

# Case presentation: The E-ferry project - Electrification of maritime transport

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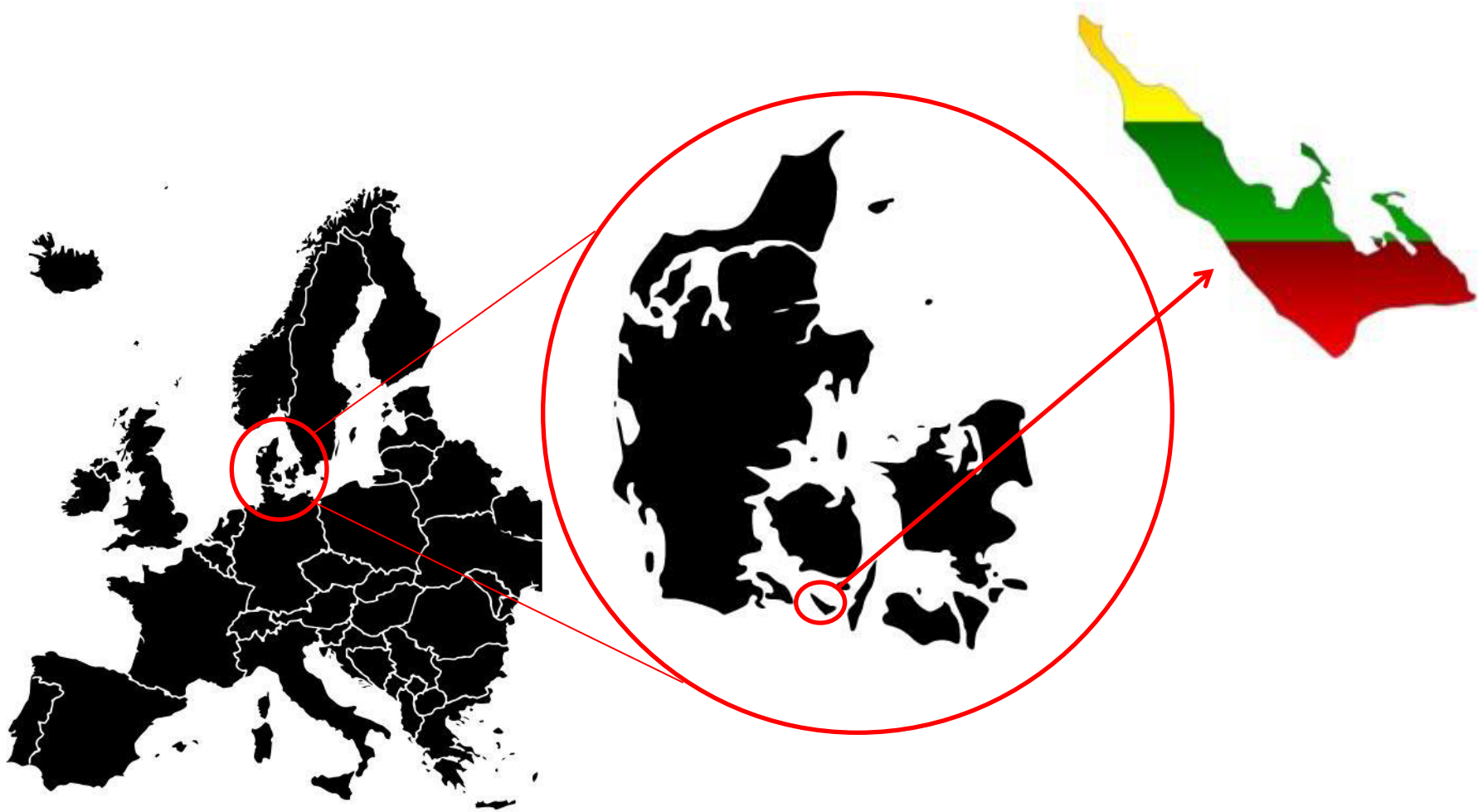
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# 1. The E-ferry case

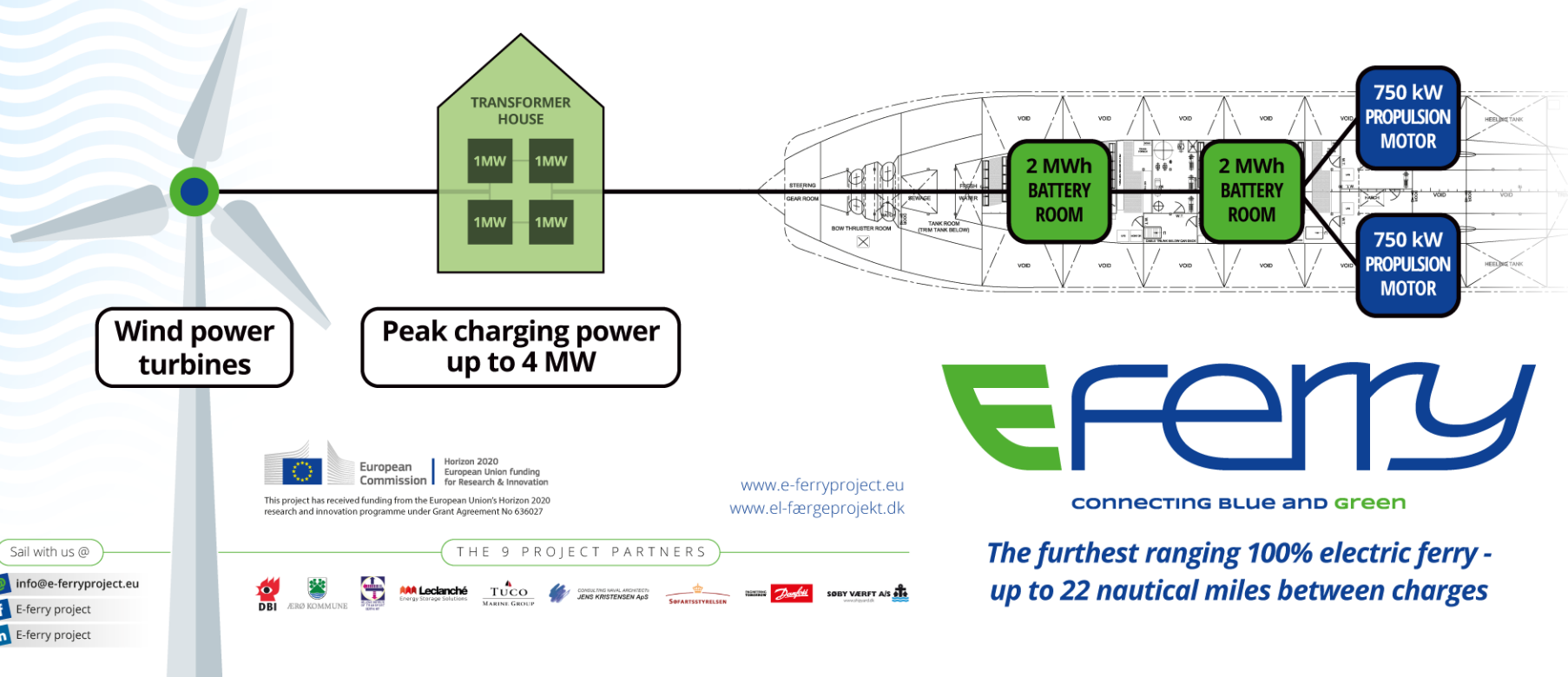


# 1. The E-ferry case





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- 4 x 1.2 MW transformers
- 4.4 MW peak charging
- Up to 6,000 amps
- AC/DC converters on shore
- Ramp-based charging arm



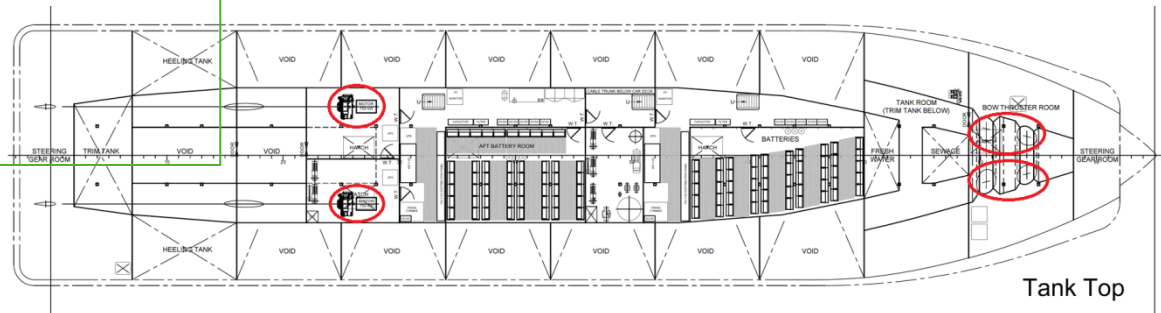
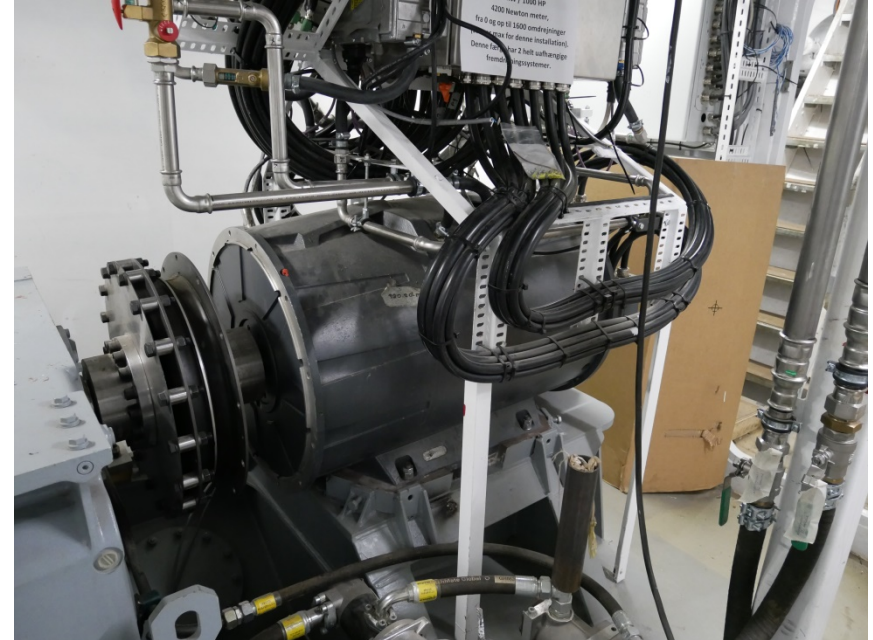
# 1. The E-ferry case

- Lithium-ion Graphite/NMC
- 4.3 MWh
- 56 tons
- 20 separate strings in two rooms
- Type approved for maritime use
- Leclanché



## 1. The E-ferry case

- 2 x propulsion engines
  - ✓ 750 kW/motor
  - ✓ 950 kg/motor
  - ✓ 1000 HP/motor
- 2 x thruster engines
  - ✓ 250 kW/motor
  - ✓ 465 kg/motor
- Fixed magnet
- Danfoss Editron





## 2. Benefits from electric operation

- Reduced pollution and GHG emissions
  - 2000 tons CO<sub>2</sub>, 41 tons NO<sub>x</sub>, 1.3 tons SO<sub>2</sub>, 2.5 tons particulates annually
- More energy efficiency
  - Hydrodynamic hull design
  - Weight reduction
  - Only 20-30 % energy loss in the full chain



## 2. Benefits from electric operation

- Reduced costs
  - Larger up-front investment
  - Lower operating costs due to
    - Lower fuel prices
    - More automation
    - Less maintenance
- Reduced noise and vibration
  - Improved comfort for crew, passengers and neighbors

# 3. Potential for electric operation

## What do we know?

- **Green Ferry Vision (2015):** 65-80% of Nordic ferry routes are suitable
- **Siemens Danmark (2016):** 7 in 10 Danish ferry routes would be more profitable
- **E-ferry Business Study (2018):** Fully electric operation is feasible on 900 ferry routes in Europe

# 4. Next steps for a transition

## Standardization

- Charging systems
  - Communication between systems and providers
- 
- Type approval
  - Sharing experiences
  - Nordic standards?



# 4. Next steps for a transition

## Battery life cycle

- Optimizing weight and energy density
- Black versus green electricity – Well to Propeller
- Pollution from battery production

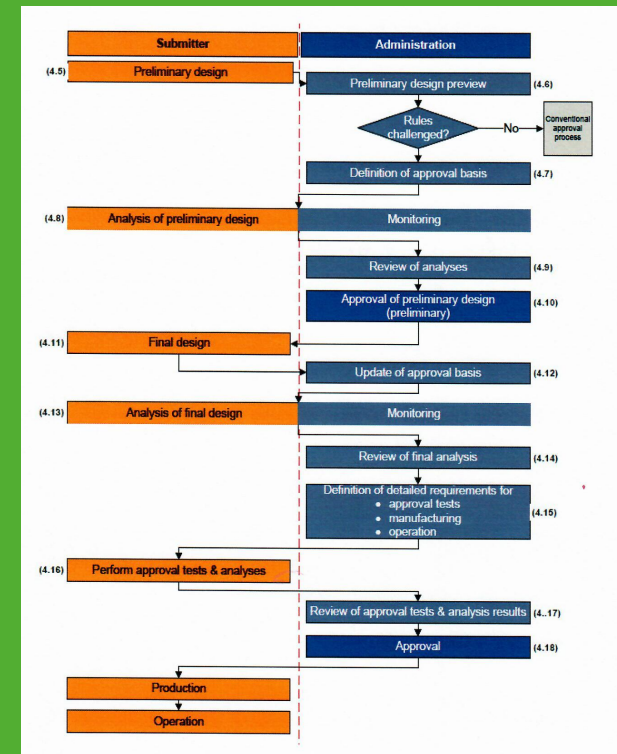
- R&D
- Recycling procedures
- Second life



# 4. Next steps for a transition

## Regulatory framework

- Short sea shipping focus
- Battery specific regulations
- Authorities familiar w. process
- Flag state/regional strategy
- Parameters in tenders
- Education





# Thank you for listening

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Eferryproject  
Den bæredygtige energiØ Ærø



[e-ferry-project](https://www.linkedin.com/company/e-ferry-project)

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