



To transport the blades, ALE worked with local authorities to obtain the relevant permits but also to make adjustments to the route, such as cutting into part of a mountain to achieve the necessary turn radius. (Courtesy: ALE)

## ► CONSTRUCTION

### Advanced route planning helps transport 61 turbines

Chile's Energy Route 2018-2022 is an initiative that hopes to bring together stakeholders in the renewable industry. Following its announcement, Spain's Acciona was contracted to build four new renewable energy projects in Chile, adding 400 MW across two solar farms and two wind farms.

One of these is the San Gabriel wind farm, in the municipality of Renaico in the region of La Araucanía.

Once completed, San Gabriel will be home to 61 wind turbines, adding 183 MW of renewable energy to the grid, with an investment of \$300 million.

To transport the components, the contractor turned to ALE. Each wind turbine was made of concrete segments, as well as a nacelle, which houses the generator; a hub, to which the blades are attached; and the blades themselves. In total, there were 976 components.

ALE was tasked with unloading the components from ships arriving into Lirquén Port near the city of Concepcion. After receiving the components, they had to be transported about 230 kilometers near to the town of Renaico.

The challenge ALE faced was navi-

gating the route from the port to the wind-farm site. The sheer size, weight, and volume of components meant that the route had to be carefully surveyed and planned.

Each nacelle weighed 105 metric tons, and each blade weighed 18 metric tons with a length of 65 meters, making the components difficult to transport on conventional trailers and under standard bridge heights.

To solve this problem, ALE surveyed the route using manual measurements as well as topographical and software simulations using AUTOCAD and AUTURN to evaluate tight bends.

To transport the blades, ALE worked with local authorities to obtain the relevant permits but also to

make adjustments to the route, such as cutting into part of a mountain to achieve the necessary turn radius and also temporarily shutting down a hydro-power station to relocate the transmission line. These subcontracting works were coordinated by ALE in order to make all the upgrades to the route in the time-scale necessary to achieve the schedule of the project.

The equipment ALE used ranged from 24 axle lines, three blade trailers, two low boys, and five expandable trailers to accommodate the tower sections.

ALE was able to turn around the project within three months of being appointed. This was made possible thanks to ALE's experience of delivering parts to the most remote locations around the world. Not only does this improve the cost per kWh of transporting components, it is vital to getting renewable energy projects up and running.

**MORE INFO** [www.ale-heavylift.com](http://www.ale-heavylift.com)

## CONSTRUCTION

### EDF and Masdar places 415-MW order in Saudi Arabia

A consortium formed by EDF Renewables and Masdar has placed a 415-MW order for the Dumat Al Jandal wind park in the Al Jouf region of Saudi Arabia. The project will be the country's first utility-scale wind park, showcasing the increasing competitiveness of wind energy globally.

The order is an engineering, procurement, and construction (EPC) contract for the supply and installation of 99 V150-4.2 MW wind turbines, as well as a 20-year Active Output Management 4000 (AOM 4000) service agreement for the operation and maintenance of the wind park.

The Dumat Al Jandal project was awarded to the consortium by the Re-



The order is an engineering, procurement, and construction (EPC) contract for the supply and installation of 99 V150-4.2 MW wind turbines. (Courtesy: Vestas)

newable Energy Project Development Office (REPDO) in January 2019 by the Saudi Ministry of Energy, Industry, and Mineral Resources (MEIM). Once operational, it will produce electricity under a 20-year power purchase agreement (PPA) with the Saudi Power Procurement Company (SPPC).

"I would like to thank EDF Renewables and Masdar for the strong collaboration on developing this solution where we have leveraged our extensive experience in pioneering wind markets to win the competitive auction for the country's first wind park," said Eduardo Medin, president of Vestas Mediterranean. "With our 4-MW platform's market-leading cost of energy and our expertise throughout the entire wind energy value chain, the project delivers sustainable energy and develops the region's renewable energy industry."

The order marks the first phase of Saudi Arabia's plan to install 7 GW of wind capacity within five years and 16 GW by 2030. As the global wind leader with experience from more than 80 markets, Vestas has a unique position to contribute to the realization of the country's renewable energy ambitions, which include the creation of a hub for wind energy, the installation of new wind projects, the transfer of know-how, and the development of local wind-energy capabilities.

**MORE INFO** [www.vestas.com](http://www.vestas.com)

# DON'T BE LET DOWN BY AN ELEVATOR

Installation and preventative maintenance by IUEC elevator mechanics will keep your elevators moving SAFELY and more efficiently.

27,000 trained craftspersons using more than 119 training centers.



Contact Carisa Barrett at [cbarrett@eiwpcf.org](mailto:cbarrett@eiwpcf.org) or 253-561-4902

We represent more than 450 elevator companies ready to serve your Elevator Lift needs



Together with global industry partners, Covestro has developed an innovative solution for an efficient production of rotor blades for wind-power plants. (Courtesy: Covestro)

## INNOVATION

### Covestro delivers first commercial order of raw materials to China

Power generation from renewable sources is a key part of the sustainability concept of Covestro and underlines its commitment to achieving the UN Sustainable Development Goals, in particular goal number 7 for renewable energy (UN-SDG 7). This applies above all to wind power, which is one of the most promising renewable energy sources due to its global availability and the technical progress already made.

This is also reflected in the development of wind-power capacity, which is seeing double-digit annual growth across the globe. China is the world's largest wind-power market with 221 GW of installed capacity at the end of 2018, according to the World Wind Energy Association.

However, cost-efficient processes for manufacturing wind-power plants are in greater demand than ever to enable further expansion and for

competing with traditional energy resources. Once in operation, the aim is for turbines to be used over a lengthy period with the lowest possible maintenance requirements.

In order to meet this challenge, Covestro has joined forces with partners and developed a polyurethane (PU) resin and a manufacturing technology, which — in conjunction with glass fiber mats and an efficient production process — enables shorter cycle times.

“This is a clear cost advantage for manufacturers,” said Dirk Soontjens, who coordinates the global wind power activities of Covestro. “Its advantage over epoxy resins used so far is that it flows more easily and ensures better wetting of the glass fiber mats used for reinforcement.”

The resin also exhibits good mechanical properties and meets many regulatory and industry performance standards.

Recently, Covestro has processed the first commercial order for use of the PU resin for production of 18 wind rotor blades with a length of 59.5 meters each, together with the respective spar caps and shear webs, all manufac-

tured by Zhuzhou Times New Material Technology (TMT), one of the largest wind-blade manufacturers in China. The blades were delivered to Envision, a leading global wind turbine technology company, and were scheduled to be installed in a wind farm in Eastern China in July 2019.

Also in Europe, Covestro collaborates with leading players of the wind-power industry and intends to commercialize its technology shortly. Besides that, Covestro operates a new wind-power laboratory in Leverkusen, which expanded its global lab capacities in Asia and Europe to support customers and innovation.

Covestro has also developed coating solutions with higher cost efficiency. For instance, protective coatings based on Pasquick® technology for steel towers as well as gel coatings for blades of wind-power plants significantly increase productivity and ensure a long lasting performance without maintenance. This is due to the fact that the use of Pasquick® requires one layer less than conventional corrosion protection, and the coatings have a lower curing time.

Besides that, waterborne topcoats

based on Bayhydur® and Bayhydrol® provide long-lasting performance with low solvent emissions. Last but not least, Covestro also offers leading edge protection for rotor blades based on products of the Desmodur® line, providing long lasting protection against abrasion.

**MORE INFO** [www.covestro.com](http://www.covestro.com)

► **INNOVATION**

## Australian startup develops wind-farm listening device

An Australian startup that has developed an acoustic listening device for monitoring the health of wind turbines has raised AU\$850,000 to support the commercialization of its world-first product.



The Ping Monitor. (Courtesy: Rosina Possingham)

Adelaide-based company Ping Services has closed a \$650,000 seed fund round after securing an additional \$200,000 in government funding earlier this year.

The patented device, known as the Ping Monitor, uses acoustic analysis, machine learning, and the Internet of Things (IoT) to continuously detect wind-turbine blade damage.

The key piece of technology is the algorithm that can rate the health of the turbine based on its acoustic signature and monitor changes over time.

The device easily attaches to wind-turbine towers and actively listens to the blades' acoustic signature while rotating to detect blade faults such as pitting or cracks caused by lightning strikes or hail.

Its conical shape protects its microphone from rain, debris such as bird droppings, and ground-level noise.

Data collected is transferred from remote sites via low orbit nanosatellite technology.

The second-generation Ping Monitor 2.0 is scheduled for launch in August.

Ping Services CEO Matthew Stead said there are 3,800 blade failures globally every year, causing up to \$2 billion in damage.

He said the tech startup recently won its first client and was further testing the technology with some of the biggest wind-farm operators in the world.

"This technology is a game-changer for the wind-farm O&M sector, and there's a rush to see which large operator will be first out of the gate to start continuously monitoring their turbines," Stead said.

The Ping Monitor intelligent listening system is also being applied to asset monitoring in the mining, transport, and power sectors.

South Australia has emerged as the epicenter of the Australian space industry in the past 12 months. Adelaide is also home to the new Austra-



**TRUSTED SOLUTIONS**  
SALES RENTALS LEASES



Albuquerque • Dallas / Ft. Worth • Denver • Dickinson, ND • Durango • Hobbs • Houston  
Grand Junction • Las Vegas • Lubbock • Martins Ferry, OH • Salt Lake City

**rentals@wrsrents.com \* wrsrents.com \* 888.997.3687**



All SHIFT 4k designs are covered with the “type and component certificate.” (Courtesy: ZF Wind Power)

lian Space Agency and dozens of space startups and major Tier 1 defense companies.

**MORE INFO** [theleadsouthaustralia.com.au](http://theleadsouthaustralia.com.au)

## INNOVATION

### ZF Wind Power gets certificate for its SHIFT 4k platform

ZF Wind Power’s SHIFT 4k platform received a “type and component certificate” from the international classification society DNV GL, for its complete platform range.

In the past, every gearbox design had to go through a long administrative process of calculation files, validation results, and more. As of now, all SHIFT 4k designs are covered with the “type and component certificate.” Customers will profit from the certificate as it speeds up processes, thus saving time and money and boosting productivity.

As time is valuable, this certificate from DNV GL will save costs for OEMs and turbine owners. In the past, the

administrative process could take a few months and now, thanks to the platform’s certificate, the gearbox is ready to be installed immediately. Consequently, turbines or upgrades can be installed faster and thus productivity will increase.

**MORE INFO** [www.zf.com](http://www.zf.com)

## INNOVATION

### Blade leading-edge coating protects against rain erosion

Wind-turbine blades are coated with one or more protective coatings to help them withstand the effects of erosion from rain, sand, hail, and dirt. In most cases, the full structure of the laminated reinforced blade is coated first with a standard two-component protective coating. The leading edge of the blade tip receives another special protective layer to protect against the extra risk of rain erosion. New cartridge-based dispensing technology improves the quality and reliability of this leading-edge protection layer, while mak-

ing it safer and more efficient for those conducting repairs using rope access.

Erosion is directly related to the speed that rain droplets, hail stones, and other airborne particles, (also known as rain erosion) hit the blade. Blade tips are subject to the fastest speeds because when it rains, as the blade rotates up, the falling speed of the rain adds to the blade’s tip speed, hitting the blade at a higher rate. This increased speed leads to faster rate of erosion, an effect that can be likened to sandblasting.

European wind-turbine blade standards expect blades to last 20-25 years – in reality they last from 10-15 years, and even that lifespan is impossible without a coating or some sort of leading-edge protection. In fact, an uncoated blade (also known as a blunt blade) will not last a year. Erosion effects can be seen in as little as a few weeks if there is a strong rain. Protective coatings are absolutely necessary to protect the blade’s leading edge.

Wind turbines are regularly inspected using a variety of techniques. Inspection, using drones or other methods, identifies the blades that need to be repaired and determines the type of repair necessary.

If full service of the blade is necessary, technicians remove the entire blade and repair it on the ground.

Many smaller repairs require simply renewing three to four meters of the leading-edge protection. These repairs can be quite time-consuming. Rope access is the standard method for smaller repairs. For larger repairs, a platform is maneuvered with a rope from the top of the tower.



Cartridge-based dispensing technologies reduce labor, waste, and disposal costs, while adding reliability and improving safety. (Courtesy: Sulzer)

Several different methods for coating the leading edge are used, including multi-layer coatings and specialized tapes applied over the standard coating.

New cartridge-based systems for applying protective coating to wind-turbine blade leading edges improve repair processes by replacing time consuming and inaccurate manual mixing and dosing. Using cartridges can be a huge advantage for workers performing rope repairs prevalent in minor repairs of turbine blades.

Workers either have to premix before going on the rope or mix at the point of installation — a difficult task while hanging by a rope 60 to 80 meters off the ground. These systems also increase the quality of the repairs, because, in general, 90 percent of coating failures (apart from insufficient surface preparation) are due to inaccurate mixing or dosing, a problem eliminated by using a cartridge.

For example, one system that provides extra protection and abrasion/erosion resistance on highly stressed areas like leading edges of wind turbine rotor blades is the Mankiewicz ALEXIT® BladeRep LEP 10DM. The two-component, solvent-free polyurethane product is usually applied using the cartridge-based Sulzer MIXPAC™ MixCoat™ Flex Hose Brush Protective Coating Dispensing System.

Sulzer cartridge-based dispensing systems are also used in the RELEST® Wind LEP ETU system, as well as in products made by several manufacturers of leading-edge coatings.

Cartridge-based dispensing technologies reduce labor, waste, and disposal costs, while adding reliability and improving safety. Use of new applicator-friendly cartridge-based dispensing technologies reduces manual mixing and dosing, improving repair quality, and making tricky rope work easier. For blade repairs that require application of leading-edge protective coatings, these systems are an excellent option.

**MORE INFO** [www.sulzer.com](http://www.sulzer.com)



The Dropsafe Net is a stainless-steel mesh net engineered to securely enclose and tether overhead fixtures, mitigating the risk of them falling and threatening the safety of personnel. (Courtesy: Dropsafe)

## MAINTENANCE

### Formosa Offshore Wind, Dropsafe tackle dropped object risk

Dropsafe, the leading provider of Dropped Object (DO) prevention solutions, recently announced that offshore wind developer Formosa I Offshore Windfarm (FOWI) has adopted the Dropsafe Net dropped object prevention system, in a bespoke installation across the 20 Siemens Gamesa turbines at the Formosa I offshore wind farm.

Six operational turbines at Formosa I, near Miaoli, off the west coast of Taiwan, have already been equipped with the Dropsafe Net system, ahead of the remaining 14 turbines that will be installed during summer 2019.

With the construction of the 130-MW project heralding the start of rapid growth in the Taiwanese offshore wind market, there is a clear imperative to ensure that, with this growth,

comes the key health and safety lessons from the established markets. Mitigating known and established risks in the early key phases of project development and construction, and factoring in those new risks that may arise from extreme weather events, will enable the emerging Taiwanese offshore wind industry to manage costs and liabilities as it builds out its offshore wind program.

As the mature European offshore wind and oil and gas markets have shown, DOs are an ever-present, increasing threat to safe and cost-effective project development and operations in offshore wind. DOs include materials carried by personnel, lifted or carried from support vessels, or fixtures fitted to the wind turbine, such as lights, ventilation louvres, or hatches falling from height.

Failure to mitigate DO risks presents a clear threat to the safety of personnel, the integrity of equipment, financial performance, and ultimately the reputation of offshore wind firms and their high-profile stakeholders.

Due to the construction, design, and installation requirements specific to the region, the increased potential for dropped objects was identified during the design risk assessment. Dropsafe was engaged by FOWI to develop a custom system that would mitigate these risks.

Off the coast of Taiwan, where typhoons and storms are common, there is a heightened risk of fixtures and fittings becoming loose and posing a threat to on-site technicians. As such, installing robust DO prevention systems demonstrates a further commitment to “typhoon-proofing” of project infrastructure.

FOWI have taken an industry-leading approach in their adoption of DO prevention technology, setting a new safety benchmark, not only for the Taiwanese market, but also for the global offshore wind sector.

The Dropsafe Net is a stainless-steel mesh net engineered to securely enclose and tether overhead fixtures, mitigating the risk of them falling and threatening the safety of personnel. It

is an application-specific solution for a wide range of fixture types, enabling wind-energy companies to confidently improve workplace safety and minimize risks to operational integrity.

At Formosa I, a bespoke Dropsafe Net design, made of SUS 316 Japanese stainless-steel, has been installed between the external landing platform and the tower of the Siemens Gamesa SWT-6.0-154 turbines. This allows FOWI to mitigate the risk of Dropped Objects falling from the landing platform into the sea.

“With this market-first installation, Formosa Offshore Wind is rising to the challenge of preventing dropped object incidents and acting as an industry safety pioneer,” said Mike Rice, commercial director of Dropsafe. “While there is a particular emphasis on Taiwanese projects to be ‘typhoon-proof,’ there are lessons to be learned by the global offshore wind sector in terms of the approach to tackling a major safety risk.”

FOWI’s Formosa II wind farm is scheduled to complete construction in Q3 2019 and is set to maintain FOWI’s leadership position in the mitigation of DO risk.

**MORE INFO** [www.dropsafe.com](http://www.dropsafe.com)

## ► MAINTENANCE

### TGM Wind brings back cleaning services due to customer demand

Kardie Equipment, a TGM Wind Services company, leading AWP provider, and turbine cleaner for the past decade, has relaunched its specialized wind-turbine generator cleaning service and expanded its cleaning capabilities to include more industry sectors.

TGM Wind prides itself on being the most efficient and environmentally friendly high-reach cleaning service company on the market, using the largest fleet of Bronto Skylifts in North America. With 10 years of experience providing both access and cleaning,



TGM Wind offers customers a choice between hand-washing or pressure-washing. (Courtesy: Kardie Equipment)

TGM Wind remains the industry leader and preferred cleaning provider. The company accomplishes this by offering customers a choice between hand-washing or pressure-washing, both of which provide a unique set of advantages.

The benefits of hand-washing in place of the pressure washer method are numerous and impactful. First and foremost, the hand-washing method uses significantly less water. Roughly five gallons of water are used to hand-clean a standard 90-meter wind turbine versus 30 gallons with the traditional pressure-washing method.

When hand-washing, TGM only uses the minimum amount of water required, to ensure there is no water waste, while also increasing efficiency. When cleaning with a power-washer, one usually starts at the top of the turbine, and all the water, dirt, and oil must be washed the full length down the turbine. Using the hand-wash method (and environmentally friendly soaps and solutions), TGM technicians are able to hand wipe only the top of the turbine where most of the dirt and oil stains are.

TGM Wind is leveraging its expertise as the renewables sector leader in cleaning, and now delivering the same best practices to the utility, power generation, refining, and telecommunications industries.

**MORE INFO** [www.kardieequipment.com/tgmcleaning](http://www.kardieequipment.com/tgmcleaning)

## ► MANUFACTURING

### Vestas to supply one of the world’s largest citizen-owned parks

Bürgerwindpark Reußenköge GmbH & Co. KG has placed an order for 12 V112-3.45 MW turbines for the expansion of a citizen-owned wind park in Schleswig-Holstein.

With this order, the wind park will have a total installed capacity of 210 MW with the possibility of a further expansion up to 300 MW, making it one of the world’s largest citizen-owned wind projects. The current wind park has an estimated annual production of around 600,000 MWh, which can cover the annual electricity consumption of half a million German citizens.

“This 12 V 112-3.45 MW turbine expansion is another major step to building out our citizen wind park to provide sustainable energy to the



Vestas’ V112-3.45 MW turbine. (Courtesy: Vestas)

region,” said Dirk Ketelsen, managing director Bürgerwindpark Reußenköge GmbH & Co. KG. “We started this journey in 1989 with our first turbine, and we plan to expand this citizen wind park to up to 300 MW in the coming years. With the 12 new turbines, Vestas will have provided 63 V112-turbines for this wind project.”

“We look forward to working with our long-term customer Bürgerwindpark Reußenköge GmbH & Co. KG and help them achieve maximum return on their investment over the wind-power plant’s lifetime,” said Claudia Feki, key account manager, Sales Germany North, Vestas Northern & Central Europe. “By expanding this lighthouse citizen-owned wind park in Northern Germany and choosing the V112-3.45 MW turbine, one of our top performers for high-wind sites, the size, capacity, and sustainability of this citizen-owned wind park make the people of Reußenköge role models for wind power commitment.”

The order comprises supply, installation, and commissioning of the turbines and a VestasOnline® Business SCADA solution. Wind-turbine delivery is planned to begin in the third quarter of 2020, with commissioning expected in the fourth quarter of 2020.

**MORE INFO** [www.vestas.com](http://www.vestas.com)

## MANUFACTURING

### Siemens Gamesa awarded large repowering order

Siemens Gamesa has been selected by MidAmerican Energy Company for the Rolling Hills wind power project for a total of 429.3 MW, the largest repowering order to date in North America. The company will repower the project with 163 SG 2.7-129 and 18 previously sold SWT-2.3-108 wind turbines.

Rolling Hills is in Adair, Adams, and Cass counties in Iowa and features 193 SWT-2.3-101 turbines. The



Siemens Gamesa will repower the Iowa project with 163 SG 2.7-129 and 18 previously sold SWT-2.3-108 wind turbines. (Courtesy: Siemens Gamesa)

repowering project includes replacement of the blades, hubs, and nacelles for all units and top-tower sections for the SG 2.7-129 units. Commissioning of the project is expected for late 2021.

The SG 2.7-129 turbine builds on the robust and successful 2.3-MW geared product series.

“We are excited to provide upgraded equipment and technology to the Rolling Hills project in Iowa, a national leader in the wind energy industry,” said José Antonio Miranda, CEO of Onshore Americas at Siemens Gamesa Renewable Energy. “This new project is a testament to MidAmerican Energy’s confidence in us as well as Iowa, where we have supplied them with

more than 2.6 GW. The blades will be produced right there in Iowa, and the nacelles and hubs will come from neighboring Kansas, making this a truly local project.”

Siemens Gamesa has installed more than 10,000 wind turbines in the U.S. totaling approximately 20 GW of installed capacity.

In Iowa, Siemens Gamesa has installed nearly 1,400 wind turbines for a total of almost 3.5 GW. The company has a strong footprint consisting of service, offices, and two manufacturing facilities in Fort Madison, Iowa, and Hutchinson, Kansas. ↘

**MORE INFO** [www.siemensgamesa.com](http://www.siemensgamesa.com)