E-ferry – prototype and full-scale demonstration of next generation 100% electrically powered ferry for passengers and vehicles

Reporting

Project Information

**E-ferry**

Grant agreement ID: 636027

Project website

**Status**

Closed project

**Start date**

1 June 2015

**End date**

31 May 2020

**Funded under**

H2020-EU.3.4.

**Overall budget**

€ 21 303 820,74

**EU contribution**

€ 15 141 035,88

**Coordinated by**

AERO KOMMUNE

Denmark

Periodic Reporting for period 3 - E-ferry (E-ferry – prototype and full-scale demonstration of next generation 100% electrically powered ferry for passengers and vehicles)

**Reporting period:** 2017-12-01 to 2019-05-31

**Summary of the context and overall objectives of the project**

E-ferry is a project supported by the European initiative Horizon 2020 and involves the design, building and demonstration of a fully electrically powered car- and passenger ferry.
The E-Ferry will be based on a newly developed, energy efficient design concept: an optimized hull and propulsion system, a high-energy battery pack, and the use of weight-reducing modules and components.

The E-ferry will be demonstrated in full-scale operation on longer distances than previously seen for other electric ferries (> 5 Nm), i.e. the medium range connections Soeby-Fynshav (10.7 Nm) and Soeby-Faaborg (9.6 Nm) in the Danish part of the Baltic Sea, connecting the island of Aeroe (Ærø) to the mainland.

The E-ferry project is a partnership between Ærø Kommune (a small Danish island municipality), Soeby Shipyard, Naval Architects Jens Kristensen, Tuco Yacht, Visedo Oy, Leclanché GmbH, Leclanché SA, The Danish Institute of Fire and Security Technology, The Danish Maritime Authority and The Hellenic Institute of Transport, all working together to develop a vessel which meets all international safety requirements for car and passenger ferries operating in coastal areas, so that the overall emission and pollution caused by waterborne transportation can be reduced in the future.

The E-ferry project addresses the societal problem of waterborne pollution, by demonstrating the feasibility of a 100% electrically driven passenger and car ferry for medium-range distances. When in operation, the E-ferry will provide zero Co2 emission transportation for e.g. island communities. Compared to similar conventional vessels, the E-ferry is expected to reduce Co2 emissions with 2000 tons.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

The E-ferry project lasts a total of 60 months.

During the first 48 months, the E-ferry project focused firstly on developing the technological innovations that were necessary for the E-Ferry, secondly on constructing the E-ferry accordingly, bringing all parts together and finally have the vessel as a whole surveyed by Class and Maritime Authorities, for approval.

After the first 48 months, the E-ferry has now been fully approved by relevant authorities and the ferry-operator ARO-ferries have started crew training on the vessel, before they will put the vessel into ordinary operation with passengers.

The E-ferry is a single-ended, drive-through ro-ro passenger ferry with the capacity to carry 31 cars or 5 trucks on the open deck, and 147-196 passengers, depending on the season. The hull shape and dimensions of the E-ferry have been optimised in terms of energy efficiency. It has waterline length of 58.60 meters, an external breadth (outside fenders) of 13.40 meters and a hull depth of 3.70 meters. The E-ferry is equipped with a range of lightweight materials, anchor and mooring winches, capstands and wheel house is constructed in aluminium, for instance. The main contribution to weight reduction, however, is Danfoss Editron’s state-of-the-art electric propulsion and drives train system, which is based on DC/DC converter technology so that heavy AC/DC converters
can be placed on shore instead of onboard the vessel.

The E-ferry will be put into operation on the routes between Søby-Fynshav and Søby-Fåborg, with a single charging station only, which is placed in Søby. This means that the vessel needs the capacity to cover distances of more than 20 nautical miles between charges, where contemporary electric ferries like the Norwegian Ampere covers only about 3 nautical miles. To achieve this goal, the battery capacity provided by Leclanche’s marine optimized NMC battery modules is 4.3 MWh, which is the largest battery capacity seen to date. The batteries are charged through an automated shore connection system. The charger is placed on the E-ferry onshore ramp in Søby, where it is connected to the shore side power supply. The automated charging system connects automatically, via plugs, when the E-ferry arrives at Søby harbour and charge each side of the vessel separately, with up to 2x2MW DC at a time. The charger is the first high power DC charger on the market and will allow the E-ferry relatively short port-side stays of 15-20 minutes.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

When the E-ferry is put into demonstration, it will be the first of its kind: a fully electric newbuilt ferry that can cover distances of more than 20 nautical miles between charges. It is expected that the E-ferry will reduce the island of Aeroe’s annual emissions with approximately 2,000 tonnes CO2, 41,500 kg NOx, 1,350 kg SO2 and 2,500 kg particulates. Moreover, the implementation of the E-ferry will mean lower operating costs (running costs) for the operator, as well as reduced travel time for passengers, when compared to the existing conventional diesel ferries that are currently in operation on the island. Locally, then the E-ferry is expected to have a huge socio-economic impact on the island community, as well as on the environment. These socio-economic and environmental impacts are expected to go far beyond the local community however, as there are numerous communities in Europe (and internationally) that are currently served by conventional ferries that cover similar distances to the E-ferry and would similarly benefit from being replaced with a fully electric ferry.
The E-ferry logo

The basic design of the E-ferry

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The routes where the E-ferry will be put into operation

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