



CONNECTING BLUE and green

# Ellen, the 100% electric ferry traveling in ranges never seen before

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101017727



# Brief History of the E-Ferry project



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## Søby on Ærø island

- **2013:** Decision to build a fully electric emission-free ferry to replace the aging diesel
- **2014 - Green Ferry Vision – feasibility study**
- **Goal:** a vessel covering unprecedented range for an electric ferry,
- No fossil fuels
- No emergency backup systems
- **2015 –The Project:** The E-Ferry project is funded by the EC

# E-Ferry at a glance

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

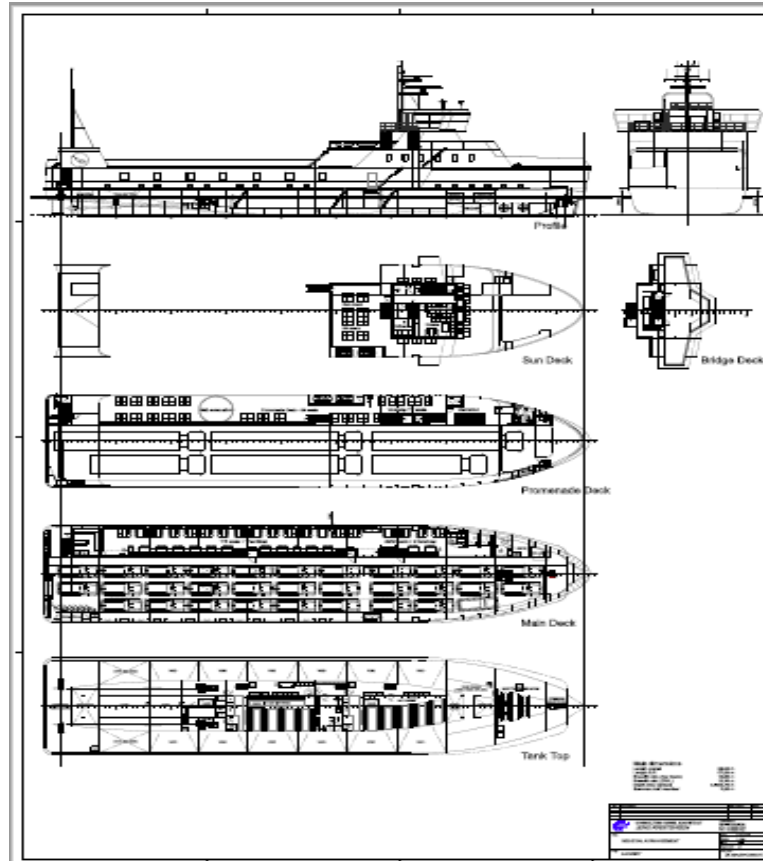
- Start date: June 1, 2015
- Duration: 48 months
- Total cost: 21,3 M€
- EU funding: 15 M€
- 10 partners

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

## E-ferry team



# Ellen's Technical Characteristics



# E-Ferry Technical Characteristics

	Technical characteristics
Type	Single ended, drive-through Ro-Ro passenger ferry
Class Notation	1A1, Car Ferry B, R4, ICE C, EO, Battery (Power)
Transport capacity	31 cars or 4 trucks and 8 cars, 147 passengers in winter, 196 passengers in summer
Dimensions	Length 59.4 m, breadth 12.8-13.4 m
Speed (draught of 2.30 m)	Service Speed: 13, 5kn, Max speed: 14.2 kn
Deadweight	235 ton
Gross Tonnage	996 GT
Propulsion	2x550kW main motors, 2x250kW thruster motors
Battery capacity	4.3MWh
Charging capability	4MW

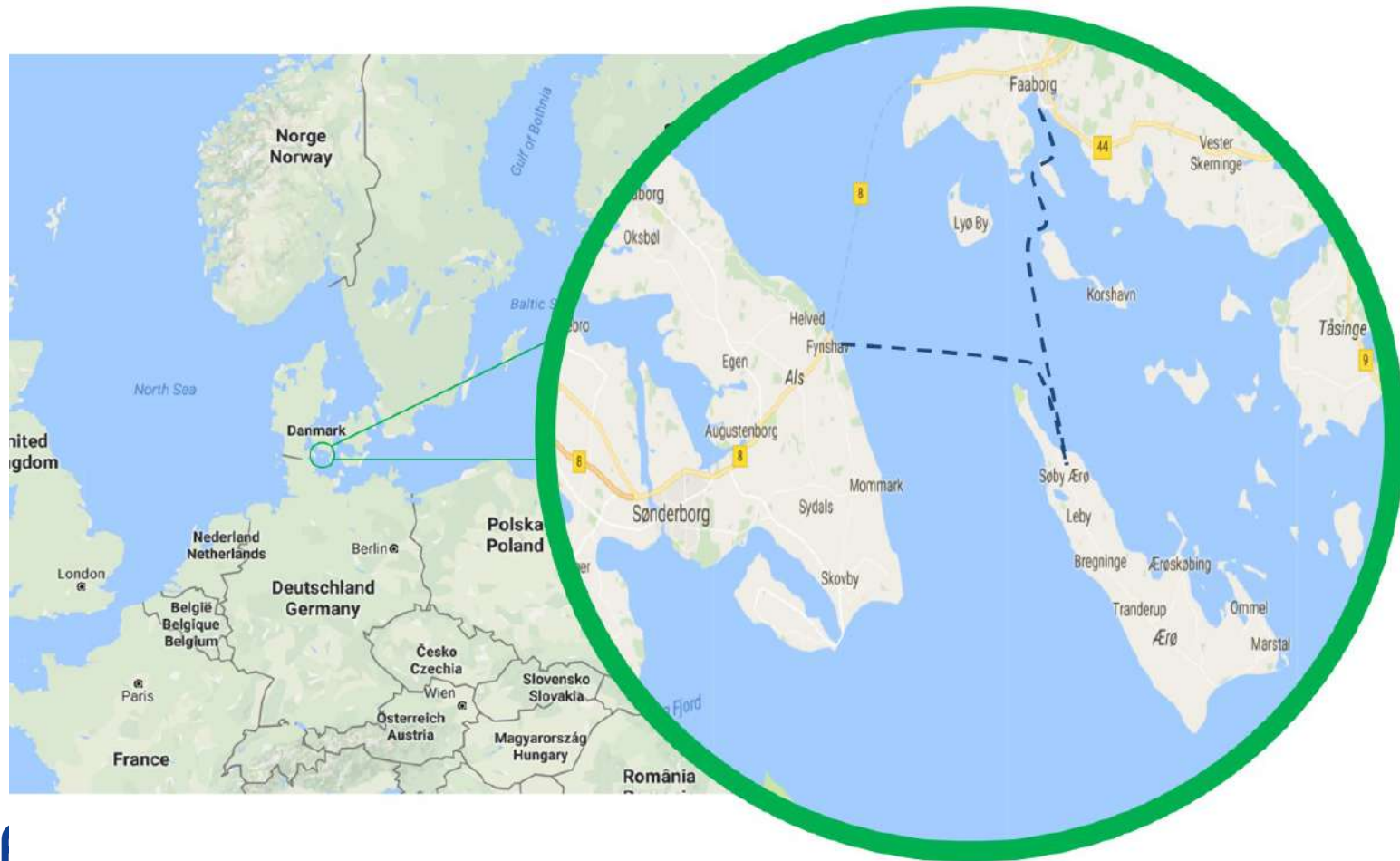
# E-Ferry Technical Characteristics

Dimensioning of battery capacity & charging effect are based on:

- ✓ ordinary ferry operation on a route up to 22 nm
- ✓ Up to 7 trips a day
- ✓ operating hours 06:00-24:00.
- ✓ no back up emergency generator,
- ✓ 2x400 kWh reserved at all times for emergency purposes
- ✓ fully charged in the morning, gradually diminishing charged capacity
- ✓ 30% of its nominal capacity at the end of the day

# Ellen's Operation

Operation area and 2 routes approved by DMA





# Ellen's operation

## Søby > Fynshav

Overfartstid 60 min.

Man-fre.	Lørdag	Søndag & H.
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+5/6-20

06:00	06:00	
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08:30	08:30	08:30
-------	-------	-------

11:20	11:20	11:20
-------	-------	-------

14:15	14:15	14:15
-------	-------	-------

17:05	17:05	17:05
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h) 19:35		19:35
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h) Sejler kun fredage i perioden 29/5 - 16/10-2020 inkl.

## Fynshav > Søby

Overfartstid 55 min.

Man-fre.	Lørdag	Søndag & H.
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+5/6-20

07:10	07:10	
-------	-------	--

09:45	09:45	09:45
-------	-------	-------

12:35	12:35	12:35
-------	-------	-------

15:30	15:30	15:30
-------	-------	-------

18:20	18:20	18:20
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h) 20:50		20:50
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h) Sejler kun fredage i perioden 29/5 - 16/10-2020 inkl.

# Ellen's Operation

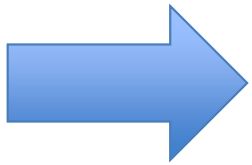
- ✓ On-shore facilities available in all 3 ports; Søby, Fynshav and Faaborg.
- ✓ Harbors equipped with automated mooring system, for faster docking and less crew work.
- ✓ Charging possible only at home harbor of Søby,

# Ellen's Technical Evaluation



# Technical Evaluation – Energy Efficiency and consumption

- ✓ Low average energy consumption per trip,
- ✓ available battery capacity of more than 3.8 MWh
- ✓ fast charger (4 MW peak charge),



**Ellen is a valid commercial alternative to diesel and diesel-electric ferries on longer ferry routes and with high frequency of daily connections.**

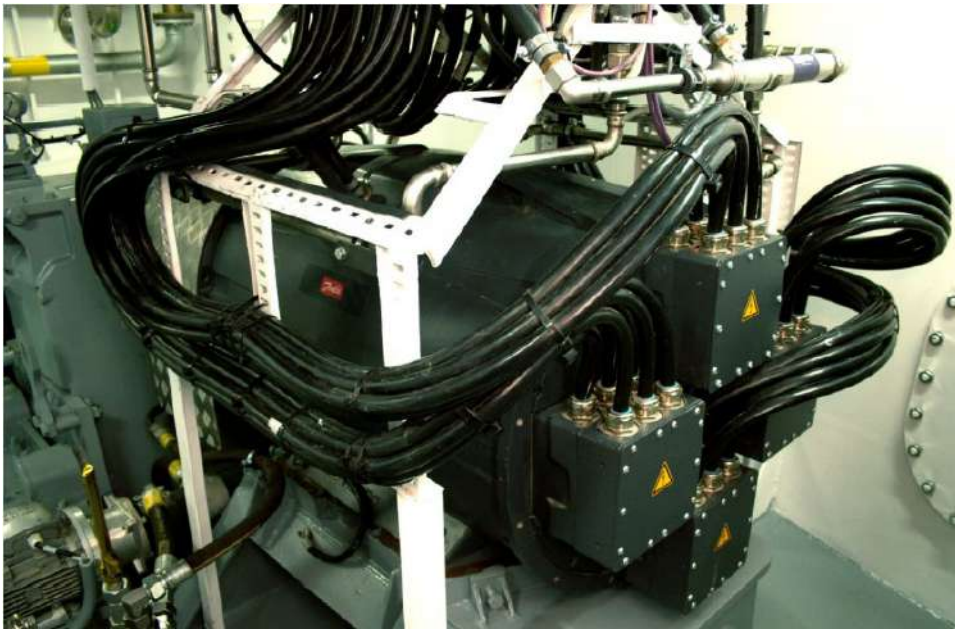
# Environmental impact of sailing fully electric



# Environmental impact of sailing fully electric

- Significant environmental savings compared to BAT and to existing ferry
- Decrease in CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO and particulate matter
- Certified green electricity for Ellen's charging
- Ellen is entirely emission free in a more global perspective

# The economy of sailing fully electric



# The economy of sailing fully electric

<b>Vessel</b>	<b>Total costs/year (5 trips/day - 360 days/year) (€)</b>
<b>E-ferry prototype</b>	1.713.669,6
<b>E-ferry series</b>	1.713.669,6
<b>New diesel-electric ferry</b>	2.255.582,1
<b>Existing diesel ferry</b>	2.689.587



# The economy of sailing fully electric

- Lower operational costs due to:
  - ✓ Lower energy cost.
  - ✓ Lower crew cost, (no a marine engineer).
  - ✓ Automation.
- Higher investment costs compensated for after just 4-8 years of operation

# E-technology is constantly becoming cheaper

- ✓ Decrease in battery systems;
- ✓ Today, Ellen would cost 20% less.
- ✓ Charging systems to be part of the infrastructure,
- ✓ Standardization efforts & economies of scale

# Passenger satisfaction and perspectives for the industry



# Passenger Satisfaction

- ✓ **Passengers welcomed the emission-free ferry and its sailing characteristics with enthusiasm.**
- ✓ “extremely satisfied” with Ellen’s operation.
- ✓ “less noisy and completely smog-free”
- ✓ “extremely satisfied” with safety, comfort and travel time
- ✓ New jobs expected to be created

# Market potential of E-Ferry in Europe

	Number of routes up to 22nm	Number of vessels	Due for renewal now	Due for renewal in 10 years
Baltic	85	142	66	31
North Sea	89	185	100	43
Mediterranean	140	369	211	96
Total	314	696	377	170

# Worldwide market potential of E-Ferry

Market	Number of routes up to 22 nm	Number of routes up to 36 nm	Total
The Americas	102	23	125
Central Asia	1	1	2
South East Asia	13	13	26
Pacific	9	6	15
Total	125	45	168

# Concluding remarks

Viable solution for:

- ❖ standard routes,
- ❖ trips of specific and known length,
- ❖ 3 times the duration of the trip
- ❖ ports located near residential areas or wildlife areas



**Welcome aboard!!!** Video : <https://youtu.be/i8LutE2oVzs>







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Sail with us@

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636027"

UN Environment Programme, July, 13<sup>th</sup>, 2021