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Blue Technology reveals zero-emission vessel type that harnesses wind power

Nick Savvides, technology editor | 3 September 2018

[Print \(https://fairplay.ihs.com/subscribe-print?width=500&height=500&iframe=true\)](https://fairplay.ihs.com/subscribe-print?width=500&height=500&iframe=true)A conceptual image of Blue Technology's *Liberty* (pictured), a trimaran vessel that would not require a ballast-water treatment system.

Credit: Blue Technology

Wind is the ultimate free energy, and harnessing that power could be a key element to the energy mix that will be necessary if shipping is to achieve the 50% cut in carbon emissions by 2050 to which the industry has committed.

With the race to find the fuels of the future under way, *Fairplay* takes a look at some of the systems that may soon be operating on the water, including both retrofit solutions and new vessel designs.

Included in the list of technologies currently under development are *Vindskip*, a Norwegian-designed car carrier that harnesses the power of wind through the design of its hull; Tig Rig, a sail system that can be fitted to existing vessels to reduce fuel consumption; and Blue Technology's *Liberty*, which is being touted as a zero-emission commercial vessel.

Wind is set to make a significant contribution to the decarbonisation of the shipping industry as owners look to cut costs and reduce emissions. Unlike hydrogen and methanol, wind is not expected to produce the main power that will drive the ship for most of the designs, but rather, be used as a back-up system for the main energy source.

That said, Denmark's Blue Technology is looking to buck the trend with an emissions-free, wind-powered design for oceangoing vessels by 2024, and this design comes in two configurations – a car carrier and a



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container vessel – according to the design company.

Harnessing wind energy is not a retrograde step. With the aid of computers, modern materials, and computational fluid dynamics, the sail-assisted vessels of the future will bear little resemblance to even the relatively high-tech tea clippers, such as *Cutty Sark*, of yesteryear.

A modern *Cutty Sark* would be a trimaran vessel with a carbon fibre body, two wing sails, and propellers that, when deployed, would charge batteries for use when the wind drops below the speeds necessary to power the vessel.

Blue Technology said it will build this type of vessel as an electric car carrier by 2024 so that the ships that transport the vehicles can be as environmentally friendly as their cargo.

But the vessel design offers more in terms of environmental savings than simply the main engine power. The zero-emissions trimaran will also deliver the kind of stability necessary to eliminate the need for ballast water, thus removing the need for a treatment system.

Brian Boserup, founder of naval architecture and innovation developer Blue Technology, said, “About 30% of vessel transport time is operated under ballast, and this is a waste of resources.”

In addition, the vessel has no need for fuel treatment tanks that are necessary for diesel-powered ships, and with four azimuth propellers placed in each corner, there is no tail shaft and therefore no bearing oil that will leak into the ocean.

As a car carrier, the capacity will be about 2,500 vehicles, but the vessel can also be configured as a container carrier with a capacity of 1,100 teu all stored within the shell of the vessel. The containers would be loaded using reach stackers and the vessel’s own designed system for moving containers.

Furthermore, with a design draught of just 4.5 m and a cargo-handling system that is contained within the vessel itself, for containers this means two reach stackers would be landed and would handle the loading and unloading operations.

This would enable the vessel to operate out of almost any harbour, including shallow-draught ports, without needing to rely on local equipment for its cargo-handling operations.

At 198 m in length and with a breadth of 55 m, the *Liberty* trimaran would be one of the largest sailing ships to have ever plied the open seas, surpassed only by *SS Great Eastern*, while *Cutty Sark* is a mere 85 m long.

However, the sailing power of *Liberty*, comprising two masts of 110 m with a total wingsail area of 8,320 m², would propel the ship at speeds of 16–28 kt, depending on wind speed and direction.

Boserup told *Fairplay*, “The vessel looks futuristic but it is simple. There is no diesel engine, no fuel-management systems, no ballast-water management systems, and no deck maintenance.”

In addition, Boserup said the bridge will be operated electronically from a virtual platform, as the hull has no windows, with cameras mounted high on the masts to give a good all-round view as the vessel sails and docks.

When the vessel is not under sail, power would be provided by the four retractable azimuth thrusters via a battery pack that would be recharged through the same thrusters when the vessel is under sail. The 15,000 m² of solar panels mounted on the exterior of the ship would boost its overall energy storage, which would be in the form of containerised removeable battery packs.

As the batteries would be stored in containers, storage capacity could be easily boosted by adding containers, depending on the vessel’s route.

The four azimuths would be placed on each corner of the hull, on the front and back of the outriggers, and with the thrusters capable of rotating 360°, no tugs would be required to steer and manoeuvre in port.

The main material of the vessel’s outer shell would be carbon fibre for when the vessel is operated in



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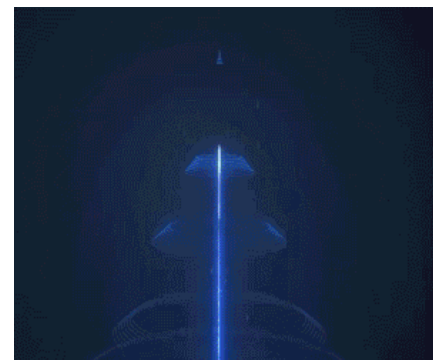


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domestic waters. However, an oceangoing version of the ship would more likely be constructed using aluminium.

According to Boserup, *Liberty's* detailed design will be completed by the end of 2019 and construction could be realised as early as 2024. Blue Technology has already earmarked the Fayard shipyard in Denmark to build the vessel, offering an early zero-emissions design to owners well in advance of the 2050 deadline for the 50% emissions cap.

However, Boserup said the dates are moveable, because some companies remain unconvinced by the design and the ability of the technology to meet the industry's commercial requirements. Boserup said Blue Technology met with major car carrier operator Wallenius Lines, but no agreement was made.

"It is a little embarrassing to say, but their view was that customers were not asking for zero-emissions carriers and they were convinced that the ship would be slow and the rates would be high," Boserup said.

Blue Technology also approached the Danish Maritime Fund (DMF) for help with financing the proof-of-concept study, but Boserup said the request was denied. Asked whether the DMF gave a reason, he claimed that *Liberty* is a disruptive concept, so it is not in everyone's interest to see it built. He implied that the Danish maritime cluster, which produces ballast-water treatment systems, scrubbers, and other technologies, could lose business if vessels of a similar design to *Liberty* were developed.

Even so, Blue Technology intends to continue pursuing *Liberty's* development. The company is convinced that the project will eventually get the funding it needs, as *Liberty* and other wind technologies look to become a permanent fixture in the shipping industry's future as the costs of wind energy become competitive in the medium term.

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