

Danish Maritime Press Tour:

From first DNV Type Approval to first sailings: how Ballard's fuel cells are powering zero-emission marine operations

Copenhagen, 8 April, 2024 - The period of 2023-24 marks a significant milestone in marine technology as several industry-first hydrogen-powered vessels take to the water on their maiden journeys. This is the culmination of multi-year developments where partners across the marine industry – integrators, vessel operators, fuel cell suppliers and infrastructure providers - are breaking new ground and launching zero-emission propulsion solutions.

Powered by Ballard's marine-grade fuel cell modules, the first vessels to embark on their maiden voyages were Norled's MF Hydra - the world's first liquid hydrogen-powered ferry - operating in Norway; FPS H2 Barge, a retrofitted cargo vessel that entered service on the river Rhine in the Netherlands in March 2024; and Zulu06, the first inland cargo transport vessel, due for launch on the river Seine in Paris in the second half of 2024.

Designed for – and together with – the marine industry, Ballard's FCwave™ fuel cell module is a catalyst in accelerating net-zero technology to meet the International Maritime Organization's ambitious global targets to cut emissions from ships by at least 50% by 2050. The fuel cell module is the first to be awarded Type Approval by DNV and Lloyd's Register for marine applications, an industry recognition certifying that FCwave™ meets the stringent safety, functional, design and documentation requirements that are required for global marine commercialization.

"Hydrogen fuel cells have already proven their performance in a variety of applications, and now, in close collaboration with the marine industry, fuel cells are also powering vessels and port applications" said John Winterbourne, market development and Norway country manager, Ballard Power Systems Europe. "Experiencing the success of the first sailings, is exactly the kind of proof we need to build market confidence in hydrogen fuel cells and encourage more ship operators to deploy zero-emission solutions.

Ballard's FCwave™ fuel cell module is a true plug-and-play solution, providing an optimal zero-emission replacement for conventional combustion engines onboard ships. It is a high-power, adaptable engine in a hybrid electric system that incorporates fuel cells with batteries to provide efficient, zero-emission power. Available in 200kW increments, FCwave™ facilitates reliable operation, scalable power output and flexible integration into the vessel. Designed hand-in-hand with the industry to withstand the rigors of the marine environment, FCwave™ is

developed, tested, certified and prepared for installation with an uncompromising focus on safety.

“The astute design of FCwave™ and extensive testing ultimately resulted in Ballard receiving the world’s first DNV and Lloyd’s Type Approvals,” added Christian Vinther, business development manager, Ballard. “Through this certification process - and by being part of several marine projects - we now have the experience, a qualified team, and purpose-built facilities in-house that enable us to support future global projects and collaborations.”

Hydrogen fuel cells are compatible with electric and hybrid architectures – generating the electricity that powers the vessel. Like batteries, they produce electricity, but for fuel cells, hydrogen is the energy storage – meaning the power system will produce electricity for as long as hydrogen is available. FCwave™ is a high-power, adaptable power generator in a hybrid electric system that incorporates fuel cells and batteries working seamlessly together to deliver efficient, zero-emission power.

The modular design of fuel cells facilitates easy and adjustable deployment, which integrators can configure for specific vessel requirements. They provide long-range operation, with consistent power delivery throughout the duty cycle. Refueling is fast, and fuel cells are proven, in many critical heavy-duty applications, to be reliable, with a long service life and few maintenance intervals.

About Ballard Power Systems

Ballard Power Systems’ (NASDAQ: BLDP; TSX: BLDP) vision is to deliver fuel cell power for a sustainable planet. Ballard zero-emission PEM fuel cells are enabling electrification of mobility, including buses, commercial trucks, trains, marine vessels, and stationary power. To learn more about Ballard, please visit www.ballard.com.

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Media contact:

Jonna Christensen
Jonna.christensen@ballard.com
+44 (0)7833 766461