

EMISSION-FREE FAST FERRY



BACKGROUND

A fast-developing growing need on worldwide scale to move from fossil fuels to zero carbon energy sources and technologies is evident.

In preparation of future replacement of the Waddenzee fast ferry connections, this research serves as pilot study to investigate the possibility to zero emission type energy source solutions for future fast ferry design. This project was a specific case study for a 400+ passenger ferry on an approx. 20 NM crossings, operating at high speed.

Already many different starting points and paths to choose from to achieve above stated goal are available, each with their challenges and potential solutions. However, at time no ultimate solution is available for the shipping industry resulting in ship owners in search for the best solution.

OBJECTIVES

The suitability of various types of low(er) to zero emission type energy sources, projected on a high-speed ferry design and in direct relation with the protected and sensitive operational Waddenzee area as well as departure and arrival locations has been evaluated.

Primary goal is to achieve a concept design based on the lowest possible, preferably completely emission-neutral solution. First step being the exploration of all different energy carriers available with the aim to reduce and narrow down to a select number of most suitable. The next step to look at the effect of implementing the

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MAIN CHARACTERISTICS

| | |
|--|-----------------------|
| Construction material: carbon fibre for full vessel construction (Hull & Superstructure) | |
| Layout: single deck design | |
| Direct drive PM propulsion motor, no gearbox | |
| Battery system rated capacity | 4200 kWh |
| Propulsion power total | 4 x 575 kW 2300 kW |
| Speed | 25,0 kn |
| Length | 50,60 m |
| Beam | 12,14 m |
| Draft | 1,50 m |
| Range | ~ 21 nm |
| PAX | 415 |

Contact:



Holger Eilers
Mail: h.eilers@reederei-frisia.de



Paul J.M. Melles
Mail: p.melles@rederij-doeksen.nl



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selected energy carriers including propulsion systems effects into the design of the current ferry.

RESULTS

The results of the study can be summarised as follows:

- Final evaluations and results showed full electric version being identified by far as the absolute favourite option.
- The results showed that the battery powered concept is on the edge of feasibility, margin between feasible and non-feasibility is critical.
- H₂ concept showed non feasibility at current date due to the weight aspect, however in future it can be expected that this could change as especially battery & fuel cell technologies as well as H₂ fuel storage systems still making significant improvements. In near future, this may well become a viable concept.
- Reviewed methanol concept proved viable however in such concept, still emission of CO₂ is applicable.
- Major distinction between an all-electric ferry concept compared to alternative fuel variants is the required onshore infra structure with required very high and reliable power delivery. This being an integral and profound aspect, very much integral part of the whole all-electric concept.

This study was limited to the selection of most suitable

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energy carrier and its technical feasibility. For a full analysis, important other aspects as indicated in the report should also be considered as they form an integral part of a solution. Ultimately, variants can only be fairly compared among themselves until such complete data is available.

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Further information at: www.h2watt.eu

Contact:



Holger Eilers
Mail: h.eilers@reederei-frisia.de

REDERIJ DOEKSEN



Paul J.M. Melles
Mail: p.melles@rederij-doeksen.nl

