

WAVESTAR

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Environmental and climate issues, as well as uncertainty about energy supply, demand that we diversify our energy supply to multiple renewable sources. We make an effort to make wave energy one of tomorrow's energy sources.

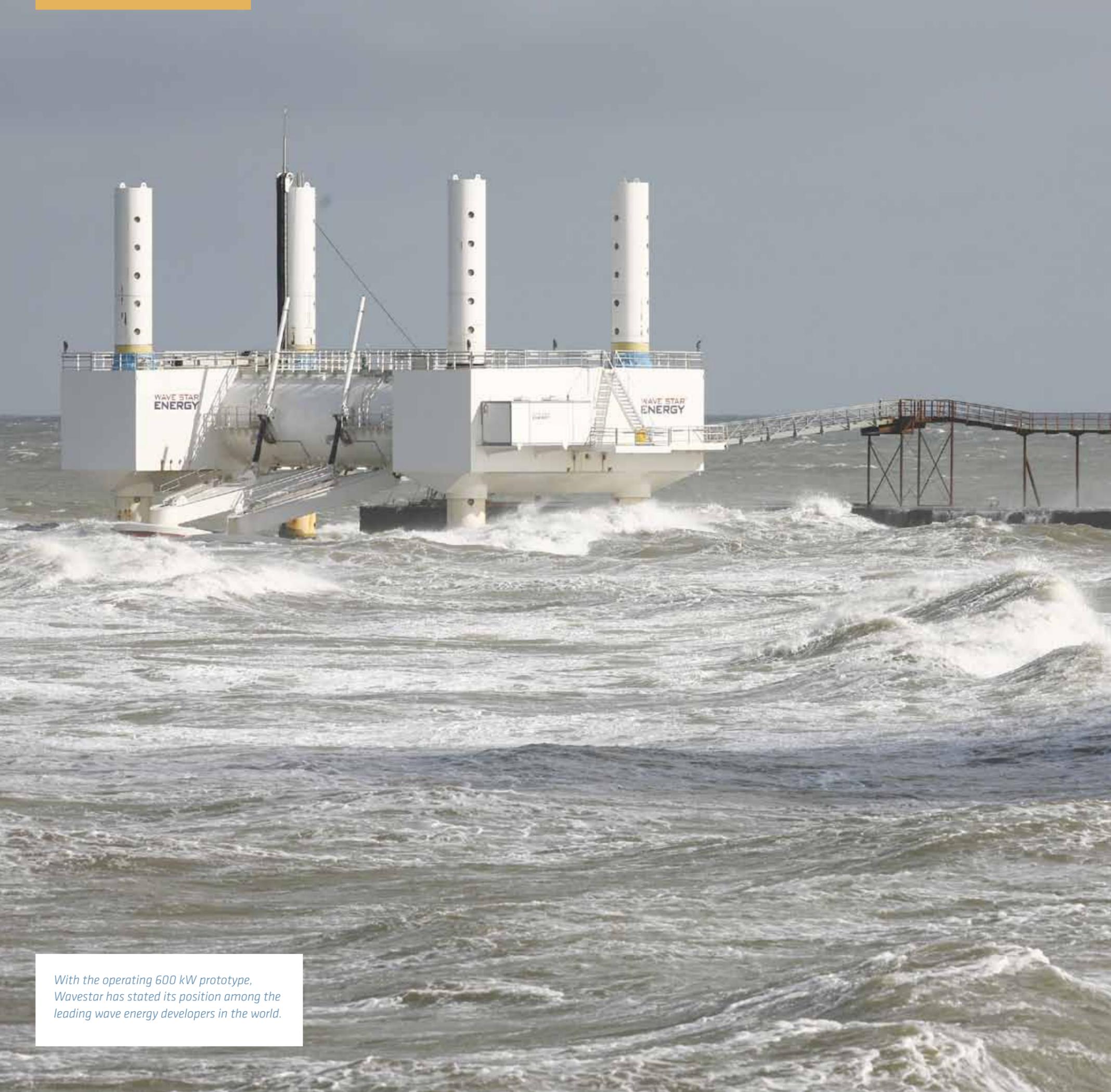
Wave energy is more predictable compared to wind power, the waves come and go slowly and can be forecasted 24 hours ahead. The Wavestar machine could also be installed together with a wind turbine which would increase efficiency, reduce costs and increase the energy production per km².

Wavestar understand that we need many renewable energy solutions, not just one, so it makes sense to harness the power of waves.

With a 600 kW prototype in operation, the company has claimed a position among the leading alternative energy developers in the world. Wavestar aim to make the first full-scale 600 kW machine in 2014/2015.

The Wavestar machine will later be doubled in size, capable of handling twice the wave height. This will increase the output of each machine to 6 MW, enabling a single machine to provide energy for 4,000 homes.





With the operating 600 kW prototype, Wavestar has stated its position among the leading wave energy developers in the world.

After 6 years of intensive development and testing of smaller-scale machines, a prototype of a 600 kW machine was installed in the North Sea of Denmark in September 2009 and has been operating ever since. The prototype is impressive 40 meters long - with two floats of a 5 meter diameter. It is located 300 meters off Hanstholm in the North Sea at a water depth of 7 meters and is producing electricity to the grid.

The prototype is a shortened version of the complete 600 kW machine which will be 70 meters long with 10 floats on each side. The full-size 600 kW Wavestar machine will be installed in 2014/15.

WITH THE OPERATING 600 kW PROTOTYPE, WAVESTAR HAS STATED ITS POSITION AMONG THE LEADING WAVE ENERGY DEVELOPERS IN THE WORLD.

The 600 kW wave energy machine at Hanstholm has for over 3 years withstood the challenges in all weather conditions with up to 10 meter high waves. Wavestar will work in harmony with other clean energy methods to support the movement towards alternative and sustainable energy.

THE WAVESTAR MACHINE HAS AN AESTHETIC PRICE WINNING DESIGN AND AIMS TO BE AS NEUTRAL IN THE SEA ENVIRONMENT AS POSSIBLE. IT HAS BEEN SHOWN THAT NEW ANIMAL AND PLANT LIFE DEVELOPS ON THE SEABED BENEATH THE MACHINES.



HOW IT WORKS

On each side of Wavestar machine, there is a number of arms and floats, which are submerged in the water. When a wave rolls in, the floats are pressed up and down.

Every time a float is raised, a piston presses oil into the machine's transmission system which drives a hydraulic motor connected to a generator that produces the electricity. The machine has an efficient storm protection concept; when the waves reach a certain height, the floats or even the whole machine is automatically lifted up.

Long ago Denmark positioned itself as a green nation. We are among the leaders in a range of renewable technologies with wind turbines as the flagship. Now we are moving forward in the exploitation of the enormous forces of the sea.

HISTORY

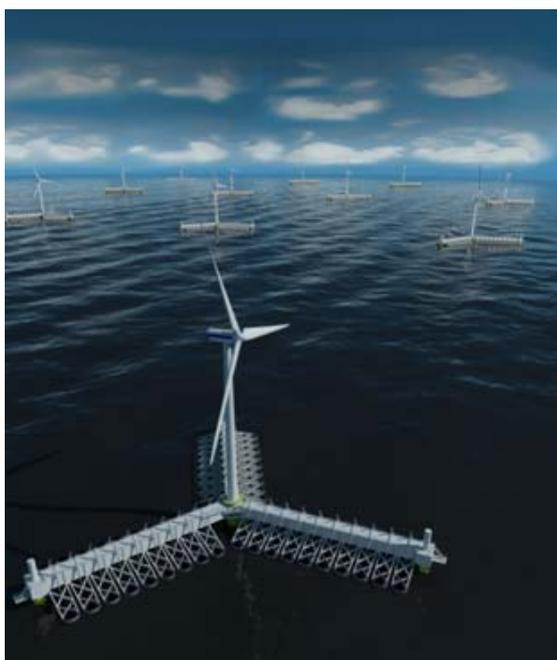
In 2004 extensive tank testing was performed on a scale 1:40 model with the sole purpose of optimising the basic configuration of the system and to document the electrical power production in typical North Sea waves. More than 1,300 different test runs were performed to optimise the concept and were used to document any technical questions about the concept as they arose from the testing.

In 2005 the first grid connected scale 1:10 model was designed and built for operation in the sea at Nissum Bredning where the waves are approx. 1:10 of North Sea waves. It was designed as if it was a big scale machine in order to learn about the practical issues of operation in the sea. The system contained all the instrumentation and control systems necessary to work unattended round the clock.

The test section of the 600 kW machine has been installed at Hanstholm the 18 September 2009, the installation was performed in two days. A bridge was built to access the machine in autumn 2009 and the first guest could visit the plant during the COP15. The machine has been connected to the grid since February 2010.



Even as children the two sailing brothers Niels and Keld Hansen, wondered how the great forces of the ocean waves could be converted into energy. Many years later, in 2000, the final idea arose, and in 2003 Wave Star A/S was established. The inventor brothers are still involved, and the Clausen family from the Danish company Danfoss is the owners standing behind the company.



Wavestar has entered into a cooperation agreement with the Danish utility company DONG Energy with the aim of identifying the potential of combining wind and wave energy in common ocean energy parks.

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