

Scandlines

Full speed ahead: the course is set towards zero emission



THERE IS SOMETHING ABOUT SAILING



Scandlines

Full speed ahead: the journey towards zero emission continues



Michael Guldmann Petersen

COO Scandlines

- Joined Scandlines in 2017
- Overall responsibility for operations and management of ferries, ports and terminals
- Appointed Chief Operating Officer (COO) in 2018

About Scandlines: integrated part of the infrastructure between Scandinavia and mainland Europe

Puttgarden-Rødby

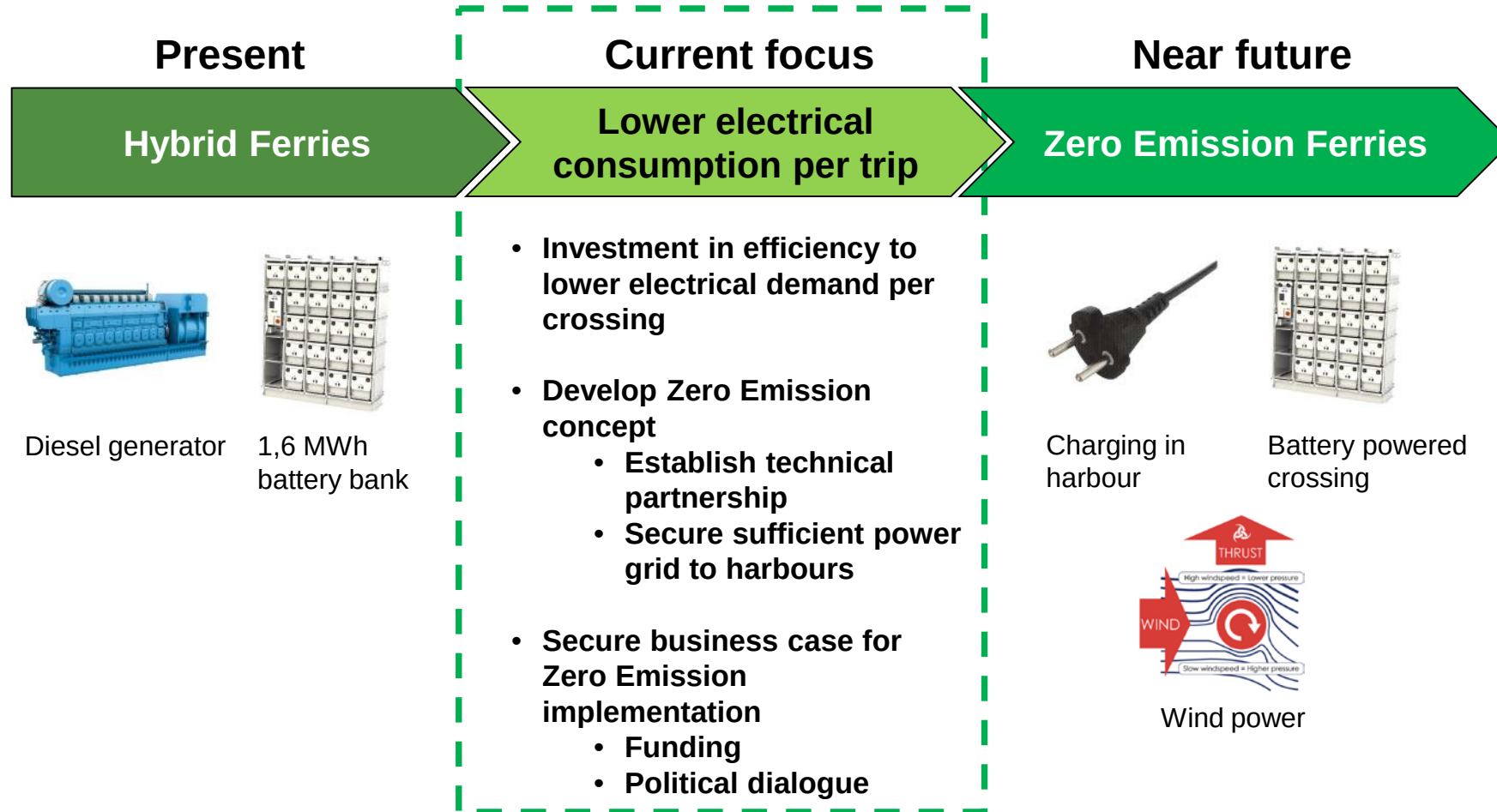
- 6 ferries (4 hybrid in 30 min schedule)
- 110 daily departures
- 15 min. turnaround
- 45 min. crossing
- 1.4 M cars
- 550K freight units
- 13K train wagons

Rostock-Gedser

- 2 ferries (hybrid)
- 21 daily departures
- 15 min. turnaround
- 1h 45 min. / 2h crossing
- 340K cars
- 150K freight units



Scandlines' green agenda



Replacement of existing 16 thrusters on our hybrid ferries operating the Puttgarden-Rødby route

- Scandlines continues the journey towards Zero Emission
- Since 2013, Scandlines has invested 25 MEUR in rebuilding ferries from conventional diesel driven ferries to hybrid ferries on the Puttgarden-Rødby route.
- It is Scandlines' aim to sail emission-free on this route in the near future.
- Now we are taking the next step with an investment of 13 MEUR in 16 new thrusters for the four hybrid ferries operating the Puttgarden-Rødby route.

Puttgarden-Rødby



38 MEUR
investments in
green technology
2013-19 on
Puttgarden-Rødby



Replacement of existing 16 thrusters on our hybrid ferries operating the Puttgarden-Rødby route

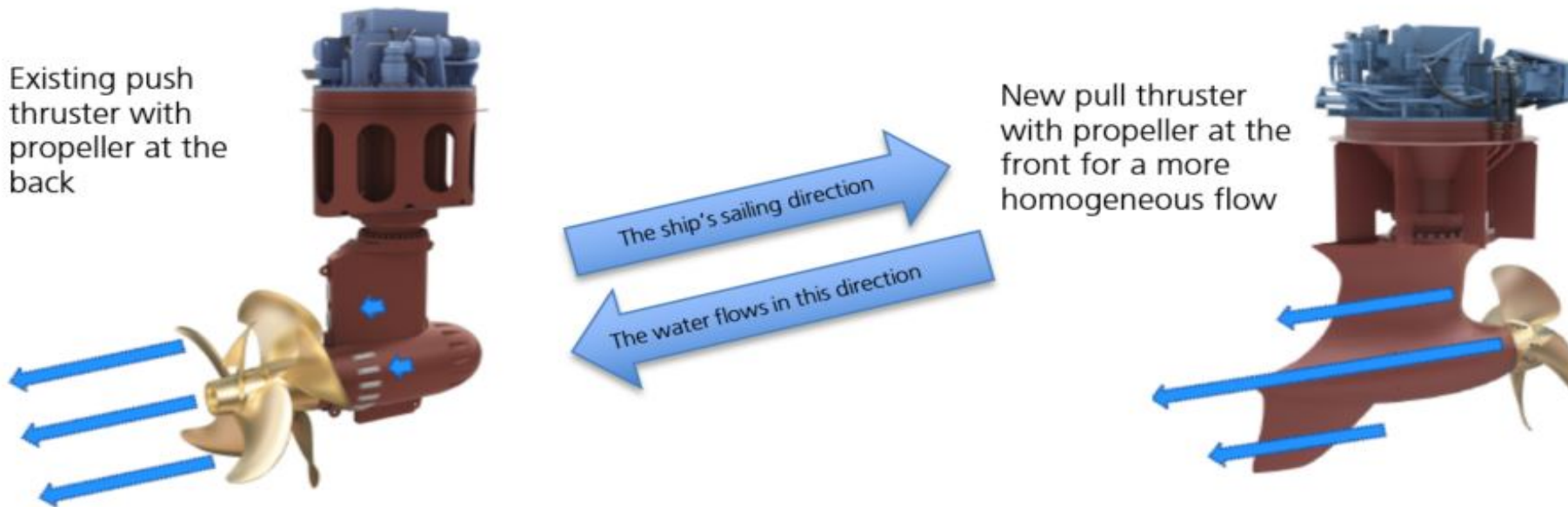
Benefits

- Reduction of underwater noise, air emissions and vibrations from the hybrid ferries on the Puttgarden (Germany)-Rødby (Denmark) route (to the benefit of the harbour porpoises)
- Easier water flow during propulsion ultimately reduces emissions, including CO₂
- Tests in the tanks indicate that CO₂ emissions can be reduced significantly with a further 10-15% due to the new thrusters
- Part of Project Zero to improve fuel efficiency – lowers investment and operation costs

Facts & Costs

- 13 MEUR investment in 16 new thrusters
- The thrusters will be delivered by Rolls Royce
- The first ferry, the M/V Schleswig-Holstein, will have its thrusters exchanged in the autumn of 2019
- All ferries will be equipped with new thrusters by 2020
- The thruster control systems on the bridge will be exchanged as well
- Also, Scandlines' simulator in Puttgarden will be upgraded

High tech pull thrusters instead of push thrusters



High tech pull thrusters instead of push thrusters

On the existing push thrusters, the propeller is at the back, so the water needs to pass the thruster before it reaches the actual propeller. We exchange these with high tech pull thrusters, where the propeller is at the front of the thruster, thus allowing a more homogeneous flow through the water.

Silicone-hydrogel underwater coating Puttgarden-Rødby

- Investment in green solution, turning our ferry transportation more climate friendly

Facts

- Releases 95% less biocide than traditional antifouling
- Investment in green solutions, turning ferry transportation more climate friendly
- The silicone-hydrogel combination forms a smooth non-stick surface on the vessel's hull, making it difficult for fouling organisms to attach, which reduces drag in the water
- Improves efficiency at the sea

- M/V Prinsesse Benedikte received silicone-hydrogel coating as first Scandlines hybrid ferry on Puttgarden-Rødby

- M/V Schleswig Holstein will receive silicone-hydrogel coating



- M/V Deutschland and M/V Prins Richard will receive silicone-hydrogel coating
- Renewal silicone-hydrogel coating M/V Prinsesse Benedikte

Silicone-hydrogel underwater coating

Puttgarden-Rødby

- Investment in green solution, turning our ferry transportation more climate friendly

Before



After



World's largest **hybrid ferries** on Rostock-Gedser: in operation since 2016

M/V Berlin
and sister ship
M/V Copenhagen

Technical data

Length:	169.50 m
Width:	24.80 m
Lane meters:	1,600 m

Two car decks:
The ferry is loaded and
unloaded in only 15 minutes.

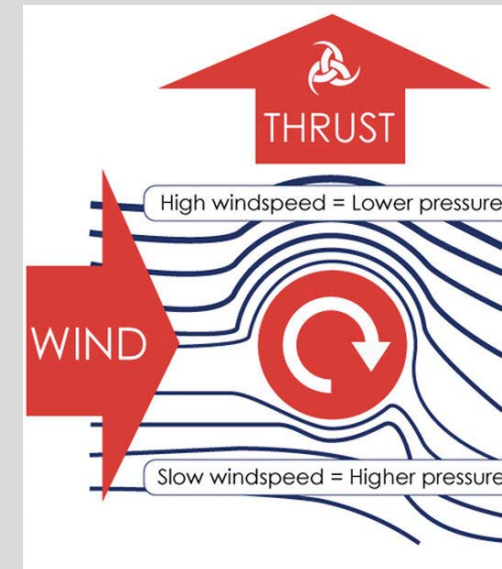


Revival of wind power for propulsion - Flettner rotors/rotor sails



What is a Flettner rotor/sail?

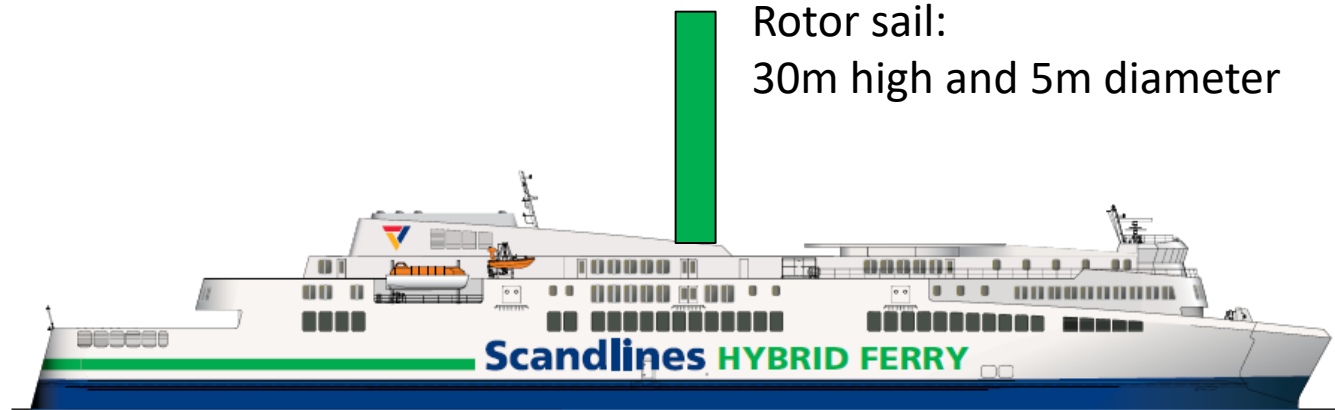
- Flettner rotor provides forward thrust similar to sails
- Old and well known technology, however only applied as pilot test
- When the wind meets the rotor sail, the air flow accelerates on one side of the rotor whilst it decelerates on the opposite side of the rotor sail.
- The change in the speed of air flow leads to a pressure difference, creating a lift force perpendicular to the wind flow direction.



THERE IS SOMETHING ABOUT SAILING

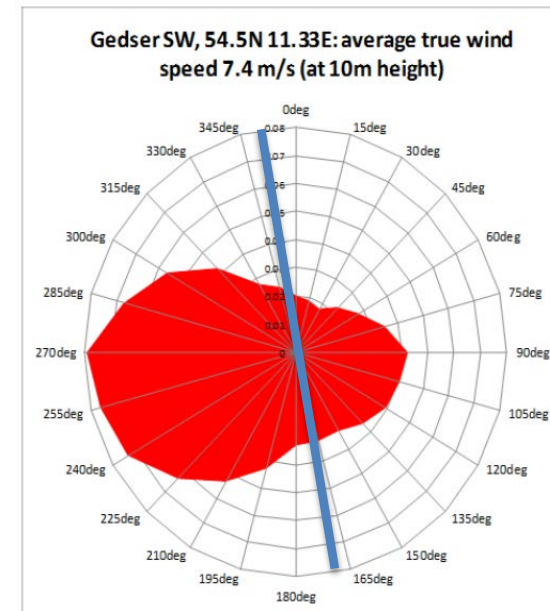
 Scandlines

Our north-south routes and wind conditions are ideal for rotor sails



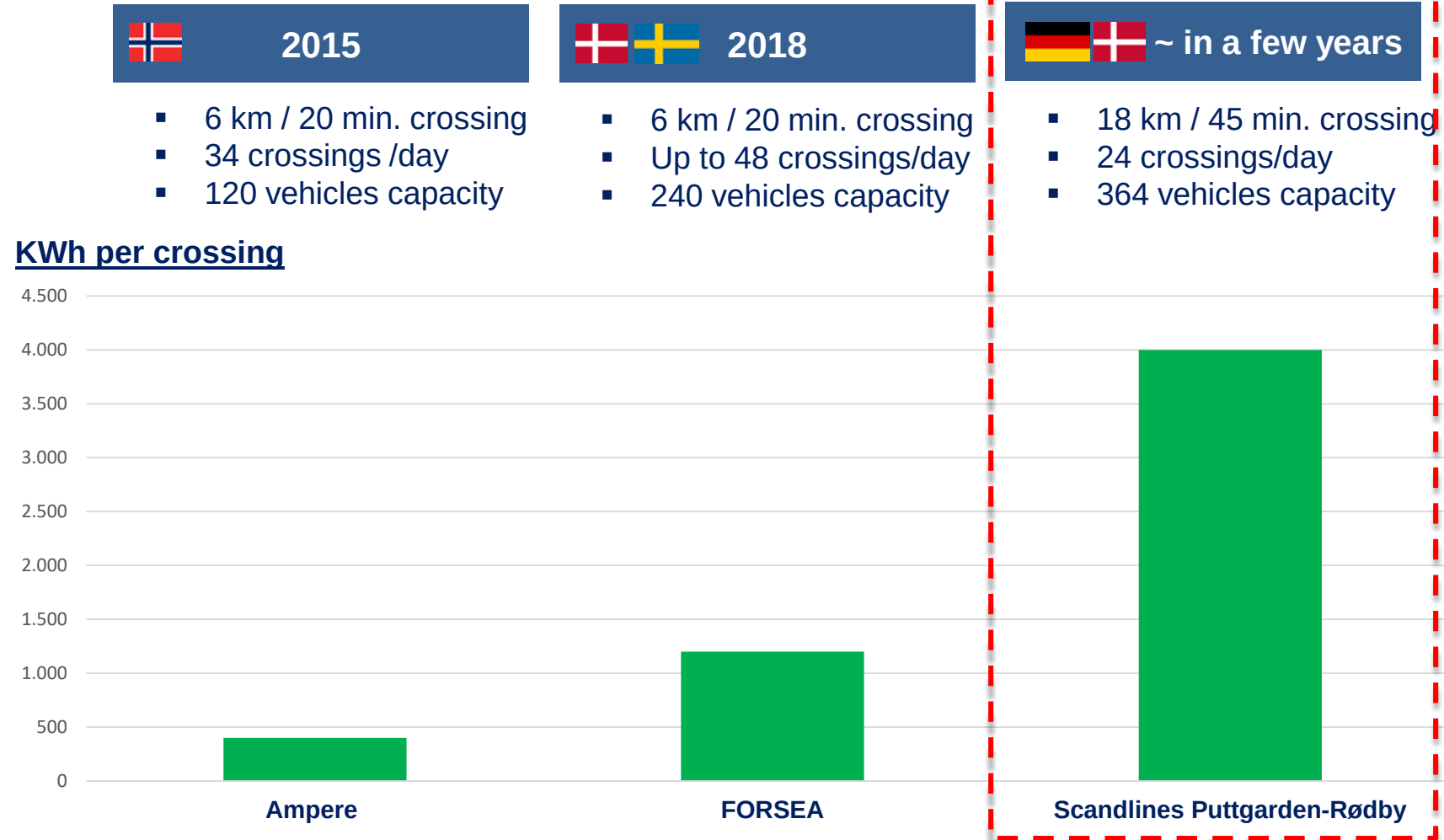
Preliminary investigation with study of sailing pattern and wind conditions

- Simulation study with current sailing pattern and wind conditions suggests efficiency savings of 4-5 percent (Rostock-Gedser)
- The wind conditions of the route area are good and the prevailing wind direction is favourable for rotor sails



Zero Emission ferries' scope is increasing rapidly!

Zero Emission ferry project examples:



Source: Lit search

THERE IS SOMETHING ABOUT SAILING

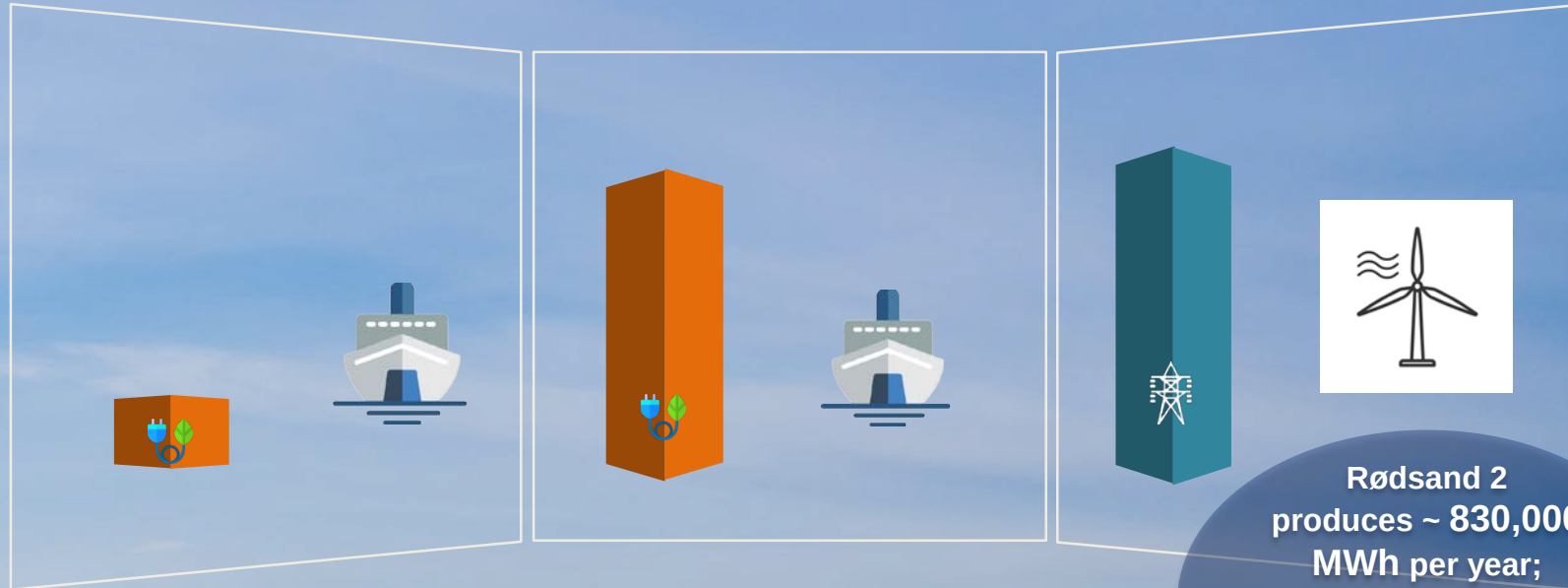
 Scandlines

Future energy supply

Approx. 4 MWh per crossing
Puttgarden-Rødby

Approx. 70,000 MWh is needed
from both Puttgarden and Rødby
per year

Local wind energy capacities



We need an electrical grid that can supply the ferries with 20 MW in 12 minutes (4 MWh)

We have approx. 32,000 departures annually (16,000 departures each way)

Challenges in summary: 3 potential roadblocks



Large-scale charging

Build competence in large-scale shore side charging – 4 MWh to be charged to batteries in 12 minutes



- Partner with specialists to develop charging solution
- Turnkey solution?

Electrical infrastructure

Secure sufficient electrical infrastructure to harbors



Current electrical grid to be investigated – sufficient to support large-scale charging?

Investment payback needs to be secured

Approx. 90-100 MEUR investment needed – need to secure realistic business case



- Evolution of technologies
- Fossil fuel alternative
- Understand funding available and finance possibilities

Scandlines



Thank you for your attention!

THERE IS SOMETHING ABOUT SAILING

 **Scandlines**