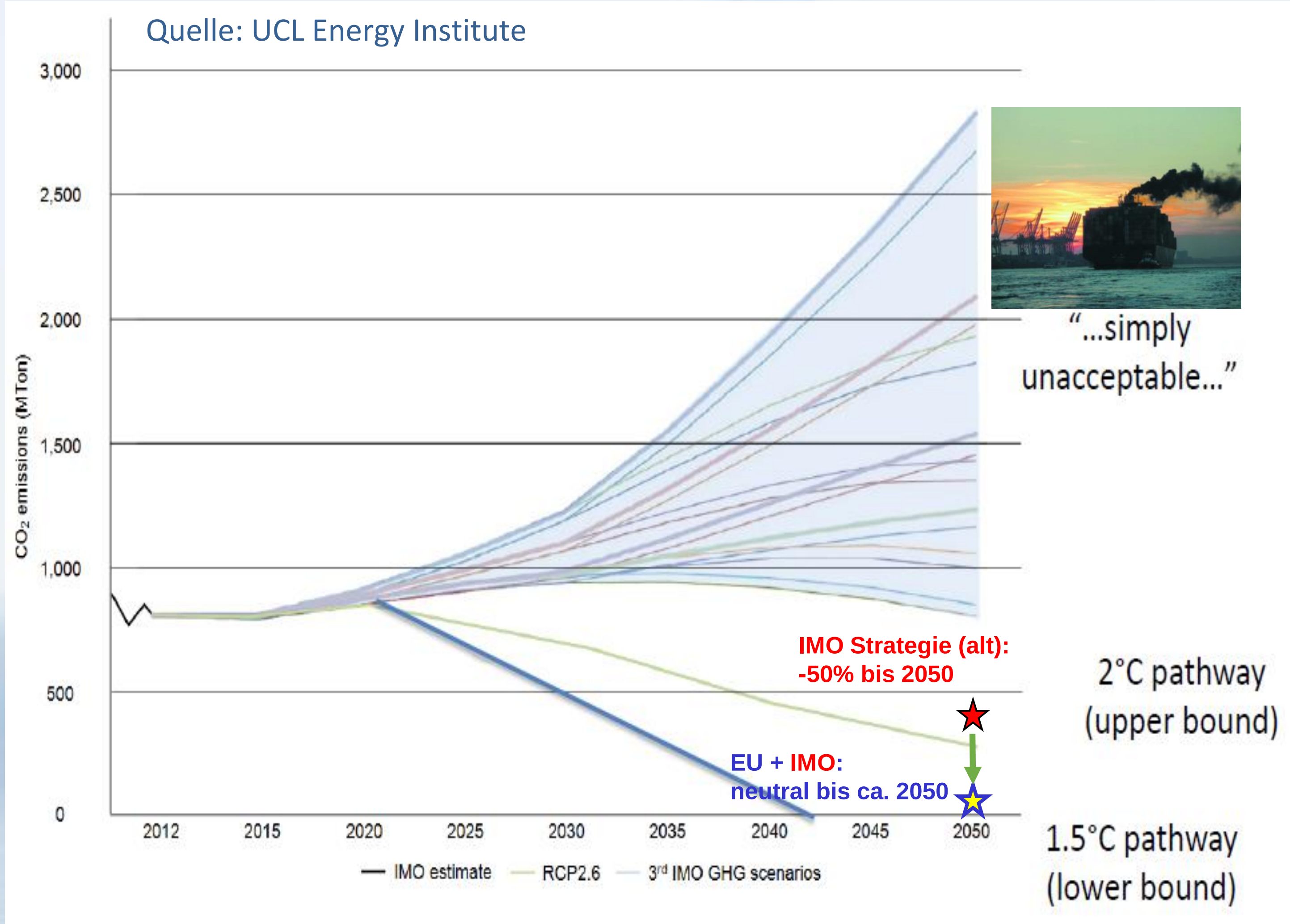
Wind als (Haupt-) Antrieb

ein wesentlicher Bestandteil zur Dekarbonisierung der Schifffahrt

Zero Emission Shipping Symposium
8. Oktober 2024

Sascha Strasser
Fraunhofer Arbeitsgruppe Nachhaltige Maritime Mobilität – Standort Leer

Der Weg zu klimaneutraler Schifffahrt…



… und mehr Krisensicherheit

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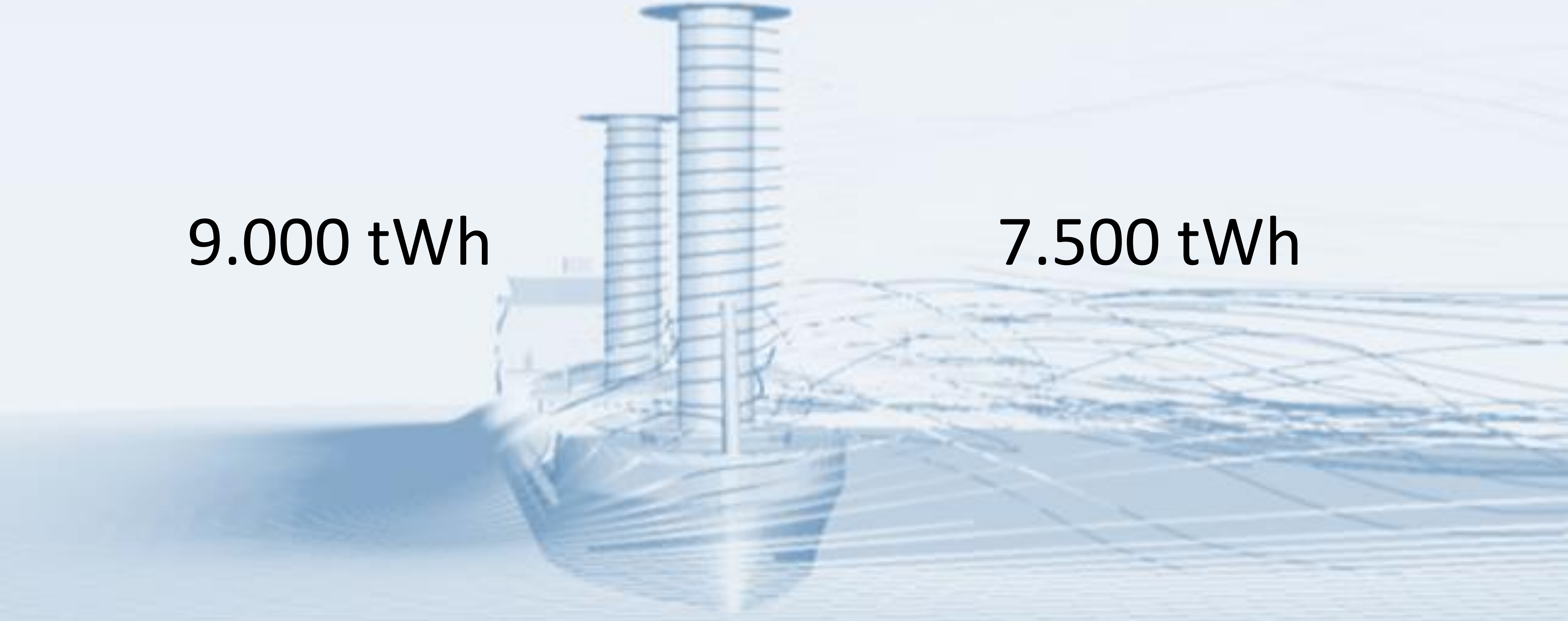
Der Weg zu klimaneutraler Schifffahrt…

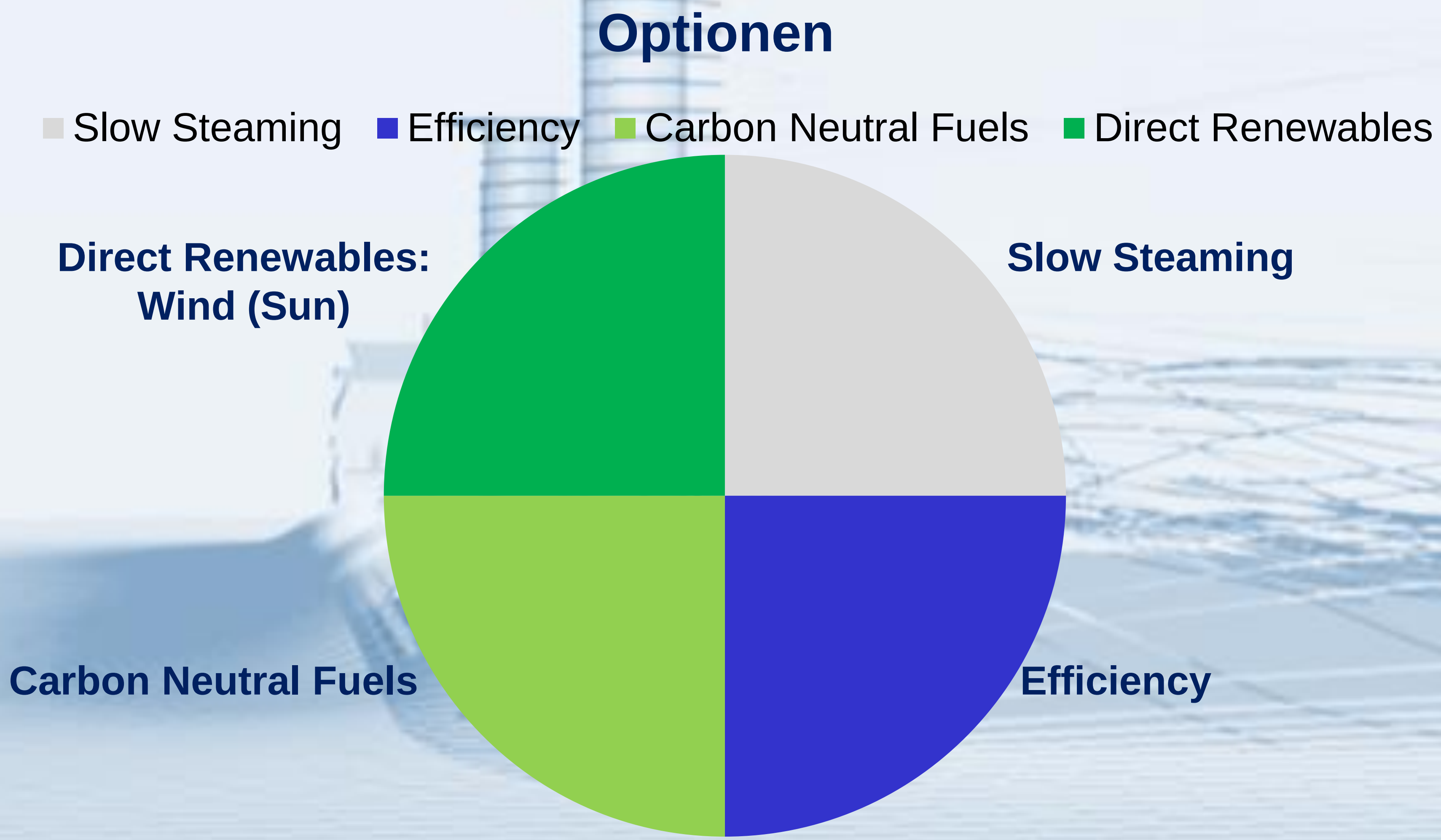


9.000 tWh

7.500 tWh

Energy Institute - Statistical Review of World Energy (2024)

Der Weg zu klimaneutraler Schifffahrt…



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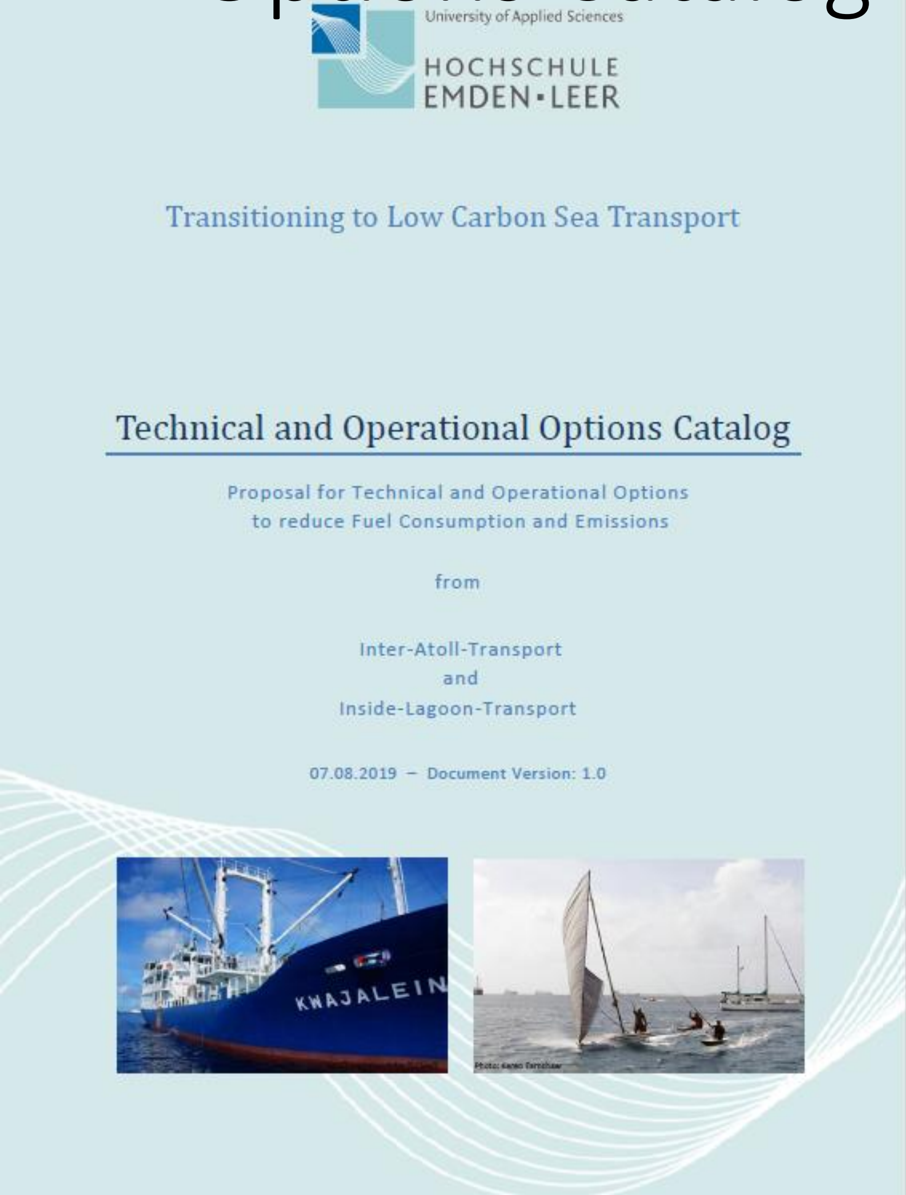
Case Study – Wind assisted Island Supply Vessel

Low Carbon Sea Transport –
International Climate Initiative (IKI) Marshall Islands
(BMUV/GIZ)

Analysis - Trading Area Marshall Islands

- Very remote trading area
- Mostly domestic routes
- International voyages necessary for dry-docking / special charters

Options Catalog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Transitioning to Low Carbon Sea Transport

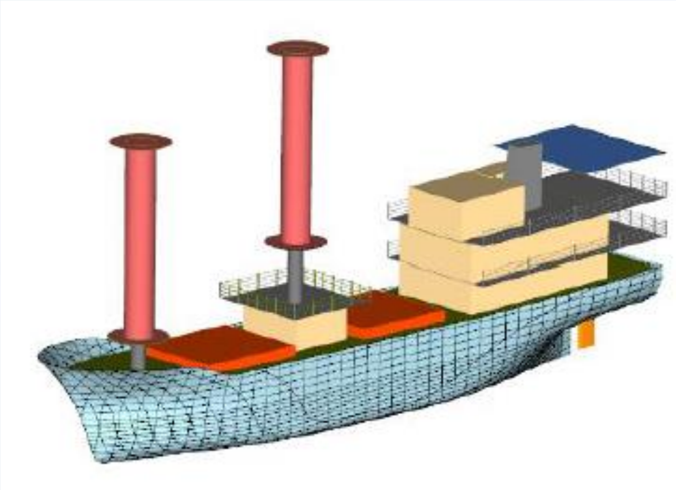
Technical and Operational Options Catalog

Proposal for Technical and Operational Options
to reduce Fuel Consumption and Emissions

from

Inter-Atoll-Transport
and
Inside-Lagoon-Transport

07.08.2019 – Document Version: 1.0



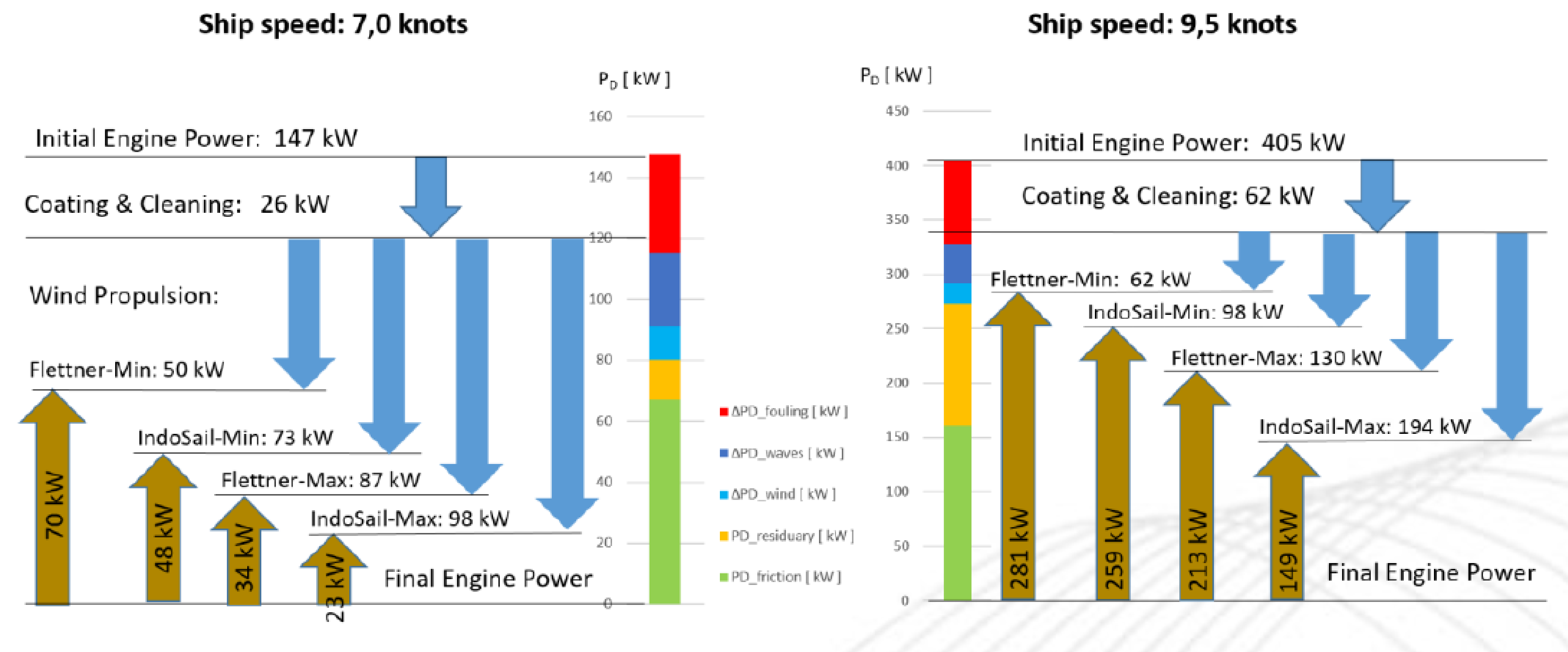


Figure 13: Saving potential from wind propulsion technologies and regular hull cleaning

“JUREN AE” - ZERO EMISSION CARGO SAILER

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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SDC SHIP DESIGN & CONSULT

KOSTEC (주) 코스텍 조선해양 KOSTEC CO., LTD.

ASIA SHIPBUILDING CO.,LTD.

BRIESE RESEARCH FORSCHUNGSSCHIFFFAHRT

EHLERMANN RINDFLEISCH GADOW

RASANT
Hybrid Sail Cargo Ships

University of Applied Sciences HOCHSCHULE EMDEN·LEER | Fraunhofer IWES | Maritimes Zentrum Hochschule Flensburg | MARIKO

Nationales Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie nip

Gefördert durch: Bundesministerium für Digitales und Verkehr

Koordiniert durch: NOW NOW-GMBH.DE

Projektträger: PtJ Projektträger Jülich Forschungszentrum Jülich

Project background

- **Budget** 2.9 million euros
- **Project period:** 01.01.2023 – 30.06.2025

Status Quo

Auxiliary wind propulsion	Primary machine propulsion

RASANT

Primary wind propulsion	Auxiliary machine propulsion

Main project goals

1. Marketable ship concept with upscaling potential
2. Cost-effective, self-sufficient ship operation by maximising the main wind propulsion
3. Network building for climate-neutral wind-based ship propulsion concepts

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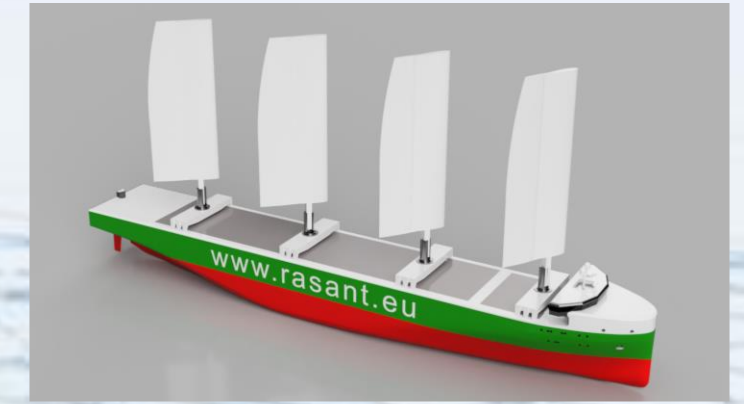
Work in progress

- Ship design study: 13k tdw sail MPC (in collaboration with Rörd Braren Shipping Company)
  - Awarded to Technolog Services GmbH and Detlev Löll Ingenieurbüro GmbH



Detlev Löll Ingenieurbüro GmbH

TECHNOLOG

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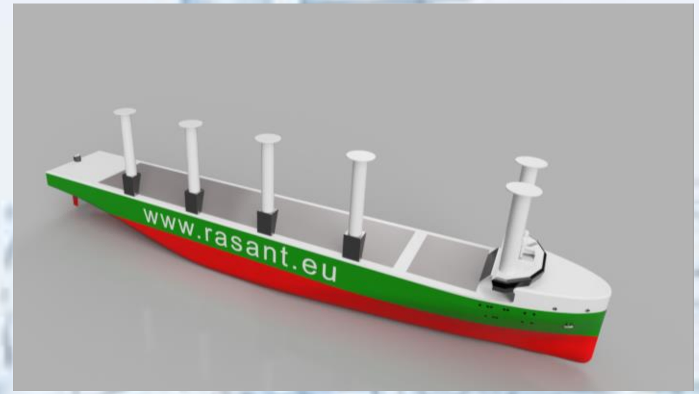
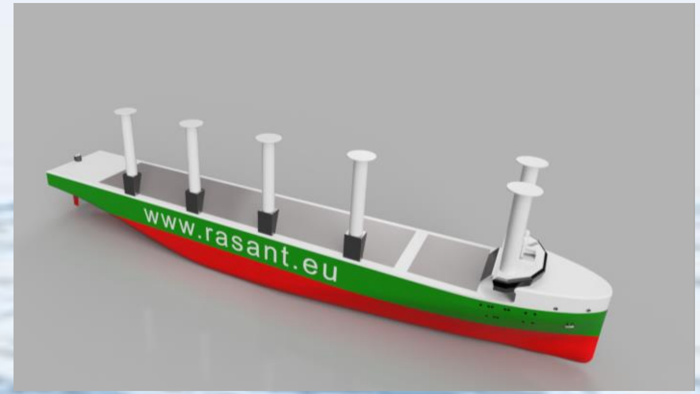
Cargo operation with sails

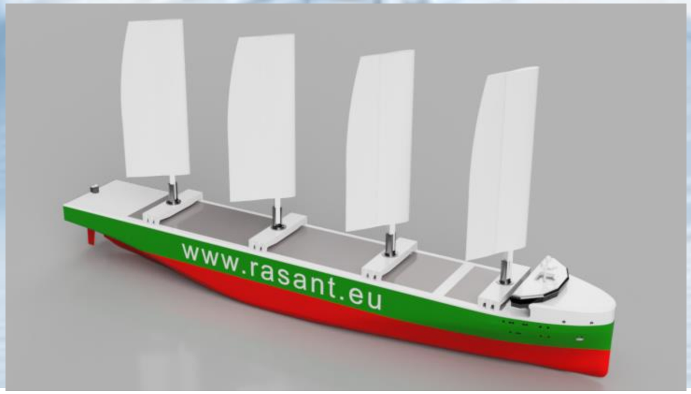
Sailing mode | **Harbor mode**

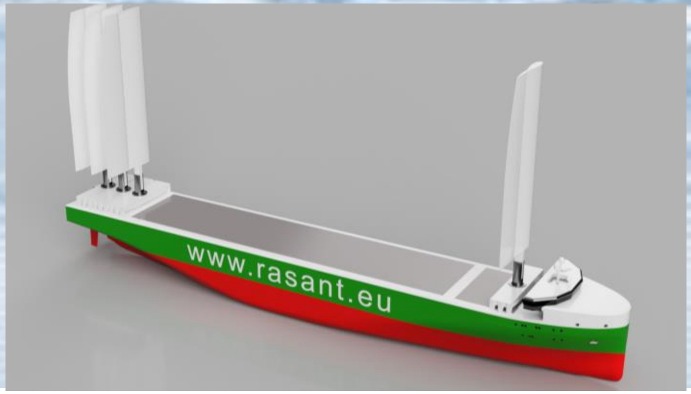
Flettner rotor on starboard side:
port side for docking





Wing sails on gantry:
Sails are moved to either end of the ship, free access to hold





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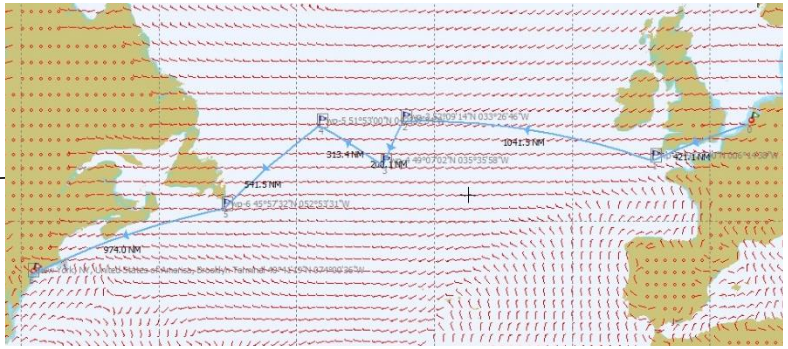
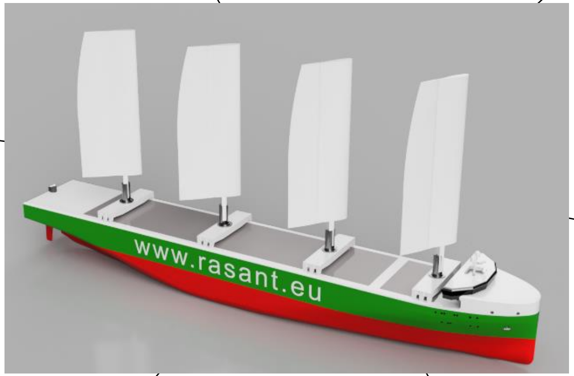
- Perform
  - Efficiency
  - Downwind
  - Upwind
  - NVH
  - Fuel savings
- Route



- Economy
  - Maturity
  - CAPEX
  - OPEX
  - Payback time



- Safety
  - Foldability
  - Man- oeuvring
  - Reefing
- Operation
  - System handling
  - Main- tenance
  - Air draught
- Ship
  - Deck space
  - Speed
  - Cargo handling

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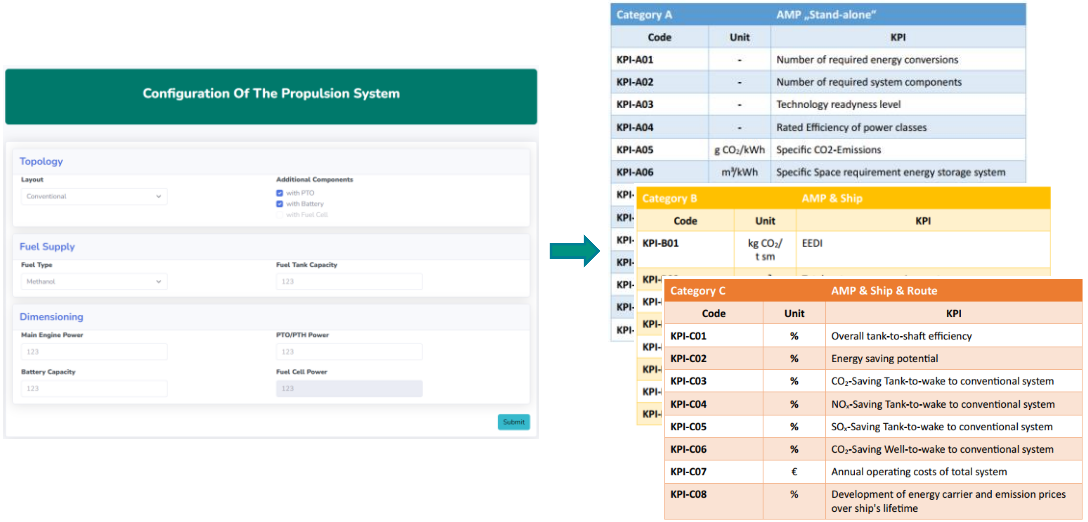
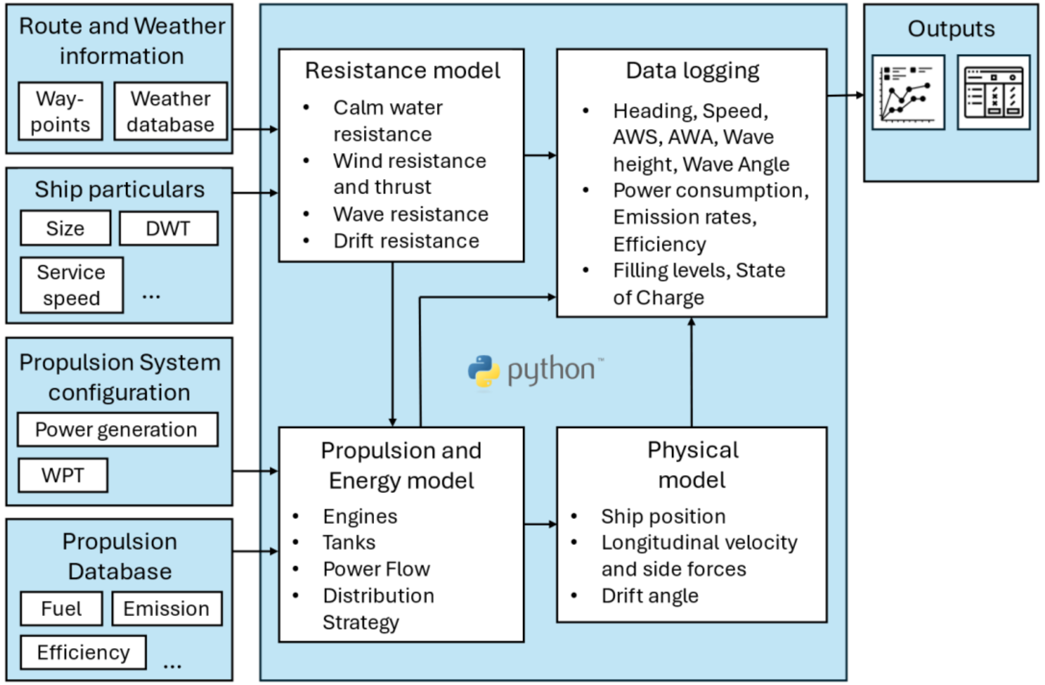
In-House development of propulsion performance comparison tools

Key performance indicator evaluation scheme



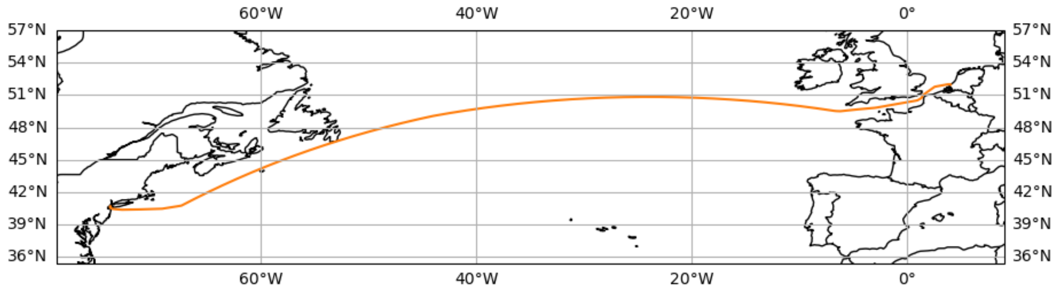
Route simulation tool Simship



Impact of sailing optimized routing

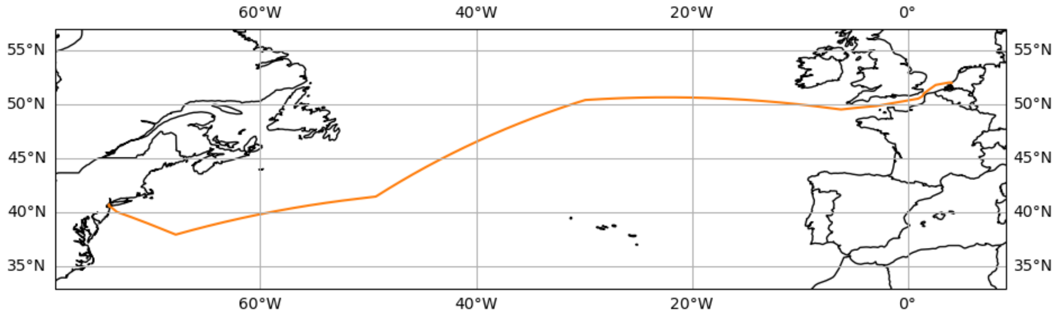
Maritimes Zentrum Hochschule Flensburg

Conventional route



Covered distance [Nm]: 3341
Trip duration [h]: 288
Auxiliary shaft energy [kWh]: 415.384
Sail energy [kWh]: 91974
Total propulsion energy [kWh]: 507358
Sail percentage: 18.1

Sailing route



Covered distance [Nm]: 3555
Trip duration [h]: 304
Auxiliary shaft energy [kWh]: 339.543
Sail energy [kWh]: 191452
Total propulsion energy [kWh]: 530995
Sail percentage: 36.1

Wind optimized routing has to be adopted to exploit the full potential of wind propulsion technology

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Outlook

- Wind assisted Hybrid-Ships available and economic viable (25% short term)
- Saving Potential of Wind Ships >25% >50% >75% ??

Many different concepts of sail technology for commercial ships

R&D methods for planning and building and operating Wind assisted Ships

Maritime Industry is interested

Political instruments as incentives for low carbon ships and penalties on high carbon

→ Preparedness/Willingness of Societies for Transformation ?