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MAN Energy Solutions to Lead Danish Consortium Developing Ammonia-Fuelled Engine for Maritime Sector

Innovation Fund Denmark supporting AEngine project that aims to deliver commercially viable, zero-carbon, two-stroke engine by 2024

Innovation Fund Denmark, the Danish investment entity, has announced the establishment of a consortium to develop a two-stroke, ammonia-fuelled engine for maritime shipping. It aims to specify and demonstrate an entire, marine-propulsion system that will pave the way for the first commercial order for an ammonia-fuelled vessel.

MAN Energy Solutions will lead the consortium that also numbers: Eltronic FuelTech, the Danish fuel-system supplier; the Technical University of Denmark (DTU); and DNV GL, the leading classification society. Development of the engine is scheduled for 2024.

Brian Østergaard Sørensen, Vice President, Head of Research & Development, Two-Stroke at MAN Energy Solutions, said: “MAN Energy Solutions has spoken in favour of a maritime energy transition in shipping for many years now and we understand the need to work with a wide group of industry partners to develop sustainable solutions. Ammonia is a fuel with a lot of potential and yet another, important step towards decarbonising the marine market. We already have a convincing track-record in developing engines running on alternative fuels – having developed the world’s first 2-stroke engines driven respectively by methanol, ethane and LPG – and have great expectations for this project.”

Project aims

As a marine fuel, ammonia has the potential to decarbonise the marine industry. The project aims to demonstrate – at full-scale – a large marine engine running on ammonia at MAN Energy Solutions’ test facility, Research Centre Copenhagen. The project comprises three main stages:

1. Concept development and initial design of an ammonia engine.
2. Design of an ammonia fuel-supply system.
3. Full-scale testing.

Why ammonia?

Ammonia is interesting because it is an energy carrier that does not contain carbon, and whose combustion therefore does not produce CO₂. Similarly, its production from electricity doesn't require a carbon-based source, while its production is infinitely scalable.

Since large quantities of ammonia are already transported around the world, it is a well-established commodity with some 120 ports globally currently involved in its import/export and some with storage facilities. Thus, using ammonia to power ships would be a natural step with infrastructure already in place.

AEngine roles

The AEngine project is adopting an interdisciplinary approach to cover the implications of using ammonia as fuel aboard a ship, as evidenced by its participants.

MAN Energy Solutions is the world's leading designer of low-speed engines for the propulsion of large merchant ships, and will act as project coordinator. It will integrate all developed technology into an ammonia propulsion-train and be responsible for fuel injection, the combustion system, and emission after-treatment technology, as well as all on-engine components. It will also be responsible for the test facility and engine testing.

Eltronic FuelTech is a leader in the development, production, installation and maintenance of fuel equipment for high- and low-pressure solutions within the maritime industry. It will be responsible for the engine's fuel-supply system, including the Fuel Valve Train and its integration with tanks, and purging and venting systems. Eltronic FuelTech will also supply the AEngine's fuel-supply system and Fuel Valve Train to the test facility.

DTU is Denmark's largest technical university and has a strong international reputation in relation to ammonia as engine fuel. More specifically, its Department of Chemical Engineering will be involved in investigating the chemistry of ammonia combustion and the formation of pollutants during combustion. Similarly, DTU's Department of Mechanical Engineering will support the project by acting as a consultant and transferring its experience from small ammonia-engine research to a larger-scale, full-size marine engine.

DNV-GL is a leading classification society. It will cover safety regulation for the use of ammonia aboard ships and act as consultant on questions where design decisions have an impact on safety.

MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon neutral future. Addressing tomorrow's challenges within the marine, energy and industrial sectors, we improve efficiency and performance at a systemic level. Leading the way in advanced engineering for more than 250 years, we provide a unique portfolio of technologies. Headquartered in Germany, MAN Energy Solutions employs some 14,000 people at over 120 sites globally. Our after-sales brand, MAN PrimeServ, offers a vast network of service centres to our customers all over the world.