

# MANUFACTURING

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## GE'S 6-MW WIND GENERATOR TO ACCELERATE OFFSHORE WIND GROWTH

Higher, bigger, and more reliable wind turbines are defining the future of offshore wind. Harsh environments demand the technology provider to come up with solutions that have high reliability and less maintenance requirements. It's a journey GE started years ago, and it's another example of how GE is helping customers build wind farms in some of the most challenging locations.

GE Power Conversion successfully completed manufacturing the first serial PMG in GE Renewable's offshore wind factory in Saint-Nazaire, France, which was inaugurated in late 2014. The factory is set up to have a capacity of manufacturing 100 generators per year.

As the first series, 300 generators will be manufactured on-site. The first recently completed generator will be installed in GE's Haliade™ 150-6MW-offshore wind turbine in Denmark. The turbine's power yield is 15 percent higher than that of other same-generation wind turbines, each capable of supplying 5,000 households per year. The power supplied by these turbines will become increasingly cost-effective as the volume of generators coming out of the



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Saint-Nazaire factory increases.

This highly sophisticated production site uses the air-cushion system that has been implemented to move generators within the site. The innovative way of manufacturing eliminates the need of cranes within the factory, driving down the infrastructure costs significantly. The site is also

equipped with a test bench, ensuring every generator coming out of the assembly line is ready to be deployed.

"The factory in Saint-Nazaire is the first offshore wind manufacturing site in France," said Frederic Maenhaut, renewables executive for GE Power Conversion. "It is a milestone in the nation's energy history. Now, by le-

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veraging technologies from different GE businesses, we are well-positioned to bring clean offshore wind energy to the domestic market and export to regions beyond France where energy is needed.”

The 6-MW PMG is one of the world’s largest generators built to date. Its direct drive system has no mechanical gearbox coupled to the generator. Low component count increases equipment reliability and, therefore, enables higher energy efficiency, which also leads to increased turbine availability. Less downtime and maintenance requirements ultimately can reduce the cost of wind energy.

The generator is split into three electrical circuits. In the unlikely event of two circuits going offline, the high level of redundancy enables the turbine to continuously produce power, even in the “degraded” mode. This is a critical el-

ement for offshore wind power plants as stormy weather and treacherous water can delay repair work for days or weeks and result in a high maintenance expenditure.

“Offshore wind is gaining increasing competitiveness in the power mix, and GE is well-positioned to serve this industry,” Maenhaut said. “We developed this PMG technology five years ago. It is ideal for offshore setting, helping increase wind turbines’ availability and optimizing energy production.”

GE’s PMGs have been previously selected to be installed on Block Island, America’s first offshore wind farm, which will help generate 30 MW of electricity in 2016. ↘

— Source: GE Power Conversion

For more information, go to [www.ge.com](http://www.ge.com) or [www.gepowerconversion.com](http://www.gepowerconversion.com).

## STEELCASE ANNOUNCES NEW WIND POWER INVESTMENT WITH APEX CLEAN ENERGY

Steelcase Inc., a global leader in the office furniture industry, recently announced a 12-year power purchase agreement (PPA) with Apex Clean Energy for 25 MW of wind power. Since 2014, Steelcase has invested in renewable energy credits equivalent to 100 percent of its global electricity consumption. This latest investment will make up nearly half of Steelcase’s renewable energy purchases, directly supporting the construction of a new clean energy facility set to begin operations in 2016 and further diversify the company’s renewable energy portfolio.

“Our decision to partner with Apex and execute a long-term renewable energy agreement reflects our longstanding commitment to drive a clean energy landscape,” said Jim Keane, Steelcase president and CEO. “At a time when businesses and governments are working to align on climate strategies, we maintain a sense of urgency and optimism. We are focused on finding new ways to reduce our overall energy use and investing in innovative, economically beneficial projects like this one to take one step closer to a sustainable energy future.”

Under Steelcase’s long-term PPA with Apex’s Grant Plains Wind project — a 150-MW facility in Grant County, Oklahoma — Steelcase is committed to support production of approximately 100 million kWh of clean, renewable wind energy each year. This amount is equal to approximately 70 percent of Steelcase’s U.S. electricity usage, roughly equal to the electricity needed to power 9,100 homes per year.



Apex Clean Energy

“Apex is proud to partner with Steelcase to help the company achieve its renewable energy goals,” said Mark Goodwin, president of Apex Clean Energy. “Our mission is to accelerate the shift to clean energy, and we do so by providing opportunities for visionary companies like Steelcase to participate in the energy market in the manner that makes the most sense for them. Steelcase has proven itself to be a leader in renewables investment, and we’re pleased that Grant Plains Wind fits with its corporate strategy.”

Steelcase has a long history of supporting renewable energy development that dates back to 2001. The company is one of the top 50 green power users in the United States, according to the Environmental Protection Agency (EPA), and received a Green Power Leadership Award from the EPA in 2014.

“After a record-setting year in 2015 for corporate renewable energy purchasing, we commend Steelcase for starting off 2016 with such a powerful long-term commitment for clean wind energy,” said Lily Donge, a principal at the Rocky Mountain Institute and its business renewables center, of which Steelcase and Apex are a member and sponsor, respectively. ↴

— Source: Apex Clean Energy

For more information, go to [www.apexcleanenergy.com](http://www.apexcleanenergy.com).

## SIEMENS TO SUPPLY WIND TURBINES TO FIRST FINNISH OFFSHORE WIND FARM



Ten Siemens SWT-4.0-130 wind turbines will supply clean energy for approximately 8,600 electrically heated Finnish households.

Siemens has been awarded its first commercial offshore wind order from Finland for which the company will supply, install, and commission 10 wind turbines, each with a capacity of 4 MW and a rotor diameter of 130 meters, for the Tahkoluoto offshore wind farm in the Baltic Sea. The customer is Suomen Hyötytuuli Oy, a wind power producer owned by eight Finnish utilities that is headquartered in Pori. Installation of the wind turbines is scheduled to begin in the summer of 2017 with the start of operations expected by fall of 2017. With a capacity of 40 MW and an annual net power production of more than 155 GWh, the offshore wind power plant will generate enough power to supply 8,600 electrically heated Finnish single-family houses with clean energy. Siemens will also be responsible for servicing the wind turbines.

“This order marks a significant milestone for Siemens,” said Michael Hannibal, CEO of Offshore for the Siemens Wind Power and Renewables Division. “The project is not only the first offshore wind farm in Finland, but will also be used by the Finnish government to demonstrate that offshore wind power is a feasible solution for this area. This project is attracting a great deal of attention throughout the entire Baltic region, and will open doors for Siemens in the emerging offshore markets in this region.”

The Tahkoluoto offshore wind farm is located approximately 0.5 to 3 km from shore in water ranging from 8 to 15 m deep. The wind turbines will be mounted on specially designed, gravity-based steel foundations in order to withstand heavy ice loading. The government of Finland is also contributing €20 million (approximately \$22 million) toward the demonstration project in icing conditions.

“The conditions for offshore wind power are excellent in Finland,” said Toni Sulameri, managing director of Suomen Hyötytuuli Oy. “We have a long coastline, windy conditions, shallow waters, and a hard seafloor.”

In 2010, Siemens supplied one wind turbine with a capacity of 2.3 MW to Suomen Hyötytuuli Oy for the Pori pilot project located 1.2 km off the Finnish coast. This pilot turbine will be surrounded by the 10 wind turbines located at the Tahkoluoto wind farm. Siemens has installed more than 5.8 GW of offshore wind power capacity worldwide with 2 GW commissioned in the last fiscal year. ↴

— Source: Siemens

For more information, go to [www.siemens.com/wind](http://www.siemens.com/wind).

# NORDEX MAKES FURTHER IMPROVEMENTS IN FRANCE

In 2015, the Nordex Group improved its position on the growing French market. With an output of approximately 155 MW newly installed turbines, Nordex has increased its market share from 9 percent in 2014 to 14 percent in 2015. Overall, the newly installed capacity in the onshore wind sector in France has increased to 1,073 MW in 2015. This means that the country has continued to maintain its position as one of the top markets for wind energy in Europe.

Most of Nordex' recent developments in France are based on the N100/2500, with 60 units in 2015. Due to a high order intake rate within the past months, Nordex expects good business in 2016 as well. The last project sold was an order for six N100/2500 for the Tenbonrev

project in the Champagne region. Nordex will deliver these turbines in September of this year.

Currently, the N117/2400 and N131/3000 are generating growing interest in the French market. With most of the new sites in France being light-wind areas, these turbine models should be used in the majority of the company's future projects.

One of these is the Morlange project located near the border to Luxembourg. For this wind farm, Nordex will deliver four N117/2400s within this year. As for Morlange, the company not only functions as manufacturer but also as developer. The wind farm is one of five recent projects generated via the Nordex Development distribution channel, a division fo-

cus on the development of wind farms with local partners. The company has been implementing projects developed in-house there in successful partnerships since the early 2000s.

As the French government last year specified its targets for increasing the use of renewable energy, following the growth in 2015 this year, too, the market offers plenty of potential for the wind sector. For example, the government has simplified administrative procedures in order to support the increase of the share of renewables in energy consumption to 23 percent by 2020 and 32 percent by 2030. ↘

— Source: Nordex

For more information, go to [www.nordex-online.com](http://www.nordex-online.com).



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