

The little big journey

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2018 ForSea – same route, new name, even greener.



The regional connector of people, fueled by the opportunities of tomorrow



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Aurora af Heisiria

Operating the region that never sleeps

day all year around in all weather 142 crossings per day Efficient, punctual & sale The most environmentally frendly alternal ve to cross the stat

Business & Pleasure



One of the most important crossings over Öresund

- 7,1 million passengers
- 1,3 million cars
- 452 000 trucks
- 16 500 buses



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-FORSEA

Battery ferries





Business considerations

- Two main consideration high oil prices environmental footprint
- Return of investment, unpredictable oil prices
- Power infrastructure in the port
- Battery lifetime fast development
- Grant from INEA 13,15 MEUR
- Taxations on electricity.
- Maintain high-frequency sailing schedule 60 minutes turnaround
- How to achieve maximum environmental benefits

The way to battery operation



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Typho Braha

M/F Tycho Brahe Battery driven



FoodXpress

-Helsingborg

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- Ristretto
- ShopXpress
- Conference & event
- Bar open in certain periods

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| Built | 1991 |
|--------------------|--------|
| Total Lenght | 111 m |
| Width | 28 m |
| Draught | 5.3 m |
| Car capacity | 238 |
| Passenger capacity | 1100 |
| Lane meters | 539 m |
| Gross tonnage | 11 434 |
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Helsingør

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M/S Aurora Battery driven

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- FoodXpress
- Ristretto
- Lounge
- ShopXpress
- Restaurant: Waves
- Bar with live music
- VIP-room/meetings

| Built | 1992 |
|--------------------|--------|
| Total Lenght | 111 m |
| Width | 28 m |
| Draught | 5.3 m |
| Car capacity | 238 |
| Passenger capacity | 1250 |
| Lane meters | 539 m |
| Gross tonnage | 11 046 |
| | |



Pioneering technology

- 640 batteries per ferry, with a weight of 90 kg per battery. A total capacity of 4,160 kWb
- Battery charged by "green electricity" from non-fossil fuel; wind, water, solar energy
- No emissions from the battery-operated vessels
- Watercooled batteries for highest safety
- The batteries are placed in four containers between chimneys
- Less noise
- Possibility to hybrid mode or full diesel mode



Co-financed by the European Union Connecting Europe Facility



Charging fast and green

- A fully automatic laser-controlled robot arm
- 6-9 minutes of efficient charging for a 20-minute crossing
- Charging with 10 500 kW, 10500 V and 600 Amp
- The energy combustion when using battery operation, is much lower compared to diesel, due to the efficiency of the power



Connecting Europe Facility

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Batteries

- Litium Ion batteries
- 'Production costs' approx. 1200-1700 tonnes CO2
- Lifespan approx 5 years
- Batteries to be reused in other areas
- Casing to be reused after end of life
- Fast development within the area



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Authorities and approval

- No Rules for batteries, IMO Alternative design
- 1455 Guidelines for approval of alternative design.
- Pre risk assessment before signing the contract. Design team consists of all specialists
- Lloyds role for approval
- Flag state Authorities (DMA and STA) roles for approval





Connecting Europe Facility

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- So far reduced bunker and emissions by 50% in 2019 -14 000 tons CO2
- Reduced energy consumption with approx. 30%
- Reduced amount of particles (PM) reduced NoX and SoX
- Less noice and vibrations
- In full batteryoperation (97%), reduction in bunker and emissions are expected to reach 65% in total this equals approx. 23 000 tonnes CO2, 13 tonnes NOx and 5 tonnes Sox
- NPS customer satisfaction increased from 50 to +62 on battery vessels





- To be a "first mover" is time consuming
- The approval process is very complicated.
- Using industrial technology in a maritime environment is challenging.
- It can be done!



Wherever you are heading, we deliver moments well spent



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So again; 20 minutes is not much, but together we can come a long way

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Operating since the vikings

History

"The most sustainable, customer focused company, striving for zero emission"

CO2

Vision

Operations

Offering

Sustainability



- Every 15 minutes, all year around in all weather
- 142 crossings/day
- 7,1 million passengers
- 1,3 million cars
- 428 000 trucks
- 16 500 buses

- Food & Beverages
- Retail
- Passenger traffic
- Freight
- eight

- Charged by green electricity.
- 6-9 min of efficient
- charging
- 4160 kwh energy capacity

