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First floating wind park to supply over 20,000 households

The World's first floating wind park began operations off the coast of Scotland in October 2017 and will deliver electricity to over 20,000 households in Great Britain.

Each of the five wind turbines is anchored to the seabed by three suction anchors. NGL evaluated the ground conditions and performed the detailed design of the anchors.

"This project is a substantial leap forward with renewable energy," says Thomas Langford, Head of Section Offshore Geotechnics at NGI – and proud to be part of the green revolution: "Our expertise gained through decades of offshore foundation solutions has now helped realise such an environmentally friendly offshore wind farm."



The technology of using suction anchors for offshore structures was pioneered by NGI and Statoil on an industrial scale during the 1990's. Suction anchor technology has been applied successfully to safely anchor and support more than one hundred oil and gas installations and fixed bottom offshore wind turbines worldwide.

Suction anchors, in contrast to steel piles, have the advantage of silent installation - avoiding disturbance of the marine environment. At the end of their lifetime, they are also easily removed.

"The planned area of the wind farm was carefully surveyed and NGI

conducted advanced laboratory testing of the retrieved soil samples. Ground conditions were found to be well-suited to suction anchors," says Technical Lead - Knut Schrøder, with his many years of experience of fixed and floating offshore installations.

"Rough seas and powerful winds expose wind turbines to enormous forces. The main advantage of suction anchors is their ability to resist high loads together with their straightforward, environmentally-friendly installation. This represents an excellent solution for next-generation wind turbines, which will only increase in size and capacity," says Schrøder.



Each anchor resembles an upturned bucket. Water is pumped out creating a vacuum inside, which makes the bucket penetrate down into the seabed. The suction anchors at Hywind are 5 metres in diameter and penetrate 15 meters into the seabed.

Statoil is planning more offshore wind farms around the world based on Hywind technology. There are also plans to harness the power from floating wind turbines for the electrification of existing production platforms.

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FACTS - HYWIND FLOATING WIND FARM

- Hywind Scotland was officially opened by the First Minister of Scotland, Nicola Sturgeon, and began operating in October 2017. The wind park is located 25 km offshore from Peterhead, Aberdeenshire. Delivers 30 MW electricity, meeting the needs of about 20,000 homes in the UK. Consists of five floating wind turbines with a total height of 253 metres, where 78 metres are

below sea level. Statoil is operator in partnership with Masdar. Read and see more about Hywind.

- Each of the turbines is anchored to the seabed by three suction anchors. This technology is based on cooperative work between NGI and Statoil during the 1980's and 90's.
- NGI conducted extensive advanced laboratory testing and numerical analyses that provided the basis for the design of the suction anchors.
- NGI's contractual partner has been Aibel. Aibel has had several assignments for Statoil in connection with the completion and installation of the wind park. Read about Aibel's work at Hywind.
- The first prototype of Hywind was constructed in Norway in 2009 on assignment from Statoil.

The Norwegian Geotechnical Institute (NGI) is a leading international centre for research and consulting within the geosciences. NGI develops optimum solutions for society, and offers expertise on the behaviour of soil, rock and snow and their interaction with the natural and built environment.

NGI works within the markets Offshore energy; Building, construction and transportation; Natural hazards, and Environmental Engineering.

NGI is a private foundation with office and laboratory in Oslo, branch office in Trondheim, and daughter companies in Houston, Texas, USA, and Perth, Western Australia. NGI was established in 1953.

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