

# The E-ferry project

*Prototype and full-scale demonstration of next generation 100% electrically powered ferry for passengers and vehicles*

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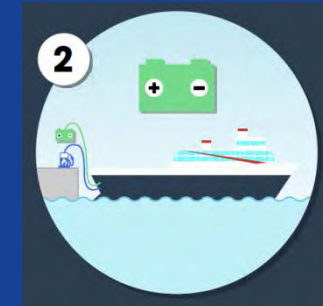
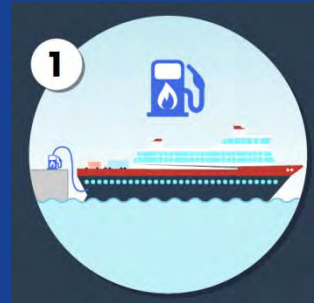


# Towards the greening of the EU ferry transport

- EU ferry fleet: old and in need of renewal
- New environmental legislation (EU Sulphur Directive 2012/33/EU)
- Oil prices go down
- Motivations to go green: *compliance to current/future rules and regulations, improved competitiveness resulting from fuel efficiency and cost effectiveness, trade flexibility (ECA friendly vessels) and (with a quite low score) the branding, innovation and first mover perception (DNV, 2014)*

# Market solutions

- (1) New LNG
- (2) New Hybrid- battery
- (3) Scrubbers
- (4) MGO fuels <0.1%



# Ferry electrifications: barriers & challenges



- Current ferry design is **not optimised** in terms of **energy efficiency**
- **Reduction** in new ferries' **weight** is often **not considered**
- **Current regulations** makes it difficult to apply carbon composite or other alternative materials to steel
- **Price** of building ferries using carbon composites



- **Short port stays** during the ferry's operational schedule
- Delivering **enough power from the local grid** to charge at very **high rates** during short port stays
- Transferring such **high powers** in a **safe** way in **all weather** and **operational conditions**



- The **maritime industry, crews /unions** are not convinced about electric ferries being part of the maritime transport solution
- **Crew competences** for fully electrical operation not clarified
- **Educational requirement** for the future ferry crews not in place

# E-ferry: A Game Changing approach to medium range ferry connections



# E – ferry at a glance

E-ferry is a new project supported by the EU H2020 programme involving the **design, building & demonstration** of a **fully electric powered** ‘green’ medium sized ferry for medium range connections.

- Start date: June 1, 2015
- Duration: 48 months
- Total cost: 21,3 M€
- EU funding: 15 M€
- 10 partners

E-ferry builds on the Danish  
Green Ferry Vision Project  
(awarded as **Initiative of the year,**  
**2015 Ship Efficiency Awards!**)

## E-ferry team

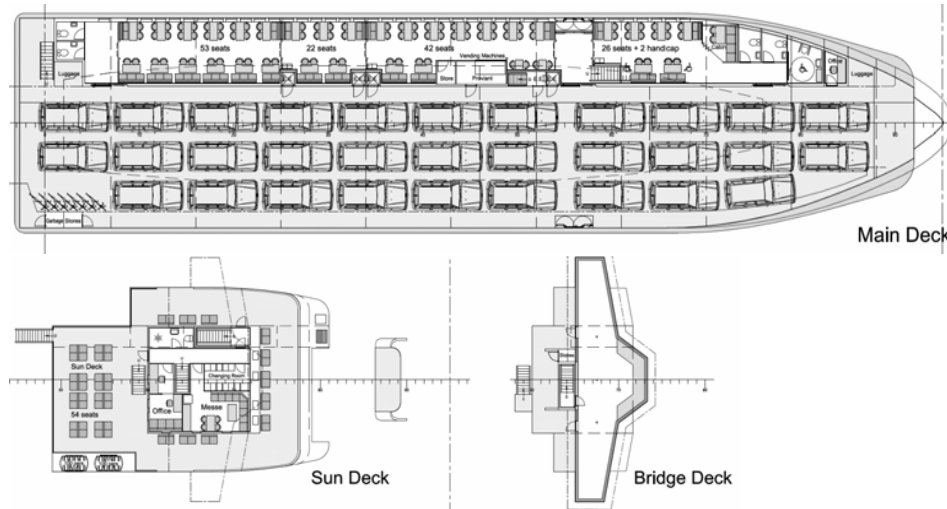


# Objectives



to **design & build** an innovative medium sized ferry combining energy efficient design, lightweight equipment, materials, state-of-the-art electric only systems with automated high power

DESIGN/BUILD



*E-ferry-December 2015*





**validate** and **prove** the **feasibility** and cost effectiveness of the concept to the industry and ferry operators

**demonstrate:** on 2 connections in the Danish part of the Baltic Sea

VALIDATE/DEMONSTRATE



(a) Soeby-Fynshav and (b) Soeby-Faaborg



ACHIEVE IMPACTS

- **life cycle assessment** for a 30-year horizon
- **reduce CO<sub>2</sub> , NO<sub>x</sub> emissions and particulates**
- **test new materials** (*CFR modules in the superstructure*)

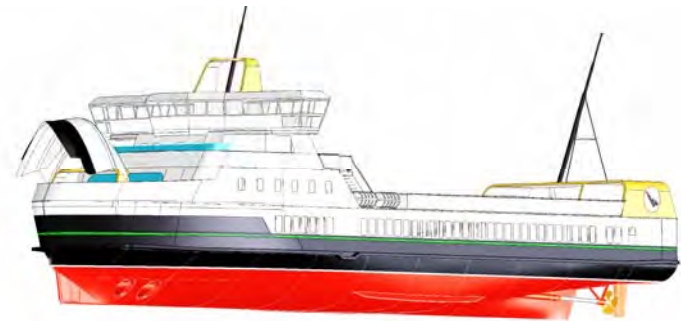


INVESTIGATE MARKET  
UPTAKE

- **quantify** the potential **market up-take** and CO<sub>2</sub> reductions on EU scale and qualify the **potential** application of the concept on a **larger scale** among relevant industry and ferry operators
- develop a **business case/model** and prepare the concept for market uptake starting soon after the end of its demonstration

# Operational characteristics/advantages

- Speed up to 14 knots
- Improved charging (at one end of the route)
- Improved sailing range between charging periods (2 x10.7 NM)
- Worldwide largest battery capacity for maritime use (4.3 MWh)
- Record breaking high charging power capacity (4 MW) allowing short port stays.



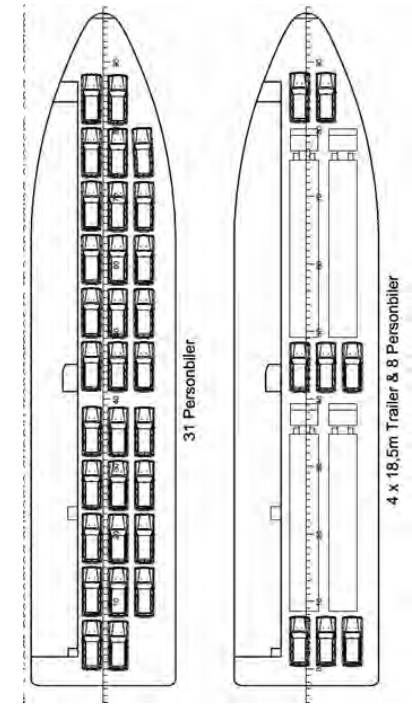
# Operational characteristics/advantages

- Reduced noise and wake even at higher speeds, benefitting communities and wildlife in the vicinity of the ferry routes.
- High safety standards (Category C & D normal trading areas for the typical island ferry).



# Vessel characteristics

- Single ended, drive-through Ro-Ro passenger Ferry with 1 continuous main deck for trailers and cars.
- Use of CFR composites in addition to the aluminium lightweight solutions for the superstructure.
- Capacity:
  - 31 cars or 4 (+8 cars) trucks (18.5m) on open deck
  - 147/196 passengers at winter/ summer
- Principal dimensions
  - Length (oa/pp) 59,40 / 57,00 m
  - Breadth mld. at vehicle deck /extreme: 12,80 m/13,40m
  - Depth to vehicle deck 3,70 m, Draught full loaded 2,50 m
  - Free height/ breadth at vehicle deck: 5,00/ 8,50m



# Speed and power

Installed power: 2 x 750 kW

Battery Capacity: 4.3 MWh

**Speed @: 2.40m draught**

No Sea margin

10% Sea margin

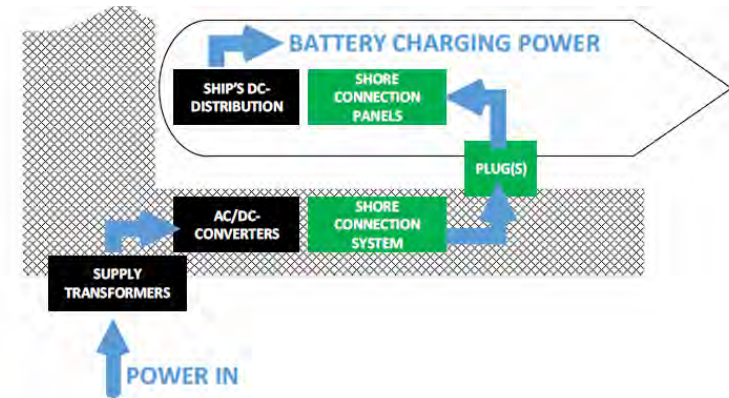
750 kW:	13.0 kn	12.8 kn
1000 kW:	13.9 kn	13.6 kn
1500 kW:	15.3 kn	15.0 kn

# Innovative elements (I/II)

- **100% electric ferry** (no hybrid solutions) powered by electricity from wind power or other **RES** (green electricity market)
- **reduction** of the weight of the ship by using a **lightweight** approach to all materials, machinery & equipment including CFR composites in part of the superstructure
- **modern** and **higher safety** standards in the **design** criteria
- **simple drive train design** also indicates that maintenance and repair cost will be lower

# Innovative elements (II/II)

- innovative charging system including fully automated shore connection
- improved sailing range between needed charging periods (2x13NM)
- worldwide largest battery capacity for maritime use (4,3 MW)
- peak charging power up to 4MW
- able to operate in ice conditions up to 15-20 cm





# Targeting green

- CO<sub>2</sub> emissions reduction (approx. 2,000 tonnes)
- NO<sub>x</sub> reduction by 41,500 kg
- SO<sub>2</sub> reduction by 1,350 kg
- particulates reduction by 2,500 kg per year\*
- reduced noise and wave heights even at higher speeds, benefitting communities and wildlife living in the vicinity of the ferry routes.

*\* from 2017 when the demonstration ferry is put into operation*



# Thank you

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