WIND SYSTEMS MAGAZINE

WIND SYSTEMS

GIVING WIND DIRECTION

Innovation

Smarter Storage

Harvard scientists develop organic flow battery

Conversation

Nicholas Robinson / AWS Truepower

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Renewable NRG Systems

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FEBRUARY 2014

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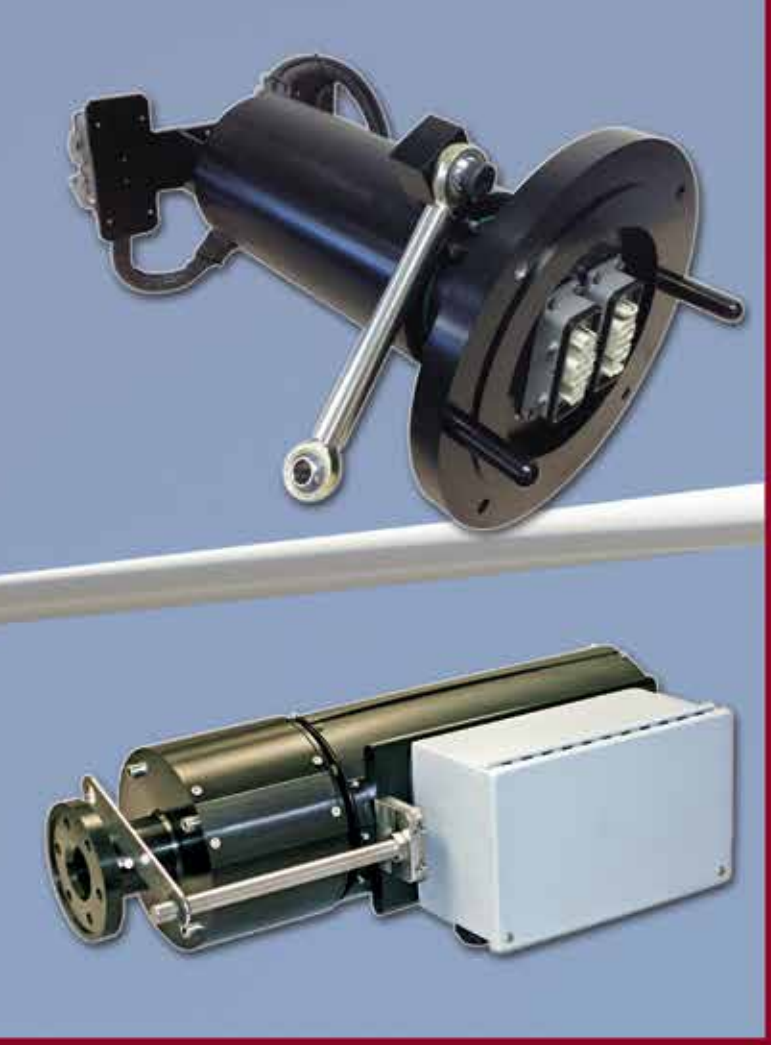

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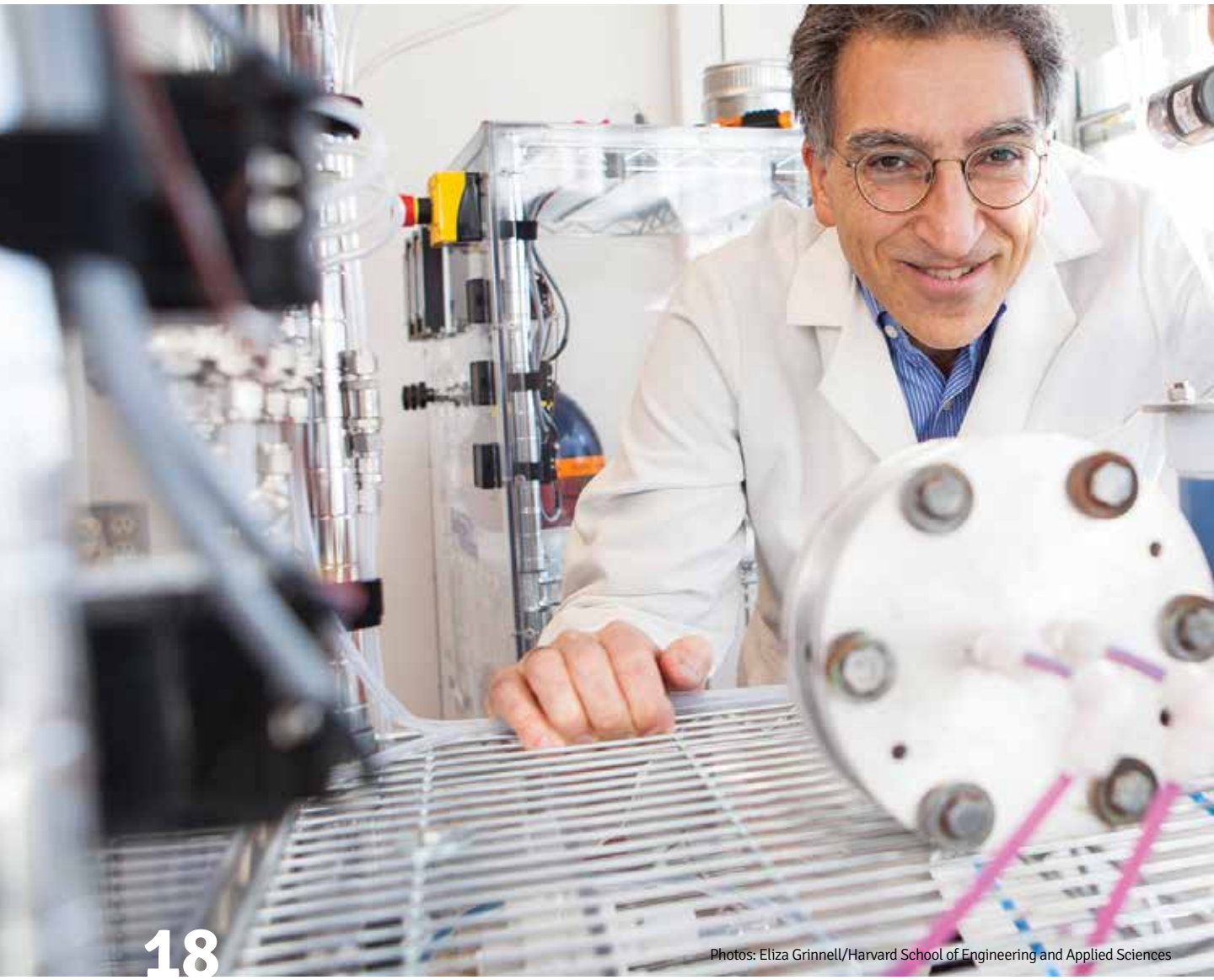

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Photos: Eliza Grinnell/Harvard School of Engineering and Applied Sciences

Harvard scientists develop organic renewable energy storage

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How many times do we hear in the business world that if you fail to innovate—whether it be with your products, your practices, your marketing, whatever—you'll most likely fail altogether?

It happens all the time with smaller companies. It could be that they can't afford to stay afloat amid larger companies with deeper pockets. But when we see the big companies fail, we sit up and take notice.

Just think. In recent history, Kodak, one of the largest, most influential companies in U.S. history, was left with no other choice but bankruptcy in 2012. The industry it had led for the better part of the 20th century gave way to bits, bytes, and cheap home printers.

Digital had taken over, and Kodak could only blame itself. The company actually pioneered the first digital camera in 1975. It had developed the technology, but didn't have the forethought to innovate.

In a similar vein, consider Research in Motion, creators of the BlackBerry smartphone. At the height of its market share, competitors launched more intuitive devices, and RIM—a technological powerhouse—refused to innovate. The company put too much faith in thinking it could hold on to the business segment.

There are important distinctions between technology and innovation. Technology alone does not move anything forward. It must be used as an avenue for innovation.

Innovation is the conversation, the sharing of ideas that improves on something. Technology is simply the phone line connecting the two ends of the call.

We place a lot of importance on the role that technology plays in our lives—both business and personal. But does the message really get across? If not, all of the technology in the world can't enact change to make anything better.

On the other hand, sometimes, just a little bit of innovation can have revolutionary effects. Consider the patriarch of the U.S. automotive industry, Henry Ford. An abnormally high percentage of people, when asked, will reply that Henry Ford invented the automobile.

He didn't, by the way. What Ford did was take the old way of producing and automobile and improve upon it... made it better. In doing so, he revolutionized automobile ownership, paving the way for what it is today.

By now, you've noticed our changes here at *Wind Systems*. Among those changes, you'll notice that we've changed the name of one of our sections altogether. We've taken "Technology" out, instead giving it the name it always deserved... "Innovation."

After all, aren't we really interested in the conversations that make things better? The phone line is just a wire until somebody starts talking.

Thanks for reading!

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Kevin Dinwiddie is currently Senior Wind Turbine Tribologist at AMSOIL INC., with more than 35 years experience in the lubrication field. Over the years he has been involved with the National Renewable Energy Laboratory and the Society of Tribologists and Lubrication Engineers (STLE). Kevin currently serves as co-chair of the AWEA O&M Working Group—Gearbox Sub-Committee.

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.

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.

Scott Connor is a Safety/Rescue specialist with 25 years professional experience in Confined Space Entry/Rescue, High Hazard Emergency Response and High Angle Rescue. Mr. Connor is considered to be one of the top industry speakers and has conducted 1000's of training sessions to mainly Multi-national companies and the Fire Services across North America. Mr. Connor is an NFPA Technical Committee Principal member.

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INDUSTRY AT LARGE

ANOTHER HOLIDAY RUSH FOR THE INDUSTRY...ONLY DIFFERENT

A late-year push is nothing new to the wind energy industry—in fact, companies are used to it. Through the years, the federal Production Tax Credit (PTC), wind's primary policy driver, has typically been extended in one- and two-year increments, and the extension often hasn't come until the 11th hour or even after a December 31 expiration has passed.

That sort of history has meant plenty of long days for construction crews around the time of the winter solstice, and the flipping of switches on newly christened projects even on New Year's Eve. Historically, of course, to qualify for the PTC, projects had to be online by the deadline.

In a sense, the final stretch of 2013—we'll call it wind's holiday season—was no different. Project activity was hot, and announcements were plentiful. Yet, while the industry turned a little frenetic at the end of the year, the nature of the activity was quite different from the usual holiday rush. Rather than reports streaming in about new projects going online, this year's holiday news was filled with construction starts, turbine orders, and power purchase agreements.

The reason: the all-important tweak to the most recent PTC extension, which required that projects start construction, rather than be completed, by the end of 2013. The new start-construction language was crucial for the industry during 2013 and beyond because the latest extension did not come until Jan. 1 of last year. As a result, the industry operated for months during 2012 with the uncertainty of a scheduled Dec. 31 expiration.

As previously mentioned, the industry has had to deal with such late extensions before. But things were different this time. Wind energy had grown into a $25 billion industry, and the turbine supply chain infrastructure had planted roots here, creating an overall industry workforce of around 80,000. So as a result of the huge policy question mark, the entire supply chain and development pipeline virtually grinded to a halt, and so it took months for the now-sizable industry to ramp back up again in 2013. A one-year extension requiring that projects be completed by the end of 2013, therefore, would have had little impact on an entire industry that needed to start up again from a stationary position.

If you want to get a glimpse of what's happening in the industry, look no further than the turbine manufacturers, which in a sense represent the heart of the business. Sure enough, original equipment manufacturers (OEMs) were announcing turbine orders at year's end that will keep them and developers busy not only in 2014 but into 2015 as well. That's the power of the start-construction language in the latest PTC extension.

Following are just a few news items highlighting the activity as most industries were quieting down and having holiday parties. The items are by no means comprehensive both in terms of the manufacturers that made announcements or orders placed, but they provide a sense of the activity that took place at year-end.

By Carl Levesque
American Wind Energy Association

VESTAS FINISHES STRONG

Vestas kicked off the holiday week of Dec. 23 with the announcement that it received a 150-MW order from First Wind for multiple U.S. projects. That's a solid order, but it gets better: The company could ultimately supply First Wind with up to 568 MW of additional turbines for multiple projects, the turbine manufacturer said. As part of the master supply agreement, Vestas will supply 75 V110-2.0 MW turbines to the 150 MW Route 66 project near Amarillo, Texas. Deliveries are expected to occur for Route 66 in early 2015 with commissioning in mid-2015.

The next day, on Dec. 24, Vestas announced an order that it said made 2013 its second-best year ever for the region. The company received a 110-MW order for 55 V100-2.0 MW wind turbines for a new project in the U.S. That order put Vestas over the 1,700-MW threshold for the year in the North American market (including Canada)—second only to the 1,883 MW in sales the company recorded in 2010.

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Gamesa secures turbine order with EDPR

Vestas wasn't the only OEM to add some late-year orders to its 2013 books. On Dec. 26, Gamesa said it has signed a framework agreement with EDP Renovaveis (EDPR) for the supply of up to 450 MW for EDPR U.S. projects that could go into 2016.

Under terms of the agreement, the OEM will supply up to 225 of Gamesa G114-2.0 MW wind turbines. The agreement represents the largest contract for Gamesa's G114-2.0 MW turbines to date.

Siemens celebrates record

Perhaps Siemens Energy made the biggest splash of the year. The deal had already been announced, but nevertheless on Dec. 16 Siemens confirmed that the 1,050-MW wind turbine order it recently received from MidAmerican Energy Company is the largest land-based wind turbine order in the world. The news was announced at a commemoration event at Siemens' blade manufacturing facility in Fort Madison, Iowa. Leading the Dec. 16 celebration were Iowa Gov. Terry Branstad, Mark Albenze, CEO of wind power Americas for Siemens Energy Inc., and AWEA CEO Tom Kiernan.

As with the other orders mentioned above, the order will keep Siemens busy for some time.

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Other North American Turbine Orders

Tri Global Energy selects Alstom for Texas project

On December 30, Alstom Power, Inc. and Tri Global Energy, LLC entered into a turbine supply agreement under which Alstom will supply four ECO110 and 25 ECO122 wind turbines and provide 10 years of service and maintenance for the 80 MW Fiber Winds Energy project near Lorenzo and Ralls, Texas. This agreement, achieved prior to December 31, 2013 secures a "safe harbor" position on the Production Tax Credit (PTC) for Fiber Winds Energy.

Following a financial closing, construction of the project is expected to begin the middle of this year, with commercial operations scheduled to commence in 2015. Tri Global Energy recently acquired 100 percent ownership of Fiber Winds Energy and intends to be the plant operator, providing local employment and services, expanding upon the original Tri Global Energy business model as a community developer for local landowners and investors.

Acciona receives 102 MW order for Nova Scotia project

Acciona has signed a contract to supply 34 turbines for a 102 MW wind farm in Nova Scotia. It will carry out the construction, internal electrical infrastructures and assembly and will also undertake the operation and maintenance of the facility.

The South Canoe wind farm—which will be the largest in the province—has been developed by three local companies: Oxford Frozen Foods, Minas Basin Pulp and Power, and the utility company Nova Scotia Power, to which the power generated will be sold. It will incorporate AW3000/116 turbines of Acciona Windpower technology, each with a capacity of 3 MW, hub height of 92m, and a rotor diameter of 116 metres.

The facility will supply electricity equivalent to the consumption of 32,000 homes and will help the province of Nova Scotia, on the eastern seaboard of Canada, to reach its renewable energy targets.

International Orders

Vestas signs two orders for Powerica projects in India

Vestas has secured two orders in India from Powerica Ltd., totalling 51.8 MW. Both orders include delivery, installation, and commissioning of 25 V100-2.0 MW and one V100-1.8 MW turbines. The orders will supply wind turbines for Powerica's Jangi and Charbara projects, both of which are located in Gujarat. Commissioning is expected in July for 21.8 MW and in March 2015 for 30 MW.

Vestas receives 36 MW order from juwi Wind for German projects

Vestas will supply German wind developer juwi Wind with 12 turbines totaling 36 MW for three different projects in Germany. The contract comprises supply, installation and commissioning of the turbines, along with a SCADA solution and 15-year full-scope service agreement.

Vestas and juwi signed a framework agreement for 52 turbines in 2012 and today's order thus continues the positive cooperation between the two partners.

The 12 turbines will be deployed at three different projects in Germany in Göllheim, Niederhausen an der Appel and Alsenz this summer.

Uruguayan project chooses Vestas for 39 MW extension

Vengano S.A. has signed an agreement

for the extension of the Carape wind power plant in Uruguay using 13 Vestas V112-3.0 MW wind turbines. The wind turbines are scheduled to be delivered in the third quarter of this year, with commissioning set for the first quarter of 2015.

In September 2013, Fingano S.A. signed a contract for the first 50 MW order for the Carape wind power plant; and now Vengano S.A., owned by the same shareholders as Fingano S.A., has signed the contract for the extension of Carape wind power plant. Once installed, the complete Carape wind power plant will have an estimated annual production of more than 440,000 MWh, generating green electricity for 400,000 people in Uruguay, equal to about one third of the population of the city of Montevideo.

The 39 MW contract comprises delivery, installation and commissioning of the turbines, SCADA system, and 17-year service agreement.

Vestas' V110-2.0 MW to make European debut in Poland

SPV – Nowotna Farma Wiatrowa and its parent company Taiga Mistral have placed a 40 MW order with Vestas for the manufacturer's V110-2.0 MW model wind turbines, marking the first European order for that model. The order will supply the Ostazewo wind project—located in the Gdansk region of northern Poland. The contract includes delivery, installation, and commissioning of the turbines, which is expected to occur during the fourth quarter of 2014. The project also includes a 15-year comprehensive service package.

Vestas has received a total of 950 MW of orders for the V110-2.0 MW in the U.S. since introducing the turbine on the market last April.

Vestas to supply 117 MW for Jordan's first utility-scale wind farm

Vestas has received a 117 MW order for Jordan. The project consists of 38 V112-3.0 MW turbines which will be installed about 180 km south of Amman, in the Tafila region, Jordan. Delivery of the turbines will start in the second quarter of this year, and the plant is expected to be commissioned in the second quarter of 2015.

The order has been placed by Jordan Wind Project Company (JWPC), a company set up by InfraMed Infrastructure, Masdar and EP Global Energy (EPGE).

The contract for the Al Tafila wind power plant includes supply, installation and commissioning of the wind turbines, civil and electrical works, a VestasOnline® Business SCADA solution as well as a 10-year custom-designed energy based service agreement for the entire wind power plant.

Nordex extends Delta offering into Turkey

In the fourth quarter of 2013, the Nordex Group has

HEADLINES

POLICY & ADVOCACY

American announces board and executive personnel changes

American Council On Renewable Energy (ACORE) has announced that Michael R. Brower has been appointed the new President and CEO of the organization. Brower served as the Interim President and CEO since July 29th, 2013.

Brower has been an ACORE member since 2002, a member of the Board of Directors, and is a long time Leadership Council member. Most recently, he served as Senior Federal Policy Director at Mosaic Federal Affairs, a wholly owned subsidiary of Hiscock and Barclay LLP, a New York law firm. Brower is a retired career Naval Officer and Aviator.

Throughout his career, Brower has been directly engaged in a wide-variety of renewable energy projects, including work in development, funding and finance, and operational deployments.

Additionally, ACORE recently announced four new Board of Directors members as a result of the annual election of Director. Dan Adler, (managing director, California Clean Energy Fund); Matt Cheney (CEO, CleanPath Ventures LLC); Michael Ware (founder, Advance Capital Markets, Inc.); and Kathleen Weiss (vice president of federal government affairs with First Solar) now fill the vacancies.

Shermco renews top-tier AWEA sponsorship

Shermco Industries, an industry leader in electrical power system maintenance, repair, testing and training, announced it will provide a 2014 Megawatt-Sponsorship of AWEA.

"Shermco has been a committed AWEA sponsor for many years, and views its sponsorship as a commitment to the advancement of the wind energy industry especially as the water supply crisis worsens in the heartland of America," said Kevin Alewine, director of renewable energy services for Shermco Industries.

As a Megawatt Sponsor, Shermco supports AWEA workshops, conferences and exhibitions across North America that educate corporations and professionals associated with wind energy generation about significant operational, economic and energy issues.

"We support AWEA because it is the premier organization for the expansion of wind energy, a crucial lynchpin to economical, independent and sustainable energy in North America and around the world," said Alewine. "We are proud to support this fine organization again this year."

PROJECT NEWS

NORTH AMERICA

EDF RE acquires300 MW Roosevelt Wind Project

EDF Renewable Energy has acquired Roosevelt Wind Project, LLC from Infinity Wind Power. The up to 300 MW project is expected to achieve commercial operation in December 2015.

The project encompasses approximately 62,000 acres of farmland within Roosevelt County, New Mexico—roughly 18 miles southwest of Portales. Southwestern Public Service Company (SPS), a subsidiary of Xcel Energy, will purchase the electricity generated by the 250 MW first phase of the project, pursuant to a 20-year, fixed-price power purchase agreement.

Marubeni Corporation, EDF RE partner for California project

EDF Renewable Energy and Marubeni Corporation recently announced that a subsidiary of Marubeni acquired a 90 percent economic interest in the 102.5 MW Shiloh IV Wind Project.

The Shiloh IV Wind Project, located in Solano County California, commenced operations in December 2012 and supplies carbon-free electricity into the CAISO transmission system under a 25-year power purchase agreement with Pacific Gas and Electric. Consisting of 50 REpower MM92 turbines, Shiloh IV generates clean electricity sufficient to supply approximately 40,000 average homes.

EDF Renewable Energy will retain a 10 percent stake in the project. Its affiliate EDF Renewable Services will continue to provide operations and maintenance services. Marubeni will participate in asset management roles working with EDF Renewable Energy in the administration of the project.

been awarded three new contracts for a combined capacity of 37.6 MW in Turkey. Included in these are the first six N117/3000 generation Delta turbines for this growth market. The second contract also marks a new development as it is the first time that a customer from Turkey has ordered four N117/2400 light wind turbines.

This summer, Nordex will be supplying six of its N117/3000 turbines for the 18-MW Cesme RES project, which is located on a peninsular close to Izmir. Nordex only launched the N117/3000 in spring 2013. This turbine is specifically designed for medium-strong wind conditions and will achieve an above-average capacity factor of over 38% at Cesme RES. The customer and future owner of the wind farm is ABK Cesme Enerji Üretim A.S., which is already active in renewable energies.

Named Aliaga RES, the second project is also located in the Izmir region and comprises four N117/2400 turbines. Construction is scheduled for summer 2014.

In addition, returning customer Karesi Enerji has placed an order with Nordex for four N100/2500 turbines to extend the 45-MW Akres wind farm. Installed by Nordex in 2011, the farm currently has 18 N90/2500 turbines.

Nordex receives order for coastal wind farm in Finland

Nordex SE received a contract from wpd europe GmbH for the delivery and installation of eleven turbines for the Mäkikangas wind farm.

The Mäkikangas wind farm is being built on the west coast of Finland close to the town of Pyhäjoki at a site with an annual average wind speed of approx. 8 meters per second. For this reason, N117/3000 Generation Delta turbines will be used and installed by Nordex during this year. The wind turbines have a hub height of 141 meters in order to generate the greatest possible electricity yield. The eleven turbines at the Mäkikangas wind farm will generate an annual yield sufficient to supply 24,000 homes.

In another order from Finland, Nordex has signed supply and maintenance contracts for a 27-MW wind farm with specialist investor Impax Asset Management. The "Joukhaisselkä" project will comprise nine N117/3000 turbines from the Delta series. Launched at the beginning of 2013, this series is specifically designed for locations with medium wind speeds.

Nordex will be installing the turbines at the "Joukhaisselkä" wind farm in Lapland near the town of Sodankylä in 2014. Given the cold weather conditions, Impax has also opted to have the turbines fitted with the Nordex anti-icing system, which prevents ice from forming on the rotor blades, thus ensuring optimum energy production during the winter months.

Acciona awarded 57 MW contract in Turkey

Acciona Windpower has been awarded the supply and assembly of the 57 MW Çerçikaya wind farm in Turkey, owned by the company ZT Enerji Elektrik Üretim Sanayi ve Ticaret A.Ş. (Zafer Group). The contract includes the operation and maintenance of the installation for 10 years.

The wind farm, located in Hatay province in the south of the country, will be equipped with nineteen AW125/3000 turbines. These machines have a rotor diameter of 125 meters and will be mounted on 87.5-meter-high steel towers. This wind turbine is specially designed for sites with low wind speeds.

Supplies will be made in 2014 and 2015, and the entry into service of the wind farm is planned for the end of February 2015.

It is the first contract awarded to ACCIONA Windpower in Turkey.

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EDF RE acquires two Texas projects totaling 394 MW

EDF Renewable Energy has announced the acquisition of the 194 MW Spinning Spur 3 Wind Project from Cielo Wind Power LP (Cielo).

Spinning Spur 3 is located on approximately 18,000 acres in Oldham County, Texas, roughly 50 miles west of Amarillo. The project expects commercial operation by the end of 2015.

Electricity generated from the Spinning Spur 3 Wind Project will be provided to two municipal utilities, Georgetown Utility Systems and Garland Power & Light, under long-term power purchase agreements.

Additionally, EDF RE has acquired the Longhorn North Wind Project, located in Floyd and Briscoe counties, 60 miles northeast of Lubbock, Texas, from RES Americas. RES Americas will construct Longhorn, its 18th renewable energy project in Texas, under a Balance of Plant (BOP) agreement. Construction on the 200 MW project commenced in time to qualify it for the production tax credit, with an expected completion date at the end of 2015.

Both projects will utilize the CREZ (Competitive Renewable Energy Zone) transmission lines to connect the wind generating capacity of the Texas Panhandle to high electricity demand areas in the state.

BayWa r.e. acquires its second New Mexico wind project

BayWa r.e. Wind, LLC has announced that it has signed a purchase and sale agreement with Compass Energies to acquire the Anderson Wind Project located in Chaves County, New Mexico. The Anderson Wind Project is BayWa r.e.'s second New Mexico wind acquisition in 2013. The 15 MW project is located approximately 100 miles southwest of BayWa r.e.'s 19.8 MW Brahms Wind Project in Curry County, acquired in July 2013.

Construction of the Brahms Wind Project began at the end of September, with commercial operation expected early this year. The Anderson project is expected to begin construction in Spring 2014 with a targeted late summer completion date.

Element Power to sell 200 MW to KCP&L Greater Missouri Operations

Element Power US, LLC, owner and developer of the Mill Creek Wind Farm, and KCP&L Greater Missouri Operations have entered into a power purchase agreement for a 200 MW wind energy facility to be built in Holt County, Missouri. The 200 MW project, once operational, will be the largest in the state of Missouri.

Element Power continues to work with local, state, and federal entities on regulatory and environmental reviews. The project currently has approximately 25,000 acres under lease with over 100 landowner partners. Element Power anticipates commencement of construction in Q3 2014, with expected commercial operation achieved by the end of December 2015.

Acciona to supply 93 MW of wind power for Brazil

Acciona has secured a turbine supply agreement for Brazilian wind farms. The agreement, signed with a joint venture between Voltalia, CHESF and Encalso, covers 31 wind turbines of 3 MW each - the AW 116/3000 and AW 125/3000 models - for wind farms located in North East Brazil.

In addition to the turbine supply contracts, the operation and maintenance of the wind farms has been contracted for a period of 15 years. To date Acciona Windpower has supplied, or has orders for 423 MW in Brazil.

Queiroz Galvão taps Alstom to supply 400 MW for two Brazilian wind farms

Alstom has signed two contracts totaling around €400 million with Queiroz Galvão, one of the main infrastructure groups in Brazil, to deliver, erect and commission ECO 122 wind turbines at two large wind farms—Caldeirão Grande I and II, both located in the state of Piauí State, Northeast of Brazil.

The wind farms Caldeirão Grande I and II will generate 400MW; this amount of energy can bring electricity to around 600,000 people. The ECO 122 wind turbines will be produced at Alstom manufacturing unit in Camaçari (Bahia State) and will be delivered between 2015 and 2017.

Alstom has already signed contracts to install over 1,700 MW of wind power capacity in Brazil, making it one of the leaders in the Brazilian wind power market.

OFFSHORE

Vestas receives 50 MW order for UK offshore wind project

Vestas will supply 15 V112-3.3 MW offshore turbines for the Kentish Flats Extension off the coast of the UK. Kentish Flats, owned by Vattenfall, was installed by Vestas in 2005. It currently consists of 30 V90-3.0 MW turbines, which Vestas services.

The order—with a total capacity of 50 MW—includes supply, installation, and commissioning of the wind turbines as well as a five-year AOM 5000 service agreement.

The Kentish Flats Extension is located approximately 10 km north off Herne Bay and Whitstable in Kent. The construction of the project will begin mid-2015. The existing wind farm and the extension will combined be capable of generating between 350,000 MWh and just over 430,000 MWh of clean electricity every year, which is equivalent to the total annual electricity needs of between 82,000 to 96,000 UK households.

SITE-BASED TURBINES TO SUPPLY HONDA PLANT WITH 10 PERCENT OF ITS POWER

Ohio transmission plant sets wind power standard among major U.S. auto facilities

Honda Transmission Mfg. of America, Inc. has finalized installation of a site-based wind power project at its plant in Russells Point, Ohio, through an agreement with a subsidiary of ConEdison Solutions of Valhalla, NY.

The installation of the turbines means that the plant will be the first major automotive manufacturing facility in the United States to obtain a substantial amount of its electricity directly from wind turbines located on its property. Honda Transmission will also reduce CO2 emissions through the use of this renewable energy source.

Studies commissioned by Honda Transmission indicate that wind-generated power is a cost-effective source of electricity for the plant and that the project will not adversely impact local wildlife or the environment. The two wind turbines will supply approximately 10 percent of the plant's electricity. Based on their location and actual wind speeds, combined output from the two wind turbines is estimated at 10,000 MWh per year.

The decision to go forward with the project followed completion of a thorough evaluation of renewable energy sources for the plant, which Honda announced in February 2012. The turbines, with blades approximately 160 feet long, have been installed on 260-foot towers on Honda Transmission property.

"We appreciate the support we have received from the township and our neighbors throughout all phases of the project that will help Honda work toward our goal of reducing CO2 emissions," said Gary Hand, vice president of Honda Transmission. "This is just one of many ways that Honda is seeking to reduce our environmental footprint."

"We are proud to be helping Honda strengthen its status as a national leader in sustainability," said Jorge Lopez, CEO of ConEdison Solutions. "Through the example set by Honda, the American manufacturing sector will see more ways it can incorporate renewable power into its facilities."

ConEdison Solutions, one of America's largest energy services companies, will own and operate the two turbines, through its subsidiary, RP Wind, LLC. The company is working in collaboration with Juhl Energy of Pipestone, Minnesota, which served as the primary developer of the project. Through agreements with Honda Transmission, ConEdison Solutions will generate electricity for the plant, and be responsible for an interconnect agreement with the Logan County Electric Cooperative and an additional agreement with Buckeye Power, Inc., an Ohio electric cooperative.

"We are honored to work with Honda and ConEdison Solutions to provide wind energy at the Russells Point facility," said Corey Juhl, vice president of project development for Juhl Energy. "By assisting in the installation of these two wind turbines next to their manufacturing facility, Honda is making tangible and immediate progress towards reducing CO2 emissions."

Invenergy completes project financing for Texas project

Invenergy Wind LLC has announced that it has arranged project debt and tax equity financing for its 288.6 MW Miami Wind Energy Center—currently under construction in northern Texas.

Morgan Stanley & Co. arranged the project debt, including a construction loan and a term loan commitment. Tax equity commitments also were secured from several financial institutions. Financial details were not disclosed.

Miami is located in the Texas Panhandle, approximately eighty miles northeast of Amarillo in Roberts, Hemphill, Gray, and Wheeler Counties. Commercial operations are scheduled to begin in the third quarter of this year.

Additionally, Invenergy announced the successful refinancing of its 100.5 MW Beech Ridge Energy wind project in Greenbrier County, West Virginia. CoBank, ACB acted as the Mandated Lead Arranger and Administrative Agent for the transaction.

Beech Ridge, which began commercial operations in 2010, is located approximately sixty miles southeast of the City of Charleston. The facility features 67 GE 1.5 MW SLE wind turbines, and is operated and maintained by Invenergy Services LLC, an affiliate of Invenergy. The project's output is sold to Appalachian Power Co., a subsidiary of American Electric Power, under a long-term power purchase agreement.

Iberdrola expands capacity at wind farm in Mexico

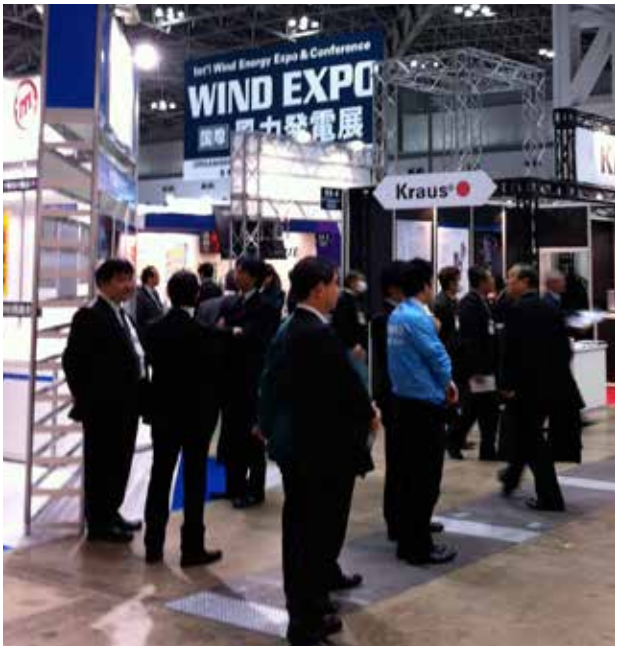
Iberdrola has extended by 22 MW the capacity of its La Ventosa wind power complex, one of its most emblematic renewable facilities in the Americas, taking it up to 102 MW.

To this end, it has installed on the site 11 state-of-the-art Gamesa G80 wind turbines, each with 2 MW unit capacity and standing 78 meters tall.

This extension means that La Ventosa can now supply electricity to over 190,000 Mexican households each year. The project, executed by Iberdrola's engineering and construction subsidiary, has also entailed the upgrade of the wind farm's grid connection and the 230 kV transmission line owned by the Federal Commission for Electricity (CFE).

An average of 250 construction jobs was created by the extension works. La Ventosa also provides a steady income for over 150 local families and land owners.

JAPANESE WIND ENERGY SEEKS TO CAPITALIZE ON FAVORABLE MARKET CONDITIONS LEADING INTO SECOND ANNUAL WIND EXPO 2014



Fostering growth of the Japanese wind energy industry is the ultimate drive behind the second annual WIND EXPO—Japan's only trade show dedicated to wind energy. The three-day event is being presented in conjunction with seven other smart/renewable energy exhibitions as part of World Smart Energy Week on February 26-28 at Tokyo Big Sight in Tokyo, Japan.

The newly implemented feed-in tariff has made Japan one of the most attractive markets for renewable energy. As an organizer of World Smart Energy Week (A group of eight smart/renewable energy trade shows, Reed Exhibitions Japan had received requests from numerous industry leaders, organizations, associations, governmental bodies and show participants to launch an exhibition specialized in wind energy.

To live up to the expectation of the industry, Reed Exhibitions Japan launched WIND EXPO in February 2013 as a new business platform in Japan with the support of Japan Wind Power Association (JWPA). The first edition was held with 157 exhibitors and 76,328 professional delegates (including concurrent event attendance) and following up to the success of 2013, WIND EXPO 2014 will be a show not to be missed for those who are looking to invest in the market.

As Izumi Ushiyama, president of Ashikaga Institute of Technology mentioned at the previous show, hopes are high for the future of wind energy in Japan, as well as for WIND EXPO.

"Energy policy has been changed, and the importance of wind power as well as other renewables has been increasing in Japan after the earthquake," Ushiyama said. "From its huge potential and low cost of power generation, Japanese government regards wind power as a leader in the future renewables, and rapid growth is expected in near future. With this circumstance, I believe WIND EXPO will continue to draw attention worldwide."

As though to reflect Ushiyama's predictions, WIND EXPO 2014 will be held with more players from both the local and international market making it an even richer venue to find business connections in Japan.

For instance, as well as continual participation of major wind turbine components and equipment manufacturers, in 2014 more offshore related exhibitors such as floating foundation manufacturers, marine cable manufacturers etc. will be showcasing their latest products and technologies.

The show will also see increase in the involvement of firms from overseas. In addition to the Denmark pavilion from the 2013 show, there will be new international pavilions from the UK and Canada, among others.

Major wind turbine manufacturers such as Mitsubishi Heavy Industries, Hitachi, ENERCON, TECO, Eurus Energy, Zephur have already confirmed their participation.

As many as 170 exhibitors and 80,000 visitors (including concurrent events) are expected at WIND EXPO 2014, including visitors from Japan and all over the world.

In addition to finding the latest high-quality Japanese products/technologies and new business leads in Japan, WIND EXPO will also be a venue to make connections with top experts in the front line of the business.

Wind energy experts from major industry companies are serving as technical conference advisory committee members to create a world class conference. Experts will be sharing the latest, cutting-edge information at the technical conference.

Conference topics range from industry outlook, to policy hurdles, to global markets.

Full conference details are available online at www.windexpo.jp/en/seminar/. (Conference details subject to change)

WIND EXPO 2014 – 2nd Int'l Wind Energy Expo & Conference

Dates: February 26 – 28, 2014

Time: 10 a.m.–6 p.m. local time (10 a.m.–5 p.m. on February 28)

Venue: Tokyo Big Sight (Tokyo International Exhibition Center)

Website: www.windexpo.jp/en/

Exhibiting inquires: wind@reedexpo.co.jp

Visiting inquiries: visitor-eng.wind@reedexpo.co.jp

EWEA EVENT TO FOCUS ON LONG-TERM STRATEGY, EDUCATION, AND NETWORKING

Wind energy personnel from across the globe will descend on Barcelona next month for Europe's premier wind energy event. Organized and hosted annually by the European Wind Energy Association, the event provides a periodic opportunity for the wind energy sector to meet with decision-makers and define the strategic direction for wind energy activities in Europe.

During the four-day event—to be held March 10-13 at Fira de Barcelona Gran Via, in Barcelona, Spain—participants will have numerous opportunities to learn about and discuss the current state of wind power in the European Union; to view and gather information about the industry's most advanced products and services; and to share and expand their own knowledge about the industry—on both regional and global scales. On a vocational level, the Annual Event fosters unity and collaboration through vast business networking opportunities.

The event's comprehensive conference program not only delivers cutting-edge technological knowledge, but also lively debates on European policy, markets, and financial issues.

Although the event is geographically aligned with the European region, event organizers are determined not to ignore the global nature of the wind energy industry. The global marketplace is becoming increasingly crowded with new players. To that end, each year EWEA brings together over 60 nationalities from across the world, making the event truly international and a great place to find new suppliers, check out new developments, and build partnerships.

While the majority of business networking is likely to occur in the context of the conference and exhibition themselves, the Association purposefully selects a different host city for each year's event, with the intent of providing a relaxed environment conducive to building business relationships. With a long-standing reputation for producing fruitful networking events in amazing surroundings, Barcelona will not disappoint.

The conference segment of the Annual Event will open with plenary sessions in which decision makers—from national governments as well as from European and international institutions—will describe how they see the present situation of the energy sector and the solutions they are putting in place to ensure that targets are met.

The conference program is subdivided into four academic tracks: "Business and Policy in Europe and Beyond," "Hardware Technology," "Resource Assessment," and "Science & Research." Each track consists of six to eight narrowly focused sessions which cover a specific topic related to the track discipline.

More details about the EWEA 2014 Annual Event, including online registration, exhibition floor plan, full conference program, exhibition guidelines, sponsorship opportunities, and much more can be found online at the EWEA 2014 Annual Event website at www.ewea.org/annual2014.

INTERNATIONAL

Gamesa sells a 25.5 MW wind farm in Greece to Eren

Gamesa has closed the sale of its 86 percent stake of a 25.5 MW wind farm in Greece to EMV, a Greek subsidiary of Eren. The Kithaironas wind farm- developed and promoted by Gamesa- is located in Thivas, in the region of Viotia, and comprises 30 Gamesa G52-850 kW wind turbines. Through this operation, Eren is further developing its presence in Greece where it owns 35 MW of solar and wind farms, as well as several hundred megawatts of wind projects currently under development.

ACCIONA sells 150 MW German wind portfolio to Swisspower Renewables

Acciona Energía has signed a sale agreement with Swisspower Renewables AG over the totality of 18 operating wind farms located in Lower Saxony and Brandenburg in Germany, with a total attributable capacity of 150.3 MW.

The transaction´s consideration amounts to 157 million euros with a net financial debt of 85 million euros. The terms of the transaction imply a valuation of 1.04 million euros per MW, an EBITDA 2013E multiple of 10.2 times and an energy index of 0.67. The 18 wind farms located in Germany, 100 percent property of Acciona, have been grid connected progressively since 2002 until 2009 and they have a weighted average life of 8 years. Out of the total, 19.8 MW are located in Lower Saxony and the other 130.5 MW in Brandenburg. The portfolio consists of 85 installed wind turbines.

This transaction constitutes the second divestment of the Energía division this year since the Acciona group announced last March an action plan rotating its non-core assets, together with other corrective actions aimed to obtain cost reduction and efficiency improvements.

Harvard scientists develop organic renewable energy storage

Metal-free flow battery could prove to be an economical solution to intermittent generation in renewable energy plants

A team of Harvard scientists and engineers has demonstrated a new type of battery that could fundamentally transform the way electricity is stored on the grid, making power from renewable energy sources such as wind and solar far more economical and reliable.

The novel battery technology was reported in a paper published in *Nature* on January 9. Under the OPEN 2012 program, the Harvard team received funding from the U.S. Department of Energy's Advanced Research Projects Agency–Energy (ARPA-E) to develop the innovative grid-scale battery, and plans to work with ARPA-E to catalyze further technological and market breakthroughs over the next several years.

The paper reports a metal-free flow battery that relies on the electrochemistry of naturally abundant, inexpensive, small organic (carbon-based) molecules called quinones, which are similar to molecules that store energy in plants and animals.

The mismatch between the availability of intermittent wind or sunshine and the variability of demand is the biggest obstacle to getting a large fraction of our electricity from renewable sources. A cost-effective means of storing large amounts of electrical energy could solve this problem.

The battery was designed, built, and tested in the laboratory of Michael J. Aziz, Gene and Tracy Sykes Professor of Materials and Energy Technologies at the Harvard School of Engineering and Applied Sciences (SEAS). Roy G. Gordon, Thomas Dudley Cabot Professor of Chemistry and Professor of Materials Science, led the work on the synthesis and chemical screening of molecules. Alán Aspuru-Guzik, Professor of Chemistry and Chemical Biology, used his pioneering high-throughput molecular screening methods to calculate the properties of more than 10,000 quinone molecules in search of the best candidates for the battery.

Flow batteries store energy in chemical fluids contained in external tanks—as with fuel cells—instead of within the battery container itself. The two main components—the electrochemical conversion hardware through which the fluids are flowed (which sets the peak power capacity), and the chemical storage tanks (which set the energy capacity)—may be independently sized. Thus the amount of energy that can be stored is limited only by the size of the tanks. The design permits larger amounts of energy to be stored at lower cost than with traditional batteries.

By contrast, in solid-electrode batteries, such as those commonly found in cars and mobile devices, the power conversion hardware

Photos: Eliza Grinnell/Harvard School of Engineering and Applied Sciences

and energy capacity are packaged together in one unit and cannot be decoupled. Consequently they can maintain peak discharge power for less than an hour before being drained, and are therefore ill-suited to store intermittent renewables.

"Our studies indicate that one to two days' worth of storage is required for making solar and wind dispatchable through the electrical grid," said Aziz.

To store 50 hours of energy from a 1 MW wind turbine (50 MWh), for example, a possible solution would be to buy traditional batteries with 50 MWh of energy storage, but they'd come with 50 MW of power capacity. Paying for 50 MW of power capacity when only 1 MW is necessary makes little economic sense.

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Harvard scientists develop organic renewable energy storage

Michael J. Aziz (pictured) and others at Harvard University have developed a metal-free flow battery that relies on the electrochemistry of naturally abundant, small organic molecules to store electricity generated from renewable, intermittent energy sources.

For this reason, a growing number of engineers have focused their attention on flow battery technology. But until now, flow batteries have relied on chemicals that are expensive or difficult to maintain, driving up the energy storage costs.

The active components of electrolytes in most flow batteries have been metals. Vanadium is used in the most commercially advanced flow battery technology now in development, but its cost sets a rather high floor on the cost per kWh at any scale. Other flow batteries contain precious metal electrocatalysts such as the platinum used in fuel cells.

The new flow battery developed by the Harvard team already performs as well as vanadium flow batteries, with chemicals that are significantly less expensive, and with no precious metal electrocatalyst.

"The whole world of electricity storage has been using metal ions in various charge states but there is a limited number that you can put into solution and use to store energy, and none of them can economically store massive amounts of renewable energy," Gordon said. "With organic molecules, we introduce a vast new set of possibilities. Some of them will be terrible and some will be really good. With these quinones we have the first ones that look really good."

Aspuru-Guzik noted that the project is very well aligned with the White House Materials Genome Initiative. "This project illustrates what the synergy of high-throughput quantum chemistry and experimental insight can do," he said. "In a very quick time period, our team honed in to the right molecule. Computational screening, together with experimentation, can lead to discovery of new materials in many application domains."

Quinones are abundant in crude oil as well as in green plants. The molecule that the Harvard team used in its first quinone-based flow battery is almost identical to one found in rhubarb. The quinones are dissolved in water, which prevents them from catching fire.

To back up a commercial wind turbine, a large storage tank would be needed, possibly located in a below-grade basement, said co-lead author Michael Marshak, a postdoctoral fellow at SEAS and in the Department of Chemistry and Chemical Biology. Or if you had a whole field of turbines or large solar farm, you could imagine a few very large storage tanks.

The same technology could also have applications at the consumer level, Marshak said. "Imagine a device the size of a home heating oil tank sitting in your basement. It would store a day's worth of sunshine from the solar panels on the roof of your house, potentially providing enough to power your household from

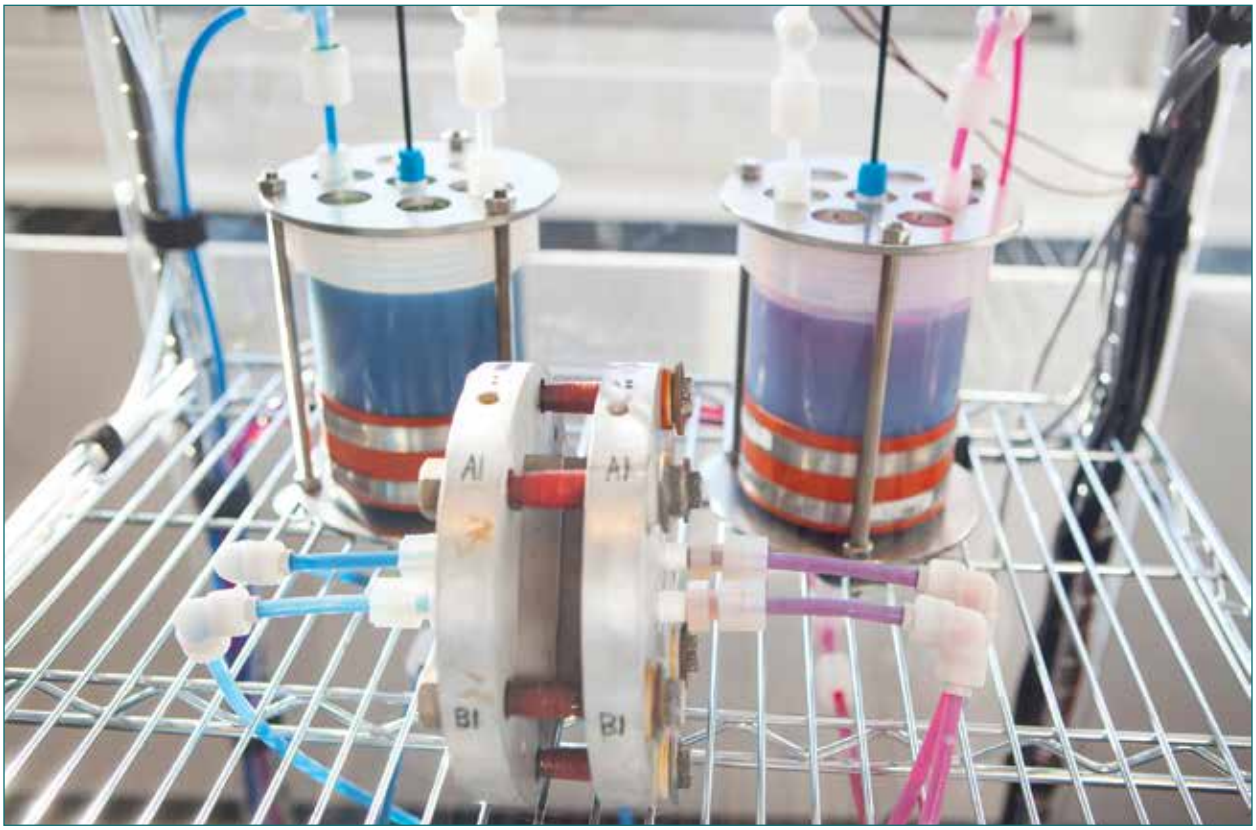
late afternoon, through the night, into the next morning, without burning any fossil fuels."

"The Harvard team's results published in Nature demonstrate an early, yet important technical achievement that could be critical in furthering the development of grid-scale batteries," said ARPA-E program director John Lemmon. "The project team's result is an excellent example of how a small amount of catalytic funding from ARPA-E can help build the foundation to hopefully turn scientific discoveries into low-cost, early-stage energy technologies."

Team leader Aziz said the next steps in the project will be to further test and optimize the system that has been demonstrated on the bench top and bring it toward a commercial scale. "So far, we've seen no sign of degradation after more than 100 cycles, but commercial applications require thousands of cycles," he said. He also expects to achieve significant improvements in the underlying chemistry of the battery system. "I think the chemistry we have right now might be the best that's out there for stationary storage and quite possibly cheap enough to make it in the marketplace," he said. "But we have ideas that could lead to huge improvements."

By the end of the three-year development period, Connecticut-based Sustainable Innovations, LLC, a collaborator on the project, expects to deploy demonstration versions of the organic flow battery contained in a unit the size of a horse trailer. The portable, scaled-up storage system could be hooked up to solar panels on the roof of a commercial building, and electricity from the solar panels could either directly supply the needs of the building or go into storage and come out of storage when there's a need. Sustainable Innovations anticipates playing a key role in the product's commercialization by leveraging its ultra-low cost electrochemical cell design and system architecture already under development for energy storage applications.

"You could theoretically put this on any node on the grid," Aziz said. "If the market price fluctuates enough, you could put a storage device there and buy electricity to store it when the price is low and then sell it back when the price is high. In addition, you might be able to avoid the permitting and gas supply problems of having to build a gas-fired power plant just to meet the occasional needs of a growing peak demand."



A prototype flow battery in Aziz's lab at Harvard School of Engineering and Applied Sciences.

This technology could also provide very useful backup for off-grid rooftop solar panels—an important advantage considering some 20 percent of the world's population does not have access to a power distribution network.

William Hogan, Raymond Plank Professor of Global Energy Policy at Harvard Kennedy School, and one of the world's foremost experts on electricity markets, is helping the team explore the economic drivers for the technology.

Trent M. Molter, President and CEO of Sustainable Innovations, LLC, provides expertise on implementing the Harvard team's technology into commercial electrochemical systems.

"The intermittent renewables storage problem is the biggest barrier to getting most of our power from the sun and the wind," Aziz said. "A safe and economical flow battery could play a huge role in our transition off fossil fuels to renewable electricity. I'm excited that we have a good shot at it."

In addition to Aziz, Marshak, Aspuru-Guzik, and Gordon, the co-lead author of the Nature paper was Brian Huskinson, a graduate student with Aziz; coauthors included research associate Changwon Suh and postdoctoral researcher Süleyman Er in Aspuru-Guzik's group; Michael Gerhardt, a graduate student with Aziz; Cooper Galvin, a Pomona College undergraduate; and Xudong Chen, a postdoctoral fellow in Gordon's group.

This work was supported in part by the U.S. Department of Energy's Advanced Research Project Agency–Energy (ARPA-E), the Harvard School of Engineering and Applied Sciences, the National Science Foundation (NSF) Extreme Science and Engineering Discovery Environment (OCI-1053575), an NSF Graduate Research Fellowship, and the Fellowships for Young Energy Scientists program of the Foundation for Fundamental Research on Matter, which is part of the Netherlands Organization for Scientific Research (NWO).

—Source: Harvard School of Engineering and Applied Sciences

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What is openWind? Can you give us an idea of its primary purpose and functions?

openWind is a GIS-based wind farm layout and wind resource assessment software that has been designed primarily with the goal of empowering the user. It is an advanced and complete software solution as well as a toolbox to allow users total control over how best to tackle their wind farm design challenges. It makes extensive use of multi-threading and is built on an open-source code-base that can run on Linux, Unix, or Windows.

What is the difference between the "Basic" and the "Enterprise" versions of openWind?

Our typical users are the biggest names in the industry, so we target the Enterprise edition to address their needs. Rather than selling modules, we provide a supporting relationship in which we improve the software on an ongoing basis and incorporate user requests into the software in a timely fashion. We found that there was a market for a low-cost, off-the-shelf version, which could allow environmental consultancies and small developers access to the core features of the openWind platform including multi-threaded wind-flow model and shadow-flicker analysis.

openWind has recently undergone a significant upgrade. What enhancements and additions have been made?

First, we have incorporated the latest IEC recommendations regarding turbine performance under non-ideal conditions, specifically:

(1) Modeling the effects of non-standard shear across the rotor disk using the rotor equivalent wind speed, and
(2) Adjustment for turbulence intensity

We have also added the capability to read time series of sodar and lidar profiles and multi-level tall tower data into openWind. For the first time, users can really make the most of their remote sensing data in estimating power production. We do this using the rotor equivalent wind speed concept.

We have responded to user requests to include time-series modelling of mitigating effects of wind distribution (which way the turbine was facing at any given day and time and whether the blades were turning) and cloud cover on the amount of shadow flicker encountered at a residence in any given year.

Another significant change is improved GIS capabilities such as integer and floating point value conversion. These tools allow users to easily convert land-cover data to roughness length or vegetation height; or to convert bathymetric data to turbine foundation costs.

We have also added openWind model outputs as shape file attributes so, for example, turbine layers can be exported to GIS including net energy, mean wind speed, cost of energy and so on.

If you were in the client's position, which of these changes would you most look forward to implementing in your operations?

The ability to model the effects of turbulence intensity on energy production will have the biggest effect just now on reducing uncertainty. Users who have lots of remote sensing data (from sodars and lidars), or who observe really unusual shear profiles at their tall towers, will appreciate being able to model the impacts on output. From a practical usability standpoint, improved data conversion and GIS output will be a great benefit.

openWind is targeted toward developers, owners/operators, investors, utilities, governments, and manufacturers. How do these clients benefit from its use?

openWind offers industry standard wind resource assessment methods and energy capture routines along with some of the best performing wake models currently available, which benefit all the groups above. For developers in particular, the ability to optimize the turbine layout taking into account the trade-

offs between energy production and constructibility and cost is hugely helpful. Energy optimization is really only helpful as a proxy for financial viability when working with very small simple projects. Dollars per MWh is the driving metric for energy projects, and openWind allows this to be optimized taking account of BOP design. For investors, improvements in the modeling of turbine performance mean lower uncertainty which should benefit everyone in the industry.

How does the software enhance the combined efforts of those clients in wind energy development in the short and long term?

Our business is based on the idea that our clients are most successful when we empower them both with tools that let them to do the job themselves if they want to, and with expertise to support them where they need it. One of the ways we do this is by sharing openWind workbooks between ourselves and our clients. We have found this has led to improved collaboration and efficiency.

What influences decision making about feature upgrades? How does AWS Truepower work with the industry in developing and upgrading openWind?

Although we like to provide useful and time-saving tools to our users, getting the energy numbers right takes precedence over everything else we do and so, where possible, we want to modify the software to be able to take account of significant effects on energy capture. Right now, the effects of non-standard shear and turbulence intensity are the focus of much discussion in the industry, and the subject of a draft IEC standard, so it makes sense for us to incorporate these proposed methods as openWind makes a good platform to test against real world performance.

In general a large part of our product development is driven by user requests and a big part of this is making ourselves readily available by email, phone, and Skype. We work through problems with our users using shared desktops or by uploading workbooks to a shared, secure FTP space, so any deficiencies in the software become obvious pretty quickly.

We try to respond equally to both internal and external requests for functionality, and in general we see a large overlap, as you might expect, between what our internal consultants and what our Enterprise users want to see as the next development priority for the software.

New systems often come with a learning curve. How does AWS Truepower support the current user's transition to the upgrade? Also, what training and support resources are available to first-time users?

We offer on-site as well as online training to clients. We find that clients generally prefer the online training, as this is less expensive and provides more flexibility in that it allows clients to split a day or two of training into several half-day sessions over the course of several weeks. This tends to be easier to fit into people's schedules and also allows the client to practice what they learn in one session before moving on to the next. We host a blog at blog.awsopenwind.com, which we use to communicate the enhancements in each update and as well as tips and videos to help users become acquainted with new features. We also have a growing number of instructional videos on YouTube, and the trusty user manual and tutorial materials. However, we find in general that people would rather watch a video than work through a tutorial.

As technology advances exponentially, so does the emphasis on taking the technology to the next level. How does openWind fit into the research and academic world?

We find that more and more top-tier institutions are coming to us to get access to openWind Enterprise for research projects. A recent collaboration with MIT CSAIL resulted in them imparting to us the algorithm that optimizes our automated collector system design as part of the optimizer for cost of energy. We are currently providing tools to various industry and research institutions to further research in optimization using the cloud and to improve the tools we already have.

What's next for openWind? Is development of the software a perpetual process?

We are currently working with industry and academia to further improve our optimization for cost of energy and hope to have an enhanced version out sometime in Q2.

We will be adding functionality to allow for combining multiple wind resource grids, query-able by time of year and time of day, in order to allow for ongoing improvements in wind resource modeling.

We are also continuing to engage with the industry to address those factors affecting turbine performance.

Renewable NRG Systems

After three decades designing and manufacturing turbine optimizaion and resource assessment products for wind energy, Vermont-based manufacturer's commitment to renewable energy remains strong

By Stephen Sisk

The year is 1982.

USA Today is first published and delivered to front doorsteps across the nation. Disney opens its Epcot theme park in Orlando. "E.T. The Extra-Terrestrial" tops the box office. Now-retired tennis phenom Andy Roddick is born.

Gasoline is 91 cents-per-gallon.

In Vermont, the company that is now Renewable NRG Systems is founded with the intent of designing and manufacturing measurement and resource assessment instruments to support wind energy—a sustainable, reliable, economical method of power generation that itself is considered to be in its infancy.

The three-plus decades that have since passed have brought the maturation both of the company and the industry it serves. The company now serves its global client base—to include renewable energy developers, utilities, government agencies, wind turbine manufacturers, and research institutions, among others—from its 75,000-square-foot headquarters in Hinesburg, Vermont.

That worldwide client base, represented by customers in more than 150 countries, has grown to depend on Renewable NRG Systems to offer reliable, leading-technology solutions to meet the rapidly changing needs of renewable energy.

Technology in the renewable energy industry has grown exponentially in the last few years alone, and through constant innovation, Renewable NRG Systems has been able to maintain its position as a pioneer in emerging renewable energy technologies.

"Our expertise spans both wind resource assessment and wind turbine optimization," Renewable NRG Systems president Justin Wheating said. "Our wind-specific product lines include complete systems, towers, data loggers, sensors, Lidar, and a condition monitoring system."

Among recent notable products introduced to the market by Renewable NRG Systems are: the WINDCUBE and Wind Iris Lidar remote sensors (in a joint venture with Leosphere), an 80-meter tilt-up tower, and TurbinePhD—the company's wind turbine condition monitoring solution.

"We have our traditional line of products—sensors, towers, data loggers, systems, and so on," Wheating said. "Our new areas are condition monitoring and Lidar, which are particularly innovative. Our condition monitoring system leverages advanced data processing techniques from the aerospace industry. We adapted the technology to provide proactive analysis of the components in turbines to predict failures. Our Lidar products use technology that is new to the wind industry to not only measure the wind for assessment purposes, but also to improve turbine performance and increase energy output."

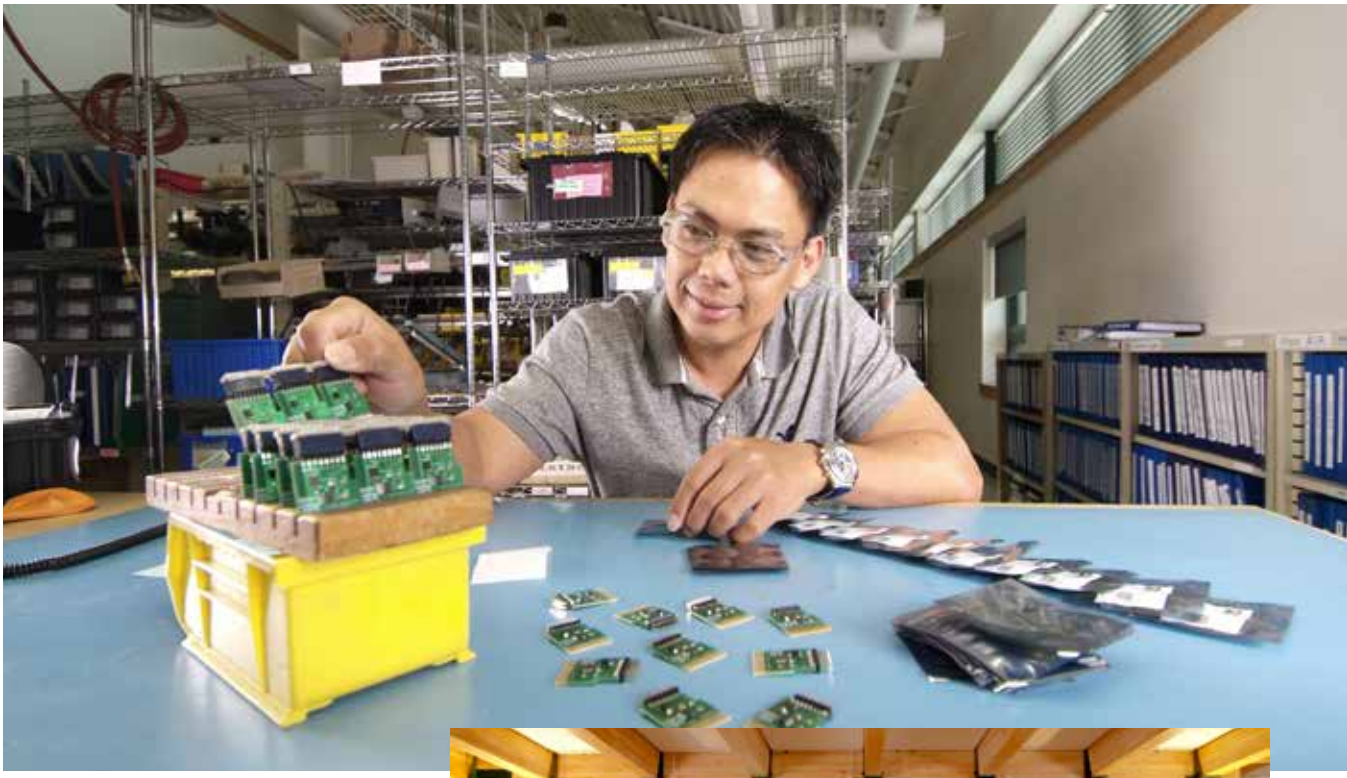
Offering products that have such capabilities exemplifies the company's close adherence to its longstanding operating philosophy.

"Our mission has always been to be a resource to renewable energy developers—to help them establish and operate their plants with minimal fuss and maximum ease," Wheating said. "We also strive to promote the benefits of renewable energy and to facilitate its development."

In other words, the company's long-term and continuing success has been made possible through commitment. However, this is not simply a commitment to individual customers. Preceding its statement of values, Renewable NRG Systems asserts:

"At Renewable NRG Systems, how we work is as important to us as what we do. Our values work together synergistically: they form the foundation of our business, guide our decisions, and energize our business practices and relationships. Through these values, we uphold our commitment to a triple bottom line focusing on our people, profits, and planet."

That commitment is evident when



examining the efforts Renewable NRG Systems makes in supporting clients' exact needs and providing a high level of support through and beyond the sale.

"We embody our values every day: both internally and with our customers, we aim to display a high level of integrity," Wheating said. "We strive for respect, fairness, and to do the right thing—which is not necessarily the most profitable."`

An impressive library of technical resources on Renewable NRG Systems' products and solutions are available to its customers online at the company's website. Resources include product manuals, a technical support forum, searchable knowledge base, and a schedule of upcoming training sessions the company offers at its offices in Vermont.

"We are lucky to have a very talented and knowledgeable tech support team," Wheating said. "They talk with customers every day, assisting with issues and learning more about customer challenges. We strive to share their expertise via various tools to address issues that appear to be consistent across all customers. "

Renewable NRG Systems staff members also compose the company's "Wind Currents" blog, consisting of company news, articles on renewable energy topics, case studies, and product information.

Comprehensive product information, including overviews, technical specifications, download links, warranty information, certifications, and support documents are easily accessible from Renewable NRG Systems' website by navigating to the "Product Quick-Link" via the top menu.

The company is also currently

making a push to further involve customer response into the development of its products and processes with the goal of more closely identifying and meeting clients' specific needs.

"Strengthening our customer feedback program has been a renewed initiative for us," Wheating said. "We now have a much stronger focus on the voice of the customer (VOC). When communicating with customers, we not only want to share what we sell but also learn about special needs and challenges. We are still in the process of learning how to distill and use this information."

Long-known simply as NRG Systems, the company underwent a re-branding campaign in 2013 to more accurately communicate its diversification into other renewable energy sources. However, Wheating is quick to point out that wind energy is and will remain the company's core business.

"We are fully committed to the wind industry," Wheating said. "Manufacturing products for the industry is what we do. We rebranded to more forcibly share the message that we are not solely in wind resource assessment. We have expanded our role into wind turbine performance and operations & maintenance. In addition, though the wind industry continues to be our primary focus, customer requests have encouraged us to expand our offerings into other renewable energy areas. Our rebranding fits with our mission and core competencies."

Regarding Renewable NRG Systems' commitment to wind, it is best illustrated in the company's own account of its history. A timeline on the company's website mentions only one event prior to its formal establishment in 1982. Pre-dating the company by four decades is what may be considered its true genesis.

"1941 – The world's first utility-scale wind turbine begins operation on Grandpa's Knob in Castleton, Vermont, launching the modern wind industry in the U.S."

Put simply: It all started with wind.

With regard to environmental stewardship, Renew-

able NRG Systems' goes beyond simply manufacturing products used by clean, environmentally conscious industries. Its commitment extends to its facilities (which are LEED Gold certified and operate on 100 percent site-generated renewable energy), to its manufacturing and packaging processes, to its transportation processes.

"The company adopted a lean manufacturing approach in the 1990s, and it is now ingrained into our culture," Wheating said. "We recently achieved ISO certification, which demonstrates our commitment to customer focus, quality, and process."

Also noteworthy is the company's commitment to its approximately 80 employees— serving in engineering, manufacturing, sales/marketing, and administrative roles—who are encouraged to help drive the company's continued success in a collaborative environment.

Looking toward the future in the wind energy industry, Wheating pointed out that, for a company that operates on a global scale, it's important to get a thorough assessment of all of the markets it serves.

"One has to look at it on a country-by-country basis—each market is different," Wheating said. "The U.S. market is, in a sense, on hiatus due to the uncertainty of government policy. But there is determination to move forward. There is a "macro" demand for energy, and in general, a strong commitment to renewables. The more mature markets are going through a period of reassessment."

Still, he has what could be described as a guardedly optimistic outlook for the industry in the long term.

"The fundamentals are such that the industry will grow. It will happen sooner in developing markets. The more mature markets will grow more gradually as the economics become more compelling," Wheating said.

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NWTC broadens drivetrain research with new 5-megawatt Dynamometer Test Facility

Test rig aims to lower wind energy costs by analyzing turbine reliability and performance in precise, "real world" scenarios

By David Glickson
National Renewable Energy Laboratory

Premature failures of mechanical systems have a significant impact on the cost of wind turbine operations and thus the total cost of wind energy. Recently, the Energy Department's National Renewable Energy Laboratory (NREL) took a giant step forward in the quest for more reliable, lower-cost wind power with the addition of the new 5 MW Dynamometer Test Facility at its National Wind Technology Center (NWTC). The new facility dramatically expands the capability of NWTC engineers and their industry partners to verify the performance and reliability of wind turbine drivetrain prototypes and commercial machines.

The facility is capable of testing drivetrains up to 5 MW— large enough to test virtually any land-based turbine — and employs dynamically variable loading capabilities that will allow researchers to better simulate conditions a turbine might experience in the field.

"These new capabilities make this a very special facility, one of the largest and finest of its kind in the world," NWTC director Fort Felker said. "It gives NREL an enhanced ability to do comprehensive testing of modern multi-megawatt wind turbine systems in a laboratory environment to verify their performance and reliability before they are widely deployed."

A Cutting-Edge Test Facility for the Future of Wind Energy

A dynamometer system replaces the rotor and blades of a wind turbine and allows researchers to control the turbine drivetrain's mechanical and electrical systems while simulating normal and extreme operating conditions. Historically, this testing has been done under torque (rotating) loads only. The new state-of-the-art facility at the NWTC, funded with the support of the Energy Department and the American Recovery and Reinvestment Act (ARRA), incorporates a non-torque loading system into the testing regimen, a hydraulic device that allows for simulation of both the rotational and bending loads that a wind turbine rotor places on a drivetrain.

"The non-torque loading system is what really sets this facility apart from other comparable test sites," NWTC Dynamometer project manager Mark

McDade said. "This allows us to test the drivetrain system with the types of loads that it will see in a real-world application. It's a very important feature for a test apparatus because the adverse impacts these types of loads can have on a system are significant."

The system features a 6-MW motor, which provides the power to a turbine during testing. The motor turns at very high speed and low torque. The motor drives a gearbox, which transforms the output to the high torque and low speed that is appropriate for a wind turbine drivetrain. This provides the rotating loads on the test article.

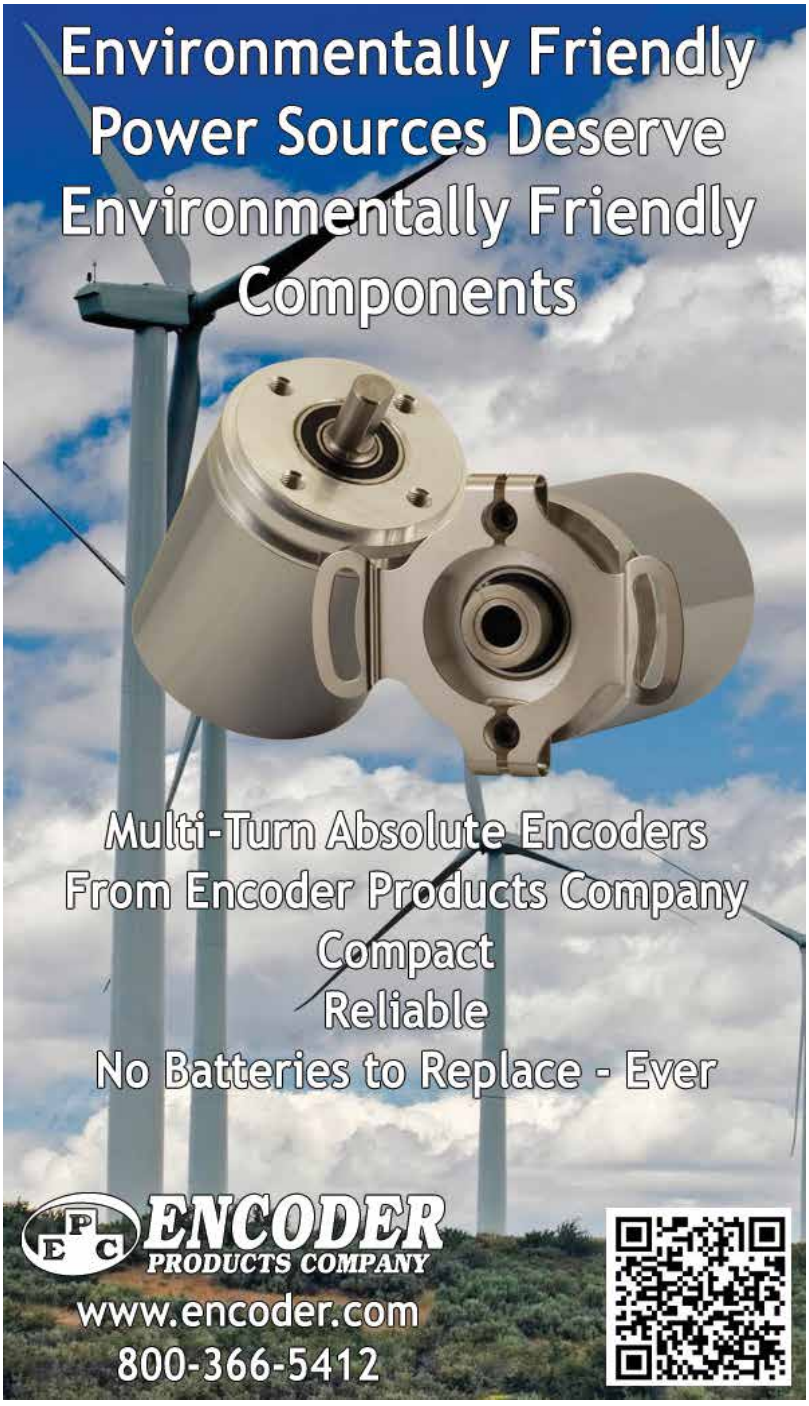
Add to this motorized torque testing the non-torque loading capability unique to the NWTC, and NREL is able to put a wind turbine drivetrain through the most realistic loading tests possible in a laboratory.

Reliable Wind Turbines for Industry Mean Lower Costs for Consumers

Dynamometer testing is used by the industry to confirm proper operation and reduce the risk of deploying wind turbine prototypes before they are put into service. By reproducing operating conditions in a laboratory environment, engineers can verify the performance of a turbine's systems, including generators, gearboxes, power converters, bearings, brakes, and control systems. Conducting these tests before deployment is important because unanticipated failures can be detected and corrected early in the development process, leading to a lower cost of ownership for wind farm operators—and ultimately lower-cost wind energy for the consumer.

"These machines are expected to operate reliably in the field, often in harsh conditions, for 20 years or more," Felker said. "The ability to comprehensively test these systems in the lab, to verify their reliability and performance before they go into service, is a critically important capability for the wind industry."

The first tests being done at NREL's new dynamometer facility are on a 2.75 MW wind turbine the DOE acquired in partnership with General Electric. The GE system is being used for the calibration and commissioning of the testing equipment in the facility, which will also provide the industry partner with useful data on this particular turbine model.



"The only way to deliver advanced technology at a lower cost of energy with high reliability is to be able to test and learn," GE senior manager for wind technologies Tom Fischetti said at the dedication event for the facility. "Being able to do that here at ground level instead of in the field, 300 feet in the air, is very important to GE and the rest of the wind industry. This is state-of-the-art technology, and we are excited to be able to partner with NREL and the Energy Department by being the first user of the facility."

Helping the Power Grid and Wind Turbines Work Better Together

Another important new capability that enhances the value of the work being done at NREL's 5 MW Dynamometer Test Facility is the Controllable Grid Interface (CGI), a powerful energy systems integration tool that allows engineers to precisely control the electrical grid conditions that a test article will see.

The CGI simulates various grid disturbances, such as over-voltage or under-voltage events, allowing engineers and industry partners to determine how grid-connected systems will react to these events in a controlled environment. This type of testing—performed offline from the grid, but simulating a real-world grid environment—enables users to verify performance, assure compliance with standards, and understand failures in a fraction of the time and cost that it takes to perform similar tests in the field.

The CGI can also help engineers determine how these systems will be able to provide ancillary services to the grid, as well as test and optimize the grid-integration-related performance of a unit before it is deployed.

"This is a significant capability for NREL, and one that is very complementary to the work that will be done in the dynamometer," McDade said. "As more and more renewable energy generation and storage technologies are added to our electricity mix, it is critically important that we understand how these systems will perform on the larger electric grid, how they will react to disturbances, and how they will be able to provide benefit to the grid from a systems integration standpoint."

The CGI can test not only the integration performance of wind turbines, but also that of a wide variety of grid-integrated energy systems, such as utility-scale solar photovoltaic (PV) generation, PV inverters, and energy storage systems.

Working Today Toward the Technologies of Tomorrow

In addition to enabling deployment-readiness testing, the new NREL test facility will be able to examine future technology innovations, such as advanced drivetrain systems, that promise to usher in

the next generation of higher-performance, lower-cost wind turbines.

Research at the facility will accelerate the development of new wind energy technologies, providing an opportunity to verify the concept and performance of prototype technology improvements at the pilot level before moving them into the marketplace.

This capability will allow research engineers to test a specific component, such as a generator or a gearbox, within the scope of a full system, to confirm that it meets its performance, efficiency, and reliability goals before introducing it into the operating fleet of wind turbines.

The NWTC has continued to grow its testing capabilities over time to meet the ever-expanding needs of the wind industry. This is the third dynamometer test facility at the laboratory, adding to the existing capabilities of previously installed 225-kilowatt and 2.5-MW test systems. The two smaller systems have directly contributed to the growth of the higher-performance, lower-cost, and more reliable wind turbines seen in use today. The new 5-MW facility is the next step forward toward even larger wind systems with increased performance expectations.

"Important basic R&D will be done in this facility to answer the key engineering questions that will allow us to develop the next generation of wind turbine technology," Felker said. "We need to continue to push the cost of energy down while at the same time improving the performance and reliability of these systems. A laboratory environment such as this, where we can seek the answers to these questions is an important step toward meeting those goals."

Source: National Renewable Energy Laboratory.

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

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Preventative measures could save lives and turbines in the event of a nacelle fire

By Jack Wallace
Frontier Pro Services

Wind turbine fires scare the heck out of me and should scare you, too.

Since modern turbines don't have ladders both inside and outside the turbine, there is only one way in and out of the nacelles. If you are caught up tower when there is a fire, you had best be prepared. That means that you should have your climbing gear on, and are able to self-rescue yourself off the nacelle.

I hear that techs today regularly leave their climbing gear on the yaw deck of the tower and continue work in the nacelle space without it. In the event of an emergency descent off the top of the tower, these techs will have to access the yaw deck, don their gear, climb back up to the nacelle, then leave the nacelle with their rescue device.

That seems improbable to me. Given an emergency in which I was able to make it to the yaw deck, I think I would continue to climb down the turbine's tower ladder. I don't think I would go down and then back up and over the edge. The only way I would go over the edge with a self-rescue device would be during an emergency in which I couldn't access the yaw deck. If techs are removing their fall protection when working in the nacelle, they should at the very least place the gear near the tower rescue device. Me? I'll just leave my gear on and keep my rescue device near me.

It's kind of like playing baseball. You have to plan in advance what you will do if the ball is hit your way. On turbines, you have to plan for the worst. Don't get stuck in a horrible situation and then make it worse by not being prepared.

Turbine fires in wind turbines are one of the most terrifying scenarios a wind tech could face. A fire extinguisher might help in this situation; then again, it might not. Probably the most fire-safe turbines today are manufactured by Siemens. This is because most of its nacelles are made of steel. Most all other manufactures use fiberglass composites. For those of you who don't know, fiberglass composite nacelles consist of glass fiber and usually a polyester or vinyl ester resin. (This composite material is used quite extensively in wind, with most blades built today using some variant during the manufacturing process.)

I imagine that most turbine nacelle fires start with an electrical problem in which an arc flash occurs. The temperature of an arc flash can be over 19,000 C (35,000 F)—almost 3.5 times as hot as the surface of the sun. This high temperature is able to vaporize metals and everything else nearby instantaneously. When an arc flash happens in a steel nacelle, it can burn a hole through the nacelle, but the metal typically will not support continued combustion and would burn out.

This is not the case in a fiberglass composite nacelle. When an arc flash happens in a fiberglass nacelle, the resin in the fiberglass nacelle can start to burn. Once the resin in the fiberglass catches fire, the resin typically can support continued combustion. The resin will continue to burn as a fuel. This is probably why when a wind turbine catches fire it continues to burn until almost all of the nacelles resin is burnt up. You will find piles of ash and unconsumed fiberglass material left over.

This is why you see photos of complete nacelles burned away. The resin is so good at burning that parts of the rotating rotor also catch fire. The heat is so intense that metal components melt. You can burn the blades away too. The glass may melt at the point of the arc flash but it typically doesn't burn.

However, a fire in the nacelle doesn't have to mean the end of the turbine. There are ways to make composite nacelles more fire-resistant. This could be done at the turbine manufacturing plant, but so far manufacturers have not made this a priority. This means that you must plan ahead and take these preventative actions on site.

In the past, I have used intumescent coatings on the interior

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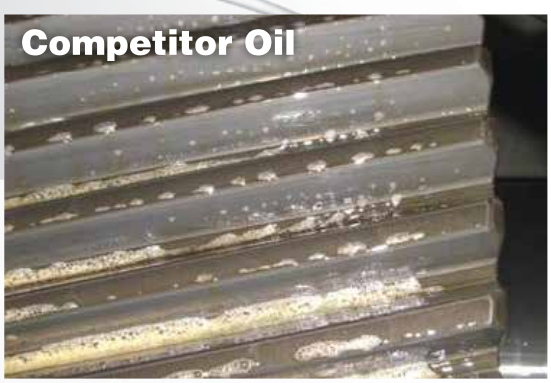

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of blades containing electrical equipment. This intumescent coating helps prevent the resin component in the fiberglass from igniting, and also helps extinguish any fire that may be in progress.

Many independent service providers (such as my employer) offer solutions in which they coat the inside and outside of your composite nacelles and blades with a fire resistant coating. There are many of these types of specialized coatings available today. A little research will help you understand the differences among the available coatings, and can guide you in selecting the best option(s) for your wind turbine fleet.

Compared to the potential loss of life and considerable monetary losses (damaged or destroyed nacelle, blades, and other components) resulting from a turbine fire, these coatings are not that expensive. Using these coatings would help contain the nacelle damage to the fire's point of origin, and would allow an area damaged by arc flash to be repaired.

I hope you consider this information for the health and safety of your turbines and your technicians. As always, work as safely as possible, and work to prevent surprises.

HEADLINES

Gamesa launches center to support O&M services in India and Sri Lanka

Gamesa recently inaugurated a services center in Chennai, India that will accommodate the performance of all wind farm operations and maintenance-related services for its customers in India and Sri Lanka.

The facility will also serve as a logistics center, enabling part storage and repair work as well as the provision of training to Gamesa employees and customer staff. It is also equipped with a remote control center from which turbine operations can be monitored in real time, facilitating rapid response times with a view to maximizing availability.

The addition of the services center allows Gamesa to efficiently respond to the growing turbine availability demands of its customer base—increasingly consisting of independent power producers—in the region. Gamesa has already installed more than 830 turbines in India and Sri Lanka.

Vestas secures service contract extension in Scotland

Vestas has secured a two-year service agreement from ScottishPower Renewables for five Vestas installed wind power plants in Scotland with a total capacity of 120 MW, which includes 162 units of V47-660 kW and V52-850 kW wind turbines.

The service contract extension includes Vestas' Active Output Management (AOM) 3000 service option. The service contract extension is a two-year agreement, with an option for one additional year.

"We look forward to continuing our relationship with Vestas, who we have worked closely with for a number of years," said Lee Callaghan, head of site operations at ScottishPower Renewables. "This contract extension is testament to the quality of service and performance we have received from Vestas, and we are pleased to have reached this agreement which will provide a foundation for us to continue working closely with Vestas to drive further operational performance improvements going forward."

Vestas applies its proactive maintenance approach to more than 25,000 wind turbines worldwide.

AeroTorque and Frontier Pro Services form sales partnership

AeroTorque Corp., a U.S. manufacturing and engineering firm for torsional control products and torque monitoring for wind turbines, is pleased to announce a new partnership with Frontier Pro Services.

The sales partnership serves to further introduce AeroTorque's innovative WindTC, asymmetric torsional control, and their WindTM, torque monitoring services, to a broader audience in the U.S. wind market.

"It was a natural fit, to bring the market's top experts in drive train inspection and analysis, and our unique offering together. Their experience with gearbox fleets and contacts in the industry are a win-win for us and for our customers." said Doug Herr, General Manager of AeroTorque Corporation.

"The Frontier Pro group continues to focus on delivering long-term reliability centered solutions," said Paul Baker, VP business development of Frontier Pro Services. "This is the first solution I've seen come to market, that eliminates a cause of failures, rather than mitigating them."

Together, the two companies expect to see good synergies between Frontier Pro's service offerings and AeroTorque's products. AeroTorque's WindTC is designed to retrofit on turbines from 600 KW to 1.5 MW and reduces the effects of torsional reversals to 40% of nominal torque. It further reduces both the magnitude of the impact loads in the gearboxes and the strain rate and speed of the impact. They have field experience on turbines up to 2 MW and can monitor the torque on any size turbine above 600 KW.

Figure 3

Foam is not your friend

Maximizing oil life and performance through the use of acrylate antifoam additives

By Kevin Dinwiddie
AMSOIL, Inc.

During gearbox operation the gears churn air bubbles into the oil, which is called entrained air. The entrained air, being lighter than oil, rises to the top of the oil and builds up as foam. The entrained air bubbles that are generated are different sizes. The larger bubbles rise faster than the smaller bubbles, which is proven by Stokes' Law. Stokes' Law is a mathematical equation that expresses the settling velocities of small spherical particles in a fluid medium. This means that if two steel balls, one the size of a BB and the other one-half inch in diameter, were dropped into a container of fluid, the larger ball would arrive at the bottom faster than the small ball, due to gravity. The same principal applies to air bubbles. The larger air bubbles rise to the top of the fluid faster than the small bubbles, due to the larger bubbles greater buoyancy (Figure 3).

Additives are used to control foam. There are two types of antifoam additives: polysiloxane and acrylate polymers. They are both surface-active agents that reside at the air/oil interface. When looking at oil analysis reports, polysiloxane is the only one that can be detected, and it will show up as silicon. In addition to excellent antifoam qualities, acrylate polymers are designed to agglomerate small air bubbles into larger bubbles, allowing quick release of entrained air.

Foam is a colloid consisting of air bubbles suspended in the gear oil. The individual air bubbles are separated from the oil by a thin liquid film called the lamella. The main function of an antifoam additive is to lower bubble surface tension and weaken the lamella,

Figure 2

OIL FOAMING

There are several conditions that can cause oil to foam:

- Cross contamination of gear oils from improper oil change
- Water contamination
- Antifoam additive depletion either from water or fine filtration
- High particle contamination
- Overfilling the oil sump
- Adding extra antifoam additive

Gear oil that foams can cause the following:

- Increased oxidation rate associated with shortened oil life
- Reduced oil effectiveness resulting in accelerated wear
- Low oil level faults and bonus climbs

> *Foam is a colloid consisting of air bubbles suspended in the gear oil.*

causing the bubbles to burst so foam does not build up. Silicon depletes when in contact with moisture and can be filtered out easily, even when using standard 10-micron filter media and tends to work more at the air/oil interface or surface of the oil. Attempts to filter oils that use silicon antifoam additives with fine filtration to reduce the amount of moisture or particles can result in clean oil that foams.

Because acrylate antifoam additives work to control entrained air and foam throughout the body of the oil, in addition to the surface, their concentration can be as much as 10 times that of silicon. Oils that use acrylate polymers as antifoam additives can be filtered with fine filtration without disrupting the antifoam performance, resulting in longer effective antifoam life and without the additive depletion associated with silicon antifoam additives.

The ASTM D892 foam test evaluates the foaming characteristics of lubricating oils, including wind turbine gear oils. The test method is performed in three sequences: Sequence I, 24°C (75°F); Sequence II, 93.5°C (200°F); and Sequence III, 24°C (75°F). For each sequence, air is blown into the oil for five minutes, then allowed to settle for 10 minutes. The volume of foam in millimeters (ml) is measured at the end of the air blow and again after the 10 minute settle time. It is most important that the volume of foam in all three sequences after the 10 minute settle time is 0ml. When the 10 minute result is 0ml on used oil, it is a good indication the antifoam additive is working properly.

Two tests are used to evaluate the foaming tendency of oils. The ASTM D892 test method (Figure 1) is widely used and is the most cost effective. When using this test method, keep in mind that the temperature in a wind turbine gearbox will never get to the temperature in sequence II (200°F), so this sequence may not be as representative to field service as sequences I and II. Also, some analysis labs would like to see more severe

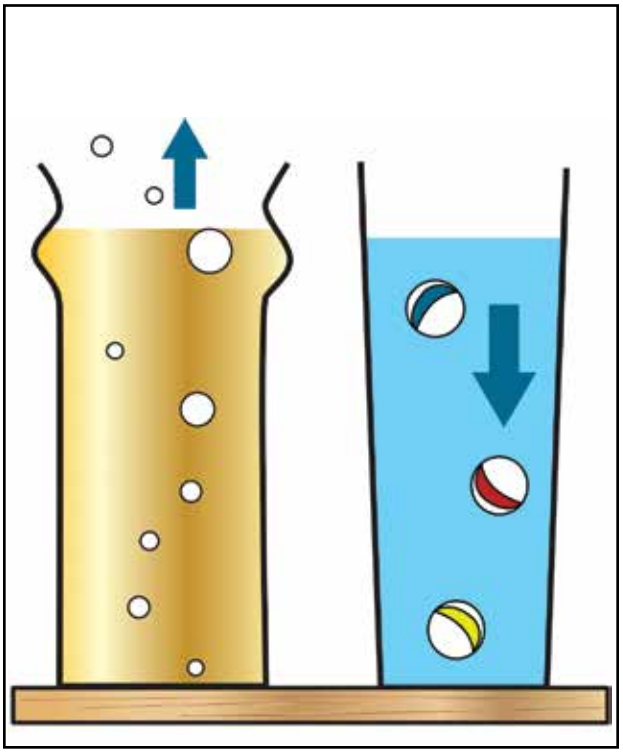

Figure 3

testing to better determine the gear oil's ability to control foam. An additional drawback to this test method is that it is limited to testing only foam and does not address the issue of entrained air.

The Flender Foam Test (Figure 2) is used in Europe and is currently not a standard ASTM test method. It is, however, quickly gaining popularity in the United States. It simulates the gear churning action through the oil that we see in a wind turbine gearbox, and evaluates both entrained air and foam as percent of volume increase versus oil volume at the start of the test. The drawbacks of this test include the cost and the lack of labs that offer this test in the U.S.

There are three factors that can reduce a gear oil's ability to lubricate properly. All three are directly associated with increased wear: viscosity shear, excess water, and foam. Properly formulated oils like AMSOIL PTN which use acrylate antifoam additives eliminate the foam possibility, assuring oil performance is not diminished by foaming. Before changing oil, attention to the antifoam type in the new oil is highly recommended.

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CONSTRUCTION

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Enbridge selects RES Americas to build $200M Texas wind farm

Microsoft signs 20-year purchase agreement for power generated from 110 MW Keechi Wind Project

Enbridge Inc. has announced that it has entered into an agreement with RES Americas for construction of the 110 MW Keechi Wind Project, located in Jack County, Texas, at a cost of approximately $200 million.

Construction for Keechi Wind commenced in December 2013 and the project is expected to reach commissioning in the first quarter of 2015. Upon attaining commercial operation, MetLife, Inc. will provide tax equity financing for the project.

The project will deliver electricity into the Electric Reliability Council of Texas, Inc. (ERCOT) market, under a 20-year Power Purchase Agreement (PPA) with Microsoft Corporation.

"As the nation's leader in wind energy—both in installed capacity and number of turbines—Texas represents a natural extension for Enbridge's growing U.S. renewable energy portfolio," said Don Thompson, vice president of Green Power & Transmission for Enbridge. "We're also pleased to continue building our relationship with RES Americas which has developed three other wind facilities for Enbridge."

"RES Americas looks forward to continuing our partnership with Enbridge Inc. Texas has shown its commitment to remain a leader in the renewable energy industry, and Keechi Wind, the 19th project we've constructed in the state, will help reduce carbon emissions, create jobs, and deliver economic benefits to the local community," said Brian Evans, executive vice president, RES Americas.

Vestas will supply 55 V100 wind turbines—a variant of which is seen here at Macho Springs wind farm in New Mexico—for Enbridge's 110 MW Keechi Wind Project in Jack County, Texas.

The Keechi Wind project comprises 55 Vestas V100-2.0 MW turbines and will be constructed by RES Americas under a fixed-price, engineering, procurement and construction agreement. A 12-mile generation tie-line will connect the project to Brazos Electric's Joplin substation.

Vestas will provide turbine operations and maintenance services for the first five years of the project after commercial operation date.

Keechi Wind brings the total generating capacity of the green power projects in which Enbridge has interests to more than 1,800 MW—enough to meet the energy needs of more than 590,000 homes. The project also contributes to Enbridge's "Neutral Footprint" commitment to generate a kilowatt of renewable energy for every additional kilowatt of conventional electricity that the company's liquids pipelines operations consume.

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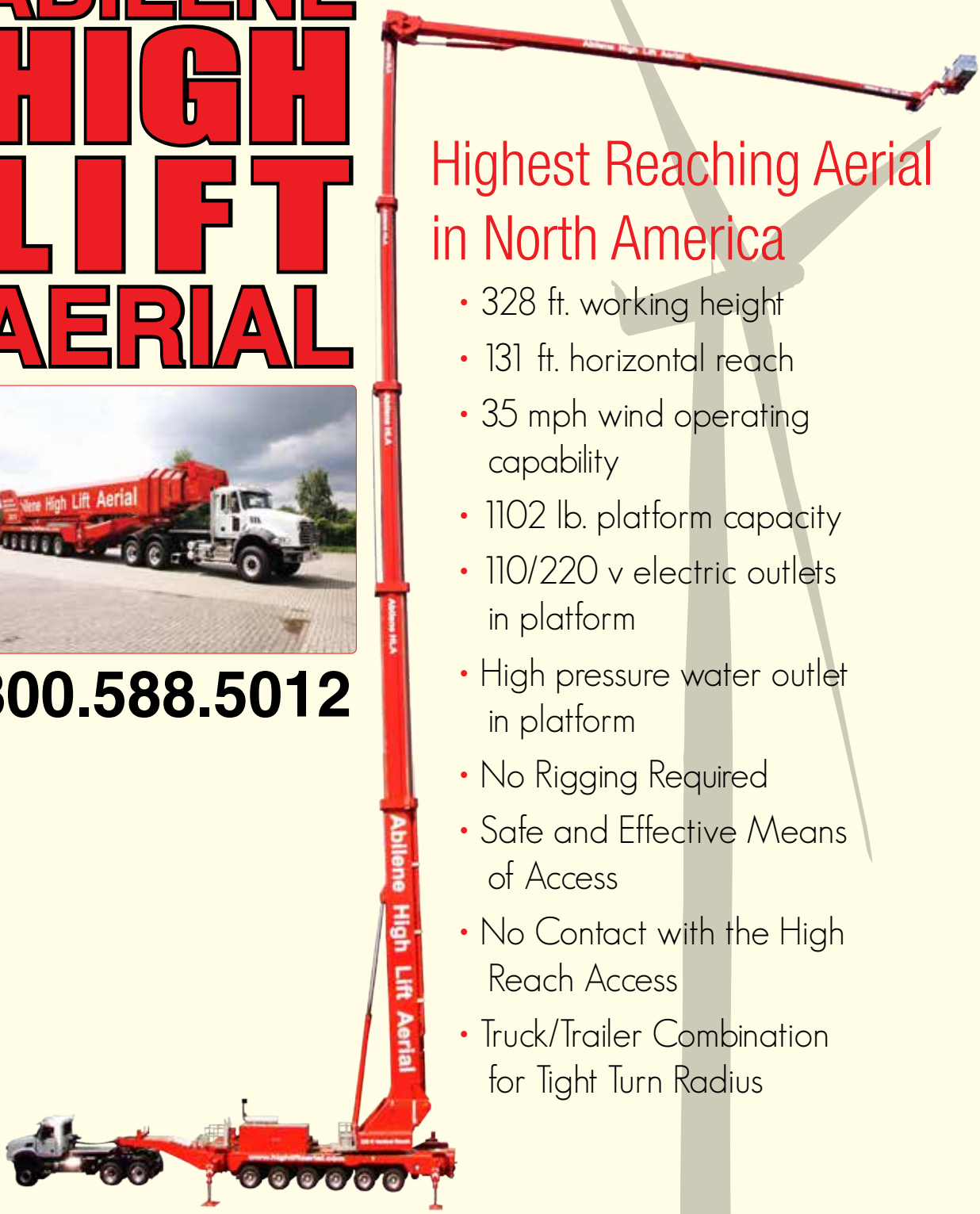

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CONEXPO-CON/AGG, IFPE OFF TO RECORD-BREAKING START

Attendees, exhibitors expected to flock to Las Vegas Convention Center for triennial events highlighting product innovations and expert industry educational programs

Individuals and organizations from all around the globe will descend on Las Vegas next month to connect with leading U.S. and global manufacturers and service provider, take advantage of expert learning opportunities, and network with industry peers from around the world

The co-located CONEXPO-CON/AGG and IFPE expositions will be held March 4-8, at the Las Vegas Convention Center. The expositions are the global gathering place every three years for the construction, building materials, and fluid power/motion control industries.

More than 95 allied associations and groups are official show-supporting organizations; hundreds of industry meetings and conventions will be held at the shows; and key countries for industry business are hosting international exhibit pavilions.

The official 2014 show-supporting organizations come from the U.S., Canada, and 16 other countries worldwide. These organizations promote the value of the shows, draw qualified buyer groups to the events, and help develop direction and content of the shows' education programs.

Besides the U.S. and Canada, these groups represent Africa, Australia, Brazil, Chile, China, Colombia, Germany, India, Korea, Mexico, Philippines, Spain, Taiwan, Turkey, United Kingdom, and Venezuela.

Exhibitor reservations break records

CONEXPO-CON/AGG 2014 covers a record-breaking 2.3 million net square feet of indoor and outdoor exhibits; IFPE 2014 has also achieved record status with 165,000 net square feet of exhibit space.

Show management stresses that quality, not size, is the goal. A strategic alignment with needs of the industry has led to programs and events geared toward helping attendees and exhibitors achieve the most value out of their time at the shows.

"Attendees will find the newest products and technologies and technical experts ready to discuss product features and applications. In the space of a few days, in one place, visitors can examine and compare the best of what our industries have to offer," stated Megan Tanel, CONEXPO-CON/AGG show director and AEM vice president exhibitions and events.

"Attendees will also find the focused industry education, with the latest techniques and information, they need to run their businesses most efficiently. The opportunity to share experiences and ideas with industry peers adds another dimension to the show experience," stated Melissa Magestro, IFPE show director and AEM senior director exhibitions.

Exhibit Pavilions

On the show floor, a new Demolition & Recycling exhibit pavilion will showcase exhibits and products specific to C&D recyclers and demolition contractors.

AGC, the Associated General Contractors of America, brings back its Technology & Construction Solutions pavilion for contractor software providers, finance and leasing companies, insurance providers, and related suppliers of contractor business solutions.

IFPE 2014 features exhibit pavilions from PTDA, the Power Transmission Distributors Association, and for sensors manufacturers and product suppliers.

International exhibit pavilions at both shows reinforce the global scope of the events and offer attendees access to a wider range of companies and product options. To date, the shows have eight official country pavilions: IFPE with China, Italy, and Taiwan; CONEXPO-CON/AGG with China, Germany, Ireland, Korea and United Kingdom.

Education programs expand knowledge

Comprehensive education programs at CONEXPO-CON/AGG and IFPE 2014 will help attendees conveniently sharpen their professional skills and improve their businesses' efficiency and productivity, all vital to stay competitive in the marketplace.

The shows' education program offers 120 sessions across 10 tracks to target the full range of attendee interests, including equipment management and maintenance, safety and regulations, recycling and preservation, earthmoving & site development, business management best practices, and workforce development, plus aggregates, asphalt, concrete, and cranes & rigging.

A new education ticket plan allows more flexibility for attendees to choose sessions onsite.

Allied industry groups will also offer training and certification programs in conjunction with the shows.

IFPE 2014 education provides both application-based and research-driven sessions, targeted to several levels of expertise and interest, with the latest information crucial for engineers and others involved in the design and manufacturing processes. Check the education section of the show website for more details.

The IFPE Technical Conference features the latest research developments in the fluid power industry. The emphasis is new technologies and methods related to improved analysis, design, manufacture, and performance of fluid power components and systems for mobile and industrial markets.

IFPE "College-Level Courses" are half-day sessions focused on hands-on technical knowledge on fluid power and hydraulics, with four to be offered: overview of fluid power systems, sizing a hydrostatic transmission using calculations, condition monitoring of hydraulic fluids, and design of hybrid systems.

Mobile App & Planner Make it Easier to Navigate Shows

The show planner—and mobile app—help attendees more easily get around the shows. Attendees can search show maps and exhibitor lists by hall/lot location, booth number, company name, and type of product. They can assemble their personalized daily schedule of booth visits and education, and edit it pre-show and onsite. The mobile app will be continually updated with exhibitor and event information and an up-to-the-minute Twitter feed.

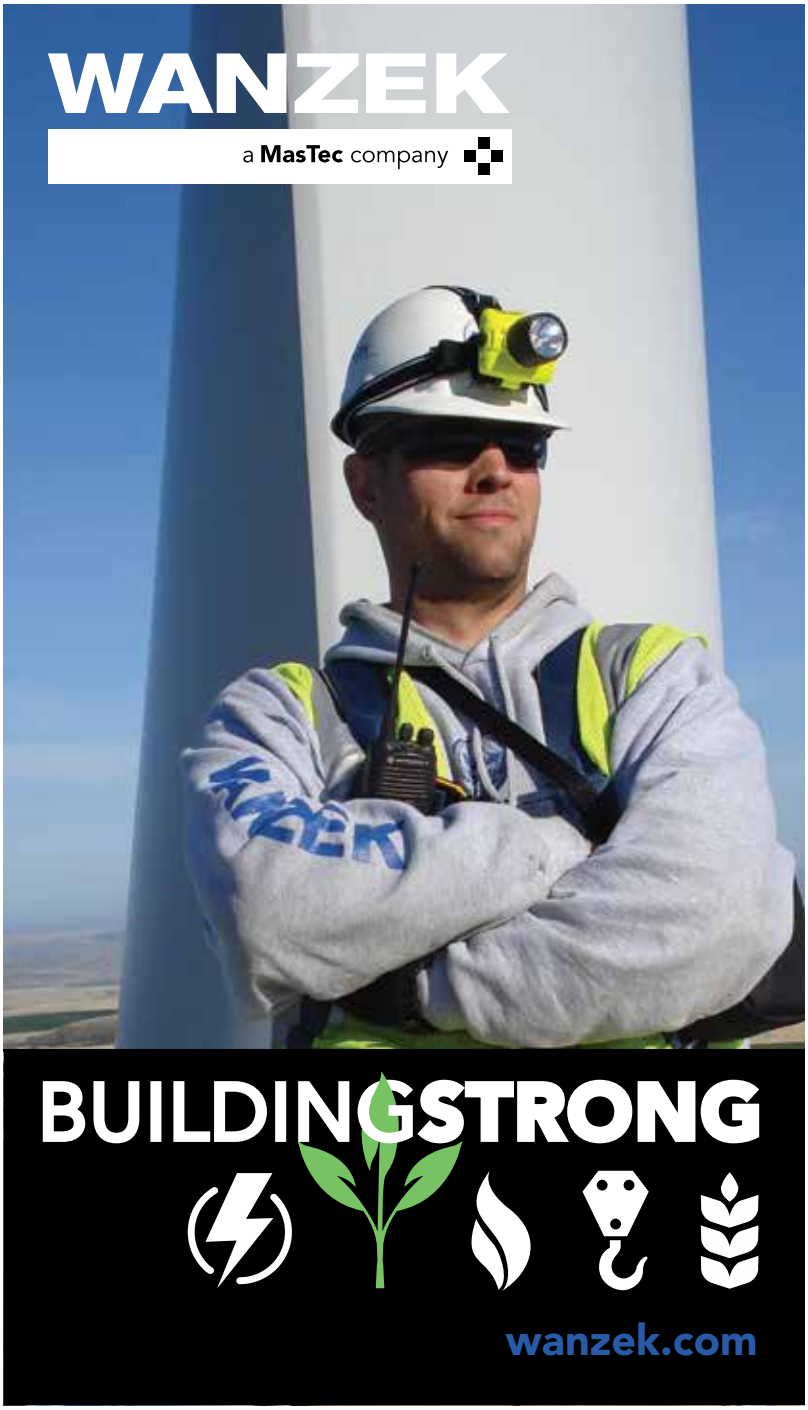
Getting Around at the Shows: It's Easier in 2014!

It will be easier than ever to get around at the shows, so attendees spend less time searching and more time connecting with the companies and products they want to see.

A new show footprint consolidates outdoor exhibit space into three large areas (a new Platinum lot joins Gold and Silver) to create better attendee flow between outdoor and indoor (including IFPE) exhibits. Wayfinding upgrades include an enhanced internal shuttle system, better-defined product concentration areas, and knowledgeable onsite guides to answer questions and help attendees navigate the show floor.

"The goal, as with all our planning, is to create the most ROI for attendees and exhibitors, and these moves will definitely make a positive difference for 2014," Tanel noted.

Visit the show websites for the complete information: www.conexpoconagg.com and www.ifpe.com.



SAFETY

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Different rescue scenarios call for different measures

Key techniques for preparedness in all wind turbine emergency situations

By Jeff Wild, DEUS Rescue and Hugh Biggle, Impact Access

Performing their duties at-height in wind towers over 100 meters, it isn't of a matter of if, but when tower technicians may be in need of rescue.

Falls, slips and trips, falling objects, electrical and mechanical issues, the fitness of workers, and weather conditions are all hazards that can play a part in accidents that may occur when working in and around wind turbines. Being well prepared and thinking through such scenarios in advance may make the difference between life and death.

The Occupational Safety and Health Administration (OSHA) requires that employers provide for "prompt rescue in the event of a fall or assure that employees are able to rescue themselves" to prevent the potential for suspension trauma. ANSI Z359.2-2007 also has guidance on rescue requirements, procedures and training that employers need to implement in their safety programs.

What Role Does Training Play in Being Prepared?

Accidents are bound to happen, but how workers react in such scenarios makes all the difference. Training is proven to substantially reduce workplace accidents. This should make ongoing training a high priority for maintenance crews.

Experience is always beneficial; however, when it's based on poor work practices, comes from a poorly trained source, or results from the passing down of information that isn't current with the most recent standards, experience can actually be a detriment to safe rescues. Staying up-to-date with current practices and standards is vital to ensuring workers are well-prepared in the event of an emergency.

Common Rescue Scenarios to Train and Prepare For

Here are some common rescue scenarios that can occur while working on wind towers:

1) Rescue from the ladder inside the tower which provides climbing access to the nacelle:
Although maintenance work is usually not performed on the ladders after the tower has been constructed, they provide workers with a means of access to the nacelle. That poses a potential threat to worker safety. This involves climbing to great heights, usually multiple times a day. Even though the climber can use the deck landings to rest, this climb can still be physically demanding, leading to cramping, fatigue, heat and cold stress, and more.

Other hazards in this scenario include slipping on an oily or muddy ladder, as well as the constant threat of items such as radios, cell phone and hardhats which can be dropped or fall, striking workers below.

Ladder rescues in this situation are challenging and must be planned from both the ground and from the nacelle. The size and portability of a complete rescue system is crucial, as it must be deployed and carried to the victim from the ground or down the ladder if it's stored in the nacelle.

2) Rescue from the top of the nacelle roof
This scenario can occur if an emergency happens while working on top of the nacelle or if the worker slips while moving on the nacelle, possibly while trying to access the hub.

Non-entry fall protection rescue is reserved for injured workers who are suspended by fall protection, but are conscious, alert and can adequately protect themselves during a lowering operation. To perform such a rescue, the rescuer must have access to the victim's anchor point, integrated lanyard rescue D-ring or harness D-ring.

It's also possible that the victim in such a situation may be injured or unconscious on top of the nacelle. In this case, it would be necessary to lower the victim over the edge of the nacelle. In cases where victims fall over the side, there may be a need to pick them up off of their fall protection equipment.

Challenges in this rescue scenario include deploying and carrying the entire rescue system to the top of the nacelle. Normally, the rescue equipment would be stored there, but there's still a need to get all the equipment through the top hatch to the top of the nacelle.

3) Rescue from inside the nacelle:
This scenario may occur at any time, as the worker is likely to be working inside the nacelle most of the time. Workers can encounter electrical hazards, sustain injuries from working on

the heavy equipment, or experience medical conditions that leave them incapacitated.

This rescue may be challenging because the employee may be working under or around equipment away from the escape hatch. Further, the employee will likely be working without a fall protection harness. There may also be a need to lift the technician up from where he's working, which may be down below the turbine housing or on the opposite end of the nacelle from the escape hatch. Putting the victim's harness onto him is imperative to complete the rescue.

The victim must also be transported from his location, up over equipment to the escape hatch. Cross haul techniques are best used for this to allow a single person to perform the rescue. Multiple lifting systems make this process very simple and efficient. Pulley systems should be carefully monitored while in use. If increased resistance occurs during the process, operations should cease to check the victim for a trapped body part or equipment.

4) Rescue from inside the hub: When a worker is inside the hub, rescue may be challenging, particularly if the rescue system is stored in the nacelle as it must be deployed and carried to the victim. Anchoring to pick the victim up may also prove difficult, meaning cross haul techniques must be used to move the victim's body up and diagonally out of the hub. Multiple lifting systems make this process feasible.

The hub is a very dirty, greasy environment, so it's important to ensure that the rescue system is not significantly affected by possible contamination.

5) Self escape in case of an emergency: Emergency scenarios can occur when a worker may need to escape the nacelle to ensure his own safety. The hazard from which a worker may need to escape affects the choice of the escape point. If there's significant heat in the nacelle the worker may be under major duress. In this case, ensure the rescue system operates with fire resistant rope.

Rescue scenarios, Continued from pg 45

Designing Effective Plans Before You Need Them

Designing effective rescue plans for each of these scenarios is critical to successful rescues. Rescue plans should include careful consideration of:

- Time, casualty management and first responder/medical help
- Direction of EMS to site/casualty or a central pick-up point
- Weather reports and site map made available to all employees and contractors on site
- Supplying local EMS with map coordinates of towers
- Clear marking of towers
- Arrangements for workers to direct EMS to accident tower site
- Drills involving EMS and tower hazards awareness. For example: Helicopter paramedics guided to a ground landing zone using green flares so as to avoid confusion with red FAA lighting

Proper planning can make a real difference in successfully rescuing workers when an accident occurs.

Putting it Into Action

The ultimate test of any rescue plan is in the execution. Of course, repetitive training is the key to ensuring workers take the correct actions when a real emergency occurs. Basic guidelines for responding to any rescue scenario always include:

- Don't put yourself in danger
- Assess the situation
- Raise the alarm
- Now, begin the rescue

A well-developed plan, effective training and a step-by-step approach to executing a rescue all increase the likelihood of positive outcomes when rescue emergencies occur.

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Performing a Job Safety Analysis Helps Ensure Successful Rescues

By Scott Connor
TEAM-1 Academy

Part of the daily routine of working on wind turbines is completing a job safety analysis or job hazard analysis (JSA or JHA). No matter what your company calls it, this anyalyis is a necessity. Part of the JSA should be a discussion on rescue planning, whether it is from the basement, nacelle, hub, top of nacelle, ladder, etc.

Many times we are aware that a general site rescue plan exists, but can be unsure if current staffing and eqipment resources allow for successful implementation. If you are part of supervisory or managerial team, you had better be sure! Relying on the local fire department to do the rescue is not a good idea since most wind farms are rural and 99 percent of all rural departments have little to no technical rope rescue training. Even if they did, a wind turbine and its components would more than likely be as foreign to them as trying to do a rescue from the space shuttle booster rockets. What's more, the response time is an issue. A big city fire department may have a greater level of training, but again, wind turbine rescue is usually not part of the training regimen. Twin energy absorbing lanyards and the vertical fall arrestors you see

on the ladders is not something for which I would expect a fire department high angle team to be trained.

Most state and provincial regulations require that if using fall arrest as a means of fall protection, your company must have a rescue plan. This can involve using your staff or contracting with a specialized rescue team. Even if the regulations don't plainly state this in your jurisdiction, you still need to protect the worker, as that is the intent of all safety regulations. Remember, you have supplied your worker with fall protection equipment that will stop them from falling to their death; but once they are suspended, you have introduced them to a new danger—suspension trauma. Keep in mind that even if they are not hanging (unconscious on top the nacelle, for example), you would need a rescue plan that would get your patient to the ground no matter the situation. In the event of an injury, there is a high likelyhood you will have to go to court. Defending claims in those circumstances requires that you prove due diligence in preventing the injuries. Considering your awareness of the suspension trauma issue and the fire department issue, preparedness is essential.

What follows is a framework for designing and implementing a JSA, and centers around three components:—work methods, equipment, and training.

Work Methods

Have the fall protection methods (i.e. travel restraint, work positioning, self-retracting lifeline/ energy absorbing lanyard) been evaluated recently for the different types of work and locations? Maybe the turbines have had physical modifications, such as hatches, decks, guardrails, man lifts, anchor locations, etc., that need to be taken into account. Get as much feedback from the field technicians as possible. You should also ask them for possible solutions. They are up there working every day, whereas it is sometimes difficult for the safety person to devise an effective solution without actually doing the specific jobs routinely.

Equipment

Considering the recent influx of new safety equipment technologies in the marketplace, it is crucial to investigate what is out there. Too often, we hear workers say they are using a piece of fall arrest equipment that will still allow them to hit the ground in many situations. They continue to use this equipment either because they are instructed to do so per a work procedure, or because no one has come up with a solution. There is always a solution, because the alternative is a fall injury. Most labor enforcement agencies have zero tolerance policies regarding fall incidents, so we must find a solution.

Rescue equipment also needs to be evaluated regularly. This often requires more than one type of device and technique. Don't be afraid to look around and see the capabilities of other devices. Alternately, make sure you keep up to date with what you manufacturer will allow you to do with your rescue device, as this often changes. Sometimes the manufacturer allows equipment to be used in different ways, while other times they will impart new restrictions.

Training

Technical rope rescue gear that a high angle rescue team uses will work, but is often complicated and requires constant training. This is not a good idea if you don't train monthly.

Choosing pre-rigged rescue equipment that is simple to use is key. Most manufacturers have something like this on the market, but we sometimes see way more complicated systems put into place. This is often due to decision-makers' acceptance of the status quo and failing to innovate. The person in charge is often convinced the complicated way the only way,as that is all they know or have been taught.

When your staff takes its fall protection and rescue training, they need to know the capabilities of their rescue equipment and PPE (along with any limitations your company or manufacturer may impose). Conducting hands-on

drills should include moving bodies (dead weight) around obstructions to give the participants a greater appreciation of what is physically possible. This will of course make for better rescue plans.

I always like people to be able to visualize the rescue realistically. What I mean by realistically is that they have taken into account the limitations of the equipment, staff and have addressed as many of the variables as they can.

The Resuce Has To Be Executable

For example, the rescue plan may state the rescuer will move the patient over an obstruction. That may work most of the time, but what if today the patient outweighs the rescuer by 100 pounds? Was that taken into account when preparing the rescue plan?

So in a nutshell: assess your work locations and methods of fall protection regularly so that you are doing the work as safely as possible; choose easy-to-use and easy-to-remember rescue equipment, since the main job of your personnel is not that of a professional rescuer; and train your staff to use your gear effectively and prepare realistic rescue plans so they can actually execute them when needed.

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PRODUCT

Capital Safety introduces Nano-Lok edge SRL

Capital Safety, home of the DBI-SALA® and PROTECTA® brands of fall protection equipment, recently has introduced the Nano-Lok Edge™—the first personal self-retracting lifeline (SRL) engineered for both foot level tie-off and sharp edge applications. While traditional general purpose products anchored at foot level and used in sharp edge environments may increase the risk of injury and create a false sense of security at height,

the Nano-Lok edge is designed specifically for use in sharp edge applications and retracts its unused lifeline so workers can anchor at their feet and move freely and with confidence at height . The Nano-Lok edge includes an 8 foot (2.4 meter) working length, ergonomic design, and is available in single or twin 100 percent tie-off units.

The Nano-Lok edge is the only personal SRL on the market to pass the most stringent leading edge standard set by ANSI Z359.14. Its tough lifeline material, patent pending energy absorber, and durable harness connector work together to absorb and limit the arresting forces in the event of a fall, and to mitigate the effect of a sharp edge on the lifeline even under harsh conditions.

"When workers anchor at their feet with traditional equipment that's not specifically designed for foot level tie-off, they're putting themselves at risk," said Jeff Martin, hard goods senior product manager at Capital Safety. "The Nano-Lok edge is specifically designed for leading edge work and foot level tie-off situations, so workers at height can do their job safely and with confidence."

The Nano-Lok edge personal SRL includes an integrated backpack style energy absorber, tough and flexible galvanized cable lifeline, various hook options, and an easy-to-install connector, The SRL can be safely used in fall clearance environments as low as 16 feet (4.9 meters).

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About **AWEA**

AWEA advances the business interests of its members and America by increasing public demand for wind-generated electricity, and lobbying for stable policies that drive technological innovation, U.S. manufacturing, and construction. Together we've lowered costs 90%, created 80,000 jobs and 550 manufacturing facilities, and attracted $110 billion of private investment. We're ensuring Americans get more clean energy that will never run out.

- **JOIN** an industry with the unique power to change the energy future for the United States of America
- **CONNECT** with the companies that share a vision for tomorrow that includes clean renewable wind energy
- **BUILD** your business with increased profit from a market that is poised for growth

Staying true to the mission

AWEA's mission is to promote wind power growth through advocacy, communication, and education. While that mission is unchanging, AWEA is constantly adapting to the industry and the needs of our members, and creating new ways of interpreting challenges.

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CG OPENS SMART GRID DEVICE PLANT IN INDIA

Bangalore facility to house manufacturing, sales, and service operations of transmission and distribution-related smart grid devices

Avantha Group Company CG launched its state-of-the-art smart grid facility at the Global Village in Bangalore, India on January 11 for full-fledged manufacturing of smart grid devices. Besides manufacturing smart grid devices, the facility will support economic development, foster job creation, and boost an understanding of smart grid solutions in the energy field.

The smart grid devices manufactured in this facility will offer numerical solutions to Indian utilities and the transmission and distribution (T&D) segment, and provide improvement in the electric grid to make it more efficient and reliable. CG has invested $1.3 million in this facility—which can employ more than 100 people. The smart grid facility will manufacture substation automation products, distribution automation devices, protection and control systems, advanced metering infrastructure (AMI), and telecommunication solutions. It will also offer global engineering services such as systems integration, installation, and commissioning. The facility is fully equipped with modern equipment to ensure an annual production capacity of 10,000 units of power line carrier communication terminals (PLCC) and intelligent electronic devices (IED).

CG has a comprehensive portfolio that provides specific solutions and products for each application, including systems that can evolve as the network evolves. CG's solutions give timely and necessary information needed to implement automatic functions and allow maximum use of the grid at minimum cost. The real value-add of the smart grid concept over the conventional automation system is that smart grids are able to convert the data provided by installed devices into actions and decisions that are taken in real time to operate the network.

With more than 2 million CG smart meter complete solutions installed worldwide, CG is a well-established manufacturer in this field. CG's smart grid devices are running successfully in the world's first major smart grid deployment at the Iberdrola STAR Project, Bilbao, Spain, where over 227,000 smart meters monitor the electricity services provided to the area's 410,000 inhabitants. In the past year, CG has participated in no less than ten Advanced Metering Infrastructure (AMI) Pilot Projects in Europe, Asia, and America.

CG is already participating with many of these smart grid devices and services in India's first smart grid pilot project—the Pudhucherry smart city project—which requires approximately 87,000 smart meters and a street light automation solution that will prove substantial savings to the electricity department of the government of Pudhucherry (PED). CG's utility distribution franchise that operates in Jalgaon efficiently manages the multiple data obtained from the intelligent devices installed at all voltage levels, enhancing the quality of service provided to the utility's end users and drastically reduces technical and non-technical losses.

CG's cost-effective smart grid solutions will help utilities identify and eliminate power thefts and system losses caused by aging or faulty equipment. For the utility's customers, CG's smart grid solutions will offer more control over their power consumption and energy costs and spread awareness of consumption patterns.

As a part of its transmission network expansion plan, Power Grid Corporation of India (PGCIL) has proposed an investment outlay of $2.76 billion for implementation of various projects during the current financial year. CG aims to participate in PGCIL's smart grid related energy improvement projects.

Commenting on the inauguration, Avantha Group Company CG's CEO & managing director Laurent Demortier said, "The opening of CG's smart grid manufacturing facility in Bangalore is a result of intense planning with the Indian stakeholders—customers, regulators, and employees. I thank all of them for what they have ac hieved so far. Expansion in smart grid markets is a key strategy of CG. After America and Europe the Bangalore facility will spearhead smart grid operations in Asia."

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TPI Composites and Acciona Windpower sign long-term supply agreement

Blade manufacturer opens its second plant in China, re-opens Mexico plant in order to serve global wind market

TPI Composites, a leading global wind blade manufacturer, has announced that it has signed a multi-year supply agreement with Acciona Windpower SA to provide wind blades from TPI's new factory in Dafeng, China. Acciona intends to export these blades for projects around the world including North America. TPI will also manufacture high-precision molds and assembly systems to produce Acciona's blades at TPI's recently announced advanced composite tooling facility in Taicang.

"TPI is excited to continue to support new customers on a global basis, and this agreement with Acciona validates the strength and value of TPI's dedicated supplier model," said Steve Lockard, president & CEO of TPI Composites. "The Acciona Group is one of the largest developers and owners of wind power projects in the world, and we are looking forward to supporting its expanding wind turbine business globally. Acciona's strength and success is demonstrated in its recent 300MW order in the U.S."

Jose Luis Blanco, CEO of Acciona Windpower SA, added, "We are very pleased to be partnering with TPI for the supply of AW116/125 wind blades for worldwide use. Acciona's track record of reliability and TPI's experience as an independent wind blade manufacturing partner will serve our needs well for years to come."

TPI has been operating in China (Taicang, Jiangsu) since 2008 and is expanding its facilities with the addition of its Dafeng, Jiangsu facility. The location allows TPI to serve multiple customers and cost-effectively deliver products to the Chinese and export markets. TPI has manufactured tens of thousands of high-quality wind blades over a decade in Asia, Europe, and North America.

In December, TPI announced its decision to reopen its plant in Ciudad Juarez, Mexico to provide cost-effective, world-class blades to the North American wind market. The Juarez factory was formerly operated as a joint venture between TPI and Mitsubishi Power Systems under the name of VienTek, but is beginning operations now to serve multiple customers as a 100 percent TPI-owned facility.

"TPI is very pleased to be reopening our Mexico operation to continue to drive down the cost of wind energy and to gain market share in the U.S. and Mexico," Lockard said in December regarding the re-opening. "It will allow us to grow our business with current customers and to support new customers in the region."

Wayne Monie, TPI's chief operating officer, added, "We launched VienTek in 2002 and operated successfully for more than 10 years, providing many thousands of highly reliable blades to the U.S. market. The skills and the blade manufacturing knowledge of the roughly 600 former employees that we are rehiring will be fully utilized during the restart."

TPI currently operates regional wind blade factories in the U.S., China, and Turkey. Lockard commented, "Our Newton, Iowa operation will continue to effectively serve primarily the mid-western U.S. market while the Mexico plant's location is ideally situated to deliver blades by truck and rail to the western U.S. and Mexico markets."

HEADLINES

TÜV Rheinland combines nine global inverter testing labs into streamlined network

With an increasing importance of inverters as energy and data hubs, TÜV Rheinland has formed a unique worldwide network of testing laboratories for various power-level inverters, Inverter Services Network (ISN), by uniting its nine facilities located in Australia, Germany, Greater China (Shanghai and Taiwan), Hungary, India, Italy, Japan, and the United States. Integrating these geographically diverse labs in one cohesive service structure will result in a fast, cost-effective and streamlined service.

The company's ISN network will share subject knowledge, local grid code requirements, testing resources and lab accreditations. More than 25 experts with extensive knowledge in inverter technology will deliver comprehensive support for their colleagues in 65 countries providing services on site and at manufacturer facilities. Operation efficiencies, enhanced communication, and reduced need for international travel are all expected to reduce costs for customers.

TÜV Rheinland has been performing inverter testing around the world for a number of years. The facility in Pleasanton, Calif., opened in 2013 and tests small- to mid-sized inverters and converters according to all relevant US and international safety, grid, and performance standards, and sets up and witnesses large, utility-scale inverters on location at customer facilities. TÜV Rheinland provides necessary listing reports and issues the appropriate U.S. (NRTL) and international certifications for inverters to be used in any location.

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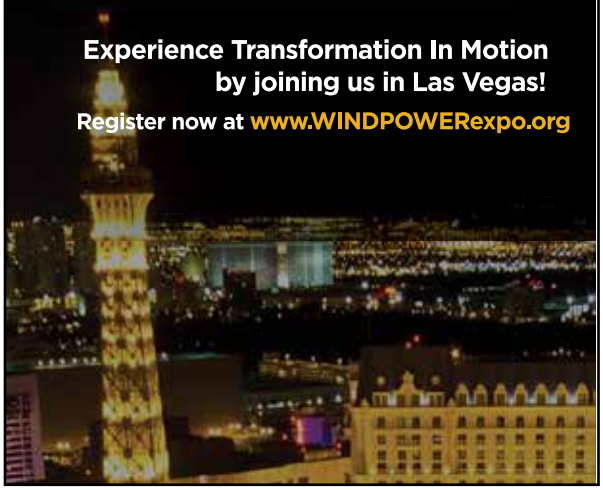

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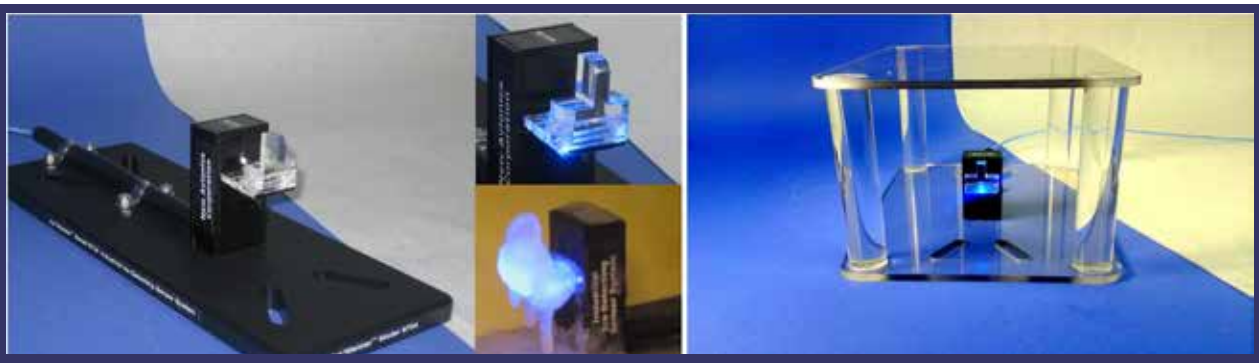
Professional Leak Detection Kit for Oil-Based Fluid Systems

Spectronics Corporation has unveiled the OLK-441 Leak Detection Kit, which finds leaks quickly and efficiently in petroleum- or synthetic-based fluid systems. The kit can be used with hydraulic systems, compressors, engines, gearboxes and fuel systems.

Central to the kit is the OPTI-LUX™400 — an advanced, LED leak detection flashlight that emits less visible light so industrial fluid leaks are easy to spot. The unit features a high-output violet light LED that causes fluorescent dyes to glow far more brilliantly and with greater contrast than with standard blue light inspection lamps, revealing the exact source of every leak. Its power is comparable to high-intensity 150-watt lamps and it has an inspection range of up to 25 feet (7.6 m) or more.

The kit also includes an 8 ounce bottle of patented OIL-GLO™44 concentrated fluorescent dye, an 8 ounce spray bottle of GLO-AWAY™ dye cleaner, an AC/DC charger, dye treatment tags, and fluorescence-enhancing glasses. The components are conveniently packed in a rugged carrying case.

For more information about the Spectroline® OLK-441 Leak Detection Kit, call 1-800-274-8888. Outside the United States and Canada, call 516-333-4840. Website at www.spectroline.com.



Compact optical design drives economical ice sensing solution

New Avionics Corporation has introduced a new compact ice sensor for use on wind power turbine nacelles and meteorological towers.

New Ice*Meister™ Model 9734-SYSTEM is demonstrably the smallest, lightest, most-sensitive ice detector anywhere. Its low cost, simple operation, simple installation, minimal host requirements, and simple maintenance adds value to every size wind power turbine, onshore, offshore, remote, parking lots, etc.

The entire 9734 assembly with its mounting plate weighs only one pound. This makes it easy to carry and install. The sensor is a self-contained compact unit that works on 8-36 VDC, consumes only 2 watts, and conveniently embeds all its electronics inside its own housing.

In operation, the 9734 is a digital/optical, go/no-go ice sensor. It monitors the optical characteristics of whatever substance is in contact with the probe. Anytime it "sees" that liquid rain has turned to solid ice, the unit alerts its host system by closing its output relay contacts and energizing its indicator LED.

When the ice has disappeared, the device's output relay contacts open, and its indicator LED is de-energized.

The ice sensor's blue indicator LED is locally visible inside its clear plastic probe, which makes it easy to test and observe the sensor at arm's length. Sensitivity is simple to adjust in the field. The only maintenance recommended is to clean the optical probe occasionally with isopropyl alcohol and a soft cotton swab.

The sensor is entirely optical. Other than the electrical contacts of its single-pole, single-throw output relay, the 9734 has no moving parts whatever. The housing measures a mere 2½ inches x 1¼ inch x 1 inch, and the probe extends an inch out from the housing. The 9734 is encased in a solid, waterproof housing, and is robust against harmful elements—including UV.

The 9734 provides its own mounting plate that bolts to the top of any nacelle, and comes standard with 6 feet of lightweight blue cable. Custom-length cables are available as a factory option. Other options include a protective polycarbonate cage and a de-ice heater.

For more information, call (954) 568-1991 or visit www.newavionics.com.

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