



In search of carbon-neutral maritime transport

The Danish shipping company MHO-Co is heading a consortium focused on developing green solutions for the future of the entire maritime industry. In partnership with Danfoss, Ballard Power Systems Europe A/S, Sterling PlanB, Stuart Friezer Marine and research engineers from Aalborg University, they will test fuel cells and new battery technology on the shipping company's advanced hybrid vessels.

'Every day, our clients in the offshore wind industry produce environmentally friendly power, but they need solutions to store electricity, and the maritime industry has yet to come up with a CO₂ neutral propulsion. Our aim is to develop environmentally friendly technology to replace fossil fuels and dominate the maritime industry in the future.'

Mik Henriksen, CEO of MHO-Co, has had a green agenda, since he founded the Danish shipping company in 2015. Now he is stepping up his green game as head of the consortium, and MHO-Co has joined forces with Danfoss, Ballard Power Systems Europe A/S, Sterling PlanB and Stuart Friezer Marine as well as with research engineers from Aalborg University in search of carbon-neutral maritime transport.

Over the next three years, the six partners have an ambitious plan to develop and test a propulsion system for maritime transport that does not emit carbon dioxide. The groundbreaking project has a total budget of EUR 4.5 million, of which EUR 2.15 million are grants from the Energy Technology Development and Demonstration Program (EUDP).

'With the EUDP grants as well as with knowledge and innovation from other participants, we will set new standards for what is possible in the maritime industry,' says Mik Henriksen.

Fuel cells and batteries

During the project, a range of green propulsion technologies will be tested, especially fuel cells and liquid cooling system batteries.

Ballard Power Systems Europe A/S, which have experience with fuel cells for heavy



Mik Henriksen

transport, are now working on how fuel cells and hydrogen can become part of the future of the maritime sector.

Another contributor to the project is Sterling PlanB, who engineer safe and robust energy storage systems in support of emission reduction. A concept that is both cost-effective and sustainable.

'We are grateful to have such innovative partners in the project. It will generate significant key advances in the fuel cells and the batteries, because we are able to test their system and technology under real maritime conditions,' continues Mik Henriksen.

Floating test platforms

This summer, MHO-Co is introducing the next generation of vessels custom-designed to service the wind turbine and offshore industries. MHO Asgard and MHO Apollo are



MHO Asgard MHO Apollo

the world's first crew transfer vessels with hybrid propulsion. These two vessels will be the focal point of the project.

'Our two new vessels are built as floating test platforms. They are designed to be adapted to the environmentally-friendly energy systems of the future, simply by replacing engine and propulsion packages. And since the vessels are catamarans, we have four platforms providing even better conditions for testing and comparing different sustainable solutions,' Mik Henriksen explains.

When the vessels are fully in operation, they will be equipped to test the different technologies. Stuart Friezer will estimate the requirements for hydrogen storage and determine suitable installation options for all components. This includes hydrogen tanks, Ballard Fuel cell, PlanB batteries along with associated mounting and connection details.

In the fall of 2021, the large extra batteries will be installed on one vessel giving it a total

of 225 kWh, and in the beginning of 2022, the hydrogen tanks and fuel cells, with a capacity of 200 kWh, will be installed on the other vessel.

During 2022, the two vessels and the partnering companies will test and evaluate the use of the batteries and fuel cells, and they will constantly measure the consumption of fuel and hydrogen.

Tailored prototype

Just like the previous MHO vessels designed by Mik Henriksen, these are two unique and state-of-the-art hybrid CTVs. In the design process he partnered up with Incat Crowther, who has expert knowledge in catamarans.

What makes the two catamarans truly special is the Danfoss Editron hybrid motor. The permanently magnetized electric motor saves both weight and space on the CTV while consuming less fuel and giving higher efficiency.

'This propulsion line is a prototype from Volvo Penta and Danfoss Editron. The system is

tailored specially to our new vessels, and Volvo Penta has named their advanced electric propulsion system after us, calling it the MHO hybrid. This is a great honor, and we cannot wait to see it all come together on our new vessels,' enthuses Mik Henriksen.

With the innovative and unique combination of gensets and the electric IPS, the electric motors will reduce CO₂ emissions and eliminate discharge of particles when idling. The large battery capacity makes it possible to stay offshore overnight in hybrid mode, not burning fuel for up to eight hours and without anchoring or mooring to a buoy.

Worth the hassle

The two hybrid CTVs are being built at the AFAI Southern Shipyard in Guangzhou, China. The largest shipyard in Asia specializing in the development, design and construction of high-performance aluminum vessels.

The large vessels have a length of 35 meters with a 110m² fore deck and a 15m² aft deck.



MHO Asgard in China



MHO Asgard MHO Apollo

Each of them is fitted with a large lounge area, eight cabins and holds up to 24 passengers and 57 tons of cargo.

Due to Covid-19 and ensuing restrictions; the process has been different from previous building projects. Progress and technical details were discussed by email and inspections made via video link. Trips to China were prolonged by quarantine periods in hotels.

'It is not easy building ships from a distance. But it has definitely been worth the hassle. All parties have lived up to their best performance, and I am happy to say that we are on time and also very eager to see the vessels finished,' declares Mik Henriksen.

The two new vessels are scheduled to be put into operation in Europe before the summer holidays 2021. During the first year, they will service the Hornsea Project 2 offshore wind farm for Ørsted, based out of Grimsby, UK.

Fitted with Z-bridge

Apart from their innovative hybrid propulsion, the new CTVs can be equipped with Z-Bridge's motion-compensated bring-to-work transfer system on the front deck. In October 2020, MHO-Co tested the Z-bridge system.

'The test with MHO Esbjerg in Breskens in The Netherlands was huge success, and we are ready to put the system into work on the hybrid vessels making them even safer and more efficient,' asserts Mik Henriksen.

This Z-bridge will improve safety and allow four technicians to transfer in a trolley directly from the CTV to the platform. The elimination of climbing up the towers will increase workability and improve the transfer time, all in a safe manner.

Fully functioning the system will give the vessels even more days of operation, with a limit higher than 2 meters h/s.

Facts about MHO-Co

MHO-Co is a Danish shipping company specializing in the service and transport of crew in the offshore wind industry. The shipping company was founded in Esbjerg in 2015 by Mik Henriksen and commands a number of vessels including the twin vessels Gurli and Esbjerg, which, each measuring 39 meters, are the world's largest Crew Transfer Vessels.

The vessels have specially designed fenders that protect the turbines. Despite the size of the vessels, they only push on to the turbine tower with a max of 250 kilo newtons.

The green ambitions are great, and the goal of MHO-Co from day one has been to service the offshore industry with reliable vessels with high performance and safety, where environmental and fuel-economy considerations go hand in hand.

Visit www.MHO-Co.dk to learn more.