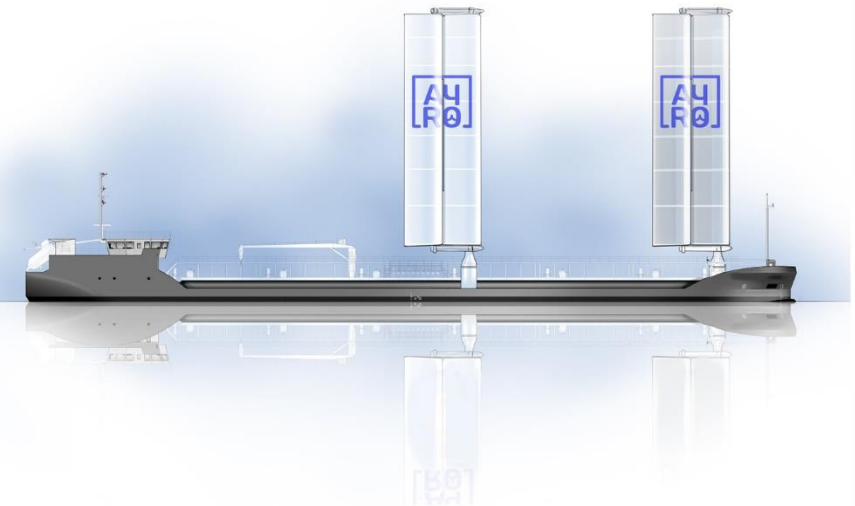
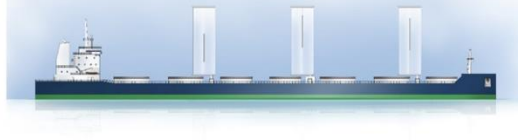


A start up to decarbonize Shipping

November 16. 2021



Wind Support NYC
Webb Institute
SNAME

CONFIDENTIAL

Context

The Company

The Oceanwings system

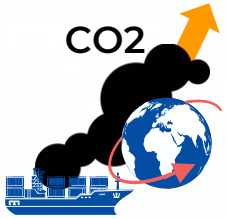
Study and next phases

STRINGENT REGULATIONS TO COPE WITH CO2 ISSUE

SHIPPING AS THE MOST EFFICIENT FREIGHT INDUSTRY, YET POLLUTING

90%
of world trade
is carried by the international shipping industry

2050
World trade to **double**



Shipping's CO2 emission to **increase** to
17% (from 11%)
of the world transportation CO2 emission by **2050**

REGULATIONS WILL BE ENFORCED BY IMO

Regulation enforced by
IMO INTERNATIONAL MARITIME ORGANIZATION

2020
Sulphur Cap
0.5%
(from 3.5%)
Maritime fuel price to double

2030
-40%
CO2 reduction*

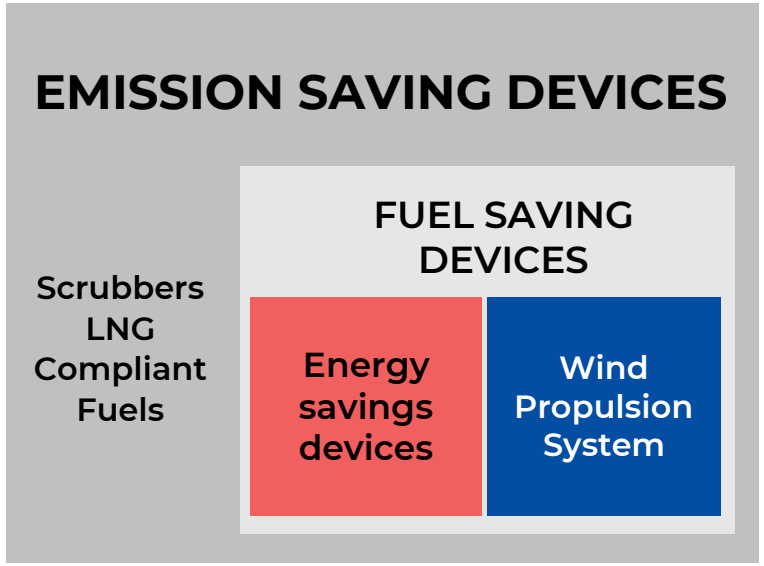
2050
-70%
CO2 reduction*

IMO's shipping CO2 emission regulation adopted by the European Union in Sept-2020

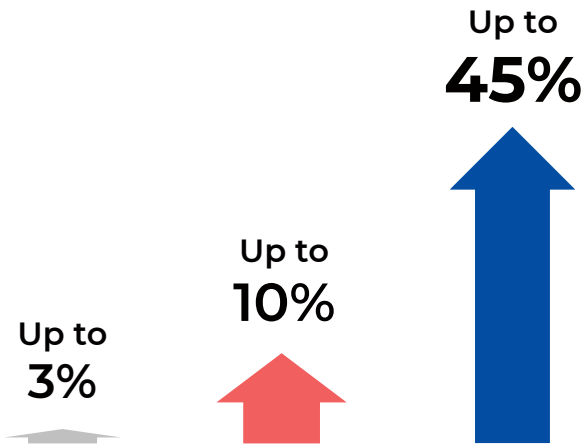
* Requirement per unit compared to 2008 level

WIND PROPULSION NECESSARY PART OF THE ANSWER

LEVERS TO REDUCE EMISSIONS



% OF EMISSION SAVINGS



> The use of wind propulsion technology onboard a product tanker vessel could take us to a new playing field.
> **CTO, Maersk Tankers.** MAERSK

> Wind Propulsion is part of our Roadmap.
> **CMACGM** CMA CGM

> Wind-assist propulsion is one of the few technologies potentially offering double digit fuel savings today.
> **Lloyd's Register**

Source: GLOMEEP (IMO)

WHY IS WIND PROPULSION BACK IN SHIPPING?

SIMULATION TECHNOLOGIES
allow for holistic approach
and precise evaluation
at design stages

CONTROL TECHNOLOGIES
allow for optimized and safe
system behaviour

MANUFACTURING TECHNOLOGIES
allow for realistic design-to-cost
approach

AYRO

Context

The Company

The Oceanwings system

Study and next phases

FROM WINNING THE AMERICA'S CUP TO TRANSPORTING ARIANE 6

2010
America's cup
Winner

- Wingsail designed for **BMW Oracle Racing**, Winner of the 33rd America's Cup in 2010

2016
Prototype

- Development in collaboration with **Ademe**
- Extensive testing in 2017

2018-2019
Industrial
Demonstrator

- 2 Oceanwings equip **Energy Observer**, a Zero CO2 emission ship, sailing successfully for more than 2 years across the seas

2020+
Decarbonation of
Maritime Transport

- **Canopee**, the 1st modern wind powered ship dedicated to Ariane 6.
- 121m long ship equipped with 4 Oceanwings

AYRO : SPIN-OFF OF VPLP WITH INDUSTRIAL EXPERTISE

BENEFITING FROM VPLP DNA

Single-handed round the world record

The first cargo ship with significant wind assisted propulsion

- Uncompromising on performance
- Design-to-cost know-how
- Customer focus
- Unique talent to innovate in naval architecture

EXPERTISE IN SHIPPING AND INDUSTRY

Expertise in maritime and propulsive innovation

Industrial expertise

- An industrial company gathering talents maritime and competitive industries
- A dedicated structure with appropriate funding
- An agile and visible initiative to catalyze the decarbonation of the maritime transport

AYRO'S MANAGEMENT TEAM

Marc VAN PETEGHEM

Designer and chairman at Ayro

Owner at VPLP Design

World renowned sailing architect and designer

Southampton Institute of Technology

Les Echos

Voiles et voiliers

Multicoque

Ludovic GÉRARD

CEO

25Y experience in Shipping industry and naval architecture

Ex-Vice President, CMA Ships

ENSTA Paris & Maritime Executive MBA KEDGE Marseille

Giorgio PROVINCIALI

CTO

25Y management in aerodynamics and naval architecture

Head of performance at America's Cup

ENSTA Paris & Politecnico di Milano

Nicolas SDEZ

CSO

6Y management experience with Ayro from scratch

Research experience at Georgia Tech

ENSTA Paris & Politecnico di Milano

Karim EIDO

COO

25Y experience in Strategic development, Performance management & Business development

Ex-Operational Performance Senior Consultant

Ex-Director at Vallourec

Centrale de Nantes & EDHEC Business School

Romain GRANDSART

CBO

14Y experience in Business Development and Finance

Ex Business Developer at ArcelorMittal

Ex-Head of IR and M&A at Aperam

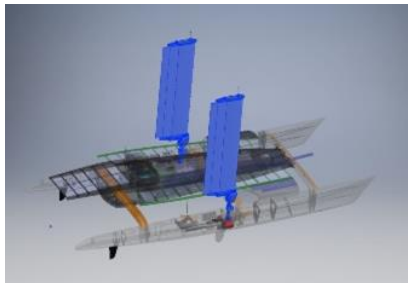
HEC Entrepreneurs Mines de Nancy & ENSTA Bretagne

AYRO ACCOMPANIES SHIP OWNERS AND BUILDERS ALONG THE SHIP LIFECYCLE

BENEFITING FROM VPLP DNA

Engineering

- Performance and fuel savings simulations
- Integration studies
- New build and retrofit



From design...

Products

OCEANWINGS

AIUTO

... to solutions...

Services

- Installation & Training
- Maintenance
- Data services

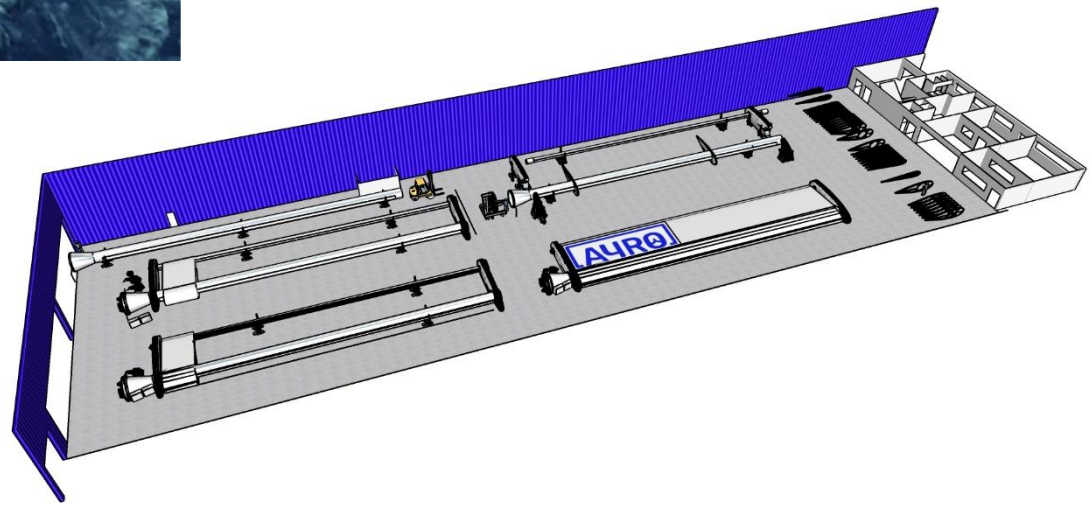
... and operations

OPERATIONS – INDUSTRIALIZATION: FACTORY IN CAEN

Agreement with CCI Caen signed

Date of starting lease : 1st Dec 2021

Start production activity : March 2022



CAPITAL STRUCTURE – SERIES B FUND RELEASE

10.5 M€ FUND RAISING ACHIEVED AND ANNOUNCED SEPT, 13 2021

Investors :

Ocean Zero Lts, USA

BPI , France

Mer Invest , France

Press Release

AYRO (France) raises €10.5 million capital from Ocean Zero (USA), Bpifrance (France) and Mer Invest (France) to boost the development of its innovating wingsail solution to help decarbonize the maritime transport industry.

Paris, New York, September 13th, 2021-10:00 am CET)

AYRO, an industrial start-up that designs and delivers Oceanwings®, a wind propulsion hybrid system for maritime transport, raises €10.5 million capital from Ocean Zero (USA), Bpifrance (France) and Mer Invest (France).

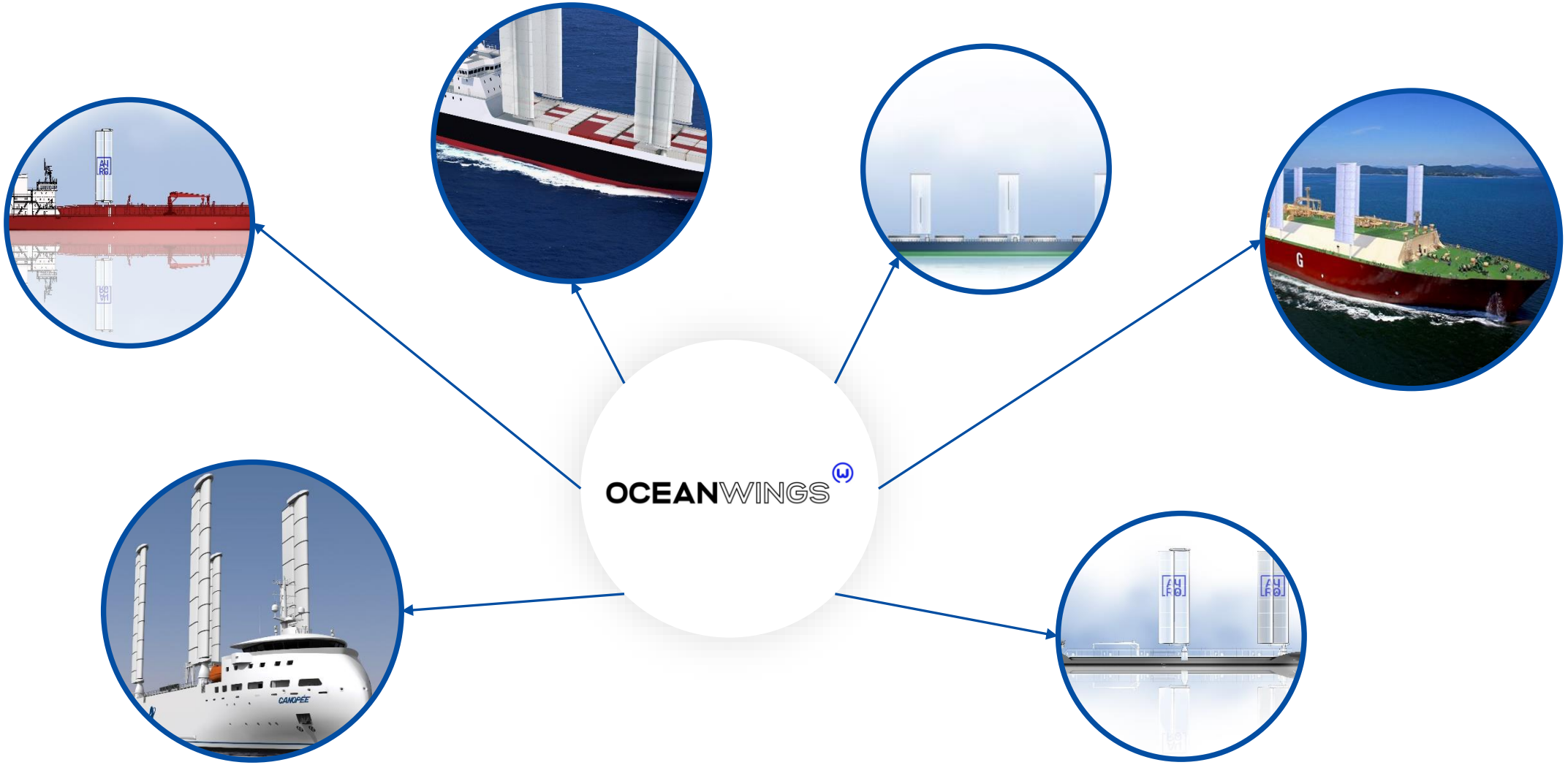
Context

The Company

The Oceanwings system

Study and next phases

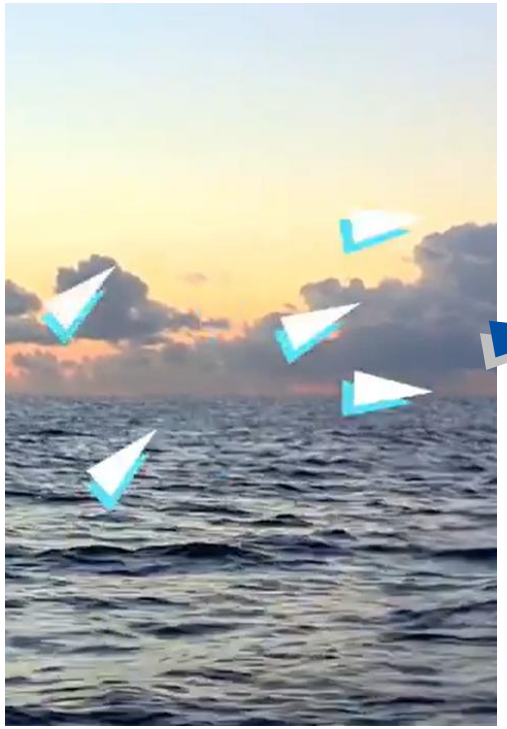
OCEANWINGS ABOARD VESSELS



OCEANWINGS OPERATING PRINCIPLES

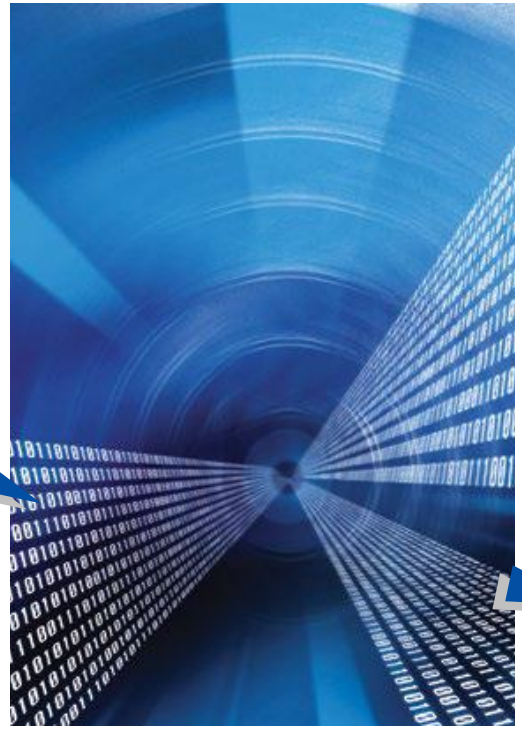
1

SENSORS ON THE WINGSAILS **MEASURE** THE WIND



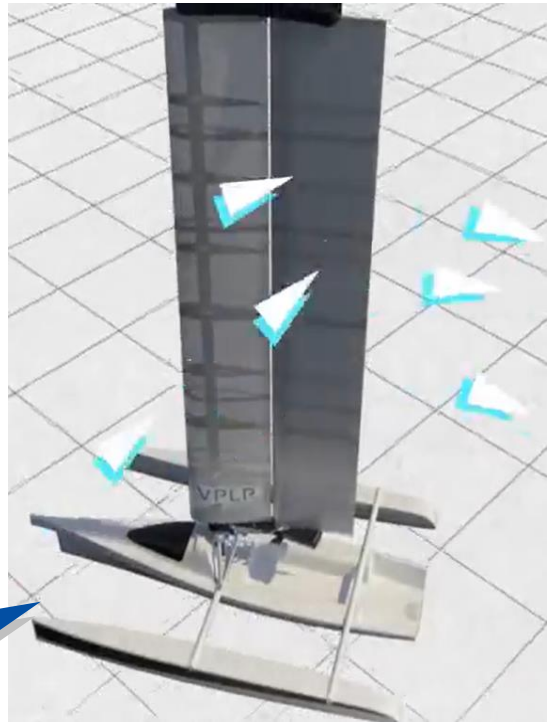
2

A COMPUTER **ANALYSES** THE DATA

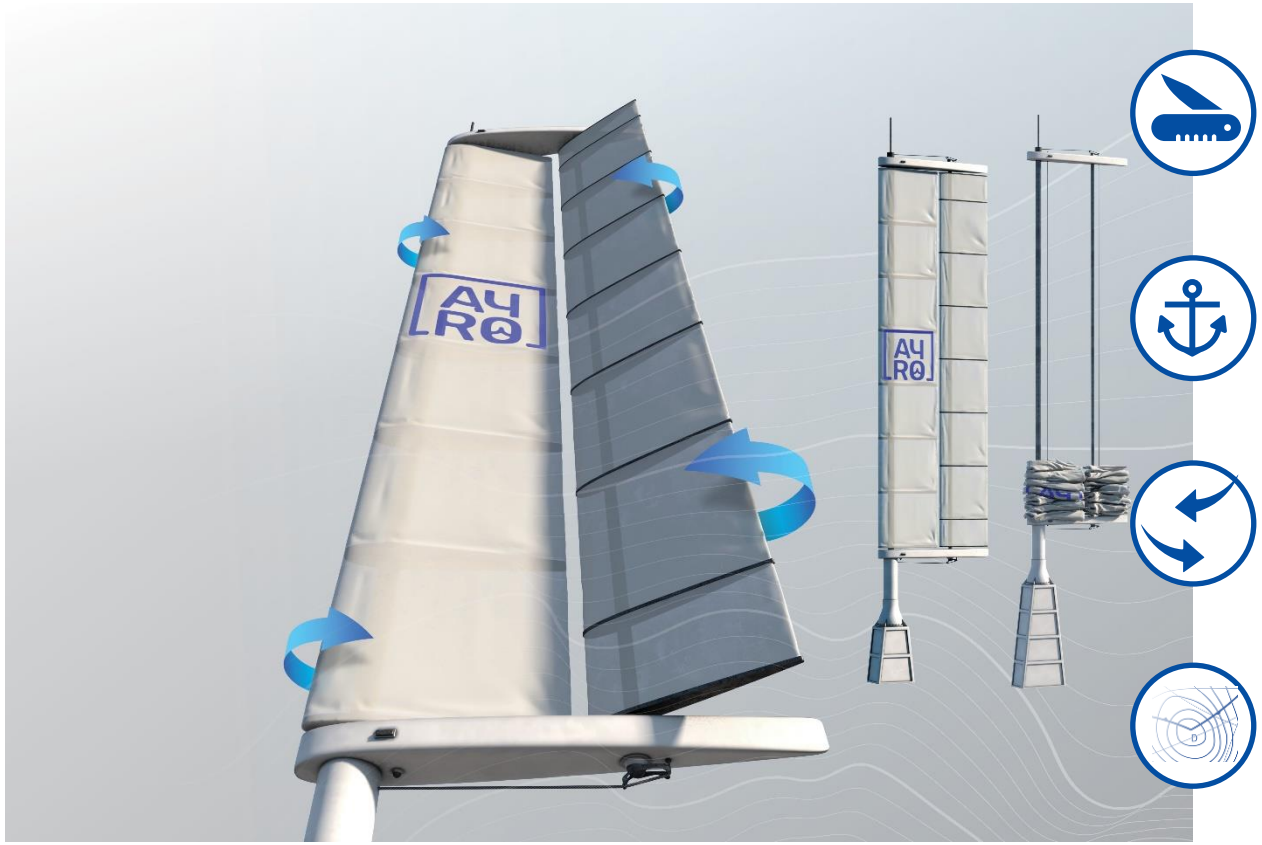


3

MOTORS **ADJUST** THE WINGSAIL ANGLE OF ATTACK AND CAMBER



OCEANWINGS ADVANTAGES



REEFABLE AND FURLABLE

- Safe at harbour, no impact on ships behaviour within minutes

LIGHT & COMPACT

- Easy Installation - Tilting - Moving / No stability impact
- Limited impact on cargo capacity
- Deck Footprint 2.5m x 2.5m

EXTREME VERSATILITY TO WIND ANGLES AND SPEED

- Propulsive Power from 5° AWA* (~constantly beneficial)

FLEXIBILITY WITH ROUTE RE-SCHEDULING

* AWA means Apparent Wind Angle

AUTOMATION & CONTROL SOFTWARE

Automated control command of system monitoring dashboard & all-level reporting ...

AYRO

Context

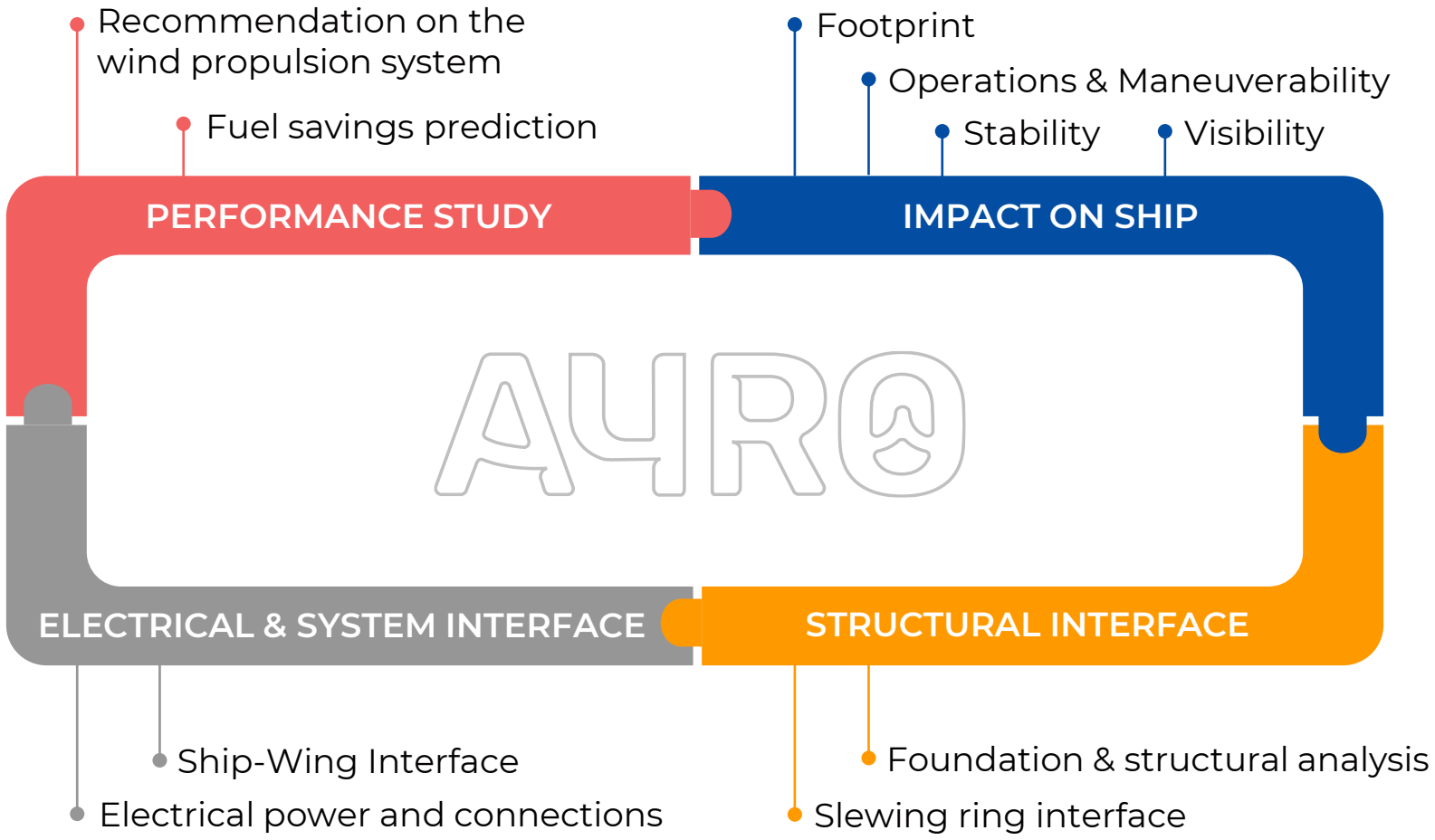
The Company

The Oceanwings system

Case Studies

DESIGNING THE MOST PERFORMANT AND ADAPTED SYSTEM TO YOUR SHIPS AND OPERATIONS

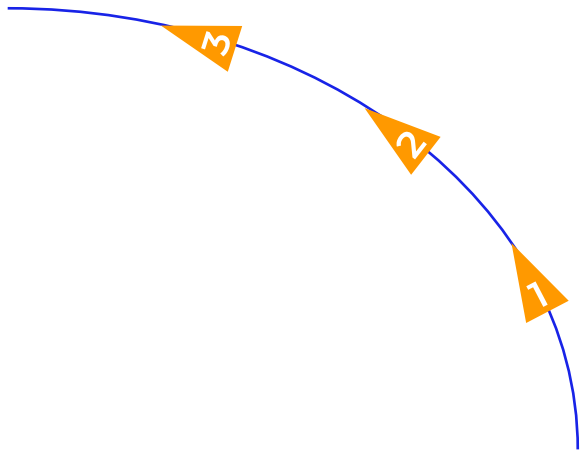
AYRO'S COMPREHENSIVE APPROACH TO DESIGN YOUR WIND PROPULSION SYSTEM



AYRO's intention is to carefully understand the program and the naval architecture of your ships to design **the most suitable wind propulsion system** for your challenges and objectives.

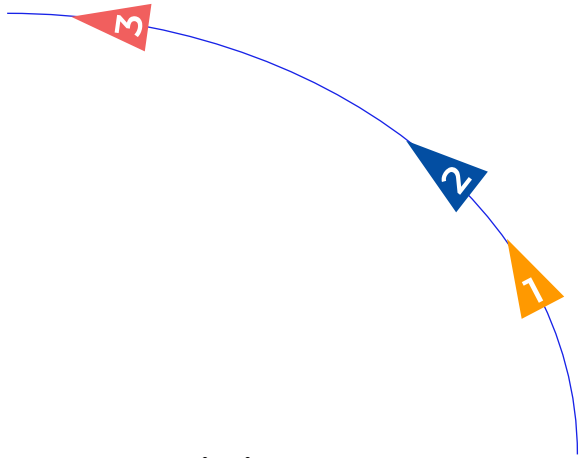
ASSESSMENT METHODOLOGY

STEP 0



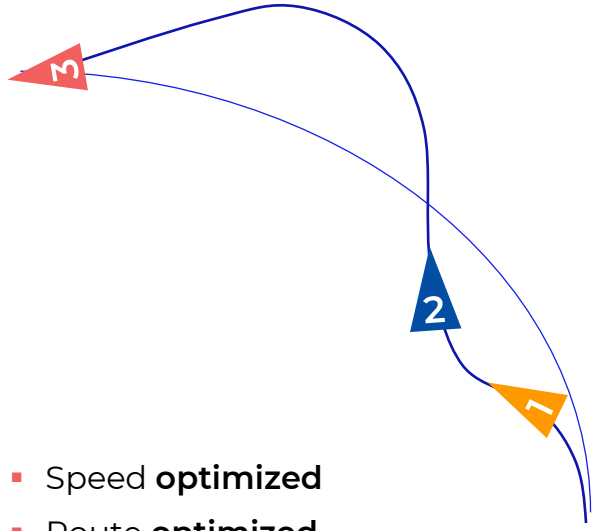
- Speed constant
- Route constant

STEP 1



- Speed **optimized**
- Route constant

STEP 2

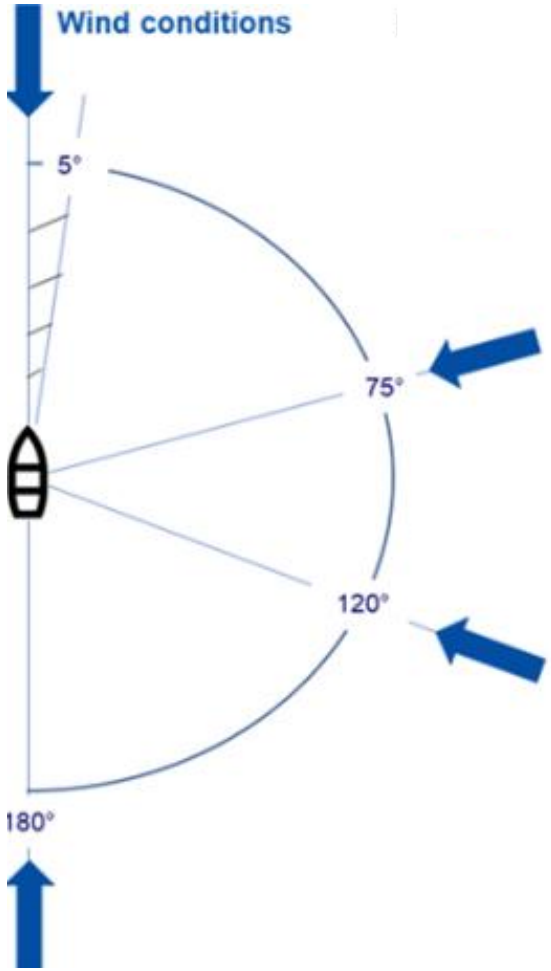


- Speed **optimized**
- Route **optimized**

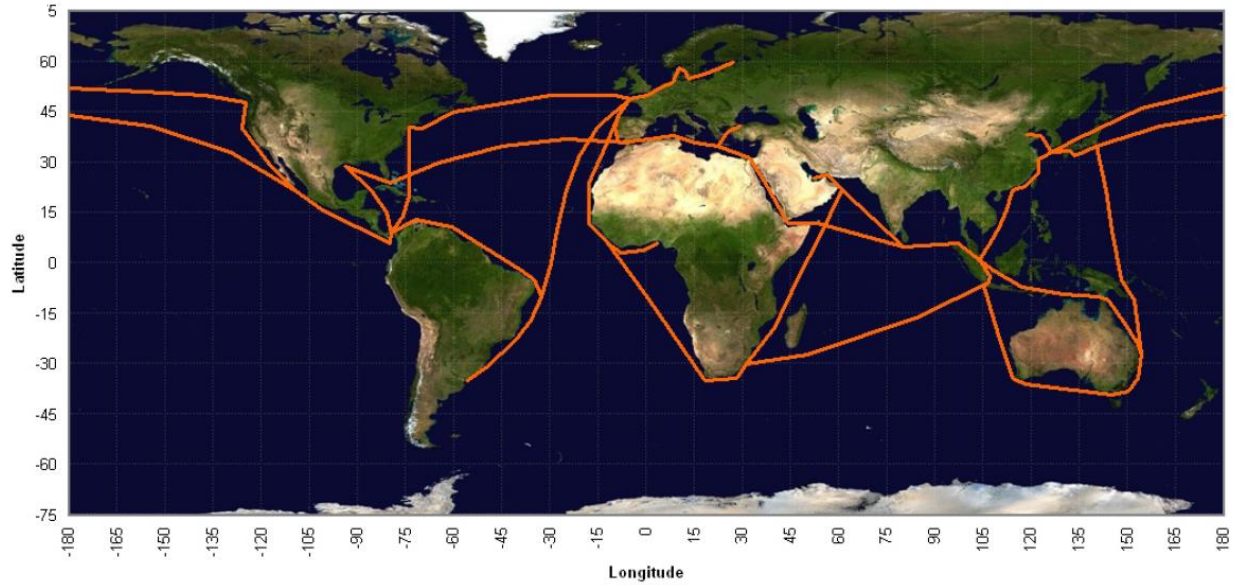
- **Later stages performance analysis requiring additional engineering resources ;**
- **Significant additional fuel savings potential could reach more than 150% of Step 0 performance.**

TAKING INTO ACCOUNT THE WIND CONDITIONS IN SHIP OPERATION, WINGSAIL HAS THE HIGHEST POTENTIAL

OPERATING WINDOWS OF THE KEY WASP TECHNOLOGIES vs. WORLDWIDE OPERATIONS



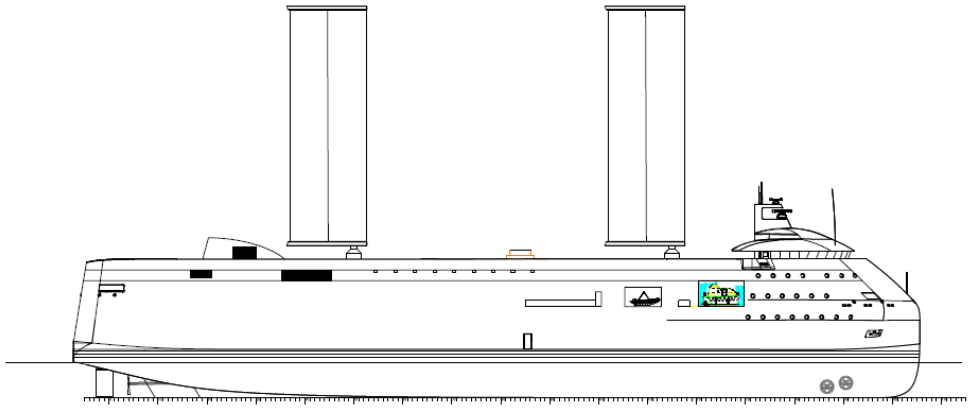
	TWA	AWA
5°	43%	87%
75°	20%	9%
120°	37%	3%
180°		



- AWA probabilities for 16kts ship speed

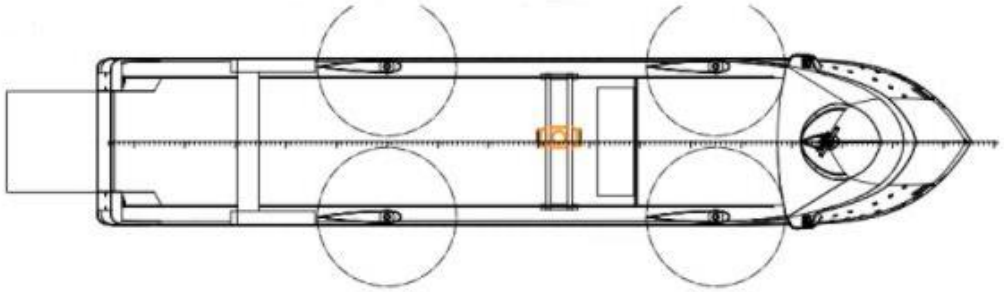
CANOPEE PROJECT

PROFILE VIEW



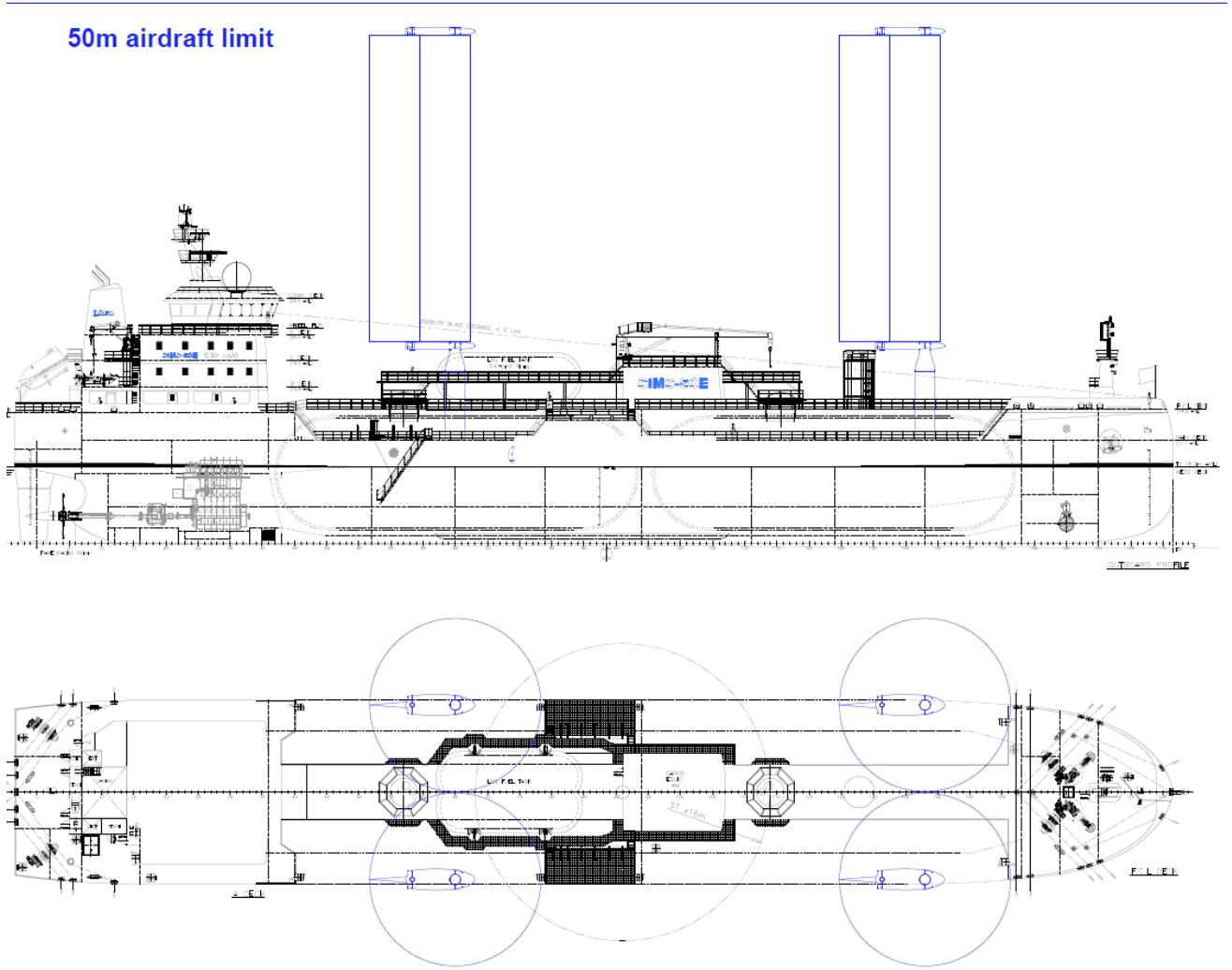
MAIN CHARACTERISTICS OF THE PROJECT

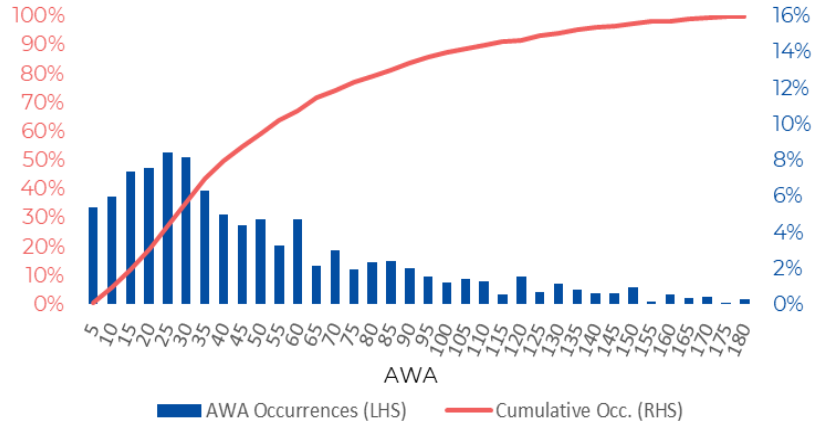
TOP VIEW



- RoRo 121 meters length
- To be delivered by the end of 2022
- Designed for 16,5 knots
- Fuel savings ranging from 20% to 35%

7 500 CBM LPG CARRIER





- 79% of the wind sailing conditions of the ship will be below 75° of Wind Apparent Angles.

Fuel and Co2 savings for the considered round trip

Speed [kts]	13.5
Brake power [kW]	3780
Duration [h]	85.9
Mechanical Energy [kWh]	324532
Mechanical Fuel Consumption [T] @146g/kWh	47
Engine eq. power 1xOW [kW]	166
Nb of OW	4
Engine eq. power 4xOW363 [kW]	664
Saved Energy [kWh]	57008
Fuel saving [T] @146g/kWh	8.3
Cf, (t CO2)/(t Fuel)	2.75
CO2 saving [T]	22.8
Rel. Fuel Savings	18%

25 000 DWT CHEMICAL TANKER EQUIPPED WITH 6 OW 3.6.3 ®

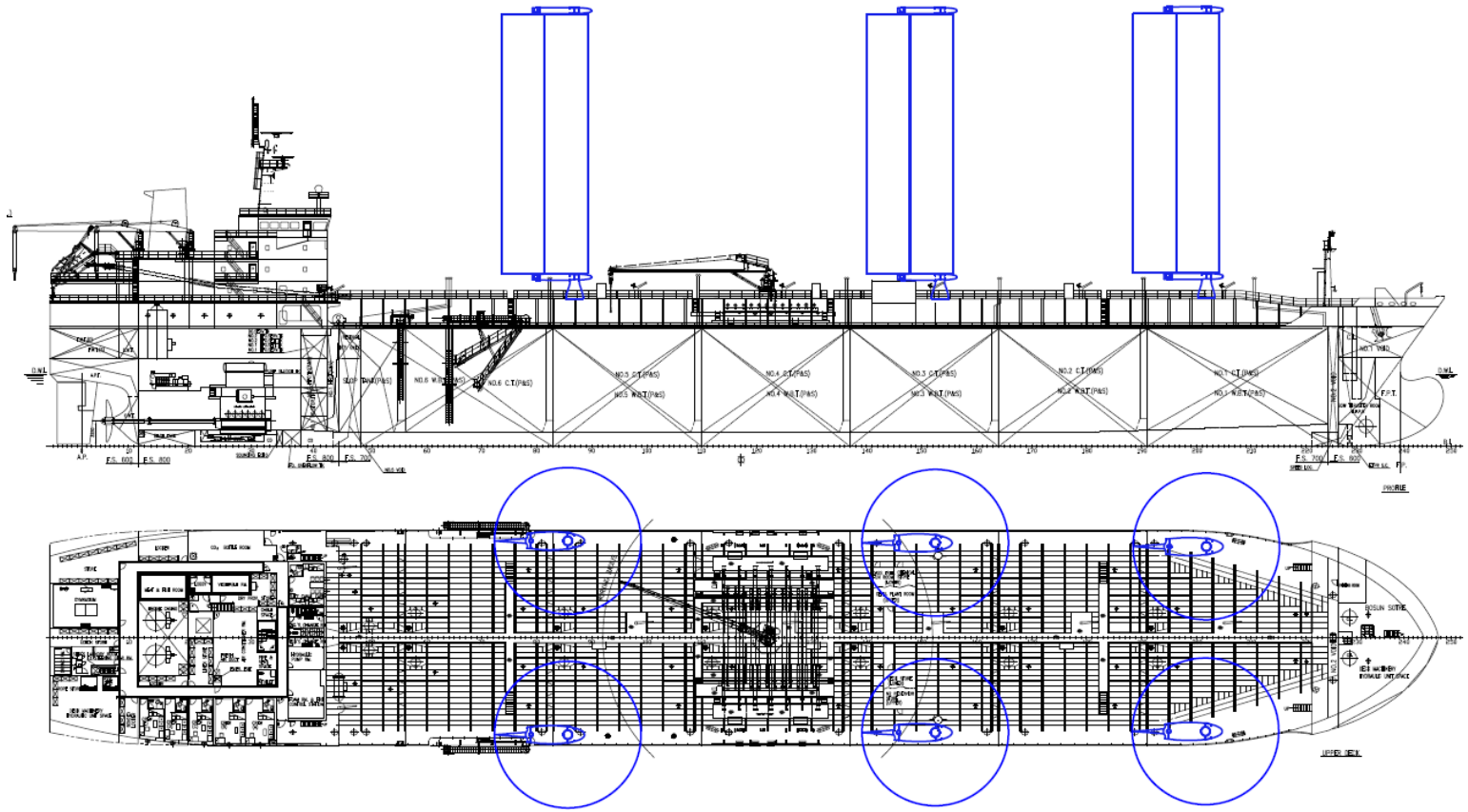
KEY GENERAL CHARACTERISTICS

- Ship type — Tanker
- LOA/LPP — 177,6/168 m
- Dwt — 25 000 t

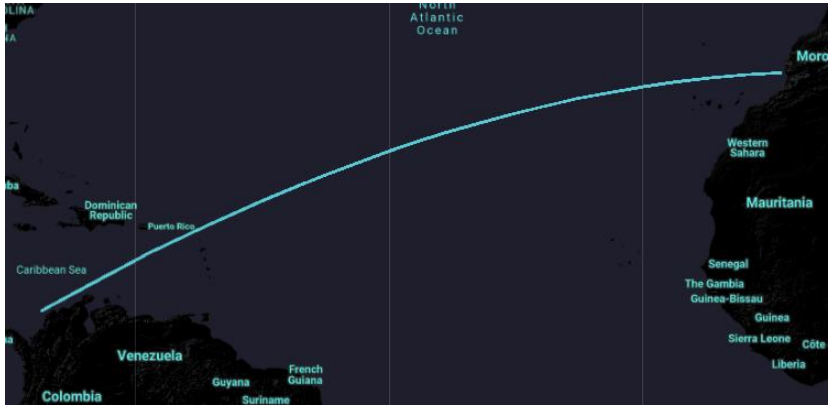
SAILING CONSIDERATIONS

- Sailing speeds considered: 14 kts
- Single trip route considered :
  - MOROCCO > CENTRAL AMERICA

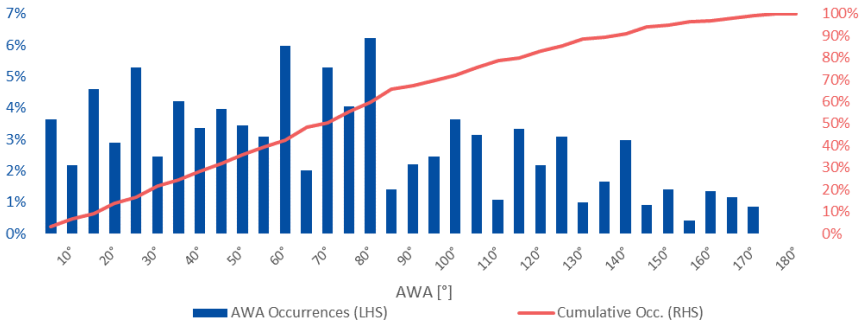
- Loaded condition (design draft)
  - Draft — 9,2 m
  - Displacement — 34 000 t



COLLECTION OF WIND STATISTICS OVER SINGLE TRIP MOROCCO > CENTRAL AMERICA



Routing calculation using Satori D-Ice



Trip duration (one way)	days	11.4
Route length	nm	3 816
Speed	kts	14.0

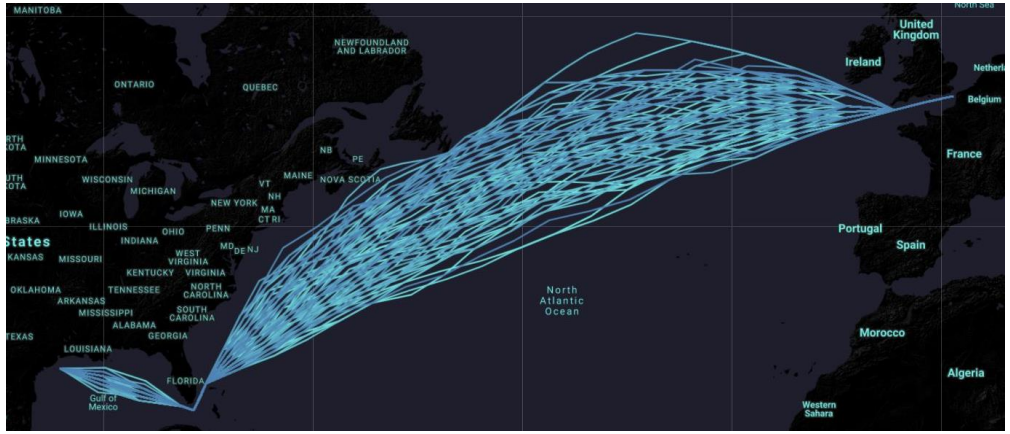
Savings over 25 years operating on this route with 85% use rate		
Fuel savings over 25y	T	19 841
CO2 savings over 25y	T	63 612

Cost savings over 25 years		
Fuel cost	€/T	600 €
CO2 emissions tax	€/T	50 €
Total cost savings	€	15 085 444 €

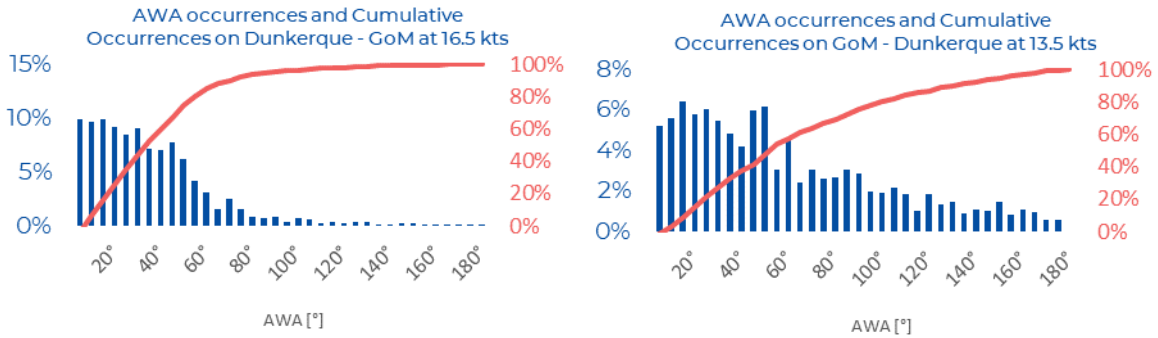
- The 6 Oceanwings system allows 2.6 t of fuel savings per day when operating on this route at 14 kts, and 794 t fuel savings per year considering a use rate of 85%.
- The fuel savings represent 12% of ship consumption.

CASE STUDIES

180 000 M3 LNG CARRIER – SAVINGS OVER ROUTE N. EUROPE – GULF OF MEXICO



Routing calculation using Satori D-Ice



- Oceanwing is the most relevant wind propulsion technology as more than 75% (forward trip) and 45% (backward) of the apparent wind angles are below 45°
- The 6 Oceanwings system allows 9.5t and 3.8t of daily fuel savings respectively on forward and backward trip.
- This leads to 1 984 tons of annual fuel savings when operating on this route and considering 85% use rate.

Route Dunkerque - GoM		**Forward**	**Backward**
Trip duration (one way)	days	12.1	14.8
Route length	nm	4 800	4 800
Speed	kts	16.5	13.5
Relative Fuel Savings with 6 x OW	%	19.5%	15.2%

Savings over 25 years operating on this route with 85% use rate		
Fuel savings over 25y	T	49 598
CO2 savings over 25y	T	136 394

Cost savings over 25 years		
Fuel cost	€/T	600 €
CO2 emissions tax	€/T	50 €
Total cost savings	€	36 578 277 €

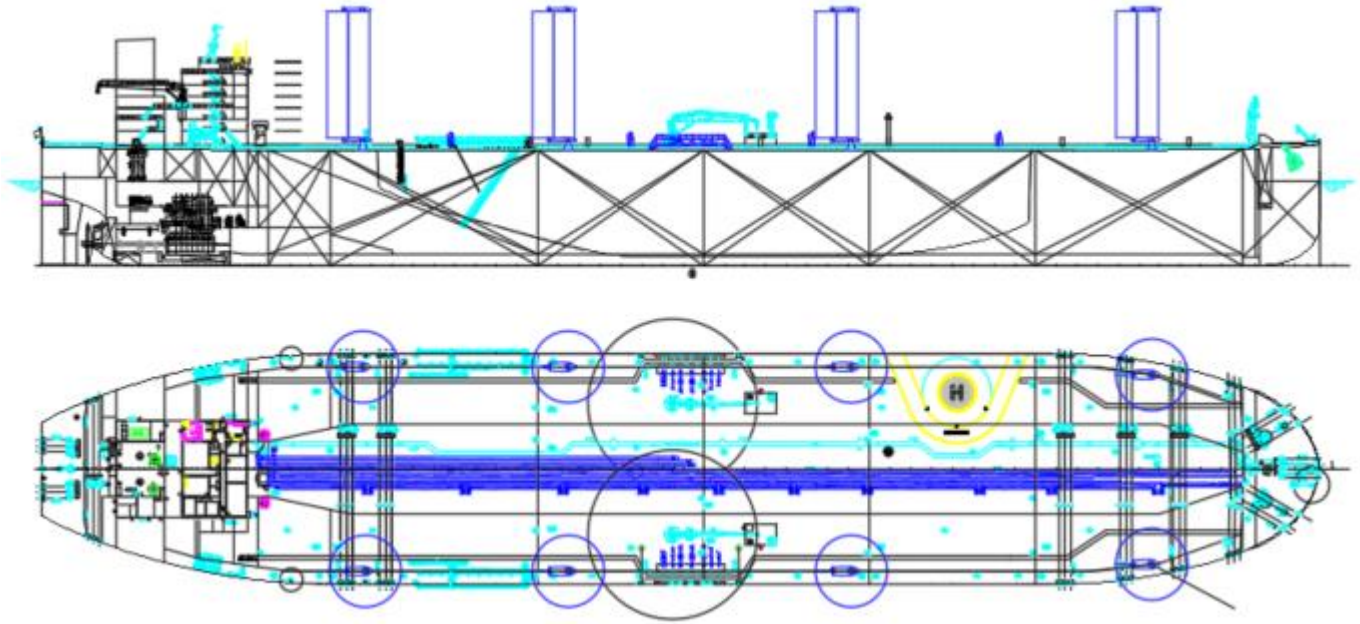
VLCC EQUIPPED WITH 8 OW 3.6.3 ®

KEY GENERAL CHARACTERISTICS

- Ship type VLCC
- LOA 332,9 m
- Dwt ~300 000 t

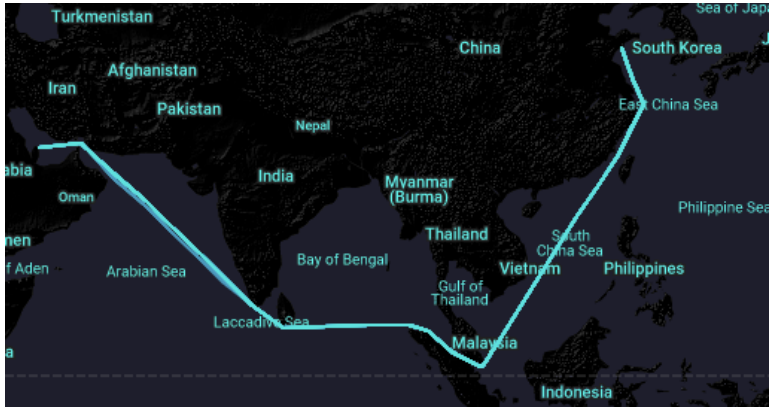
SAILING CONSIDERATIONS

- Sailing speeds considered: 14 kts
- Single trip route considered :
  - Dalia [ANG] > Qingdao [CHI]
  - Gebig [BRA] > Dalian [CHI]
- Loaded condition

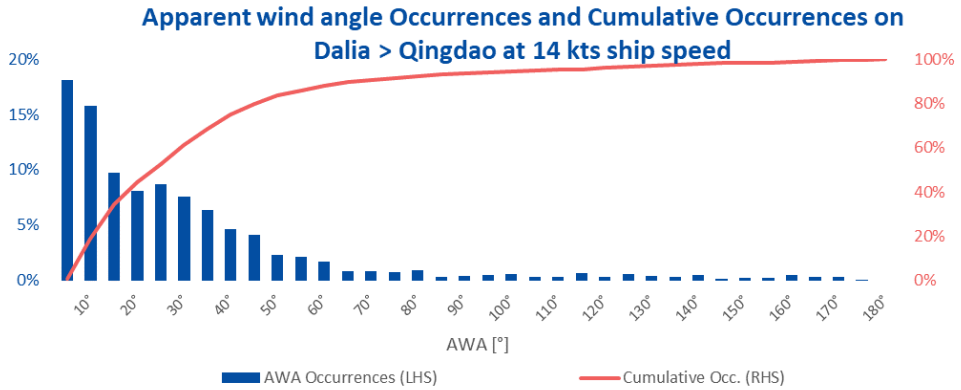


CASE STUDIES

PERFORMANCE PREDICTIONS OVER SINGLE TRIP DALIA > QINGDAO (LOADED) - VLCC



Routing calculation using Satori D-Ice



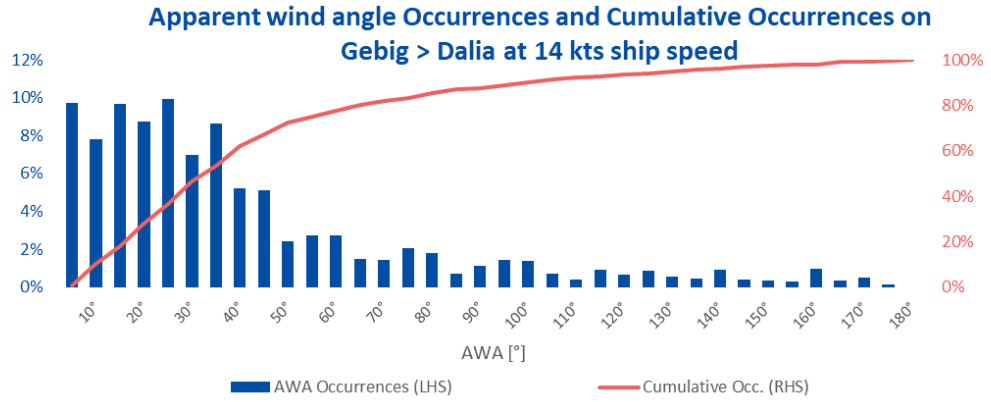
Route : Dalia > Qingdao		
Trip duration (one way)	days	28.4
Route length	nm	9 536
Speed	kts	14.0
Rel. Fuel Savings with 8 x OW	%	9.5%

- Oceanwing is the most relevant wind propulsion technology as more than 80% of the apparent wind angles are below 45°.
- The 4 Oceanwings system allows 1685 tons of annual fuel savings when operating on this route and considering 85% use rate.

CASE STUDIES

PERFORMANCE PREDICTIONS OVER SINGLE TRIP GEBIG > DALIAN (LOADED) - VLCC

Routing calculation using Satori D-Ice

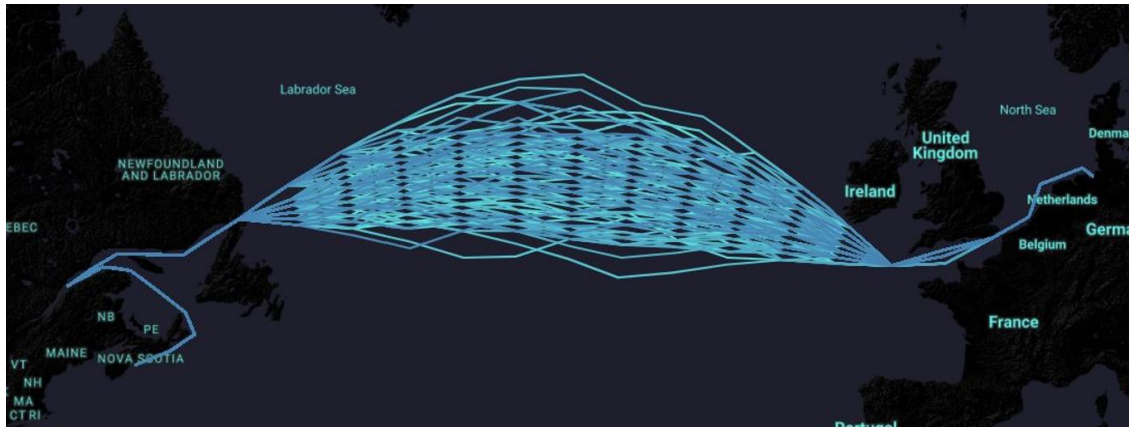


Route : Gebig > Dalia		
Trip duration (one way)	days	33.6
Route length	nm	11 306
Speed	kts	14.0
Rel. Fuel Savings with 8 x OW	%	11.6%

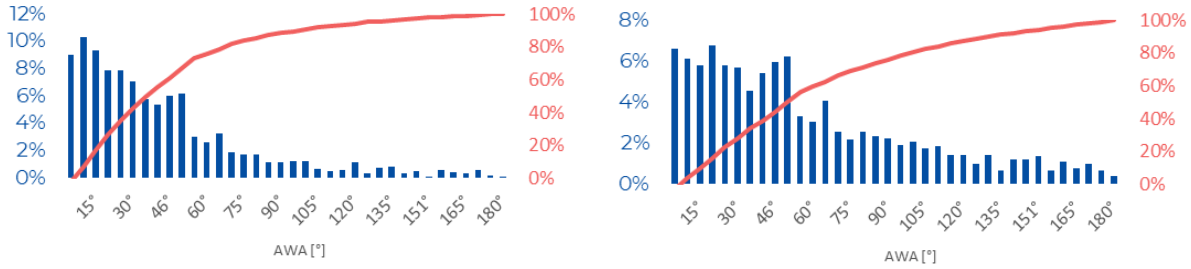
- Oceanwing is the most relevant wind propulsion technology as more than 67% of the apparent wind angles are below 45°.
- The 4 Oceanwings system allows 2062 tons of annual fuel savings when operating on this route and considering 85% use rate.

CASE STUDIES

PERFORMANCE PREDICTIONS ROUNDTRIP N. EUROPE <> USA - CONTAINER SHIP



Routing calculation using Satori D-Ice



- Oceanwing is the most relevant wind propulsion technology as more than 65% (outward trip) and 50% (return) of the apparent wind angles are below 45°
- The 6 Oceanwings system allows 6.3t and 7.9t of daily fuel savings respectively on outward and return trip.

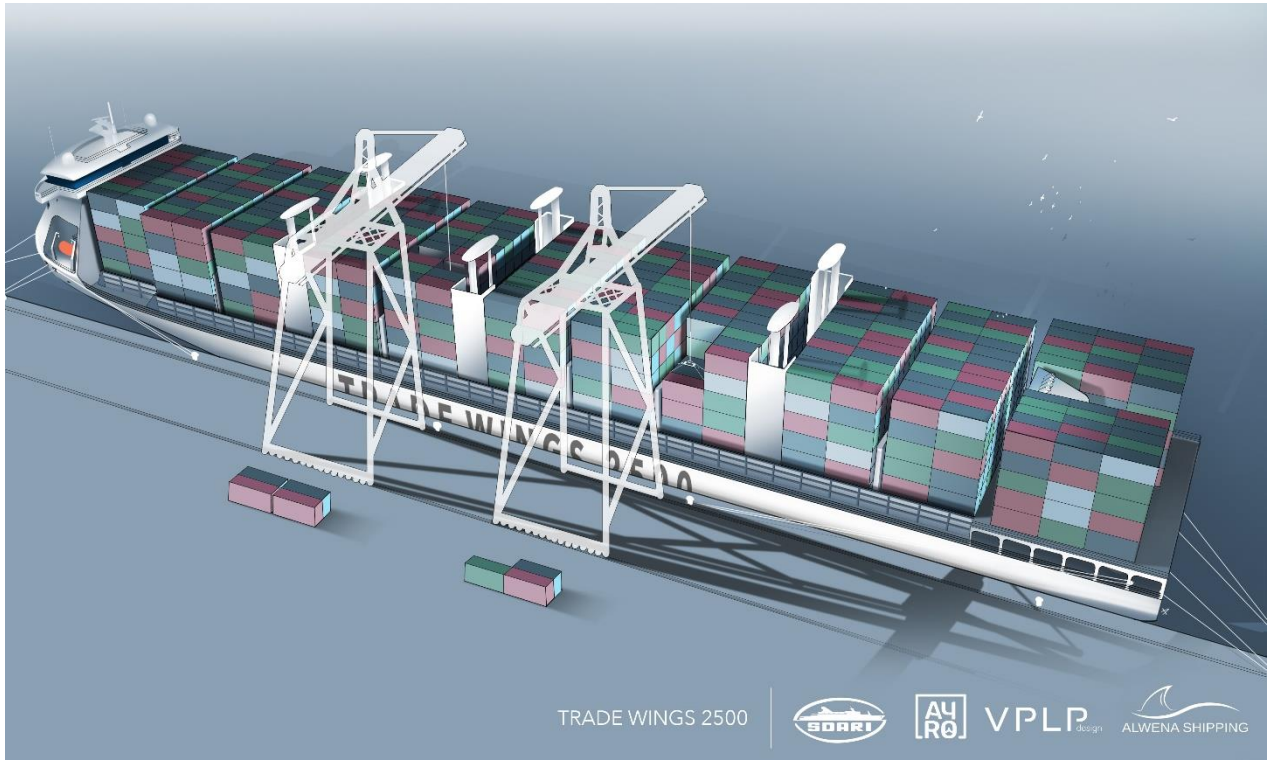
		Outward	Return
Trip duration (one way)	days	12.1	10.5
Route length	nm	3 783	3 783
Speed	kts	13.0	15.0
Relative Fuel Savings with 6 x OW	%	25.3%	23.5%

Savings over 25 years operating on thisRoute with 85% use rate		
Fuel savings over 25y	T	54 762
CO2 savings over 25y	T	175 566

Cost savings over 25 years		
Fuel cost	€/T	600 €
CO2 emissions tax	€/T	50 €
Total cost savings	€	41 635 343 €

TRADE WINGS 2500

LOW EMISSION SAIL-ASSISTED 2500 TEU CONTAINER VESSEL WITH APPROVAL IN PRINCIPLE FROM BUREAU VERITAS



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