Several wind developers are making a case for partial campaigns.

New In 2017
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Tools
An effort to prevent dropped objects might lessen the alarming rate of incidents.
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Spotlight: Oklahoma
Facing mounting budget shortfalls, the state looks to rein in wind.
page 30
The S128 wind turbine is Suzlon’s newest and largest rotor diameter helping drive down the cost of energy. The S128 features a rotor diameter of 128 meters and a swept area of more than 12,860 square meters generating one of the highest-yielding IEC Class II (3.0 MW) and III (2.6 MW) medium speed full converter wind turbines in their class. Suzlon has more than 2,700 MW of installed capacity throughout the United States and Canada, with a team of over 200 trained Operations, Maintenance and Service technicians providing industry leading service in North America | Wind turbine manufacturer with an installed capacity of over 15 GW | Operations in 17 countries across 6 continents | R&D facilities in Denmark, Germany, India and the Netherlands. For higher yields contact us today at 773-328-5077 ext. 201 or ext. 203.
Casting A Safety Net Around Dropped Objects
Several organizations are working to reduce the number of incidents from objects dropped from elevated distances.

Partial repowering can further improve wind energy’s competitive economics.

Exelon’s Bluestem Wind Comes To Fruition
The energy conglomerate makes its initial wind claim in Oklahoma.

When Wind Is Too Much Of A Good Thing
Facing budgetary shortfalls, Oklahoma looks to rein in wind.
This month’s cover story illuminates the growing trend of partial repowering, an issue that has taken center stage among wind developers. Written by DNV GL’s Kevin Smith and Alex Byrne, the article takes a critical look at repowering – the action that calls for the replacement of older turbines with newer, more efficient models. Repowering aging assets creates an opportunity to realize substantial returns from increased annual energy production, while also deploying significantly less capital than would be required for a new project.

The trend is being fueled by advanced turbine technology and data. In short, we know more about our project assets now than ever before. And when the ultimate goal is to wring as much output from the asset as possible, such data is powerful.

Repowering is not a new idea, to be sure. However, the idea is now being applied to projects whose wind turbines are not old. For example, I spoke with one developer that asserts that the turbine technology has become so advanced that the company can justify replacing a fleet of Gamesa 850 kW machines with more powerful, more efficient Vestas turbines.

The other aspect that is fueling the repowering push is the recent extension of the production tax credit (PTC). Although the PTC has traditionally applied to new installations, its four-year extension, passed in 2015, has incentivized a number of asset owners to consider repowering or retrofitting existing wind power assets. In theory, the asset owners are doing so in order to re-qualify projects under PTC eligibility guidance from the Internal Revenue Service so that they receive another 10 years of tax credits.

But before you jump in, be careful, warn the authors. For starters, repowering a project and increasing generating capacity will result in having to renegotiate the power purchase agreement. Therefore, prices will likely go down. Finally, the authors suggest that the loading history of the turbine must be reviewed to estimate the amount of remaining life in the structure. That said, rebuilding or increasing the capacity of an existing foundation is very challenging and could reduce economic benefits.

Finally, the authors give another note of warning: It’s important that obtaining tax credits does not become the main driver for repowering projects, as the blind pursuit of PTC eligibility could result in higher project costs.

Before you jump in, be careful.

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The U.S. Fish and Wildlife Service (FWS) has released its final environmental impact statement (EIS) on Power Company of Wyoming LLC’s (PCW) voluntary applications for standard and programmatic eagle take permits, both of which are based upon PCW’s comprehensive conservation plans and coordination with the FWS.

The service’s final EIS analyzes avian conservation measures for the 500-turbine, 1.5 GW Phase I of PCW’s Chokecherry and Sierra Madre (CCSM) Wind Energy Project, to be located in Carbon County, Wyo. The two phases are expected to total 3 GW of wind energy.

A notice of availability of the final EIS was included in the Dec. 9 Federal Register. A record of decision was supposed to have followed no sooner than 30 days afterward, says PCW.

PCW developed two main conservation plans addressing eagles, bats and other migratory birds: the Phase I Eagle Conservation Plan and the Phase I Bird and Bat Conservation Strategy.

PCW says both plans are built on a foundation of over five years of scientific data collection, over 5,000 hours of avian use surveys specific to the CCSM project site and ongoing coordination with the FWS since 2010.

According to the developer, the plans ensure that eagle conservation is a priority during both wind project construction (standard permit application) and operation (programmatic permit application). In addition, the plans provide for mitigation and compensation in case of incidental eagle take.

PCW officials say that using site-specific environmental data to finalize the CCSM project’s Phase I design was key to its work to meet the FWS’ strict regulatory criteria.

“PCW chose to commit to a significant scientific and engineering effort to proactively and responsibly minimize impacts to eagles and migratory birds,” states Garry Miller, PCW’s vice president of land and environmental affairs. “It was important to PCW to give our neighbors, regulators and customers further confidence that the CCSM project will be built and operated in a manner consistent with wildlife conservation.”

The CCSM wind farm is a 1,000-turbine project to be built in two phases on a working cattle ranch consisting of checkerboard private land, federal land and state land.

Report: States Go Big On Renewable Energy

The U.S. electric power industry has been going above and beyond in investing in renewable resources past states’ renewable portfolio standards (RPS) and targets, according to a new report from The Brattle Group.

The report says the majority of these “beyond-RPS” investments have occurred in regions that offer access to low-cost wind or solar potential and regions that have organized regional electricity markets.

According to Brattle, this facilitation of renewable generation development by regional markets should be considered by Western U.S. states as they contemplate the future of their electricity industry and its impact on the environment.

The firm has reviewed a number of industry statistics and practices to show how regions with regional transmission operators and independent system operators (RTO/ISO markets) have been facilitating development of renewable generation.

Specifically, the group says RTO/ISO markets are leading the growth in U.S. renewable generation. They have achieved
this growth through ready-made markets for real-time energy; lower-cost integration, balance and congestion management over large regions that provide diversity benefits; and improved regional transmission planning and generation interconnection processes.

In addition, about half of all U.S. renewable generation investments in the last five years have been in excess of state RPS requirements. The report says these beyond-RPS renewable generation investments are driven by voluntary purchases by utilities, public power entities, and commercial and industrial customers, as well as by merchant renewable developments with spot sales (or short-term contracts) and financial hedges.

However, according to the firm, very few arrangements take place in non-market regions – even if those non-market regions are endowed with locations suitable to constructing low-cost renewable generation.

Looking ahead, power purchase arrangements and green tariffs with commercial and industrial customers are expected to grow rapidly, the report says. In fact, many large corporate users of electricity have already committed to purchasing 600 GW of new renewable generation by 2025.

Brattle notes that RTO/ISO markets provide an effective platform to support this activity and facilitate the development of the resources that customers seek.

Additionally, according to the report, renewable generation investments beyond RPS are already reducing annual carbon dioxide (CO2) emissions by approximately 100 million tons per year nationwide. This corresponds to about 50% of total U.S. electric sector CO2 emissions (or twice the entire electricity sector emissions of California).

“The successful growth of renewable generation is well documented, we were surprised that half of all renewable generation development has moved beyond RPS mandates and that most of this beyond-RPS activity is contained to RTO/ISO markets,” notes Johannes Pfeifenberger, a Brattle principal and co-author of the firm’s presentation. “You may see very little of it in the adjoining non-market region, even if the quality of renewable resources is just as high.”

The authors note that the effectiveness of regional markets in facilitating renewable development beyond regulatory mandates will likely be a significant driver of additional emission reductions in the U.S. electric power industry.

“The opportunity for forming or joining regional RTO/ISO markets that facilitate renewable generation development beyond RPS mandates needs to be considered, particularly now that Western states actively contemplate how they can cost-effectively reduce the environmental footprint of the electricity industry and their economies,” Pfeifenberger adds.

## Google To Reach Renewables Milestone

Google has announced a major milestone in its quest toward becoming powered entirely by renewable energy: It’s set to happen as soon as 2017.

According to a company blog from Urs Holzle, senior vice president for technical infrastructure, Google, touting itself as “the world’s largest corporate buyer of renewable power,” says it currently purchases 2.6 GW of wind and solar power globally. In 2015 alone, the company says it contracted for a total of 842 MW of renewables.

Google says it has inked a total of 20 renewable energy purchase agreements to date. Now, in order to reach 100% renewables next year, the company plans to purchase even more wind and solar – enough to power “every unit of electricity [its] operations consume globally.” This includes both corporate offices and data centers, the company notes.

In response to the announcement, Jodie Van Horn, director of the Sierra Club’s Ready for 100 campaign, says in a statement that “leadership from major corporations like Google plays a critical role in the transition to 100 percent clean, renewable energy.”

“By transitioning global operations to run entirely on renewable energy, Google is charting a course for other corporations, institutions, cities and communities to take bold action that will create jobs, save money and protect families from dangerous fossil fuel pollution,” Van Horn adds.

Google signed its first renewable energy agreement back in 2010 for NextEra’s Story County II facility, a 114 MW
Deepwater To Acquire Former NRG Lease Site

NRG Energy Inc. has confirmed a transfer of NRG Bluewater Wind project assets to an affiliate of offshore wind developer Deepwater Wind.

According to NRG, the project assets include an offshore lease from the U.S. Bureau of Ocean Energy Management (BOEM) for approximately 96,400 acres of an offshore Delaware area that was formerly known as the Mid-Atlantic Wind Park.

NRG expects the Deepwater Wind affiliate to take possession of the lease, provided that BOEM approves the transfer.

Deepwater Wind has also confirmed that the lease assignment is under review by BOEM regulators.

Deepwater Wind recently announced plans for the Skipjack Wind Farm, a 120 MW offshore project that would be situated off the coast of Ocean City, Md. The company has secured the rights to acquire the site’s federal lease.

wind project located in Iowa. Most recently, Google teamed with Dutch companies DSM, Philips and AkzoNobel for a long-term agreement to jointly source power from renewables projects in the Netherlands. The company is also a member of RE100, an initiative of corporations pledging commitments to 100% renewable energy.

Google notes in its blog that this new milestone is not the last step toward growing its clean energy initiatives.

“As we look to the immediate future, we’ll continue to pursue these direct contracts as we grow, with an even greater focus on regional renewable energy purchases in places where we have data centers and significant operations,” the blog says.

“Since the wind doesn’t blow 24 hours a day, we’ll also broaden our purchases to a variety of energy sources that can enable renewable power, every hour of every day. Our ultimate goal is to create a world where everyone – not just Google – has access to clean energy.”

In a statement, Bob Perciaspe, president of the Center for Climate and Energy Solutions, says, “Google’s achievement is further evidence of the continuing momentum of America’s clean energy transition. Companies like Google are investing billions of dollars in clean energy and efficiency because it makes sound business sense.”

Gregory Wetstone, president and CEO of the American Council On Renewable Energy, which is applauding Google’s announcement, says in a statement that the “impressive early achievement” is a “definitive demonstration that renewable energy is cost-effective and readily available at scale today.”

Big Three Dominate EIA Energy Report

The U.S. Energy Information Administration (EIA) has reported that as of the end of 2015, just three manufacturers – General Electric (GE), Vestas and Siemens – accounted for 55 GW, or 76%, of installed wind generating capacity in the U.S.

Of the 8.2 GW of total wind capacity installed in 2015, these three companies’ combined share is even greater, representing more than 92% of new capacity in 2015.

Two other companies, Gamesa and Mitsubishi, also accounted for significant shares (6% and 5%, respectively) of U.S. wind turbine capacity that was operating at the end of 2015. However, these two companies did not have a significant amount of new capacity installed in the U.S. in 2015.

After GE, Vestas and Siemens, the next-largest shares of installed wind capacity during 2015 were held by Acciona and Nordex, at 6% and 2%, respectively.

The report says GE has consistently been the dominant manufacturer of wind turbines installed in the U.S. since it purchased Enron’s wind business (formally Zond) in 2002. Between 2005 and 2015, GE’s average annual share of installed capacity was 44%, or 2.7 GW per year.

According to Bloomberg New Energy Finance, the Chinese company Goldwind led in global wind capacity commissioned in 2015, manufacturing 7.8 GW, largely for installations in China.

Vestas, GE and Siemens were the second-, third- and fourth-largest global suppliers of wind turbines, respectively, in 2015.

Texas Wind Sets Another Record

Wind generation officially set a new record on the afternoon of Sunday, Nov. 27, 2016, accounting for more than 15,000 MW of the electricity used in the Electric Reliability Council of Texas (ERCOT) region for the first time ever.

Specifically, the ERCOT system used a whopping 15,033 MW of electricity from wind at 12:35 p.m., representing about 45% of total demand for electric power at the time.

Of the total, more than 8,800 MW was produced from wind generation facilities in west and north Texas, while nearly 3,800 MW came from the south region, mostly the Gulf Coast area, and about 2,300 MW came from the Panhandle region.

“We saw high wind output throughout the day, ranging from just over 10,000 MW during the late-night hours to this peak output during the noon hour,” says Dan Woodfin, senior director of system operations for ERCOT. “Over the years, ERCOT has taken a number of steps, such as improving renewable generation forecasts, to allow us to operate the grid reliably on days like this.”

ERCOT says the portion of load served by wind ranged from about 35% to more than 46%, averaging nearly 41% throughout the day.

For comparison, the group notes that 1 MW is enough electricity to serve about 200 homes during peak demand and 500 homes during milder conditions. There is more than 17,000 MW of installed wind generation capacity serving the ERCOT system, and that total was expected to top 19,000 MW by the end of 2016.
Canada Unveils Plan To Increase Renewables

The Canadian government is accelerating its investment in clean energy and the phaseout of traditional coal power in order to reduce Canada’s greenhouse-gas emissions by more than 5 million tons by 2030 – representing the equivalent of taking 1.3 million cars off the road.

Catherine McKenna, Canada’s minister of environment and climate change, made the announcement as part of the government’s vision to put the country on a path to move from 80% to 90% non-emitting sources by 2030.

“Taking traditional coal power out of our energy mix and replacing it with cleaner technologies will significantly reduce our greenhouse-gas emissions, improve the health of Canadians and benefit generations for years to come,” she says. “It sends a clear signal to the world that Canada is a great place to invest in clean energy.”

The government of Canada will support this transition by using the Canada Infrastructure Bank to finance projects such as commercially viable clean energy and modern electricity systems between provinces and territories. According to a press release from the Canadian government, the initiative will attract global investments that grow the economy and create good, middle-class jobs.

The government says it is committed to working closely with provinces and territories to attract the investments necessary to build a modern, integrated, clean power system that results in local solutions for ratepayers, workers and the environment. It also plans to work with provinces and territories to set performance standards for natural gas-fired electricity.

It will also work with provinces and labor organizations to ensure workers affected by the accelerated phaseout of traditional coal power are involved in the transition.

The Canadian Wind Energy Association (CanWEA), applauding the announcement, says the new measures will open up new opportunities for wind energy in Canada. In addition, CanWEA says they will enhance Canada’s ability to compete for renewable energy investment as the world transitions to a low-carbon economy in response to climate change.

“The federal government’s commitment to phase out greenhouse-gas emissions from coal-fired electricity generation by 2030 will bring important health and climate benefits to Canadians,” says Robert Hornung, CanWEA’s president. “As the most cost-competitive source of new renewable electricity generation in Canada, wind energy will play a critical role in replacing that power by providing reliable and affordable electricity that will enable the federal government to meet its goal that 90 percent of Canada’s electricity will be carbon-free by 2030.”

Though Canada’s electricity system is currently 83% non-greenhouse-gas-emitting, Canada’s abundant renewable energy resources make it possible for the country to move to a near-zero-greenhouse-gas-emissions electricity grid over time, adds CanWEA.

Meeting this longer-term objective will require natural gas-fired electricity to be used strategically in a manner that will also decline over time, according to CanWEA.

“The federal government has also made it clear that it is willing to use the new Canada Infrastructure Bank to invest in critical infrastructure, like new transmission lines, that will enable the increased penetration of renewable electricity into Canada’s grid,” adds Hornung.

AWEA: Wind Jobs Help Veterans Find Work

The American Wind Energy Association (AWEA), a national trade association of the U.S. wind energy industry with over 900 member companies, is putting out a call to its grassroots network, Power of Wind, asking for support communicating the economic success of wind power, while also aiding veterans transitioning back to the civilian workforce.

“Wind power is a job-creating engine that’s putting thousands of Americans to work, including many veterans. Our newly elected officials need to know the scope of this opportunity and how they can pass job-creating policies to keep business booming,” says Tom Kiernan, CEO of AWEA.

“We’re asking Americans who support the growth of renewable wind energy to make a donation to the Power of Wind in the spirit of #GivingTuesday. In turn, AWEA will give back half of each donation to Hire Heroes USA, furthering their efforts placing American veterans in good jobs,” he says.

According to AWEA, the special skills and qualifications that veterans bring to the table are well-suited to wind power careers, enabling the wind industry to be a major employer of the American workforce.

In the spirit of giving and collaboration, AWEA says donations made to Power of Wind for #GivingTuesday will be split with Hire Heroes USA, a 501(c)(3) nonprofit organization that helps U.S. military members, veterans and spouses to succeed in the civilian workforce.
Ingeteam Nets Frequency Converter Certification

DNV GL has awarded a component certificate to Spanish technology company Ingeteam for its new wind frequency converter.

During its certification process, DNV GL examined the converter to ensure safety, functionality and quality. The award confirms that the INGECON WIND Full Converter MV Series 3000-10000 family meets all globally applicable requirements for wind turbines for onshore and offshore use, says DNV GL.

The certification body says Ingeteam’s newest wind frequency converter is the first electrical component certified according to DNV GL’s new certification scheme for type and component certification of wind turbines: the DNV GL-SE-0441. This service specification identifies DNV GL’s services for type and component certification of onshore and offshore wind turbines. Furthermore, the wind frequency converter has been certified according to all DNV GL and IEC criteria.

“Following the previous certification of our INGECON WIND DFM 3000 converter with DNV GL last year, we are very happy to continue this excellent relationship with the certification body,” comments Ana Goyen, deputy director of Ingeteam’s wind business unit.

PSI Ships 30,000th Repaired Component

PSI Repair Services Inc., a subsidiary of Phillips Service Industries and independent service provider to the wind energy industry, says it recently shipped its 30,000th repaired wind turbine part to a prominent wind energy company.

According to PSI, the company has provided economical repairs, as well as engineering services, for the largest wind farms in the U.S. since 2009.

PSI’s repair services cover major wind turbine manufacturers, such as GE, Vestas, Suzlon, Gamesa, Siemens, RePower and Clipper. As reported, commonly repaired components include printed circuit boards, pitch drive systems, inverters, converters, thermistors, IGBTs, hydraulic pumps, pitch and yaw motors, encoders, slip rings, transducers, yaw modules, three-phase bridge rectifiers, blade bearing automatic grease dispensers, battery chargers, and much more.

PSI says its engineering services include custom tests, root cause analysis, product upgrades, remanufacturing and new product manufacturing services.

According to the company, the custom test program leverages advanced diagnostic equipment, allowing PSI to detect hard part failures, as well as parts degraded due to stress, right down to the microchip level. The root cause analysis service allows PSI to get a comprehensive view into a customer’s production environment to identify all of the elements that are connected to recurring problems so that the appropriate corrective actions eliminate the problem once and for all.

Further, the company says the product upgrade service allows PSI to improve upon legacy design, with newer, more reliable technology. PSI’s remanufacturing services are available for obsolete and unsalvageable parts, such as circuit boards and power supplies. Finally, the new product manufacturing service is available for customers who need a cost-effective option to produce a small run of unique legacy parts or components.

“PSI is proud to support the renewable energy industry,” says Mike Fitzpatrick, general manager of PSI Repair Services Inc. “We understand the importance of keeping wind turbines up and running, so we have created a wide variety of solutions to help [operations and maintenance] professionals achieve those objectives.”

New Power-To-Gas Method Aids Renewables

Southern California Gas Co. (SoCalGas) has announced the power-to-gas (P2G) hydrogen pipeline injection program it funds at the University of California Irvine (UCI) has successfully demonstrated the use of excess renewable electricity that would otherwise go to waste.

According to the utility, P2G is a technique for converting surplus clean energy from solar panels or wind farms into hydrogen, which can be blended with natural gas and utilized in everything from home appliances to power plants. The renewable fuel can...
also be converted to methane for use in a natural gas pipeline and storage system or for use in hydrogen fuel cell vehicles. The features of hydrogen can especially enable long-term storage of large amounts of carbon-free power – which is a significant advantage over lithium-ion batteries, the utility claims.

“This research lays the groundwork for leveraging the natural gas infrastructure already in place for the storage and transmission of renewable energy,” says Jeff Reed, director of business strategy and advanced technology at SoCalGas. “As more wind and solar production is deployed, energy storage will be a critical component for grid reliability.”

“One of the big challenges we’ve faced in adding wind and solar to the grid is what to do with the excess electricity,” says Jack Brouwer, associate professor of mechanical and aerospace engineering and civil and environmental engineering at UCI and associate director of its Advanced Power & Energy Program (AEP). “We’ve shown you need not halt renewable power generation when demand is low. Instead, the excess electricity can be used to make hydrogen that can be easily integrated into existing natural gas pipeline infrastructure.”

The pilot project began last summer, with funding from SoCalGas and the participation of Proton OnSite, provider of an electrolyzer that produces hydrogen from electricity and water. AEP engineers worked with UCI facilities management technicians to install the new equipment adjacent to the campus’ power plant. Since then, the process has been closely monitored by researchers trying to determine whether P2G is feasible on statewide or regional power grids. Such systems are currently in place in Germany and Canada.

The central component of the process is the electrolyzer, which takes in water and uses excess renewable electricity to power an electrochemical reaction that splits it into hydrogen and oxygen. The oxygen is released into the atmosphere, and the hydrogen is compressed and sent about 60 feet through a pencil-thin, stainless-steel tube to an injection point in UCI’s natural gas pipeline. There, the hydrogen is mixed with natural gas and, shortly thereafter, burned in the gas turbine power plant to generate electricity and heat for the campus.

Hydrogen produced from electricity and water can also be converted into methane and injected into a natural gas pipeline system. The natural gas system includes transmission and distribution pipeline networks and existing underground storage facilities that can store enormous amounts of renewable methane or hydrogen energy for use at a later time. In the SoCalGas service territory alone, more than 12 TWh of electric equivalent storage can be accommodated.

“Our initial testing indicates smooth operation for this first successful U.S. proof of concept,” says Brouwer. “Storage of the hydrogen in existing natural gas infrastructure could become the most important technology for enabling a 100 percent renewable future.”

Vaisala Conducts Triton Remote Sensor Studies

Vaisala, a renewable energy resource measurement, project assessment, energy forecasting and asset management company, has released two independent verification studies conducted by Ecofys, an international consultancy recently acquired by Navigant.

According to Vaisala, the studies used two production Triton units deployed from March 5 through May 29, 2015, and June 6 through Sept. 10, 2015, respectively, at the Lelystad test site in the Netherlands.

The company says that the verification studies include an assessment of the sensitivity of the Triton remote sensor to environmental factors, demonstrating that wind speed measurements taken by the unit are unaffected by changing environmental parameters. Rather than using the minimum amount of data required, the studies were conducted over several months, ensuring a more representative data set with which to assess measurement uncertainty.

The wind energy industry’s ability to predict and assess a project’s annual energy output is a crucial factor in securing and maintaining investor confidence in wind projects, according to Vaisala.

Triton, a ground-based SoDAR remote sensing system, is used to measure wind at and above the hub height of today’s taller wind turbines. By supplementing or replacing measurements from met towers in resource assessment and operational settings, Triton adds value and provides a cost-effective solution to wind developers and operators.

As reported, the Ecofys studies are part of Vaisala’s commitment to support wind power plant developers and system operators in applications ranging from early-stage prospecting, to repowering legacy power plants.
How Does The PTC Affect Owners’ Repowering Call?

Although the federal production tax credit (PTC) has traditionally applied to new installations, the four-year extension of the PTC passed in 2015 has incentivized a number of asset owners to consider repowering or retrofitting existing wind power assets, according to a new report from MAKE.

The report says these asset owners are doing so in order to re-qualify projects under PTC eligibility guidance from the U.S. Internal Revenue Service so that they receive another 10 years of tax credits.

MAKE explains that repowering aging assets creates an opportunity to realize substantial returns from increased annual energy production, while also deploying significantly less capital than would be required for a new project.

To re-qualify an existing asset, owners must invest 80% of the fair market value of the asset; this is achieved through repowering or retrofitting.

MAKE estimates the total capacity likely to be repowered under this mechanism to be upward of 6 GW. In addition, this includes a capital investment of more than $2 billion per year.

Given the scale of an “80-20” campaign – in which the tower and foundation of a wind turbine are retained but a new nacelle and blades are mounted – MAKE will use the following methodology to account for such cases in its products and is publicizing it for the sake of transparency, clarity and standardization.

Traditional repowering, which has been practiced predominantly in California, where a large number of turbines were installed in high-wind sites before 1990, is defined as the complete removal of a wind turbine and its replacement with a modern unit. This includes foundations, towers, nacelles, blades and usually balance-of-plant facilities.

By contrast, MAKE’s methodology for repowering under the current PTC program (80-20 repowering) begins with the understanding of the nacelle as the central energy-producing component of a wind turbine; accordingly, if the nacelle is replaced in its entirety, the turbine is considered repowered, and the market share is assigned to the turbine manufacturer.

The foundation and tower, as non-productive components, may remain unchanged or enhanced if necessary in an 80-20 repowering, the report says.

Selective replacement and upgrade of components within the nacelle – a common strategy regarding older turbines in which the FMV is lower and fewer replacements are required for PTC qualification – will not be considered repowering but, rather, will be considered “retrofitting.”

MAKE says retrofitted turbines will not contribute to the market share of turbine manufacturers in the year of installation or thereafter. Projects adjusted through a retrofit will not be considered new installations (for the purposes of MAKE’s databases and analyses, except in certain cases).

In these certain cases, the retrofitting of components within a turbine may lead to an enhanced capacity rating or rotor diameter, says MAKE.

Such cases will be accounted for in the manner of a
traditional uprating or derating after initial project operation: The changes in capacity will not be considered part of a turbine manufacturer’s annual new capacity, but existing entries within MAKE’s installation database will be updated to reflect the new figures. In addition, MAKE’s market outlooks will be adjusted to reflect cumulative totals.

As an example, a retrofit of components within a GE 1.5 MW turbine with a 77-meter rotor that increases nameplate capacity to 1.6 MW and rotor diameter to 82.5 meters would be reflected in the “capacity,” “turbine capacity” and “turbine model” fields of the host project’s line in MAKE’s installation database.

Bill To Scrutinize Projects Sited Near Military Bases

A New York Republican congressman has proposed a bill that would prevent wind projects near military bases from obtaining tax credits. Specifically, U.S. Rep. Chris Collins cites "significant concerns from local residents and lawmakers" for an Apex Clean Energy project in western New York.

Complementing a companion bill from Sen. John Cornyn, R-Texas, Collins has rolled out the “Protection of Military Airfields from Wind Turbine Encroachment Act.” According to a press release from the congressman, the legislation would mandate that any new wind projects being built “within a 40-mile radius of a military installation” be ineligible for production tax credits.

According to Collins, Apex’s 200 MW Lighthouse Wind project – which the company expects to be completed in 2019 – could threaten the future of the nearby Niagara Falls Air Reserve Station, which “employs over 2,600 people and contributes over $200 million a year to western New York’s economy,” he says.

“I cannot condone any activity which puts the Niagara Falls Air Reserve Station’s future operations and viability at risk,” Collins says.

In a statement to North American Windpower, Apex explains that it has been diligently working with the U.S. Department of Defense (DoD) “to ensure [its] wind energy facilities do not adversely impact military missions.”

Related to Lighthouse Wind, we have been consulting with the Department of Defense and Niagara Falls Air Force Reserve Station regularly to ensure that any concerns regarding the base’s operations are resolved before the project is built,” Apex says, adding that the project would be situated more than 25 miles from the military base.

The developer says it has even received a letter from the DoD Siting Clearinghouse in which the agency confirmed that Lighthouse Wind is “unlikely to impact military testing or training operations in the area.” Thus, Apex believes it is “appropriate to trust the expertise of the DoD Siting Clearinghouse, as well as that of local military experts and advisors, to assess the potential risk of wind energy projects to their own bases.”

However, Dan Engert, town supervisor for Somerset, N.Y., claims that the DoD has been “increasingly engaged to express either reservations or objections to potential wind projects across the country on the basis of military readiness issues and conflicts with military radar systems,” he explains in a press release.

“The Lighthouse Wind project in Somerset is very poorly sited for a number of reasons, and I do not think it’s in our government’s best interest to expand wind energy at the expense of military readiness,” Engert says.

The congressman, who adds that he will “do everything in [his] power to ensure the viability of the Niagara Falls Air Reserve Station,” notes that the U.S.’s military installations are “crucial to the security of our nation.”

“This legislation ensures that military installations like the Niagara Falls Air Reserve Station can fully operate without potential interference from wind turbines, some of which can be as tall as 600 feet,” he contends.

However, Apex says it has not yet chosen the turbines for the project, which is still in a pre-application phase. In

Markey, Merkley Propose 100% Clean Energy Bill

U.S. Sens. Edward J. Markey, D-Mass., and Jeff Merkley, D-Ore., have introduced a Senate resolution calling for generating 100% of the electricity consumed in the U.S. from clean and renewable energy resources by 2050.

Other senators supporting the resolution include Bernie Sanders, I-Vt.; Elizabeth Warren, D-Mass.; Al Franken, D-Minn.; Ben Cardin, D-Md.; Brian Schatz, D-Hawaii; and Mazie Hirono, D-Hawaii.

According to the senators, the resolution points to the enormous job creation potential of transitioning to renewable energy sources such as wind, solar and geothermal, particularly in communities with high rates of unemployment or underemployment.

“As a technological giant, the United States must continue to lead the clean energy revolution,” says Markey. “Moving to 100 percent clean energy will power job creation that is good for all creation. We can and will meet this goal, and now, more than ever, it is critical that we stand up and fight for our clean energy future.”

Merkley says the resolution “sends a message loud and clear to our Senate colleagues: It’s time to get serious about our climate efforts with big, bold and rapid moves to accelerate the clean energy economy.”

The Sierra Club agrees. In a statement, Christine Hill, the group’s deputy legislative director, says, “It’s long past time we set a national goal of moving to an economy fully powered by 100 percent clean energy.”

The organization, which heads the Ready for 100 campaign, points out that 20 U.S. cities are currently committed to reaching 100% renewable energy.

“Cities across the country have already demonstrated that achieving 100 percent clean, renewable energy is a goal well within our reach, and major corporations like Google are showing the same in corporate America,” says Hill. “The question isn’t if we can power our future with 100 percent clean energy – it’s how quickly we can get there.”

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addition, the developer points out that structures standing more than 200 feet tall in the U.S. are “required to undertake a rigorous system of review by the DoD and FAA” before construction can commence.

“When this final [project] proposal is made, the DoD and FAA will have the chance to weigh in again with their approvals through these review systems,” Apex adds.

Voicing support for Collins’ proposed bill, Pamela Atwater, president of Save Ontario Shores, says in a statement that her group “pledges its full support” for the bill and “look[s] forward to its enactment.”

“We are grateful to Congressman Collins for taking the initiative to propose legislation that will work to protect the future of our air base and the thousands of families and workers who rely on its continued operation,” says Atwater.

However, Apex maintains that the DoD does, indeed, know what it’s doing: “We believe our professional national security experts are doing their duty and acting in the best interest of our nation, the communities in which they operate and our armed forces.”

Florida City Unveils Renewable Energy Plans

The St. Petersburg, Fla., City Council has formally approved the city’s commitment to transition to 100% renewable energy. According to the Sierra Club, St. Petersburg represents the first city in Florida and the 20th city in the U.S. to make such a commitment.

In a unanimous vote, the City Council Committee of the Whole has allocated $250,000 of BP settlement funds from the 2010 Deepwater Horizon oil spill to an Integrated Sustainability Action Plan, which will chart a road map to 100% renewable energy in St. Petersburg.

In addition, the plan also incorporates components of a climate action plan and a resiliency plan and strategies for St. Petersburg to achieve a 5 STAR Community rating. The 100% clean energy road map builds on Mayor Rick Kriseman’s executive order establishing a net-zero energy goal for the city earlier in 2016.

“Working toward 100 percent clean energy and zero waste will help ensure that St. Pete remains a ‘city of opportunity where the sun shines on all who come to live, work and play,’” says Kriseman.

The Sierra Club continues working to get U.S. cities to fully commit to renewables through its Ready for 100 national campaign.

“The movement for clean energy in cities and towns across the country is now more important than ever,” comments Michael Brune, executive director of the Sierra Club. “St. Petersburg joins 19 other cities, from San Diego, Calif., to Greensburg, Kan., that will lead the way to support equitable and inclusive communities built on 100 percent clean, renewable energy for all. Whether you’re from a red state or blue state, clean energy works for everyone, and local leaders will continue to move forward to create more jobs, stronger communities, and cleaner air and water.”

The association’s local branch, Suncoast Sierra Club, heads the Ready for 100% St. Pete campaign, which develops residential and commercial pilot programs with partner organizations and raises public awareness of clean energy and climate planning in the city.

Campaign Manager Emily Gorman says, “This is a historic moment for St. Pete. We envision a city where families can raise their kids in communities free from toxic pollution — where everyone has the opportunity for a good job and access to healthy, affordable energy. The transition to 100 percent clean, renewable energy will ensure a more resilient, sustainable and equitable future for all our residents.”

Illinois Supreme Court To Hear Clean Line Case

It’s a yes from the Illinois Supreme Court: The rejection of Clean Line Energy Partners’ $600 million Rock Island Clean Line will soon be reviewed in court.

The Rock Island Clean Line, first proposed in 2010, was approved in 2014 by the Illinois Commerce Commission (ICC). However, opposition from Commonwealth Edison and various landowner groups resulted in the Third District Appellate Court’s reversing the approval.

Then, in September 2016, the ICC, Clean Line Energy Partners, the International Brotherhood of Electrical Workers, the Natural Resources Defense Council and Wind on the Wires asked the Illinois Supreme Court to take up the case on the project, which would deliver wind energy to power approximately 1.4 million homes annually, according to Clean Line.

According to the Chicago Tribune, the court has now decided to go ahead and review the reversal case.

Specifically, the developer anticipates that the 500-mile, high-voltage, direct-current transmission line will deliver 3.5 GW of wind from northwest Iowa and the surrounding region to communities in Illinois and other states to the east.

In a statement encouraging the Illinois Supreme Court to take up the case, Tom Kiernan, CEO of the American Wind Energy Association, said in September, “New transmission infrastructure is vital to the national need for more wind energy development, and Illinois is at the nation’s infrastructure crossroads. It is not good for Illinois or America for the state to close its borders to low-cost renewable energy.”

Send your Policy items to mdelfranco@navindpower.com
Out with the old. In with the new.

There’s something about a new year that triggers inspiration – the belief that we can, and should, be something more. Such thinking is probably why your gyms and weight rooms are a little more crowded than usual. The same mind-set can also be applied to business. With each January, companies and service providers typically use the coming year to chart a different course of action or roll out new products. And service providers that cater to the wind industry are no different. That’s why, this month, we bring you a special section we’re calling “New In 2017.”

As you’ll read in the following pages, these original equipment manufacturers and service providers have pushed the envelope in terms of conventional thinking. They typically fall under two primary categories: new entrants to the U.S. wind market and those rolling out product innovation. Regardless, the beneficiary is the broader wind industry itself, as new entrants to the U.S. market bring with them a fresh perspective, while product innovation offers the hope of increased efficiency and lower costs.

Welcome to 2017.
AFTER rigorous testing at the Høvsøre testing site in Denmark for large wind turbines, Siemens has obtained certification for a 2.5 MW rating by the certification body TÜV Nord for the latest evolution in its G2 wind turbine platform – updating the energy output for its newest product. The SWT-2.5-120 is slated to commence serial production this year.

By incorporating extensive operational data and advanced design tools into the turbine, the SWT-2.5-120 is able to help deliver increased energy production and a lower cost of energy for medium- to low-wind sites all over the world. “Given our relentless focus on delivering wind power technology that reduces cost and boosts energy output, we are very pleased with these test results. With the certification of a higher energy output for the latest evolution in our G2 product line, we are excited to start serial production next year of the SWT-2.5-120 – a product that is designed for markets with low- to medium-wind sites, such as the United States,” says Jacob Andersen, CEO of Siemens Wind Power Onshore Americas.

With high-performance, 59-meter blades, the SWT-2.5-120 turbine’s 120-meter rotor diameter represents about a 17% boost in annual energy production compared with the SWT-2.3-108 – helping to substantially reduce the cost of energy. The SWT-2.5-120 turbine uses Siemens’ robust and flexible aeroelastic tailored blade, designed in Boulder, Colo., to reduce weights and loads through intelligent use of the blade’s flexing capabilities. This design allows for the SWT-2.5-120’s larger rotor size without a proportional increase in structural loading, decreasing wear and tear on the turbine.

Blades for the new turbine will be produced at Siemens’ blade factory in Fort Madison, Iowa, and the nacelles and hubs will be assembled at the Siemens plant in Hutchinson, Kan.
WindGuard North America:

When dealing with something as important as power curve measurements, every detail matters, as faulty estimates can result in missed forecasts and earnings. Additionally, performance is also fundamental to the certification of a wind power installation.

Therefore, why not opt for the service provider that was instrumental in coming up with the industry standards that are still used today?

That’s the case at Europe-based service provider WindGuard Group, which was intricately involved in formulating the International Electrotechnical Commission (IEC) standards, as well as the Measuring Network of Wind Energy Institutes, an industry standards body, explains Axel Albers, WindGuard Group’s managing director.

WindGuard’s staff have been heavily involved in power curve testing and the development of corresponding standards and guidelines since the 1990s. They brought their expertise to WindGuard when it was founded in 2000.

The company’s fingerprints are also on the forthcoming second edition of the IEC 61400-12-1 standard, including the entire turbulence normalization procedure, the principles on the calibration and classification of remote sensing devices (such as LIDAR and SODAR), many tricky parts of the uncertainty assessment, and an improved procedure for in-situ testing of anemometers.

As power curve testing has always been a priority, Albers notes that leading original equipment manufacturers and wind farm developers have inquired directly about its U.S. capabilities. So, the WindGuard Group set up a local team in Alexandria, Va., as part of its subsidiary, WindGuard North America, to specifically monitor power curve measurements for the U.S. market.

“In our experience, customers in the U.S. place great value on whether or not a company has its own U.S.-based team when working with European companies,” Albers says. “Also, we feel it’s much easier to tend to our customers’ needs and provide them with the high quality we expect from our services when we are closer to them.”

By early summer 2017, the company expects to establish a team for site and wind resource assessments.
For more than two decades, Goldwind has been innovating for a brighter energy future. The Goldwind 3.0 MW permanent-magnet, direct-drive platform is part of that innovative future. Although the design principles of the Goldwind 3.0 MW and 2.5 MW remain much the same, the new GW3S Smart Wind Turbine introduces best-in-class energy production, smarter controls and industry-leading reliability.

**Scalable capacity.** Through the scalable nature of the GW3S platform, the rated output of the turbine can be scaled from 3.0 MW to 3.4 MW, and the turbine features an impressive increased rotor diameter size of up to 140 meters. As a result of the adaptive nature of the 3S platform for low- and ultra-low wind speeds, the turbine can be extensively applied to projects with average wind speeds ranging from 5.5 m/s to 8.5 m/s.

Scalable rated power and group control systems are two key elements for maximum energy production. With these two site-adaptive technologies combined, turbines synchronize closely with each other to compensate for any loss in total power output. The two technologies can also be utilized for decreasing noise emissions and can operate in special wind conditions, harsh terrain and extreme high/low temperatures.

**Smart sensing.** The GW3S platform’s key components are monitored by multiple strategic sensors that enable predictive diagnostics and precision control.

**Smart control.** Based on Goldwind’s big data analysis of tens of thousands of installed direct-drive turbines and more than 20 years of wind energy expertise,
Goldwind has developed the most advanced optimized control algorithms for maximum energy capture.

**Structured design.** In addition to Goldwind’s overall optimized design features for unique operation conditions, the GW3S’ modular approach features shared blade molds, a single blade erection method and modular generator technology – all of which support efficiencies in logistics, installation, and operations and maintenance over the life of the turbine.

The first deliveries for the North American market are slated for late 2017/early 2018.

**Who We Are**

**Mission – Highly efficient energy solutions to power our lives**

**Commitment to Excellence.** Through our extensive global network of companies and the longevity of our energy and finance professionals, Goldwind Americas offers a comprehensive, turnkey menu of services, including research and development, project development, turbine manufacturing, project management/supervision, and after-sales services – we are focused, yet integrated. In addition to our breadth of project work, we also engage several financing solutions by leveraging an extensive network of global resources and our finance arm, Goldwind Capital.

**Commitment to Innovation.** Building upon our strong foundation rooted in wind power solutions and permanent-magnetic, direct-drive expertise, we continue to explore the potential to combine wind power with other forms of renewable energy. This includes the pursuit and development of wind and solar power generation, smart micro-grids, energy savings, and technical and operational solutions. Providing clean, cost-efficient renewable energy is an urgent, global imperative. Goldwind is dedicated to furthering the most advanced and cost-efficient wind power projects, continually raising the bar through a steadfast commitment to innovation.

**Commitment to Quality, Health, Safety and the Environment.** Goldwind senior management is fully committed to protecting the health and safety of our employees, contractors, visitors and other interested parties, while also incorporating sustainable development throughout its worldwide business.
Black & McDonald: 
Black & McDonald Launches Into U.S. Wind Market

Canada-based Black & McDonald is accustomed to growing its business by sharing the experience and expertise of its resources from one region with its employees in another area of potential. The company has followed a planned course of diversification and expansion, combining growth and financial stability with ongoing investment in its people and a willingness to pioneer new business opportunities and directions. Therefore, it means something when it identifies the U.S. renewables market as a key growth opportunity.

Since 1921, the company has made its mark as a “boots-on-the-ground” construction services provider serving government, institutions and the industry across Canada, the U.S. and overseas. Following its founder’s code of business to “do the job right . . . regardless,” Black & McDonald has become a trusted resource in even the most critical environments. The company’s marquee projects range from Oil Sands projects in Alberta to public-private partnership projects across Canada and multimillion-dollar projects for U.S. automotive giants. Not one to rest on its laurels, the company is now expanding its U.S. presence into the renewables market.

“We feel that renewables projects in the U.S. are the logical target at this time,” explains Mark Winstead, general manager of Black & McDonald’s newly formed U.S. renewables group. He’s confident such a move is the right one due to the long-term extension of the production tax credit and the fact that some of Black & McDonald’s largest clients were asking them about their U.S. wind and solar capabilities.

No stranger to renewable energy, Black & McDonald has completed over 30 wind and solar projects in the past decade across Canada and one in New York in 2016.

Not that the expansion into the world’s largest wind market will be easy. For his part, Winstead is well aware of the competition and the pressures of standing out among the market’s well-entrenched players. To differentiate the company, Winstead describes Black & McDonald as a single source services provider that has the ability to keep construction schedules on time and on budget.
“Our people are our strength, making our multi-trade ability to self-perform one of our biggest assets,” he explains, meaning that the company is directly involved in each phase of construction. From turbine construction, to installing the overhead or underground collector system, energizing the substations and overseeing transmission installation/upgrades, Black & McDonald is able to control the major areas of wind farm construction.

And by leveraging its corporate purchasing strategy, the company is able to promote outstanding, quality workmanship at a fair price. Its well-organized, professional approach was established in 1921 and has been a cornerstone of its electrical, utility, mechanical, fabrication and technical services, as well as facility management and operations resources.

Winstead is optimistic about the company’s short-term prospects. “We’ve been well established in the U.S. for many years and are excited about our expansion into renewables here,” he notes. “In fact, by the time this article is published, we will have been awarded our first projects, which will be completed in the fall of next year.

“With Black & McDonald’s solid foundation and experience in the U.S., our renewables group is off to a great start, with contracts in hand and the resources to maintain it for the long term,” says Winstead.

A crane lifts the rotor for attachment at 350 feet. 
Photo courtesy of Black & McDonald

We honor and respect these beliefs.

Projects Overview

With a team of over 5,500 strong, Black & McDonald lives and breathes the ultimate in safety, quality and high performance, along with engineering excellence, best-of-class fabrication and unprecedented customer service. Delivering the right solution in the right way at the right price is driven by an ongoing attitude of unwavering integrity and proud tradition.

Everyone at Black & McDonald knows that continued success depends on the ability to deliver innovation and exceed client expectations. It continually rests on the shoulders of each and every member of the team.

Anything less is not the Black & McDonald way.
Casting A Safety Net
Around Dropped Objects

A new effort attempts to limit the rate of incidents of objects falling from various heights.

By Mark Del Franco

According to the Bureau of Labor Statistics (BLS), there were 240 fatalities as a result of falling objects or equipment in the U.S., which accounted for approximately 5% of all workplace fatalities. And in 2015, the BLS found that 42,400 incidents of falling or dropped objects culminated in a medically reported incident.

According to the American Wind Energy Association (AWEA), a dropped object “falls from its previous static position under its own weight, with the potential to cause injury.”

Working safely and securely with tools is important in any industry, but when the rigors of the job take you 300 feet above the ground, dropped objects take on added importance. A small falling object, such as a bolt, will generate an impact of 300 pounds and can cause serious injury.

Such was the case at the Ninnesscah Wind Farm in Kansas when a 26-year-old worker was seriously injured after being struck in the head by a four-pound, 10-inch bolt during construction in July. Although the man recovered, incidents like this underscore the risk faced by workers.

To raise awareness, as well as to help prevent further incidents from occurring, the International Safety Equipment Association (ISEA) is readying a tool-based standard that it hopes will provide a further level of scrutiny at U.S. job sites, particularly those involving heights.

Working together with manufacturers such as Ergodyne and Capital Safety, a subsidiary of 3M, ISEA seeks to standardize the tools available to protect workers from objects falling from heights. These objects include hand tools, instrumentation, small parts, structural components and other items that have to be transferred and used at heights.

According to ISEA, the objective is to provide employers with a document that establishes minimum design, performance and labeling requirements for solutions that reduce dropped object incidents in industrial and occupational settings, explains Cristine Fargo, executive director. An industry first, the proposed standard will focus on preventive solutions actively used by workers to mitigate these hazards and address the classification and testing of these solutions.

Fargo anticipates completing the new standard sometime in the second quarter. To test acceptance and gain feedback, Fargo plans to introduce the standard at the upcoming National Association of Tower Erectors national conference.

“It’s really important to use that show as an opportunity to make sure the voice of the customer is heard,” she notes.

From there, ISEA will present the standard to the American National Standards Institute (ANSI) for consideration. Once a draft standard is approved within ISEA, it will undergo a formal review and approval process by an outside consensus body before being submitted to ANSI for acceptance as an American National Standard.

ANSI is a nonprofit organization that sets the rule for the development of fair industry- or interest-based consensus standards.

Regulating and enforcing agencies, such as the Occupa-

How To Get Involved

Transparency and consensus are cornerstone principles in the development of voluntary industry standards drafted by ISEA product groups, explains Fargo. By participating as a member of the consensus body, you can do the following:

• Influence the quality and direction of standards that have a direct impact on worker safety and health;
• Directly contribute to documents that are codified by regulatory bodies, recognized as industry best practices or incorporated as part of commercial contracts;
• Gain competitive knowledge by learning of revisions before they’re published; and
• Enhance your understanding of relevant standards and trends that can increase efficiency and reduce costs to your businesses.

For more information, visit safetyequipment.com.
tional Safety and Hazard Administration (OSHA), tend to look to ANSI standards because of the rules that it sets about fairness, resolving comments and participation. Therefore, any adoption by ANSI can take on added significance.

For its part, AWEA, having recently enacted its own dropped object campaign, notes that the new standard could be significant.

“If OSHA were to adopt it, the standard is more significant for the manufacturers,” explains Michele Myers Mihelic, AWEA’s director of worker health and safety policy and standards development. “It would be helpful because there would be a known entity to a certain rating and code.

“Our membership would then benefit if they purchase equipment, such as a tool bag, that has an ANSI rating for dropped objects.”

What’s also notable about this particular effort is that it’s a new standard – not one that was made applicable to U.S. industries.

“I’ve been in the industry for 10 years,” notes Nate Bohmbeck, senior products manager at Ergodyne and ISEA member, “and I’ve not seen something like this. The majority of standards you see typically involve European or Canadian standards that have been revised to fit the U.S.

“This [program] will help guide companies on what type of equipment to use rather than having them rely on their own know-how,” he explains. “Not only will it help put equipment in the field, but [it] also will help by putting a program and a policy behind it.”

Scott Bramlett, health, safety and environment specialist at EDF Renewable Energy and chairman of AWEA’s safety committee, likes the idea of equipment manufacturers coming together and working under the auspices of an organization, such as ISEA.

“When equipment manufacturers come together to bring high standards to their products, the end user will oftentimes benefit,” he says.

The only drawback to such standardization is that it could hinder product advancements. “It might make it harder for someone wanting to innovate.”

Ultimately, having a solid set of equipment standards will benefit the wind industry and its workers, he says.

“Our employees are our greatest asset,” Bramlett says. “Providing them with high-quality tools for their day-to-day success is a big priority for us.”

The ties – and tools – that bind. There are several product areas that the new rule will impact, including the following:

- Crescent wrench.
- Channel lock.
- Hoist bucket.

Photos courtesy of Ergodyne
Thanks to turbine technology advances, repowering provides many opportunities.

Photo courtesy of DNV GL
Historically, repowering a wind project has meant the complete removal of older turbines, including foundations and electrical collection systems, because the scale and generating capacity of modern turbines have grown to the point where new machines are five- to 30-times larger than the original turbines, rendering the original equipment effectively useless in terms of upgrades.

However, now that the industry has been deploying thousands of multi-megawatt-scale turbines since about 2000, there is a significant population of turbines that have similar physical characteristics such that they can be adapted (within limits) to accept current state-of-the-art nacelles, rotors, power electronics and controls. Turbine original equipment manufacturers (OEMs) have been actively taking technology improvements contained in their new models and offering them as upgrades for models sold five to 10 years ago that are suitable. This upgrade approach can be effective in achieving some improvement in power generation, increased reliability and the better adaptation of turbines to actual site conditions. However, there are limits to the magnitude of the performance improvement achievable in this upgrade approach: Roughly speaking, single-digit percent increases in annual energy production (AEP) are most common (but your mileage may vary).

Partial repowering involves leaving some portions of the existing turbine and replacing other portions with new equipment and technology. This could mean as few parts as the foundation, tower and balance-
of-plant electrical systems remain, while all other elements are replaced. There are also a variety of other possible component replacement combinations, depending upon the turbine model under consideration. Given that wind turbines are fatigue-limited structures, reuse of the tower and foundation means partial repowering is best performed on machines that are able to retain a good portion of their remaining useful life such that the partially repowered turbines could operate for a sufficient period and achieve the economic benefits of repowering.

**Why partially repower a 10-year-old turbine?**

Ultimately, the partial repowering of a project must deliver improved economics, both for the project owner and, ultimately, the consumers of electricity. There are a number of scenarios by which this can be achieved. Projects where turbines are “under-sited” or certain phases or rows of turbines are significantly underperforming due to wind speeds being significantly lower than original projections are good candidates.

The low wind speeds mean the turbines have not experienced structural load levels, and the rate of loading (fatigue accumulation) is less than expected in the design. Although the turbine may be 10 years old, analysis of historic wind and SCADA data demonstrates that it may have accumulated only five years of fatigue. Although updating software, operating the generator at higher power levels and installing certain aero devices on the blades are potential upgrade options, more dramatic increases in energy production could be achieved by replacing the entire rotor and nacelle with larger and more site-specific equipment. Depending on the wind resource, a 20% larger rotor (in terms of swept area) might be able to extract 10% to 20% more energy, given other characteristics such as hub height and rated power remaining the same.

Consider another scenario in which a project has turbine models that have been significantly less reliable than expected and the OEM is no longer active in the market or able to support that specific model. Due to accumulation of downtime, it’s possible the towers and foundations have experienced a lower level of fatigue accumulation — meaning they have remaining structural life that can be utilized after the replacement of the nacelle and rotor.

Much has been written and discussed this year about U.S. Internal Revenue Service guidance on the eligibility of repowered projects to qualify (or re-qualify) for production tax credits, provided the new investment value is at least four-times greater than the retained value of the unmodified equipment. Although this clarification and opportunity are welcomed, it’s important that obtaining tax credits does not become the main driver for performing partial repower projects. The combination of increased energy production, improved efficiency of energy capture, increased equipment reliability and a potentially longer operating life is expected to offer improved project economics and competitive cost of energy, which should be the primary drivers.

**Are there limits?**

There are some practical limits to the size of new rotors and nacelles in comparison with the existing towers and foundations. Although this is not absolute, rotors larger than about 20% could impart loads too high for the remainder of the original tower and foundation to withstand and achieve a desired 20-year operating life. There are also physical tolerance considerations related to dimensions of a new nacelle in comparison with yaw bearing and tower top diameter or blade tip-tower clearance to avoid tower strikes. Larger rotors will mean greater wake impacts on downwind turbines (and related load impacts, as well), potential infringement on setback requirements, and potential impact on avian and bat mortality, among other issues. Therefore, a partial repower effort takes on many characteristics and requirements of new project development but with more focused reviews and targeted actions.

The reuse of foundations has several potential advantages, including the avoidance of soil excavation and related new permitting. If the tower is being reused, or being replaced with a similar configuration, existing foundation anchor bolts or mounting pieces could be reused with replacement or rehabilitation of the grout bed or mounting surface. However, the foundation for a partially repowered turbine will experience different ultimate and fatigue loading than the original turbine, and the capacity of the foundation and surrounding soils must be reviewed. Wind turbine foundations designed more than 10 years ago may not have been designed for fatigue loading at all and would need to be brought up to current standards — if even possible.

Soil conditions should be assessed for settlement, excessive deformation or other signs of load-related effects. Finally, the loading history of the turbine must be reviewed to estimate the amount of remaining life in the structure. Rebuilding or increasing the capacity of an existing foundation (where possible) is a very challenging task and could reduce economic benefits. Depending upon the findings, the capability of the foundation can pose clear limitations on the magnitude of possible repowering.

Repowering a project and increasing generating capacity will result in having to renegotiate the power purchase agreement (PPA), and prices will likely go down — so why should we do this?

This is a fair point, and partial repowering does not always make economic sense for every project. As noted earlier, partial repower projects necessitate performing many activities that are required as part of developing a new project, including...
evaluating various contracts. Certainly, a potential risk that must be evaluated is the impact on power sale price triggered by renegotiating the PPA to enable high production and/or generating capacity levels. Although current power prices may be lower than originally negotiated, the impact of using turbines with higher performance levels and current pricing has the potential to result in acceptable project economics. The same turbine technology deployed at new projects is resulting in economically viable projects with lower PPA prices that are competitive in current markets.

Where partial repowering is performed and a new calculation of future energy production is completed, use of historic operating data and wind data, as well as the analysis of wind-flow, can be used to improve energy calculation accuracy. Unlike pre-construction energy assessments, energy assessments based on operation data can more accurately account for long-term effects, environmental losses, electrical collection system losses, wake effects and terrain effects of windflow. We estimate that the uncertainty of long-term AEP is reduced by about 2%-3%, and the one-year P99 energy value can increase 4%-7% (but your mileage may vary).

Early experience

Partial repowering has likely been performed at projects with very old, kilowatt-scale technology to one degree or another. But looking at modern megawatt-scale turbines, there are some early examples of partial repowering. At Medicine Bow Wind, Gamesa was able to acquire and modify two V42 and seven V47 turbines via its turbine life extension upgrades, increasing generation capacity by 10%. This process retained the original blades and nacelle, thus limiting the magnitude of performance increases, and the company was able to successfully demonstrate the process. General Electric completed a demonstration project by adding a seven-meter extension onto turbines at Noble’s Clinton Wind Park. The blade extensions increased the swept area by 40% and reportedly increased production by about 20%. Although this did not involve changes to the nacelle and drivetrain, the rotor size was increased and an assessment of the associated implications in loading was performed. Finally, NextEra has announced it is evaluating options to implement partial repowering in its fleet and appears to have selected a couple of initial sites in Texas to begin the effort.

As the wind industry matures, full and partial repowering will continue to play a role, along with new project development, in meeting society’s need for low-cost, carbon-free electricity. Areas that have experienced the economic benefits of wind energy will likely continue to be strong supporters of the industry. It’s difficult to imagine scenarios in which large projects in the Midwest are simply decommissioned at the end of their 20- to 30-year operating life, and we don’t take further advantage of the known good wind resource in these areas. Although it’s not currently a significant contributor to increasing generation capacity today, full and partial repowering will become a critical industry capability in the near future.

Kevin J. Smith is director of asset management and operating services for the Americas at DNV GL, and Alex Byrne is senior engineer of turbine technology at the company. They can be reached at kevin.j.smith@dnvgl.com and alex.byrne@dnvgl.com, respectively.
Exelon’s Bluestem Wind Comes To Fruition

Google will buy the entire output from the 198 MW Bluestem wind farm as part of its commitment to power 100% of its operations with clean energy.

By Lauren Tyler

Construction was slated for completion by the end of the year.

Photo courtesy of Exelon Corp
With construction set for completion last month, the 198 MW Bluestem wind project is ready to bring renewable energy to the state where — excuse the show-tune reference — the wind comes sweeping down the plain.

Developed by Renewable Energy Systems (RES) and subsequently sold to Exelon Generation in December 2015, the Bluestem wind farm features 60 Vestas 3.3 MW V117 turbines with approximately 100-meter towers and is located in Beaver County, part of the Oklahoma Panhandle.

RES began construction on the Bluestem project in mid-January 2016 and, as of press time, was slated to reach completion as the year came to a close. Once operational, the new wind farm will bring 845,000 MWh per year to the Southwest Power Pool.

Although Exelon is no stranger to wind power — currently standing as the nation’s 12th-largest wind producer, with 47 projects across 10 states and boasting nearly 1,500 MW of power — the Bluestem wind farm is the company’s first in Oklahoma.

Exelon is largely known for its nuclear generation, which represents 64% of its holdings — in fact, the company operates America’s largest fleet of nuclear power plants. In comparison, only about 5% of its holdings are related to renewable energy, such as wind and solar. That said, the company has been growing its portfolio of natural gas, hydro and renewables as of late.

The company brought its first wind project into full commercial operation in early 2012 and has only expanded since, maintaining high hopes for projects like Bluestem.

According to Exelon’s Bill Harris, the most notable aspect of the Bluestem project was simply how everything went so smoothly — especially considering there were nearly 200 participating landowners to consult.

To ensure lines of communication were open and to address any issues, if necessary, three landowner meetings were held at Balko High School in the local school district, starting last January.

According to Harris, the most recent landowners’ meeting — the last such gathering before the start of operations — was a “mutual admiration society.”

Harris comments that Exelon worked together with RES, the project leadership team and the community to move forward on the Bluestem project, noting that there were minimal issues across the board.

As those in the industry know, that’s certainly not always the case.

“How having no remarkable construction or safety issues is a really positive thing,” Harris says.

When discussing Exelon’s other renewables ventures, Harris mentions that the development process for the 78 MW Sendero Wind Farm, an Exelon-owned wind project located in Hebbronville, Texas, went a bit differently, having faced some of the common hurdles for wind farm development.

“There was a lot more to manage and supervise with Sendero than we saw with Bluestem — people issues, land issues, violation issues,” he says. “A lot of it has to do with communication and making sure everything is clarified.”

According to Harris, Exelon purchased Bluestem for its key strengths, including the strong wind resource in the area; the flat and clear land; the strong connection to the transmission grid via new infrastructure; and lastly, but perhaps most significantly, the 15-year power purchase agreement already in place with Internet behemoth Google.

On Dec. 3, 2015, Google signed off on the Bluestem agreement as part of the company’s plans to add an additional 842 MW of renewable energy capacity over the next two years to power its data centers — its largest renewable energy purchase to date.

As a non-utility company, Google has been making headlines for its pledge to triple renewable energy purchases by 2025 and for its goal to power 100% of its operations with clean energy as early as 2017. These promises have certainly garnered attention, considering Google consumes approximately 5.7 TWh of electricity annually between its global data centers and offices, serving more than 1 billion people across the world.

As it stands, Google is currently the largest corporate purchaser of renewable energy in the world.

Besides the “green” aspect, wind farms like Bluestem can offer several advantages to companies like Google, considering how wind power is becoming increasingly cost-effective and development can boost job creation.

The Bluestem wind project, in particular, created 300 jobs during construction and will require a dozen full-time professionals during operation.

“It’s already been an economic boom with its construction,” Harris says. “It’s a huge capital investment for Exelon, and it’s provided hundreds of jobs during construction.”

Once in operation, Bluestem will benefit from the full value of the production tax credit (PTC) — although Harris notes that development would have gone forward even without the PTC’s helpful push. Bluestem was full-steam ahead from the start.

All things considered, operations in Beaver County are expected to go forward without a hitch — putting that “sweeping wind” to good use. —

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Among central U.S. states, Oklahoma has built itself into a wind leader. According to the American Wind Energy Association (AWEA), Oklahoma ranked third nationwide in 2015 for total wind energy generation, which comprised an impressive 18% of the state’s electricity. The state’s incredible wind resource also contributes to economic development, providing annual land lease payments to landowners and supporting nearly 8,000 direct and indirect jobs in 2015. A recent study from Oklahoma State University found that wind companies have paid nearly $134 million in ad valorem taxes to the state since 2004, increasing revenues for local schools and county services.

Situated between Texas and Kansas, the state flew under the radar as its neighbors accentuated their wind resources. However, faced with massive mounting shortfalls in its state budget, Oklahoma is experiencing some Texas-sized headaches. In fact, some influential lawmakers, such as Rep. Mike Mazzei, R-Tulsa, have considered wind the culprit and want to eliminate the zero-emissions tax credit, more commonly known as a state production tax credit. Whichever you prefer calling it, the incentive is Oklahoma’s only remaining wind energy tax incentive.

Jeffrey Clark, executive director at the Wind Coalition, an AWEA regional partner, explains that several macroeconomic factors occurred that have forced the present-day situation. “Because of low oil and gas prices, Oklahoma’s budget has been a challenge in recent years,” Clark explains. “And when you factor in the structure of Oklahoma’s energy incentives, it’s had a direct revenue impact on the state budget.”

Zero-emissions tax credit

More specifically, Clark is referring to the state’s zero-emissions tax credit, which was enacted in 2002 before utility-scale wind farms were constructed in the state. The incentive has changed over the years, but it now provides a tax credit of $0.50/kWh of electricity from zero-emissions sources. It can be carried forward for up to 10 years, allowing companies to accumulate tax credits and use them in later years to offset taxes owed. The incentive used to be transferable, Clark says, meaning wind developers could sell the credit to other taxpayers to reduce tax bills. To increase transparency, lawmakers changed the incentive to a refundable tax credit in 2014.

According to the Oklahoma Tax Commission, wind-related tax credits have been growing and cost the state more than $101 million from tax years 2012 through 2014, including more than $60 million in tax year 2015 alone.

And when some state lawmakers, such as Mazzei, saw the increasing wind totals, it didn’t take long to find a solution: Eliminate Oklahoma’s zero-emissions tax credit altogether. And for Mazzei, the sooner the credit is eliminated, the better.

“In 2010, this credit cost Oklahoma $3.7 million, but as of 2015, the cost exceeded $100 million,” he says in a press release. “The whole goal of any tax incentive should be to generate economic benefits that are greater than the cost. When you look at the direct economic benefit from the wind power facilities in
2015, it was $78.4 million and produced only $17.1 million in tax revenue.”

Mazzei continues, “When you take into account the fact that Oklahoma is looking at a budget shortfall of at least $600 million for fiscal year 2017, we clearly cannot afford to wait until 2021.”

The tax incentives have facilitated a significant amount of wind power in the state, Mazzei concedes. “However, in light of the cost versus the benefit, the significant budget constraints facing the state and the many unmet funding needs for core functions, the tax credit needs to end immediately.”

A continual fight

The recent acrimony over wind energy and tax incentives is not new. In fact, energy tax incentives have been a frequent bone of contention over the years.

In the last legislative session, lawmakers were considering three bills to scale back an existing tax credit of $0.50/kWh for generating electricity from wind and a separate bill to establish a 75% natural gas energy standard by 2020, notes Keith Martin, a partner at law firm Chadbourne & Parke.

One of the wind bills would have cut off tax credits for new wind facilities placed in service after 2016. Another would have reduced the tax credit by 25% starting in July of that year. The third would have denied any tax credits on wind electricity generated after 2017 unless the state legislature reauthorized the tax credit after hearing from an evaluation body it set up to look at state tax incentives, says Martin.

Fortunately for the wind industry, the bills missed a procedural deadline to move to a third reading. However, the bills’ reprieve was short-lived, as hawks such as Mazzei had already sounded the alarm.

As it is, the wind industry has already offered to make concessions. Clark says the industry voluntarily gave up half of its state incentives in the 2015 legislative session, immediately ending a five-year property tax exemption for wind farms. Now, the coming fight over the production tax credit (PTC) may leave Oklahoma without any incentives to lure wind development. It’s a classic chicken-and-egg scenario, according to Clark.

“On the one hand, Oklahoma wants to stay competitive with wind,” he says. “On the other, they really want to reduce those impacts to that state budget.”

David Burton, partner at law firm Mayer Brown, offered North American Windpower a potential solution back in July.

“One solution would be to simply cap the aggregate amount of the credit and limit eligibility to a first-come, first-served basis.”

However, Burton noted, the problem with this approach is that the credit would have less appeal to developers and investors because of the uncertainty surrounding when the credit reserve would be depleted.

To address this concern, the state could design a program in which projects apply for the PTC in advance to reserve a PTC at a projected level of production. The program would have to balance the developers’ ability to reserve the credit before committing themselves to a project; the caveat would be that highly speculative projects should not be incentivized at the expense of more likely projects.

If a highly speculative project displaces a more likely project on the reservation list, and then the speculative project does not get built and the lack of a reservation discourages the developer of the likely project, then the policy will have failed to have effectively stimulated construction of either project.

On the other hand, Burton advised, the legislature should avoid neutering the policy by requiring developers to progress their projects too far to qualify for a reservation – which would discourage entrepreneurial developers from selecting sites in the state providing the PTC.

The Wind Coalition will continue to work with Oklahoma on potential alternatives, notes Clark.

Of A Good Thing
Vestas Extends Services For B.C.’s Dokie Wind Farm

Alterra Power Corp. and funds managed by Axium Infrastructure Inc. have extended a service contract for the 144 MW Dokie wind farm, situated in the Peace River District of northern British Columbia.

Vestas has been providing operations and maintenance services at the wind farm since the commencement of operations in 2011.

Now, the extension renews the project service agreement through 2031.

“We are pleased to enter into this new contract,” comments Paul Rapp, Alterra’s vice president of wind. “We have enjoyed a great partnership with Vestas over the past five years and are pleased to continue this relationship into the future.”

According to Axium, 100% of the power produced by the project is sold to BC Hydro under a 25-year power purchase agreement.

Firm Notes Good Progress With 2017 Orders

Broadwind Energy Inc. has announced $23 million in new wind tower orders from undisclosed customers.

The company plans to produce the towers in its Manitowoc, Wis., and Abilene, Texas, facilities. Broadwind expects delivery to take place this year.

Stephanie Kushner, president and CEO of the company, notes that Broadwind has booked more than $250 million in new tower orders this year.

“Both of our tower manufacturing facilities are operating consistently, and a good portion of our 2017 capacity is under contract,” she says.

ACCIÓNA Powers Up Texas Wind Farm

ACCIÓNA Energy’s San Roman Wind Farm is now operating commercially near Brownsville, Texas.

The 93 MW project is ACCIÓNAs eighth wind farm in the U.S. and brings the company’s total U.S. wind capacity to 721 MW. ACCIÓNA also has 181 MW of operational wind power capacity in Canada (in Alberta, Ontario and New Brunswick) and 556 MW in Mexico (all in Oaxaca).

The San Roman Wind Farm comprises 31 AW125/3000 turbines manufactured by Nordex/ACCIÓNA Windpower. (The companies completed their big merger earlier this year.) Each turbine has a rotor diameter of 125 meters and is mounted on an 87.5-meter steel tower.

Owner and operator ACCIÓNA also served as general contractor during San Roman’s construction, which was completed in approximately 11 months.

“ACCIÓNA is proud to complete this latest addition to our U.S. renewable energy portfolio and become a part of the community here in Cameron County,” comments Ilya Hartmann, CEO of ACCIÓNA Energy for North America.

According to the company, the new facility will produce enough electricity to power more than 30,000 Texas homes. Over its 25-year life span, San Roman is expected to generate $30 million in tax revenue for local school districts and other public services, as well as more than $25 million in lease payments to local landowners.

ACCIÓNA says it performed extensive wildlife studies prior to construction and conducted a social impact analysis to understand the project’s effect on local stakeholders. Based on the analysis, ACCIÓNA chose to establish a scholarship fund and a community benefit fund to support education and job growth in the area.

Silicon Valley Power Grabs California Wind PPA

Salt Lake City-based independent power producer sPower has signed a 25-year power purchase agreement with Silicon Valley Power (SVP) – the municipal electric utility of Santa Clara, Calif. – for 49.5 MW of wind.

The power will be bought from sPower’s Sand Hill Wind facilities, which will be constructed within California’s Altamont Pass Wind Resource Area.

sPower anticipates erecting up to 25 wind turbines for the project, which is expected to enter commercial operations before the end of 2020.

“The Altamont Pass is just 40 miles from our service territory,” comments Steve Hance, SVP’s electric division manager. “It’s great that our local community will benefit directly from increased renewable energy and the favorable economics afforded by the Sand Hill Wind project – and also indirectly from the local job creation and generation of new state and local tax revenues.”

Ryan Creamer, sPower’s CEO, adds, “sPower is excited about developing its first wind farm in California, especially given SVP’s initiatives to create a cleaner energy future for the City of Santa Clara’s residents and businesses.”
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New York Holds The Key To U.S. Offshore Wind

A
fter 15 years of frustration and hundreds of millions of dollars spent on false starts, the pendulum is finally swinging in a promising direction for the offshore wind industry in the U.S.

Up and down the Northeast coast, by far the most densely populated and power-hungry region of the country, developments are moving forward briskly. Nearly a decade since having been first proposed, the Block Island Wind Farm demonstration project has been built and is generating. Maryland also seems poised to award a utility-scale contract in May of this year on the back of 2013 legislation. Talks are again percolating in New Jersey, a state that has long flirted with offshore wind and in 2010 became the first jurisdiction to pass legislation specifically targeting its procurement. Progress stalled under the administration of Gov. Chris Christie, but there is renewed hope that New Jersey will finally take the plunge in 2018 under potential new Democratic leadership.

Finally, the industry knew it had attained legitimacy last summer, when Massachusetts passed and signed into law “An Act to Promote Energy Diversity,” directing the state’s utilities to competitively procure 1,600 MW of offshore wind power by 2027.

Now, much of the industry’s attention has shifted to New York, home to 20 million people, a $1.5 trillion economy and electricity prices that are among the highest in the nation.

In bold Big Apple fashion, New York’s Energy Research and Development Authority announced that it would be participating in the federal government’s lease auction for the designated wind energy zone located 12 miles off of Long Island. The move was unprecedented, as no government entity had participated in the five previous federal offshore wind area lease auctions held by the Department of the Interior. A key driver for the decision from Albany was the recognition that offshore wind is the only large-scale resource that can be effectively leveraged to meet the state’s aggressive “50% by 2030” renewables target.

If successful, New York will carry out a robust program of pre-development activities on the site to dramatically reduce development risks and collect relevant data. Private developers would then, likely not before 2018, compete in a cost-of-energy shootout that will ultimately deliver the lowest possible levelized cost of electricity to consumers. Finally, the elusive hat trick of offshore site control, power take-off and minimal ratepayer impact could be a reality in the U.S.

In recent months, four similarly designed European offshore wind tenders have yielded shockingly impressive results, with the latest coming in at approximately $0.07/kWh, including transmission costs. Europe did not get to this point overnight, having built upward of 15 GW to date at price levels that would cause revolt on this side of the Atlantic. Similarly, the emerging U.S. sector will have to create scale at a price premium but will benefit from an enormous head start down the cost curve, thanks, in large part, to the many painful and expensive lessons already learned by the Europeans. Much of that cost-saving knowledge is already being transferred to the U.S. With political will and some patience, the U.S. will catch up.

New York is uniquely positioned to create the scale and entice the investment in local infrastructure that is required to make all of this a reality. When you consider proximity to load, market price of electricity, thirst for renewables and viability of alternatives, no other coastal state in the region comes close to New York’s potential demand for offshore wind that must be exploited.

The Netherlands, with a similar population but an economy half the size of New York’s, is currently tendering 700 MW annually, with a plan to ramp up to 1 GW. The Dutch are well on their way to meeting their 4.5 GW by 2023 target, with no plans to stop there. With the New York industry lobby calling for a 5 GW by 2030 target, there is clear optimism that the state will go Dutch on offshore. If it does, and progress follows plans in Massachusetts and elsewhere, it will be awfully difficult for anyone to break the American offshore wind wave – not even climate change deniers and a kid from Queens in Washington.

Sunny Gupta is an offshore wind strategist based in New York City. He can be reached at (917) 691-9881 or sunny.gupta@gridalternatives.org.
Success means driving operational excellence by partnering in four main sectors, health & safety, O&M, workforce training & development, and quality assurance.

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