



Floating wind power

Hywind

Over the past couple of years we have heard more and more about successful floating wind turbine projects. It seems there is huge potential for these floating wind farms. These structures bring with them numerous different security issues. PES brings you an update on the partnership between Orga and Sabik Offshore. It lights up the whole perimeter of the 'Hywind' wind farm and makes it visible to both marine vessels and aircraft alike.

A unique wind project off the coast of Scotland

Our oceans, with their vast uninhabited surfaces, have a great potential for creating wind energy. One of the challenges with offshore wind has been that turbines always had to be built on the ocean floor, in relatively shallow waters. This meant that close to 80% of the oceans wind power potential could not be used.

In 2017 the offshore wind farm 'Hywind', off the coast of Scotland was opened. The

Hywind farm – built by Statoil and Masdar – is the first commercially operational, floating wind farm. It brings us a step closer to unlocking the enormous potential of floating offshore wind parks across our oceans.

A buoy as a source of inspiration

The idea of floating wind turbines, came from a simple buoy that a Statoil engineer passed on an afternoon of sailing with his colleague. The engineers recognised the value of the idea. Later that day they started sketching in the canteen, on the

back of a napkin.

The wind farm consists of 5 Siemens turbines that have a total capacity of 30MW. The turbines are subjected to winds of 10 meter per second and waves with an average height of 1.8 metres.

The design of the floating turbines is based on a single floating cylindrical spar buoy. The construction is chained to the sea bed with chains or cables. To make sure the turbine is balanced and floats upright, it is ballasted with three 60 tonne weights.

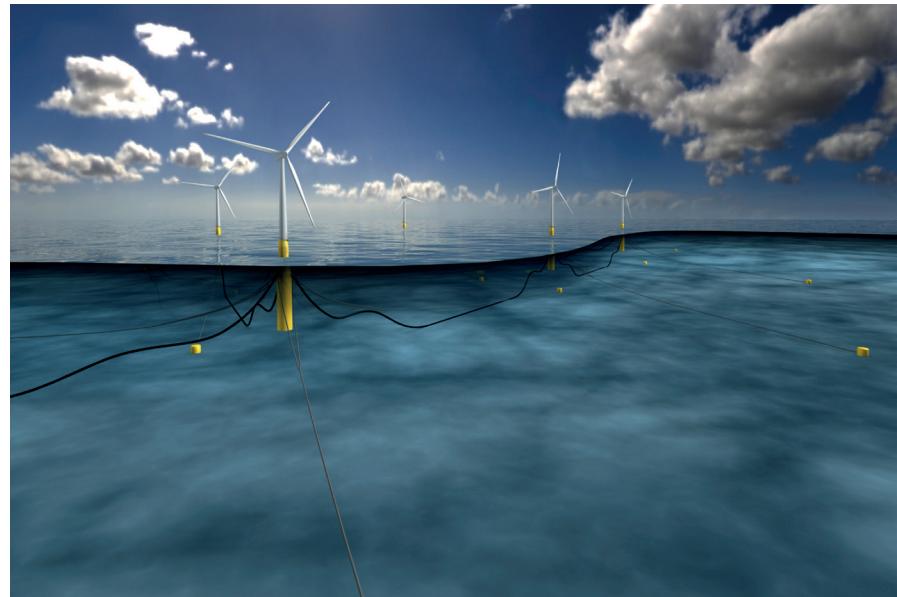


Photo Illustration Statoil. Hywind wind farm

Marking a wind park for air traffic, is different from marking a wind park for marine traffic. The aviation obstruction lighting system is situated in the top of the tower and in some cases, half way up the turbine. The marine lighting system on the other hand, is situated much lower on the turbines.

The specifics of both types of safety marking, are described in different regulations. This means that companies building the parks have to deal with two different regulations.

ICAO and IALA regulations

The International Civil Aviation Organisation (ICAO) has written worldwide guidelines for the safe marking of structures for air traffic. The International Association of marine aids to navigation and Lighthouse Authorities (IALA) on the other hand, has written international guidelines for the safe marking of offshore structures in order to protect marine traffic.

Both regulatory bodies provide a frame of reference for safety regulations. Countries can choose to adopt them, or make their own variations on regulations. This means that the actual regulations that need to be followed vary per country. Luckily, companies like Orga and Sabik Offshore, make it their business to help others comply with the different regulations worldwide.

Orga and Sabik offshore formed a partnership for the Hywind project, to mark the entire park safely and efficiently. Sabik Offshore took care of the marking system that warns marine traffic. Orga provided the Aviation Obstruction Lighting system, which makes the wind farm visible for passing air traffic.

The combined solution presented by the Sabik Offshore & Orga partnership shows

the latest in asset marking technology. The systems installed are energy efficient and extremely durable. They also require little to no maintenance due to smart technologies, built in redundancy and the use of LED lighting. To make the solution even more user-friendly, Sabik Offshore and Orga integrated their systems in a way that they can communicate with one another. Both systems can be controlled and monitored remotely through the same control unit.

Obstruction marking systems have been around for hundreds of years. The first light houses warned ships with fires and later with incandescent lights. We have come a long way since then. During the last twenty years obstruction safety marking systems have become increasingly important because of intensified air- and marine traffic.

The evolution of Aviation Obstruction Lighting systems

Over the last decades, Dutch company Orga has supplied aviation obstruction lighting systems to mark and protect their customers' worldwide. These marked assets have varied throughout the years from prestigious city skyscrapers and bridges, to chimneys on large plants, to wind farms in remote areas.

The wind farms have been Orga's most important Aviation Obstruction Lighting market, and they have seen the movement from onshore wind farms to offshore wind farms.

Matthieu Scheffers Strategic Business Development Manager at Orga Aviation says: 'Luckily, Orga is no stranger to the offshore industry. For decades we have supplied explosion proof Aids to Navigation lighting to offshore platforms (and assets in hazardous areas). Now we can combine our offshore know-how with our Aviation

Software aboard each turbine monitors the winds and waves and alters the pitch of the blades. This dampens the motion of the turbine and maximises production.

The most challenging aspect was to make the wind farm last for 20 years in these extreme circumstances. The stresses on the big constructions are enormous. The Hywind concept was successfully tested on a full scale prototype located off the coast of Karmøy, Norway and was then optimised for the Hywind pilot park.

Marking the project safely for passing air and marine traffic

To keep people, assets and the environment safe, a floating offshore wind farm has to be marked effectively. Specialised lighting systems, ensure that the asset is visible to passing air and marine traffic.



Photo Roar Lindefjeld Woldcam Statoil. Hywind Scotland - preparations for first sail away

obstruction lighting technologies. It all comes together beautifully in this highly innovative offshore wind farm.'

Obstruction lighting has made many technological advancements over the last decades, making the solutions to mark assets more economical, more durable and more environmentally friendly.

Marking an asset used to be done by placing a light behind a strong lens on a tower, chimney or platform. Years of research and development have brought the systems to where we are today. Now obstruction lights are part of smart modular systems.

The system can be controlled remotely and is fitted with multiple sensors. A visibility meter measures the amount of available light and adjusts the light intensity of the system accordingly.

Optical engineers have modelled the lenses in such a way that the light beam is directed in an angle that causes minimal light pollution. When one of the lights in the systems fails, the system can activate a built in back-up light to maintain a safe situation. With new technologies such as GPS, Aviation- and Marine-Obstruction lighting systems throughout the park can even communicate and synchronise their signals. Connection to the internet gives users the luxury of remotely controlling and monitoring the lighting systems, which saves a lot of time and money. LED lighting provides the latest available technology when it comes to extended lifetime of the product.

Another novelty in the Aviation Obstruction Lighting systems is the Helihoist system.

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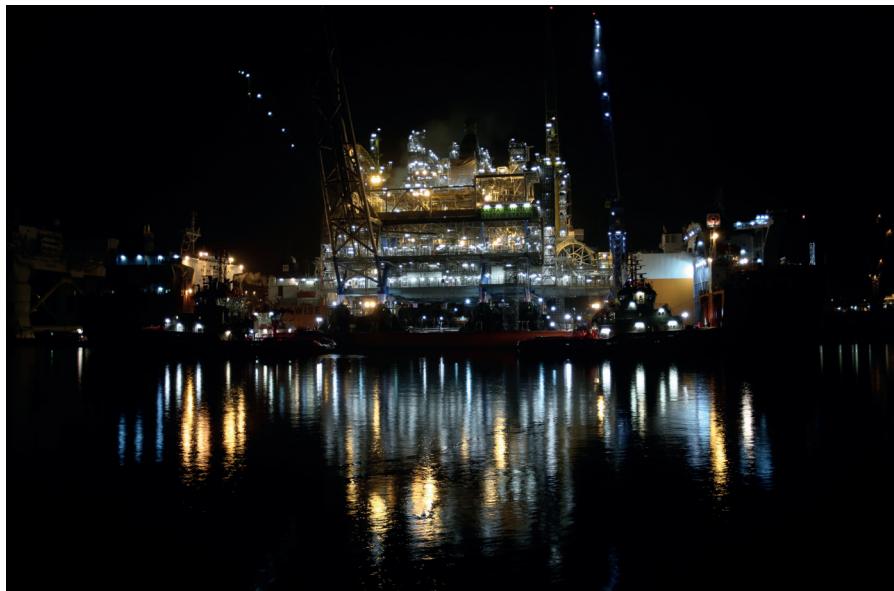


Photo Espen Rönnevik Woldcam Statoil. Aasta Hansteen topside vessel transfer December 2017

Turbines have grown larger and larger over the years. Maintenance crews are often deployed to the turbines on ships. In some cases, where time is of the essence, crews are flown in by helicopters. The helicopter then drops off crew members on the helipad installed on the nacelle. To make sure the helicopter drop off happens safely, the helicopter has to know when the turbine blades have stopped moving entirely. The Helihoist light becomes green when the blades have stopped moving and signals that it is safe for the pilot to perform the drop off.

Orga and Sabik Offshore solutions to the offshore wind market

The Hywind pilot park shows that we might be able to make floating wind a competitive energy supplier. Following regulations to mark wind farms in a safe way will be easier as well. When the time is right, partners Sabik Offshore and Orga will be ready to supply fully integrated aids to navigation and obstructing lighting system that will keep the wind farm, passing traffic and the environment safe.

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