

DIRECTION

THE FUTURE OF WIND



Stavro is in the northern part of Sweden, northwest of Umeå, and divided into two sub-sites. (Courtesy: Siemens Gamesa)

Siemens Gamesa turbines in Sweden to power Google data center

Siemens Gamesa Renewable Energy (SGRE) has secured an order to supply the Stavro project, its largest ever on-shore wind order in Sweden. The 62 turbines with a 4.1-MW rating built by SGRE will power Google's data center with clean energy, as well as Holmen's local paper and board business.

Stavro is in the northern part of Sweden, northwest of Umeå, and divided into two sub-sites: Blodrotberget, with 40 turbines, and Blackfjället, with 22 turbines, for a total installed capacity of 254 MW. Commissioning of the wind farm is scheduled for the end of 2021, and the project will be covered by a 30-year service agreement also delivered by SGRE. The grid connection, comprised of engineering, civil works, installation, and commissioning of the two 150/33 kV sub-sites, will be provided by Siemens Gas and Power.

The project is realized by German Asset Manager Prime Capital AG on behalf of an international consortium comprising Korean institutional investors, German Pension Fund Nordrheinheinische Ärzteversorgung, and Siemens Financial Services, whose financial expertise and proven wind-investment experience was key to successfully making Stavro a reality.

"The Scandinavian market continues to show its great potential for wind power and increasing demand for renewable energy as it strives to reach climate neutrality by 2050," said Alfonso Faubel, Siemens Gamesa's On-shore Business Unit CEO. "The project will facilitate Holmen's transition to 100-percent renewables consumed in its business and meet part of the fast-growing demand for electricity of Google's European datacenters."

"Projects like Stavro illustrate how we in Siemens Gamesa drive the transformation toward renewables through strong, long-term relationships where we are constantly working to offer innovation, technology, and solutions tailored to the needs of the individual customer," he said.

The project is the second large scale transaction of this kind that Prime Capital has commercialized and built in the last two years and is representative of a strategy it will launch in a fund format in the first half of 2020, enabling access to a broader range of institutional investors.

"Scandinavian wind is at the core of our current renewable energy strategy, as we can leverage on both a unique competitive advantage in sourcing and realizing projects and very favorable market conditions for investing," said Andreas Kalusche, CEO for Prime Capital. "Our close collaboration with SGRE has enabled us to source the project early and to add value through a full-scope commercialization process. This strategy, in a market benefiting from one of the world's best wind resources and the ability to realize large-scale projects, increases overall profitability and risk-adjusted returns for our investors."

MORE INFO www.siemensgamesa.com

Renewables growth may close hydrogen cost gap by 2030

Green hydrogen production can compete with fossil fuel-based hydrogen by 2030 in Australia, Germany, and Japan, should renewable power prices reach \$30 per megawatt hour (MWh), new research from global natural resources consultancy Wood Mackenzie indicates. Today, wind and solar power purchase agreement (PPA) prices range from \$53 to \$153/MWh in those markets.

The production of hydrogen, used in industries as diverse as oil refining, steel manufacturing, and ammonia and methanol production, is carbon-intensive. In 2017, hydrogen production resulted in 830 metric tons of carbon emissions, greater than the annual emissions pumped out by the

entire nation of Germany (797 metric tons) or the 677 metric tons attributed annually by the global shipping sector.

Wood Mackenzie's research shows that less than 1 percent of all hydrogen produced today comes from renewable electricity, relying instead on natural gas and coal.

Switching to hydrogen produced by wind and solar via electrolysis, which splits water molecules into hydrogen and oxygen atoms, offers a significant opportunity to decarbonize its production and reach emissions targets.

According to Wood Mackenzie, from 2000 to the end of 2019, 252 MW of green hydrogen projects will have been deployed worldwide. By 2025, this will increase by 1,272 percent, with the deployment of a further 3,205 MW of electrolyzers dedicated to green hydrogen production.

"The large increase in the 2019-2025 period is partially due to the nascency of the market," said Ben Gallagher, a senior analyst at Wood Mackenzie. "But aggressive targets in East Asia and increased interest from major international stakeholders will drive deployment in the near term.

"While cost-competitiveness might be out of reach in most scenarios by 2025, national targets and pilot projects will produce enough volume to realize substantial CapEx declines beyond 2025," he said.

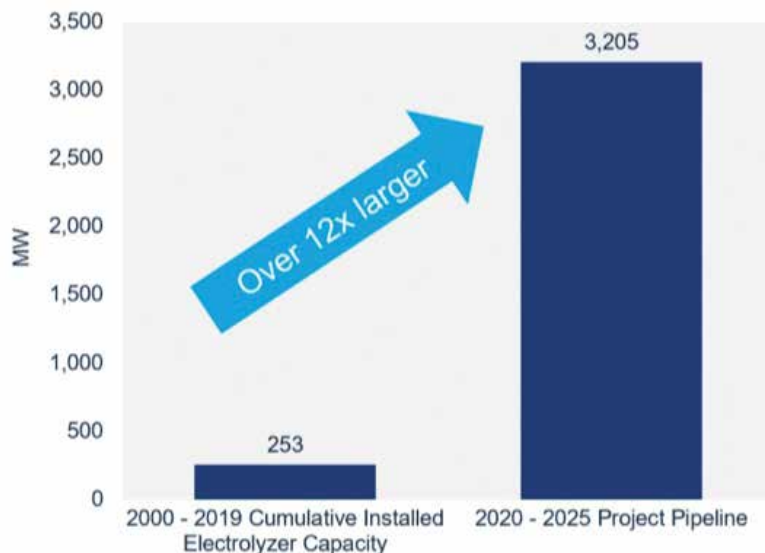
Gallagher said that as renewable energy deployment grows, so too will the green hydrogen market.

But there are challenges. While green hydrogen has made gains in a number of key markets, including Japan, Germany, and Australia, at present it cannot compete with the low costs of locally produced coal and natural gas-produced hydrogen in China and the U.S., for example.

On top of this, it remains unclear if renewable PPA prices worldwide will fall fast enough to make green hydrogen production competitive.

However, Gallagher is optimistic

Cumulative installed capacity vs. 2020-2025 project pipeline (MW)



(Courtesy: Wood Mackenzie)

about the green hydrogen sector's future.

"We are just embarking on the energy transition," he said. "There are several unknowns that would further spur adoption of green hydrogen: changing policy dynamics, new carbon regimes, new ways to monetize grid flexibility, and lower-than-expected costs of renewables."

MORE INFO www.woodmac.com

Vineyard Wind proposes 1,200 MW of offshore

Vineyard Wind recently set offshore wind-project proposals called "Park City Wind" to the Connecticut Department of Energy and Environmental Protection (DEEP) in response to their 2019 solicitation for offshore wind power. The bids submitted include a required 400 MW plan and options to develop projects that will generate 800 MW, 1,000 MW, and 1,200 MW.

"Vineyard Wind is pleased to submit a dynamic set of project pro-

posals to deliver a reliable source of fixed, low-cost, zero-emission energy to Connecticut rate-payers, while supporting the state's efforts to reduce greenhouse gas emissions," said Lars Pedersen, CEO of Vineyard Wind. "Our Park City Wind proposal is much more than an energy project — it's an opportunity for Connecticut to develop a world-class offshore wind industry in Bridgeport and solidify its role as a high value industry hub in the U.S. for years to come. Vineyard Wind looks forward to working with all stakeholders involved throughout the review process and will be announcing additional details about this exciting opportunity in the weeks ahead."

Park City Wind, named after the City of Bridgeport, includes projects ranging from 408 MW to 1,200 MW that would be constructed in one of Vineyard Wind's two federally designated lease areas (Lease Area OCS-A 0501 and Lease Area OCS-A 0522). Both lease areas are south of Martha's Vineyard and Nantucket in the midst of the strongest winds on the east coast and would not be visible from any shoreline in Connecticut.

Each Park City Wind option will bring substantial economic development and job creation benefits to Connecticut, providing hundreds of millions of dollars in economic activity and thousands of jobs particularly in and near Bridgeport. Beyond the immediate job and economic opportunities, Vineyard Wind has sought partnerships with a number of pre-eminent educational and workforce development organizations to ensure that Connecticut residents of all skill levels, ages, and backgrounds can have access to a tremendous opportunity in this 21st Century industry.

Vineyard Wind LLC is an offshore wind development company seeking to build the first large-scale offshore wind energy project in the U.S. 15 miles south of Martha's Vineyard. Vineyard Wind, based in New Bedford, Massachusetts, is 50 percent owned by funds of Copenhagen Infrastructure Partners (CIP) and 50 percent by Avangrid Renewables.

MORE INFO www.vineyardwind.com

Dominion Energy announces largest offshore project in U.S.

Dominion Energy is proposing the largest offshore wind development in the country to provide more renewable energy to its customers in the Commonwealth and provide a boost to the offshore wind industry on the East Coast.

The company recently filed an application with PJM, the regional transmission organization that coordinates the electrical grid in all or parts of 13 states and the District of Columbia, to interconnect the proposed turbines to the transmission grid.

Dominion Energy's filing is a vital first step to move forward in developing Virginia's full offshore wind potential. The company looks forward to working with the Gov. Ralph Northam administration and other partners on next steps in public policy needed to realize both the clean energy and eco-

nomic potential of offshore wind.

“Offshore wind is an excellent renewable energy source, and this filing with PJM shows how serious we are about bringing commercial-scale offshore wind to Virginia, giving our customers what they have asked for—more renewable energy,” said Mark D. Mitchell, vice president of generation construction. “Northam has made it clear Virginia is committed to leading the way in offshore wind. We are rising to this challenge with this 2,600-MW commercial offshore wind development.”

Dominion Energy is aggressively pursuing a clean energy future anchored by a 55 percent reduction in carbon emissions by 2030. To accomplish this goal, the company is investing in solar and wind energy partnered with zero-carbon nuclear and low-carbon natural gas. The company also has planned investments in battery storage, pumped hydroelectric storage, and other resources that can support the intermittent nature of solar and wind.

If approved, the project would be in the 112,800 acres Dominion Energy is leasing from the Bureau of Ocean Energy Management 27 miles off the coast of Virginia Beach. Following the key filing with PJM, ocean survey work is expected to begin in 2020 and a construction-and-operations plan will be submitted in 2022.

Building on an expected successful deployment of the Coastal Vir-



Vineyard Wind's lease areas are located south of Martha's Vineyard and Nantucket. (Courtesy: Vineyard Wind)

ginia Offshore Wind (CVOW) project in 2020, Dominion Energy plans to move forward with its commercial offshore wind project in three phases, each totaling 880 MW. The first phase of the buildout will support initial generation of wind energy by 2024. Additional phases will come online in 2025 and 2026, totaling more than 2,600 MW of energy, enough to power 650,000 homes during peak wind.

The company began construction in June on the 12-MW CVOW project, which is the first fully permitted wind project in U.S. federal waters. Dominion Energy will leverage key learnings from the permitting, design, and development of that project as it goes through a similar process for commercial offshore wind development. ↗

MORE INFO www.DominionEnergy.com

