renewable energy, oil & gas, heavy/civil, and industrial agriculture.

Backed by parent company, MasTec, Inc., a leading North American infrastructure construction company, Wanzek is equipped with a comprehensive understanding of the industries it serves, innovative technology, and a wholly owned fleet of state-of-the-art specialty construction equipment. The company has geographic reach, scalability and overall financial strength. But Wanzek's most valuable asset, according to the company's leadership, is its people.

With interrelated, client-focused teams, including a national workforce of OQ-qualified professionals, Wanzek has established a work process that supports the company's policy to provide services that exceed client expectations and requirements. Among the many roles that maintain Wanzek's success, the project manager is key to managing and controlling the outcome of a project. Arnie Jelinek, Wanzek's vice president, cites the company's project managers as instrumental in navigating the unique characteristics and challenges that are inherent in most job sites.

"Planning, organization and communication before, during and after site work is essential to each project's success," Jelinek said. "Wanzek's project management team is continuously elevating site management through sound procedures, controls, and effective communication. These dedicated individuals have a special



set of communication and leadership skills that help drive the whole team through the dynamic nature of a typical day."

A typical day can vary based on industry focus. As exemplified by a wind energy project, a typical day for a project manager includes a wide range of tasks including reviewing project status, reviewing safety plans, meeting with owners, quality control, finding and addressing issues, coordinating with engineers and supervisors, leading project teams, forecasting, maintaining material flow, managing timelines, and overseeing budgets.

Wind projects are very fast paced. Once a contract has been signed and a plan has been finalized, there is no downtime until the project has been completed. A typical wind project takes six months. This challenging pace is what engages Nick Ibach, project manager at Wanzek.

"I really enjoy the quick pace of a wind project," Ibach said. "It is very hands-on and requires a consistent level of attention. A project with a tight schedule gives me the opportunity to engage a range of skills and provides a tremendous sense of satisfaction upon completion."

Led by project managers like



Ibach, Wanzek's wind teams have installed more than 5400 MW of wind generation capacity across the country for some of the biggest names in the industry. Services include building, expanding, and maintaining facilities while working closely with owners to develop

detailed, conceptual budgets and construction schedules, address topography challenges and complete civil and electrical design. The successful completion of each project is due largely to communication between project managers and owners. During construction, Ibach spends one to two weeks a month on-site. He meets with owner representation multiple times a day by phone and on-site weekly.

"Communication is critical," Ibach said. "It is the means by which everyone on the team, from owner to superintendents to our field force, stay informed regarding project status, any challenges that have been presented and the chosen method for handling them. I consider communication to be one of the ways with which I try to lead by example. If everyone is informed and has the right tools for the job, we will provide a higher level of service."

Other essential qualities for a project manager include the ability to coordinate people and processes, organizational and planning skills, as well as dedication and flexibility. Ibach cites coordination as fundamental to keeping a project moving forward. The long hours involved in a project require dedication and the implementation of prioritization methods to stay on course. Even with high levels of planning and coordination, problems can present themselves. Incremental weather or unexpected issues like concrete breaking can challenge a team to regroup quickly.

"We have learned to be dime-rate meteorologists," Ibach joked "I begin a project as prepared as possible but knowing that my crew and I need to be adaptable. Part of being successful on a project is having the ability to face a challenge, regroup, and quickly implement a new plan that keeps the project on track and affects the schedule and budget as little as possible."

Some challenges come with the territory. As wind farms are generally constructed over hundreds of square miles, it can be a difficult to coordinate a wind project geographically. Unlike many construction sites, a project manager or supervisor cannot physically walk the whole project. Getting from a turbine installation to the laydown yard can often be an hour-long drive. Ibach believes that successful coordination relies on having a really great team.

"We have built a talented team and developed a high level of trust," Ibach says. "Our people are safety-oriented, skilled and dedicated people who are invested in the success of the projects they work on."

Wanzek is continuously strengthening teams by hiring the top technicians and operators and offering continual training.

For more information about Wanzek, its teams, and its projects, visit www.wanzek.com. ✈

Joe Bruce

Principal
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Norm Tooman Construction recently rebranded itself as NTC Wind Energy. How did that come about?

We were involved in general construction for a long time before getting into the wind business. It seemed appropriate to be more specific about our current concentration and expertise. In honor of Norm Tooman, who started the business, we wanted to keep his name but got tired of spelling it to everyone, so NTC seemed like the best answer. Besides, I had to keep peace in the family and especially with my wife, who is the majority stock holder, president and the daughter of Norm Tooman.

The company is widely known for its Ironclad bolt caps. Could you tell our readers about the product?

We were the first to introduce and patent bolt caps in the wind industry, back in the days that we were still building lattice towers. We saw that

the bolts were rusting out and sought a solution that did not require painting the bolts every few years, while preventing water from going through the threads and into the bolt sleeves under the surface of the foundation. There have been a number of generations of our IronClad bolt caps over the years in our ongoing attempt to improve performance and keep prices low. For example, we've recently added a small vent to the standard duty bolt cap to prevent expansion and contraction and allow any condensation to escape, while adding no additional cost to the customer. Actually, bolt caps are intended to protect the grease on the bolt from dissipating or collecting dirt. A thorough coating of high-grade and high dropping point, anticorrosion grease is essential in combination with the bolt cap for proper protection. We're very impressed with the performance of Corrosion Block grease and often sell it or use it with our caps.

How does the Extreme Duty bolt cap differ from the original?

Our IronClad Extreme Duty bolt caps were developed in cooperation with a BOP engineer. We were addressing potential damage caused to the caps in cold environments from sheet ice dropping off the blades and, at the same time, addressing applications near saltwater, where the cap might be partially or completely filled with grease or cosmoline for extra protection against the elements. We ended up designing a 14-ounce polypropylene monster of a cap that incorporates a grease injection port. We also designed it to so that the same cap fits rods from number 10

grade 75 to number 11 grade 150. It actually has four sealing surfaces against the tower flange including a flexible skirt on the outside, an o-ring and the two o-ring retainers, all of which bottom out on the flange. It's nearly indestructible but necessarily a bit more expensive than the Standard Duty cap.

Another product of interest is the new grout sleeve line. Can you tell us a little more?

That came about almost the same way the bolt caps did. We looked at the foam rings in the grout trough — all taped up with duct tape — and just felt that there had to be a way to save labor, prevent the foam rings from floating in the grout, displace less grout, and better protect the bolts. The clincher was a tensioning job that we did where the grout actually squeezed through the bolt holes in the flange and caused all kinds of problems tensioning the bolts. The grout sleeve was the answer to all of that — and they're both inexpensive and fast. The engineers love the sleeves too, because they displace almost no grout, allowing for a more sound grout bed. Foam rings displace about 3.5 square inches of grout each — essentially voids in the grout — which amounts to 4 to 6 million pounds of lost compressive strength in the grout bed, depending on the grout strength and the number of bolts. If the bolt sleeves are incorporated in the plans, the engineer can call out lower compressive strength requirements at initial tensioning which saves time and money on the job. Plus, the grout sleeves can be installed on an open pedestal with

caulk, protecting the bolt sleeves within the foundation from filling up with water before the base is set.

Aside from those products, NTC Wind Energy also offers services to the industry. Please tell us about the foundation bolt tensioning.

We've been tensioning bolts from the very beginning, when 40 KIP was pretty standard. We still use the old-fashioned double cylinders and push-plate, but that is because we can service all the tools in the field if we have to and avoid lost time. But we can also adapt more easily to different bolt spacing and clearances while keeping prices reasonable. In addition to calibrating our pumps with certified gauges, we've recently developed a load cell that is small enough to use on foundation anchor bolts to calibrate not just the pump, but all of our equipment as it is working together. No more extrapolation based on the effective working area of the cylinders. This is a direct and precise measure of the tension being put on that particular bolt. We've been using larger load cells in rock anchor bolt tensioning for a years to measure creep, but to my knowledge, we're the first in the industry to come up with a small enough load cell to fit on the foundation anchor bolts that is capable of accurately measuring up to 120 KIP. We've also upped our

game by building an entire mobile unit dedicated to bolt tensioning and having seasoned professionals overseeing the work at all times. We do quite a bit of re-tensioning since we can be very precise in lift-off testing, provide detailed reports and, as a small family-owned business, we can keep our prices low. We've also put a huge emphasis on safety and I think we're ahead of the curve there too.

Another service you provide is anchor bolt restoration. What does this service involve?

We've tried all kinds of methods to clean bolts that have rusted and found that there is only one safe and cost effective way to do it, and that's using a mild phosphoric acid. Basically, it converts iron-oxide into a protective coating of iron-phosphate. Then we pressure wash the flange and bolts with a biodegradable acid neutralizing solution. Our Corrosion Block grease also helps to neutralize any corrosion that might be left but it has to be applied and bolt caps installed as soon as the bolts are dry. This service is inexpensive, very effective and doesn't cause damage to the epoxy paint on the tower or flange. Often times, this service is incorporated with tensioning, which allows us to remove and clean or even replace the nuts and washers if necessary. ↵

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CLEAN ENERGY AT WORK IN ST. GEORGE, ALASKA

City turns to distributed generation in its plan to boost industry and job creation

By Patrick Pletnikoff



Like many rural communities in Alaska, St. George struggles with sustainability. St. George is located on the northeast shore of St. George Island, the southernmost of the four Pribilof Islands, 750 miles west of Anchorage.

Although we are surrounded by a resource that feeds the world, we strug-

gle to maintain jobs for our residents. The lack of components necessary to develop and maintain a sustainable local industry to provide those jobs is a reality that St. George has been actively addressing for generations.

St. George is located in the middle of the most productive seafood harvest-

ing grounds in the world. Millions of dollars are generated by the seafood industry which operates in waters used by residents for thousands of years. The volumes of seafood extracted off the shores of our community are shipped around the world. The residents would like to better participate



in that industry. The city of St. George is working to facilitate participation, but lacks essential infrastructure.

What does industry need? We know industry needs reliable transportation, a labor force, access to resource materials and low cost energy. St. George, along with many remote communities, has a higher cost of doing business; for example, fuel costs are astronomical.

To help resolve the energy issues on St. George, the Alaska Energy Authority (AEA) created a long-term plan in partnership with our community to address the needs on the island. This included both wind generation and upgrading the diesel generators to become more efficient.

I am pleased to report that the new diesel generators that were installed last fall as part of this project included a heat recovery system that completely heats the St. George school, city offices, and the public safety building. The city and school have little to no need to even turn on their boilers because the heat recovery system is so efficient. The design and implementation by AEA could become a model for all rural villages looking to combat the ever-rising energy costs. The efficiency of the system is monitored using the latest technology available. AEA set the system up with an Internet based load control system. The trained and certified technicians based in Anchorage monitor and adjust the

load required by the generators 24/7. They turn down the generators to nearly idle when the need is low, and increase output when the need increases throughout the day. This ability to monitor the load maximizes fuel efficiency, which lowers the overall cost of fuel consumed.

Alaska has quickly become a global leader in remote wind diesel systems. The Aleutian and Pribilof Islands are home to the strongest, highest quality and consistent wind regimes in the country. The AEA measured winds with maximum entropy principle (MEP) towers for four years to get solid reliable data prior to embarking on the turbine project. The scale used to determine the viability of wind power generation is measured on a scale of one to seven; St. George scored a seven. This month the completion of controllers and communications software will allow a 95 Kw refurbished Windmatic turbine to be integrated into the existing power grid, providing more than half of the community's electricity needs and significantly reducing the current \$1/Kwh residential rate. The diesel power system was designed in conjunction with the Rural Power System Upgrade (RPSU) division of AEA.

Reliable low-cost energy is essential for St. George and other rural communities throughout our state. We applaud AEA's vision and commitment to making significant clean and economical improvements to the electrical infrastructure on our island. I would be remiss if I failed to mention the outstanding professionalism and passion of three AEA staff members in particular who truly went above and beyond to make this critical project happen — Sara Fisher-Goad, Sandra Moller and the project manager, Tim Sandstrom. Our strong and productive partnership with AEA produced great energy improvements that will make St. George more competitive in the regional fishery economy and help to stabilize our community. ✎

FORD BRINGS CLEAN ENERGY TO DEALERS THROUGH PILOT PROGRAM



Ford Motor Company is collaborating with Wind Energy Corporation to bring a new and innovative source of clean energy to its dealers. Under a pilot program exclusive to Ford, Wind Energy will install wind sail and solar panel systems at four Ford dealerships, a nearly \$750,000 investment, to help power dealer facilities.

Each Windy System includes highly efficient wind sail technology that harvests wind energy and an integrated 7-kilowatt solar array. Ford dealers will use the electricity to power their buildings, electric vehicle charging stations and lot lighting. The wind sails will be emblazoned with the Ford blue oval logo and the name of the dealership – serving as a bold statement by Ford and its dealers’ to their commitment to sustainability.

A Windy System is expected to deliver 20,000 kilowatts of electricity

annually. That is enough energy to power two average-sized homes for a year or charge a Ford Focus Electric 870 times, Fusion Energi 2,600 times and C-MAX Energi 2,600 times. Using one Windy System will offset nearly 14 tons of greenhouse gases per year.

“We are pleased to be working with Wind Energy Corporation to offer a pioneering, clean energy option to Ford dealers,” said John Felice, vice president, U.S. Marketing, Sales and Service for Ford. “This is yet another innovative tool to help Ford and its dealers address a global sustainability challenge.”

Participating dealers are electric vehicle-certified and were selected by Ford and Wind Energy Corporation for both their exceptional commitment to clean energy and their wind and solar-efficient locations. Installations of the systems are set to begin in early 2015 and be

completed by spring. Once installed, the dealerships will keep the systems permanently.

Participating dealers include: Dana Ford Lincoln, in Staten Island, New York; Tom Holzer Ford, in Farmington Hills, Michigan; The Ford Store, in Morgan Hill, California, and Fiesta Ford, in Indio, California.

“The Windy System was created in concert with world-class partners and we are thrilled to bring this innovative renewable energy solution to Ford and its dealers, including our beta site at Boggus Ford in Harlingen, Texas,” said Jim Fugitte, CEO.

“What sets the Windy System apart is its combination of wind, solar, and market impact. It is a branded beacon of sustainability that delivers both energy and a point of view,” said Jack Phillips, COO of Wind Energy.

— Source: Wind Energy Corporation

NORTHERN POWER SYSTEMS SUPPLIES WIND COMPONENTS FOR ADVANCED HYBRID ENERGY TECHNOLOGY PROJECT IN ASIA

100kW turbines and microgrid expertise to help power South Korean island

Northern Power Systems has commissioned four of its NPS 100 wind turbines in South Korea's newest and most advanced hybrid energy project, while working in close collaboration with the national grid operator Korean Electric Power Corporation (KEPCO), to ensure effective delivery of this hybrid microgrid.

The 100kW turbines are the largest component of energy generation in what's known as a "high-penetration" wind-diesel hybrid system with solar and storage. Power is now delivered to remote island residents with an integrated, reliable wind/solar/storage supply for as low as \$.25 per kWh, representing substantial savings over the previous diesel-only energy solution.

The NPS 100-21 was chosen due to its superior energy production, its compatibility with multiple generation technologies, a proven history of operating in hybrid microgrids, and its ability to withstand typhoons that regularly affect the region. The distributed wind turbines were supplied and installed in cooperation with Haebaram Energy.

The installation also features a KEPCO developed Energy Management System (EMS), 314 kW array of solar photovoltaic (PV) panels and a 3 MWh Hyosung battery storage facility. The site provides enough power to supply more than 160 homes, a water treatment plant, a lighthouse and radar station on the island.

The project is the cornerstone of an initiative to transform the islands around the Korean peninsula into renewable power communities, no longer dependent

on fossil fuel and government subsidies. The microgrid and full inverter were designed by

KEPCO which plans to install similar systems on additional local islands.



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Courtesy of Northern Power Systems

Northern Power Systems is now offering throughout Asia both its next generation distributed wind turbine, featuring state-of-the-art blade technology and a variety of hub heights, as well as proven capabilities to effectively deliver reliable power generation in a variety of environmental conditions.

Troy Patton, CEO and President of Northern Power Systems, said, "We are excited to be bringing our solutions to Asian markets. We have been helping to deliver stable energy solutions to hybrid microgrids for over 10 years in North America. During this time we have proven that we can provide a significantly lower cost of energy that leverages local natural resources." ✎

UK'S BEST-SELLING 100kW TURBINE NOW BACKED BY 10-YEAR PERFORMANCE GUARANTEE

Northern Power Systems has announced its new wind turbines will be backed by its 10-Year Performance Guarantee Programme (PGP) in the United Kingdom.

The PGP will protect owners of the NPS 100, Britain's best-selling 100 kW wind turbine, by ensuring 95 percent availability and 95 percent performance to power curve over 10 years. This is double the time of the current standard 5-year warranty available from most manufacturers in the British market.

The annual cost for the 10-Year PGP to the customer will be directly linked to annual power production and charged per kWh produced.

Under the program, both the owner and Northern Power Systems will benefit from turbines meeting and exceeding expected performance.

During the program NPS will be the sole service provider. Knowing that the wind turbine will pro-

duce maximum energy and return on investment, while offering the lowest total cost of ownership for the turbine's 20-plus year life, provides peace of mind for the turbine owner.

Reinout Oussoren, Vice President Global Sales at Northern Power Systems commented "This type of performance guarantee programme is normally only seen with utility scale projects and is the first of its kind offered for wind turbines up to 100kW in Britain."

Graham Hygate Managing Director at developer Fine Energy commented "Northern Power Systems' 10-Year Performance Guarantee brings further financial stability for investors in wind energy. By providing long term backing, we expect it to create opportunities for growth in the small wind market."

For more information, visit the company's website at www.northernpower.com.

ENDURANCE WIND POWER UNVEILS AN ADVANCED NEW DESIGN

New turbine model boasts 35 percent higher generation than predecessor

Endurance Wind Power recently launched its new 85kW E4660 wind turbine at RenewableUK's 36th Annual Conference in Manchester.

This new turbine generates 35 percent more electricity than the original model, which means

a lower cost of energy and an excellent return on investment (ROI) even at modest wind sites, effectively turning back the clock on the UK Feed in Tariffs to 2012 levels.

The 35 percent jump in productivity more than compensates for

the 30 percent Feed in Tariff (FiT) depression that has taken place over the last 18 months, giving installers a second chance at achieving the FiT revenues of 2012.

Dave Rankin, UK Managing Director of Endurance Wind Power, said: "The purpose of UK's Feed

in Tariff scheme is to make wind more affordable and that is what this machine does. Endurance has created an even more efficient machine that shows DECC's Feed-in Tariff scheme continues to work."

Brett Pingree, Commercial Vice President at Endurance Wind Power, said: "You don't get a lot of second chances, but if you didn't invest in wind this year, or you missed out on the FIT revenues of 2012, this new machine is one of those rare second chances."

The biggest selling wind turbine in the UK is the Endurance E Series: more than 600 have been installed by farmers, landowners, small businesses and community groups. The new E4660 is a powerful advancement of the UK's leading small wind machine.

The higher output and larger swept area deliver a lower 'levelized cost of energy' (LCOE), making wind work in more places by opening up sites with lower wind speed sites where the business case for installation previously didn't make commercial sense.

The capability of the E4660 to generate a strong ROI from lower wind speeds allows many more farmers and local communities up and down the country to 'farm wind' from single turbines.

The E4660 has undergone extensive design verification testing at the Endurance Wind Turbine test facility, a location that features powerful nightly winds and provides an ideal range of wind conditions to validate turbine performance.

Dr. Daryl Musselman, P.Eng., Vice President of Engineering at Endurance, said "the goal of this new product development effort was to maximise the customer benefit by optimising the efficiency of the design, while retaining all of the essential elements that our customers recognise and appreciate in the smaller E3120 model. The E4660 is the product of a global engineering effort and incorporates lessons learned from over 14 million fleet hours of operation in the UK and around the world. I am very proud of what our teams have achieved in the design of this new turbine."

Louisa Coursey, Small & Medium Wind Development Manager at RenewableUK, said: "Small and medium wind turbines are already powering many UK homes, farms and businesses, and are a crucial strategic consideration for UK policy makers looking to support the shift from the Big 6 to the Big 60,000."

The E3120 will continue to be available in the UK and in Endurance's other markets including Italy, Canada, and the United States. ↴



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WETZEL BLADE CONCEPT WINS OUTSTANDING VENTURE AWARD

Space frame, field-assembled turbine blade holds potential for wind energy



The complex logistics involved with transporting one-piece blades generally amounts to 3-5 percent of the total installed cost of each turbine.

Among the winners of the 2014 Clean Energy Venture Awards at the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory's NREL Industry Growth Forum, was Wetzel Blade.

The startup company was presented with the Outstanding Venture award for their work on what insiders might call the Holy Grail for wind energy — a pre-fabricated, field-assembled turbine blade that boosts production capacity and outlasts current generation composite blades. Award winners receive in-kind commercialization support to help increase their chances of becoming commercially successful.

The new blade technology is based on a space frame design and features independently fabricated pultruded FRP spars. The parts are sized for easy transport and field-assembly, in similar fashion to high reliability military equipment.

Today's current generation blades are fully assembled in large-scale factories and transported in one piece to wind farms. In the United States, the familiar 58-meter land turbine blades are the largest that can be transported in a traditional manner using supersized trailers with escort vehicles. The complex logistics involve coordinating drivers, escorts, permits and special-



Photo by Dennis Schroeder / NREL

Kyle Wetzel, CTO/Founder of Wetzel Blade receives the Outstanding Venture award for its innovative blade concept from Bobi Garrett, NREL, and Ashley Grosh, Wells Fargo, at the NREL Industry Growth Forum. The Pflugerville, Texas, startup has developed an innovative, field-assembled, component-based wind turbine blade.

ized equipment – which generally amounts to 3- 5 percent of the total installed cost of each turbine.

According to Kyle Wetzel, CTO/ Founder of Wetzel Blade and a

well-published expert in wind blade design, “This concept emerged from a project that our parent company, Wetzel Engineering, was involved with in China. We were engineering

a 100-meter blade for a 10MW turbine and wanted to eliminate shell panel buckling as a design driver. The balsa requirements presented another challenge – almost 10,000 kg of this expensive core material absorbing approximately 6,000kg of epoxy.

“Because of our involvement with the entire turbine lifecycle, we understand that to make a real shift in the economics, a blade design must generate more electricity, cost less to build and maintain, and be more efficient to transport and install. The industry is hungry for a solution that delivers on all those points.”

Wetzel Blade is currently in the structural testing phase with plans to demonstrate a sub-scale prototype in early 2015. The project has been partially funded through an SBIR/STTR award from the Department of Energy. ✎

— Source: Wetzel Blade

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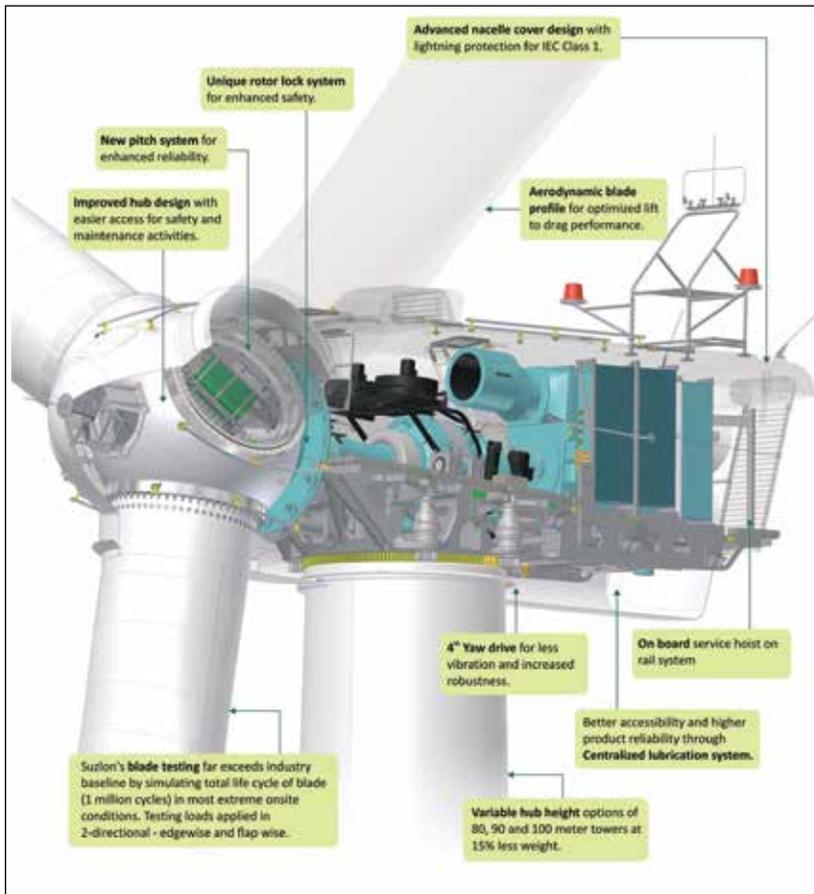
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SUZLON UNVEILS WORLD'S TALLEST HYBRID TURBINE IN INDIA

New model incorporates manufacturer's latest R&D efforts



Suzlon Group recently surpassed yet another milestone by expanding the capacity of Asia's largest wind farm at Kutch, Gujarat to 1100 MW. With this expansion, Suzlon now generates 1800 MW in Gujarat thus accounting for 20% of Suzlon's total pan-India capacity of over 8250 MW. Commemorating this landmark occasion, the company unveiled its S97 120m wind turbine.

The S97 120m is the world's tallest hybrid tower model, designed indigenously to harness the wind energy across low wind sites. It is installed at Jamanwada, Kutch in Gujarat, India, and has successfully generated 1500-plus kWh in its

pilot stage of three months.

Speaking on the occasion, Hon. Chief Minister, State of Gujarat, Smt. Anandiben Patel said, "The challenge of global warming has given an opportunity, whereby the world is now looking at clean and renewable sources of energy to combat climate change. While the 20th century belonged to Information Technology (IT), the 21st century will be that of Environment Technology (ET). Gujarat has championed the cause of generating power through renewable sources and has adopted pioneering technologies in wind, solar and other renewable resources. Suzlon has played an integral part in enhanc-

ing Gujarat's renewable energy portfolio. Suzlon took up the challenge put forth by Shri Narendra Modi of establishing 2,000 MW wind energy in Gujarat and Suzlon has already delivered 1080 MW in Kutch. We will continue to forge alliances with private players to harness the full potential of renewable energy in Gujarat."

Tulsi Tanti, CMD, Suzlon Energy, said, "The S97 120 m hybrid tower, a potential game changer, is the result of our continued focus to invest in next generation technologies that will provide energy efficient solutions thus ensuring higher yields to our customers. As the world is waking up and implementing measures to combat climate change, the contribution of wind energy in the energy architecture mix across the world has increased manifold. Governments are now pivoting their attention on renewables to provide the much needed energy security for their respective countries."

Suzlon group's leadership in offshore wind turbine is a testament of the organizations technological prowess. It continues to drive innovation by focusing the R&D efforts to develop cost efficient and reliable wind turbine technology. The group has a wide range of on-shore and off-shore energy solutions ranging from sub-megawatt onshore turbines at 600 kilowatts to 6.15 MW offshore turbine. The group is catering to over 2,500 customers across Asia, Australia, Europe, Africa, and North and South America. The S97 120M hub height hybrid tower is part of Suzlon's S9X turbine suite.

— Source: Suzlon Group

S97 120M FEATURES AND BENEFITS

- **Innovative & Powerful:** Combination of lattice and tubular which gives enhanced tower strength at lower cost. The three-dimensional lattice structure can support heavier weights due to the broad base. The tubular structure houses and protects the power and control systems, thereby keeping them safe and from bad weather and vandalism.
- **High yield and ROI:** 120m hub height- ensures 4-5 percent better wind speed and increased in power output of 12-14 percent over at 90-meter tower and at lower cost. This will deliver higher returns for the customer.
- **Logistics Friendly:** The Hybrid Tower can be transferred by normal trailers, thus significantly reducing transportation costs. The 17-meter base reduces the steel requirement by over 30 percent.
- **Reduced maintenance cost:** Structural bolts are covered with a friction coating to reduce wear-and-tear, thereby also reducing maintenance stress and cost.
- **Better Grid compliance:** The DFIG converter gives better provision for the windfarm to connect with national grid by controlling power parameters like frequency, active/reactive power regulation and stability during grid disturbances.
- **Safety:** S97 120 m is certified according to GL standards for 20 years of life. Safety has been incorporate in S97 120m in all aspects of product design, from the People Exclusive Suzlon- designed Cable Guiding Systems, to safe hub design and as per the highest safety guidelines. ✈

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A SHORT COURSE IN WIND TURBINE BLADE TERMINOLOGY

Someone recently asked me about the “zippers” on the blade.

Zippers? What Zippers?

Okay, so it appears we take for granted that everyone understands wind turbine blade parts and attributes. Let’s take some time and describe the different parts of the blade.

BLADE ROOT

The root allows for the blade to be attached to the blade and to transfer all the blade and wind loads to the main shaft. Most blade roots are round today but some have been shaped square in the past.

BLADE TIP

This is the outer most part of the blade. Most turbines today are pitch regulated but some turbines that are stall regulated have a pivoting blade tip. The pivoting blade tip can be the primary method of slowing the turbine down for braking the turbine or it can be an emergency brake should the turbine go into overspeed. The old Fayette turbines of the ‘80s did not have brakes and were designed to run with the blade tips out- normal operation- so turbine over speeds were not possible.

TRAILING EDGE

The trailing edge of the blade is the end of the airfoil. It is usually the knife edge of the blade although today the trailing edge can be what is called a “flat back” airfoil in which the knife edge is cut off flat. This allows for stronger structures and less weight.

LEADING EDGE

This is the part of the blade that tends to get the most attention for service today. The leading edge is the part of the blade that first hits the wind in normal operation. The leading edge is usually fatter than the trailing edge and typically should be smooth with no imperfections.

AIRFOIL

I once read in a blade forum that if it looks like an airfoil it probably is. The airfoil shape seems to be very sensitive to changes. If you change it slightly, like with leading edge erosion or even just brush marks in the coating, then you change that airfoil. In fact, you have just changed the airfoil into another airfoil, with different performance curves.

CHORD

If you draw an airfoil on a piece of paper and then draw a straight line from the two farthest parts of the airfoil- from the leading edge to the trailing edge, you have just drawn the chord line. Usually the chord is indicated in meters, measured from the root of the blade. This reference is used so that you know which part of the airfoil is being referenced in a discussion or report.

LONG SIDE (ROUND SIDE, AERO LOW PRESSURE SIDE, STRUCTURAL HIGH PRESSURE SIDE)

This is the side of the blade that develops low pressure in which the blade then tries to move into. Notice that this is also the high pressure side structurally as the



*By Jack Wallace
Frontier Pro Services*

blade skin is compressed as the blade loads up and typically bends back toward the aero low pressure side, down wind. Most commonly referred to as the Low Pressure side.

SHORT SIDE (FLAT SIDE, AERO HIGH PRESSURE SIDE, STRUCTURALLY LOW PRESSURE, OR TENSION SIDE)

This is the side of the blade that remains at atmospheric pressure, which is relatively higher pressure than the other side of the blade. This side of the blade usually operates in tension like a rope as the blade flexes back. This is usually the up wind side of the blade. This is most commonly referred to as the High pressure side.

LIFT

Is what is generated when the airfoil passes in the wind. This is the force that we use to rotate the rotor which is generated by properly orientating the airfoil in the wind.

DRAG

Drag is the friction generated by the airfoil as it passes in the wind. Sometimes drag is good such as when the winds are very strong and you don't want to absorb more power. But most of the time we are concerned with drag costing us energy as it robs us of being able to produce more electricity. Leading edge erosion can cause additional drag as well as change the performance of the designed airfoil. Adding vortex generators in the wrong area can increase drag so be careful.

VORTEX GENERATORS

Are devices that are typically added to the Aero low pressure side of the blade to help improve lift. The devices cause the air to swirl which in turn helps keep the air flow attached to the skin which also helps reduce drag. Vortex generators help prevent stall. (also referred to as zippers)

TRIP TAPE

Is used to cause a disturbance in the airflow. Although this disturbance may cause drag, it is planned that this purposely installed issue will prevent a much larger issue of unwanted stall or drag which will cost much more than the minor problem it may cause.

STALL

Is the loss of lift caused by the separation of the air flowing over the Aero low pressure side of the blade. If an airplane stalls you would know it as it would start to drop from the sky.

PITCH MARKS

Are usually placed at the root of the blade, both inside and outside to help properly mount the blade and to adjust blade pitch. The marks are usually parallel or line up with the chord line of the airfoil at the very tip of the blade.

ROOT CUFF

Also known as the "shark fin" if you're from the U.S Windpower group... This is the transition point from the round root shape to the active airfoil of the blade. It is usually the widest portion of the blade with the largest airfoil chord.

Okay, so some of these terms or others that describe parts or functions of the blade are strange but all of them have been used to describe parts of a blade. Hopefully it helps you improve communication within your group at your wind farm. Discussing them amongst your team will help remove confusion and improve communication.

As always work as safe as possible and work to prevent surprises. ↘



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MOVENTAS COMPLETES FIRST-EVER CLIPPER UP-TOWER SERVICE



Moventas USA recently carried out the first Clipper Liberty intermediate assembly roller bearing replacements that has ever been made up-tower. Mastering this type of challenging repairs is another example of the

innovative, highly skilled SkyService™ that Moventas offers in North America and Canada.

Moventas' Big Spring SkyService team completed yet another first when they replaced all four upper intermediate assembly roller bearings up-tower in a Clipper Liberty turbine in Hamburg, New York for their customer First Wind.

Introduced in 2006, the 2.5 MW Liberty turbine was the largest wind turbine manufactured in the United States when it was first installed. Its field failure began to occur shortly after the first installs and spiked in 2011 before Clipper divested in 2012. Until now, the Clipper gearbox that is of a unique design has only been accessible for service at the factory and at considerable expense to the end user.

Moventas worked in close cooperation with First Wind to understand the failure modes and the limitations in addressing those failures up-tower. In July, the Big Spring SkyService team successfully completed the first repair in New York within four days, extending the life of the gearbox.

"The challenge was to develop the special tools as well as lifting and holding devices to access the

upper housing half and intermediate gear assemblies," said Steve Casey, head of Moventas North American facilities. "Designing and fabricating special tooling for challenging repairs is something that our Big Spring team has a lot of experience with."

Moventas service teams located in Portland, Oregon and Big Spring, Texas work together to serve a diverse customer base, including OEM's, O&M service providers and end users. With multiple workshops and regionally based field service and sales teams, Moventas offers local service and real time support, added with gearbox expertise that only an OEM can offer. Moventas also operates three tailor-made Mobile Service Units across the USA and one in Canada, making up-tower service fast and cost efficient.

The success of the Clipper project extends Moventas' ability to address gearbox failures on-site and provides Moventas with further opportunities to grow its SkyService business in North America. Addressing the growing demand of life-extending gearbox service, Moventas has decided to open a new workshop facility and field service homebase in St Paul, Minnesota in February 2015. ↴

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MHI VESTAS OFFSHORE WIND TO SERIAL PRODUCE 80-METER BLADES FOR V164-8.0 AT UK FACILITY

Manufacturing on the Isle of Wight could begin as early 2Q 2015



MHI Vestas Offshore Wind will serial manufacture the 80m blade for the V164-8.0 MW, the world's most powerful offshore wind turbine on the Isle of Wight off the southern coast of the UK. The announcement is the first part of a wider industrialisation strategy in the UK which is expected to result in up to £200m worth of economic impact, including investment and safeguarding or creating up to 800 jobs.

As part of the strategy MHI Vestas Offshore Wind will lease the production hall at Vestas' blades technology centre on the Isle of Wight from 1 January 2015. Production of blades could commence in the second quarter of 2015 de-

pending upon a pipeline of firm and unconditional orders.

CEO Jens Tommerup said the agreement underlines MHI Vestas Offshore Wind's commitment to the UK offshore wind market.

"We are extremely pleased to publically announce the first stage of our industrial strategy here in the UK, the world's largest offshore wind market," Tommerup said. "MHI Vestas Offshore Wind will become the first manufacturer with the capacity to serial produce blades for future offshore wind projects in the UK, and we look forward to sharing further aspects of our industrial strategy in due course."

"The energy sector is powering Britain's economic recovery — the UK is already the world leader for investing in offshore wind, and 2,250 green jobs were created this year in our wind industry," UK Energy and Climate Change Secretary Ed Davey said. "We are building on that success with our historic reforms to the electricity market.

"The blades that MHI Vestas Offshore Wind will manufacture are being designed, tested and produced in the UK. This is another great example of how our offshore wind industry is attracting global investment — not just in building the turbines themselves but right across the supply chain and right across Britain."

BUILT IN THE UK

The R&D facility on the Isle of Wight was opened in 2011 and was specifically designed to develop large blades for the latest wind turbines. The facility consists of two halls 170m long and 50m wide, one for testing and verification, and one for blade production, which will be leased by MHI Vestas Offshore Wind.

“The Isle of Wight is a world class R&D centre for developing and testing blades. The blades for the V164-8.0 MW prototype were designed, manufactured and tested at the Isle of Wight facility so we have developed the unique skills and processes necessary to manufacture blades which makes it a good location to have the capacity to ramp up to serial manufacturing,” Tommerup said.



Vestas will continue to conduct research and development of blade technology on the Isle of Wight, including the testing and verification of the V164-8.0 MW which is being finalised by Vestas on behalf of MHI Vestas Offshore

Wind. The lease of the production hall will have no impact on Vestas employees working in R&D on the site. ✎

— Source: MHI Vestas Offshore Wind

SIEMENS AWARDED TURBINE SUPPLY CONTRACTS TOTALING 315 MW FOR TWO WIND PROJECTS IN CANADA

Blades for the turbines will be manufactured at the OEM's plant in Ontario

Siemens' Wind Power and Renewables Division has received two new orders for onshore wind projects in Ontario, Canada. The contracts include the supply, installation and commissioning of a total of 137 wind turbines rated at 2.3 MW. Of those, Siemens will supply 91 units of its SWT-2.3-101 turbines to Samsung Renewable Energy Inc.'s and Pattern Energy Group LP's (Pattern Development) 180-MW Armow Wind project. The G2 geared turbines are equipped with 101-meter rotors. Suncor Energy Inc. ordered 46 D3 direct drive wind turbines for the 100-MW Cedar Point II wind project. The SWT-2.3-113 turbines have a rotor diameter of 113 meters.

Together, both wind power projects will generate clean power for more than 100,000 Ontario homes. All 411 blades will be manufactured at the Siemens blade facility in Tillsonburg, Ontario. The Armow Wind project will feature 273 blades with a length of 49 meters while Cedar Point II will use 138 blades of 55 meters each. The towers for the projects will be manufactured in a local facility using steel made in Canada. Construction of the Armow project is now underway with commercial operation expected by the end of 2015. The Armow Wind project will be located close to the shore of Lake



Siemens Press Picture - Siemens has been chosen to supply 137 turbines for two wind farm projects in Canada.

Huron, more than 220 kilometers northwest of the city of Toronto in the province of Ontario, Canada. The wind turbines for Cedar Point II will be installed in Sarnia, Ontario, approximately 100 kilometers north of the U.S. city of Detroit. The project is scheduled to start commercial operation in late 2015.

— Source: Siemens



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SIEMENS GOES ON TOUR WITH LINKIN PARK TO RAISE SUSTAINABLE ENERGY SUPPLY AWARENESS



Courtesy of Siemens Press Picture - The picture shows the “power booth”, a specially equipped multimedia container set up by Siemens, Linkin Park and Warner Music. During Linkin Park’s tour through eleven cities from November 3 - 20, 2014, the container will turn visitor’s attention to Power the World.

Wherever they play, the American rock band Linkin Park not only excites the crowd with the energy of their powerful songs. In a joint initiative with Siemens, the superstars will now also be electrifying its audiences with its performances for sustainable power supply. The six band members will be using their tour through Germany, Austria and Switzerland in a joint campaign with Siemens to make a clear statement that is backed up by Power the World. In Europe in general, and especially in Germany, wind power is making a decisive contribution to sustainable energy supply.

Around 1.3 billion people, or 20 percent of the world’s population, do not have access to electricity. The United Nations has therefore launched an initiative and declared the years from 2014 to 2024 to be the “Decade of Sustainable Energy for All”. One of the missions of Power the World is to support the UN Secretary General, Ban Ki-Moon, in finding sustainable energy solutions throughout the world.

During Linkin Park’s tour through eleven cities from November 3 - 20, 2014, a so-called “power booth” — a specially equipped multimedia container set up by Siemens, Linkin Park and Warner Music — turned visitor’s attention to Power the World. Inside

the container, a multimedia show raised awareness about the fact that access to electricity is unfortunately not a matter of course in other regions of the world to motivate visitors to learn more and get involved. The fans also were able to take their picture inside the container. The selfies that were taken in the container before the concert were shown as part of a pre-show presentation, and a drawing was held for all participants for a special “Linkin Park edition e-Smart.” Power the World was also highlighted in a short teaser film prior to the stage show. ⚡

FOR MORE INFORMATION:

- Siemens Wind Power and Renewables Division: www.siemens.com/wind.
- Siemens sustainability and social responsibility: www.siemens.com/about/sustainability/en/index.php
- Power the World, please see www.powertheworld.org/
- UN initiative for sustainable energy for all: www.un.org/en/sustainablefuture/energy.asp



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