Co-funded by the European Union

SOLAR IMPULSE EFFICIENT SOLUTION JULY 2018

IWSA International Windship Association

Natural co-propulsion for ships: sailing towards a sustainable future

Oriol Sánchez García – Lead Automation Engineer – osg@bound4blue.com

bound4blue

MARITIME INDUSTRY SEEKS COSTS AND POLLUTION REDUCTION

Tighter environmental legislation

Higher fuel prices

SO_x EMISSIONS

Reduce, **by 2020** Sulphur content in fuel:

from

3.5%

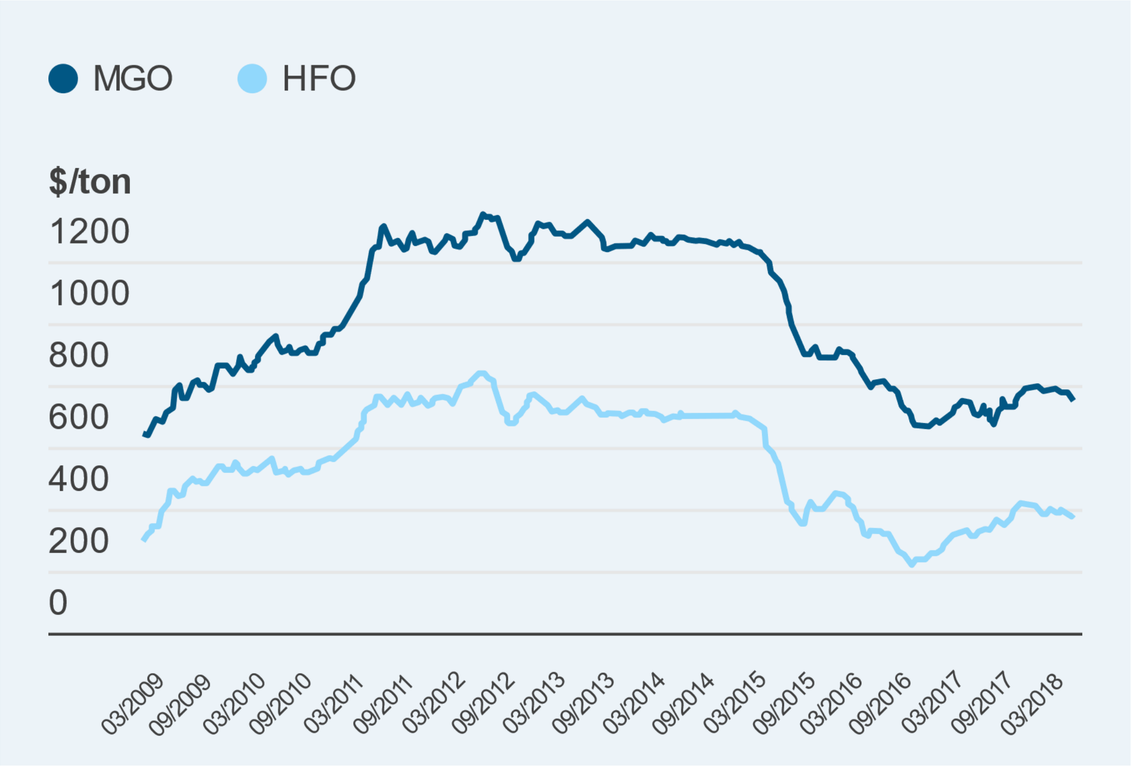
Heavy Fuel Oil (HFO)

→

to

0.5%

Marine Gas Oil (MGO)



CO_2 EMISSIONS

IMO CO2 emission Goals & Strategy

approved in April 2018

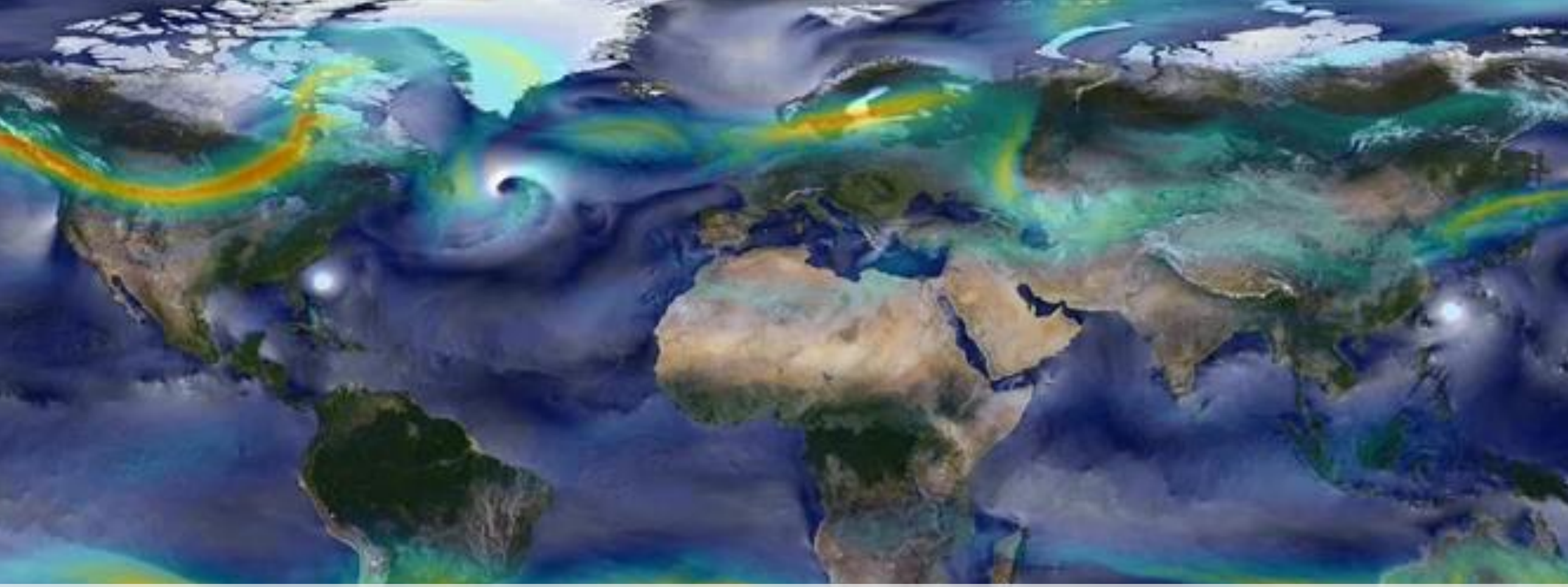
Reduce **total** CO_2 emissions

50% by 2050
compared to 2008

Reduce CO_2 emissions per **transport work** (tonnes·NM)

40% by 2030
compared to 2008

70% by 2050
compared to 2008



SOLUTION

WIND-ASSISTED PROPULSION

FOLDABLE WINGSAIL

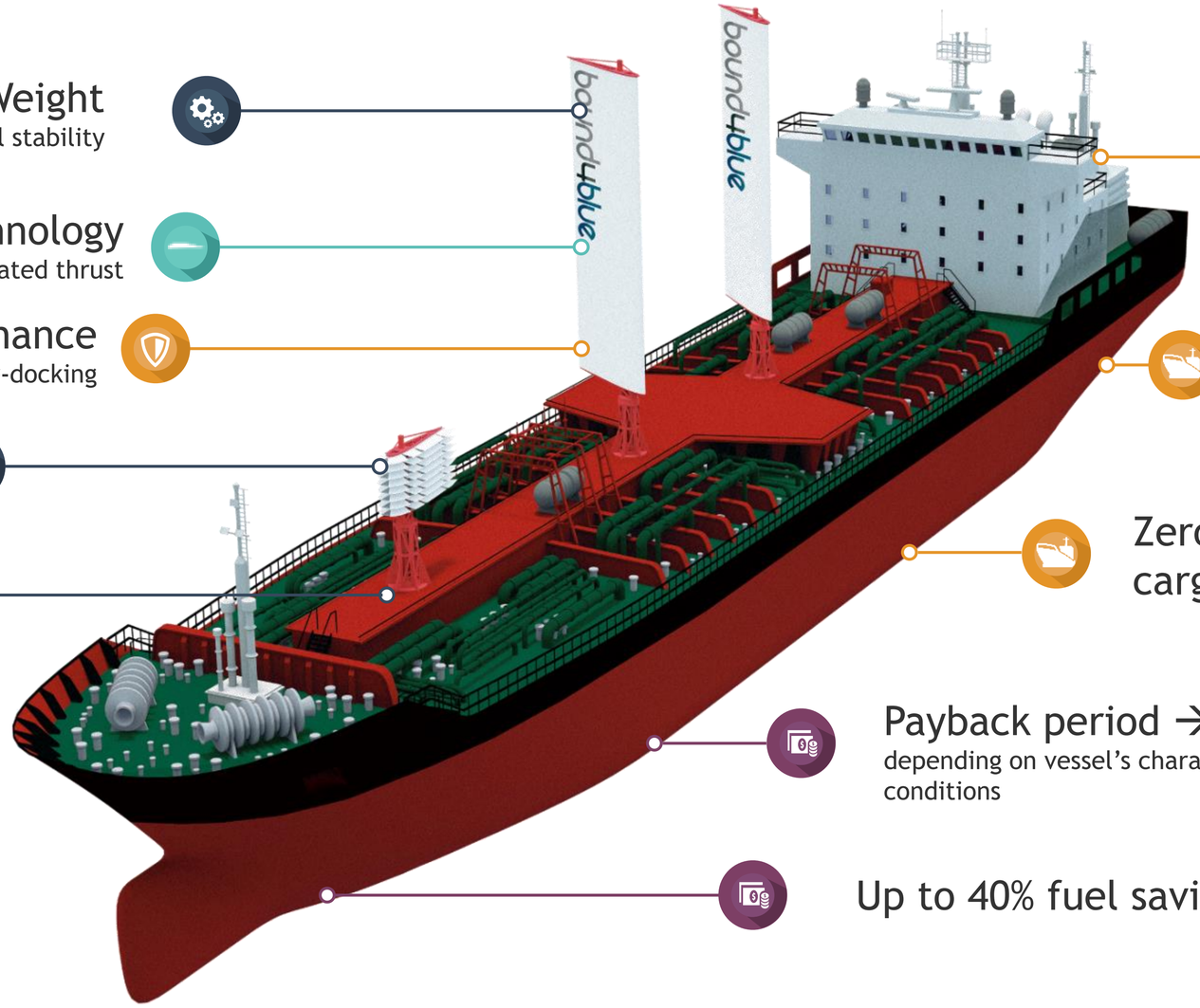
Light Weight
to ensure vessel stability

Aerospace technology
to maximize wingsail generated thrust

Low maintenance
to meet vessel scheduled dry-docking

Foldable
to ensure safety at port and during harsh weather

Orientable
to maximize performances at any wind direction



Autonomous
to avoid extra crew-related costs

New & Existing vessels

Zero impact in cargo capacity

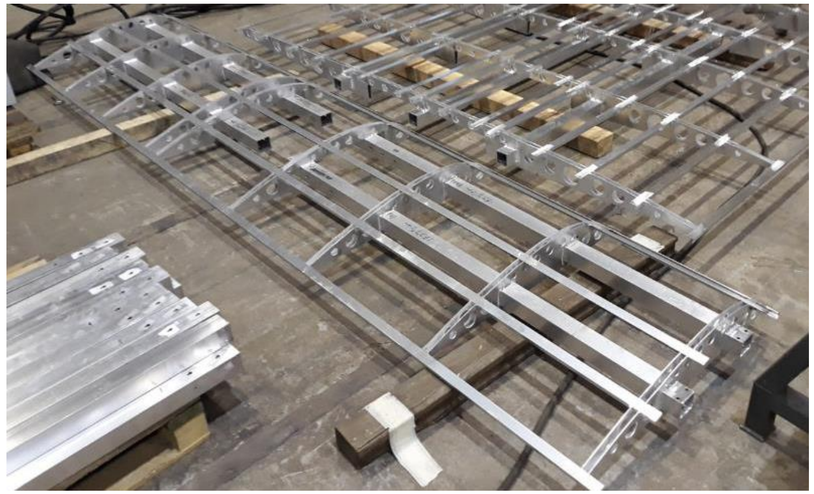
Payback period → 3 to 5 years
depending on vessel's characteristics, routing and weather conditions

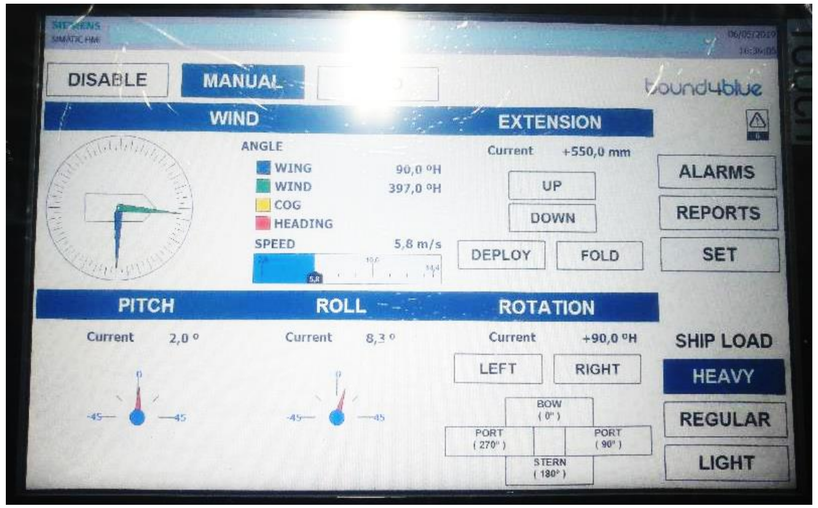
Up to 40% fuel savings

FOLDABLE WINGSAIL

BUILDING FIRST COMMERCIAL UNIT

BUILDING FIRST COMMERCIAL UNIT

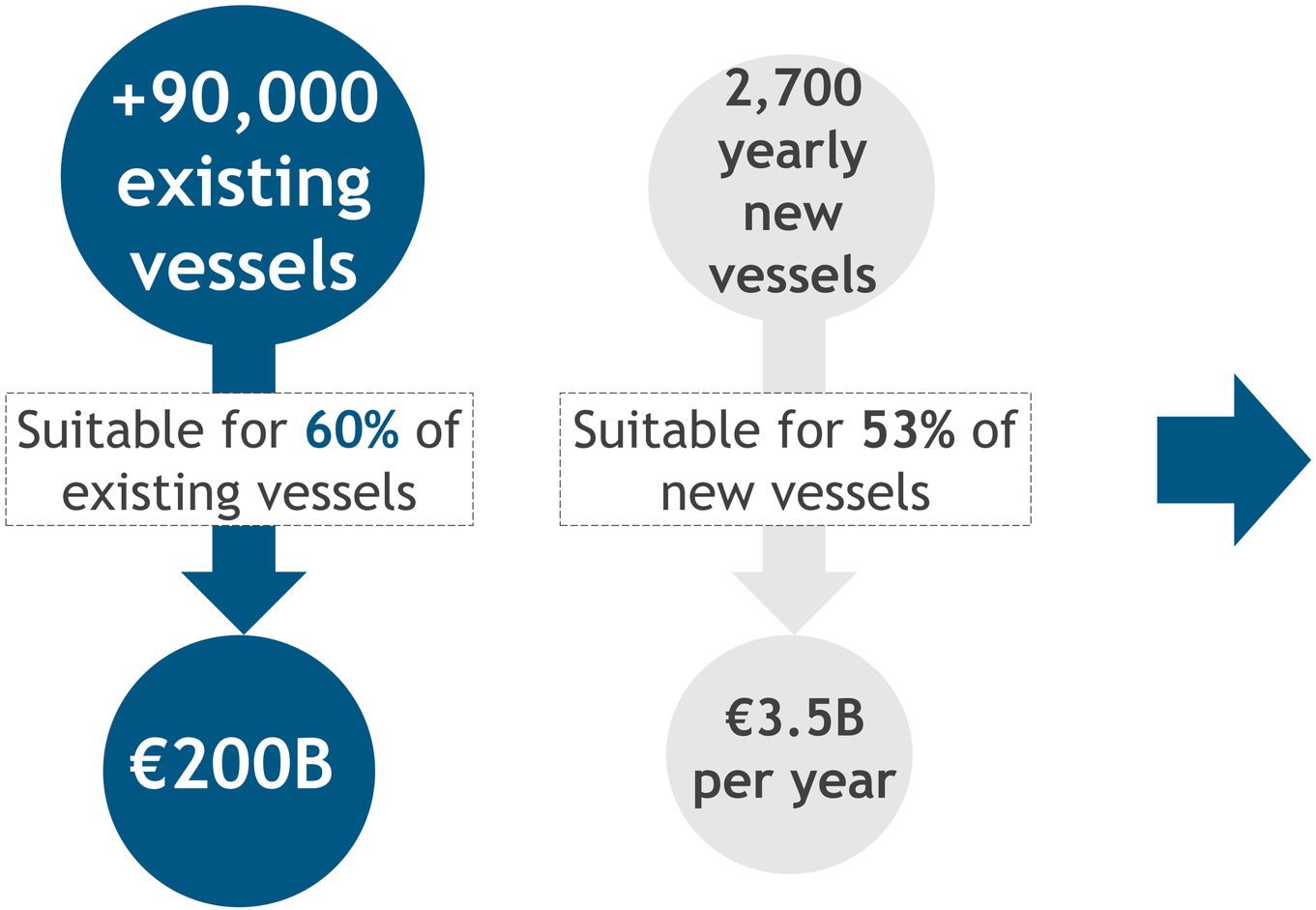




COMPETITORS & BUSINESS CASE

	bound4blue Foldable wingsail	Competitor #1 Rotor	Competitor #2 Kite
			
Is it foldable?	✓	✘	✓
Is it 100% automated?	✓	✓	✓
Expected range of fuel savings	**Up to 40%**	**Up to 25%**	**Up to 20%**
Maintenance costs	**++**	**+++++**	**++++**
Average payback periods	**< 5 years**	**+ 5 years**	**+ 5 years**

MARKET



Tankers

Bulk Carriers

Gas-tankers (no Moss)

Ro-Ro cargo ships

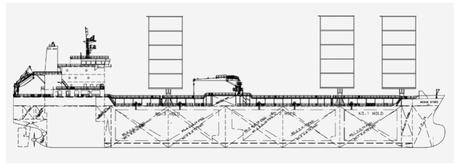
Passenger ships

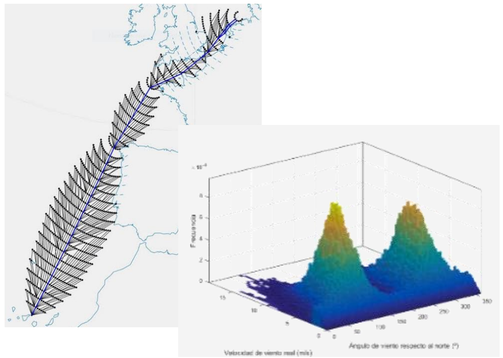
General cargo ships

Fishing boats

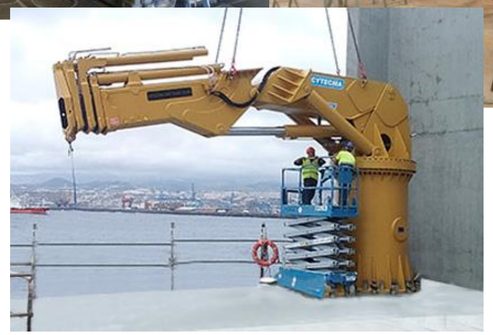
BUSINESS MODEL (i.e. Europe)

Engineering
Project Management
Quality Assurance





Wingsail manufacture



Wingsail integration on the vessel

A REAL MARKET NEED

ONGOING PROJECTS

INTEGRATIONS IN 2019

OR.PA.GU

40 m longliner fishing vessel

8x20 m wingsail

Shipyard (Panamá)

Sea trials (Pacific Ocean)

Funded by the shipowner

INTEGRATIONS IN 2019

Co-funded by the European Union

V CENTENARIO 1ª VUELTA AL MUNDO

La Fura dels Baus

60 m dry-bulk vessel

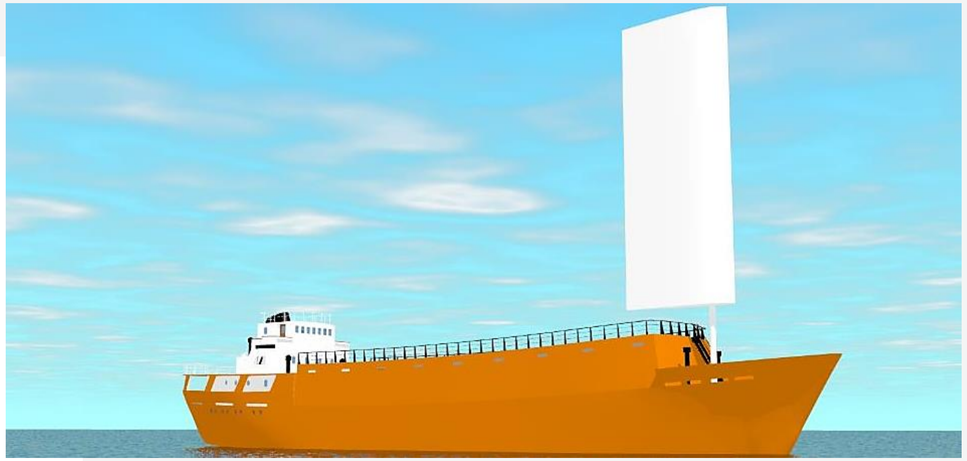
8x20 m wingsail

Shipyard (Astander – Spain)

Sea trials (Cantabrian Sea)

Co-funded by European Union

SPHÆRA MUNDI
LA FURA DELS BAUS
500 años de la primera vuelta al mundo



INTEGRATIONS IN 2020

Naviera Murueta

120 m dry-bulk vessel

10x30 m wingsail

Shipyard (Spain)

Sea trials (Cantabrian Sea)

Funded under a HaaS contract

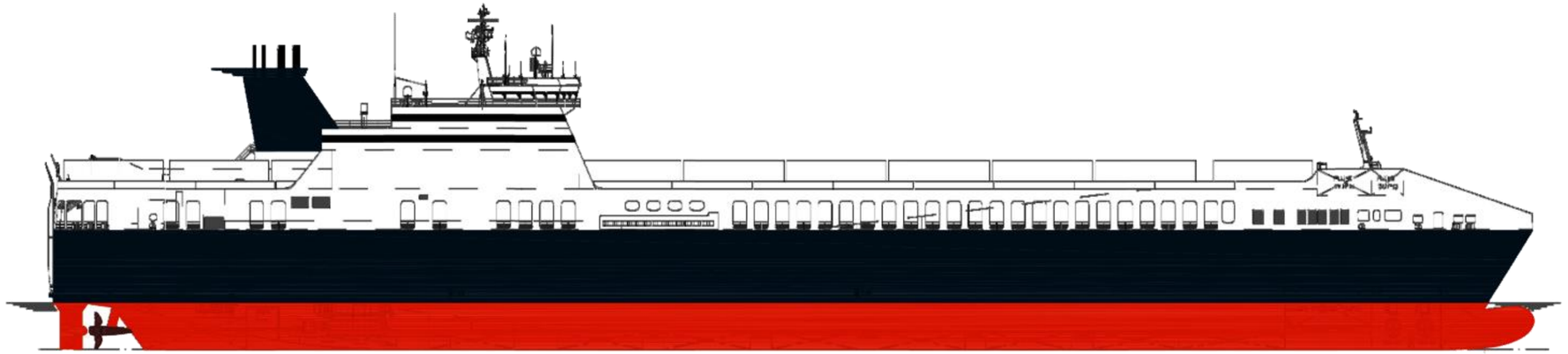
PERFORMANCE

AN EXAMPLE BUSINESS CASE

THE VESSEL

VESSEL MAIN DATA	
LOA	126.5 m
Beam	20.6 m
Depth	9.15 m
Main engine	(2x) MAN 9L48-60

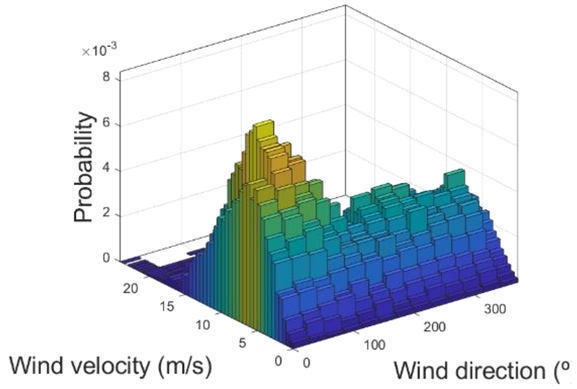
OPERATIONAL DATA	
Speed	14 knot
Engine Power	3.400 kW
Specific fuel consumption	183 g/kWh
Fuel (today)	HFO
Days of operation	275 days/year

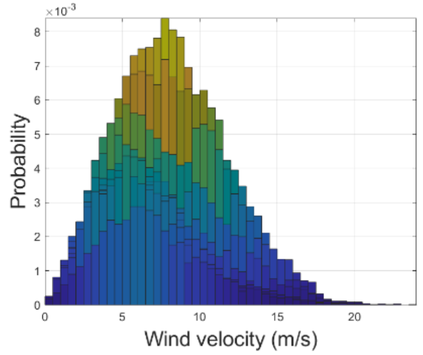


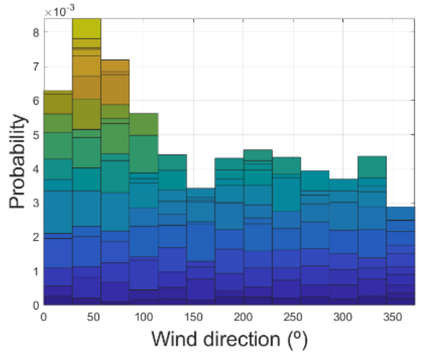
RO-RO SHIP

THE ROUTE

Wind data:
ECMWF: Historical data 2010-2015
Vw at 10m AMSL





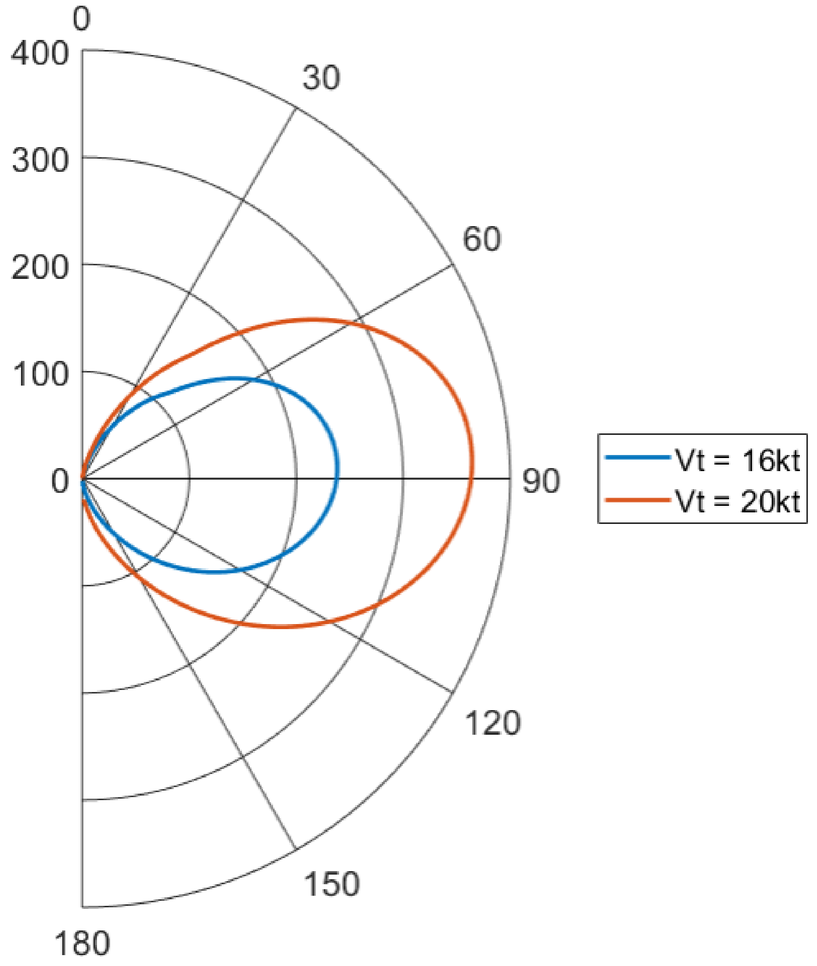


Route:
Europort - Teesport

FOLDABLE WINGSAIL PERFORMANCES

WINGSAIL DATA

Size (1x) 25 x 10 m



(*) Vship = 14 knot

Propulsive efficiency = 0.6

OBTAINED PERFORMANCES

PERFORMANCES

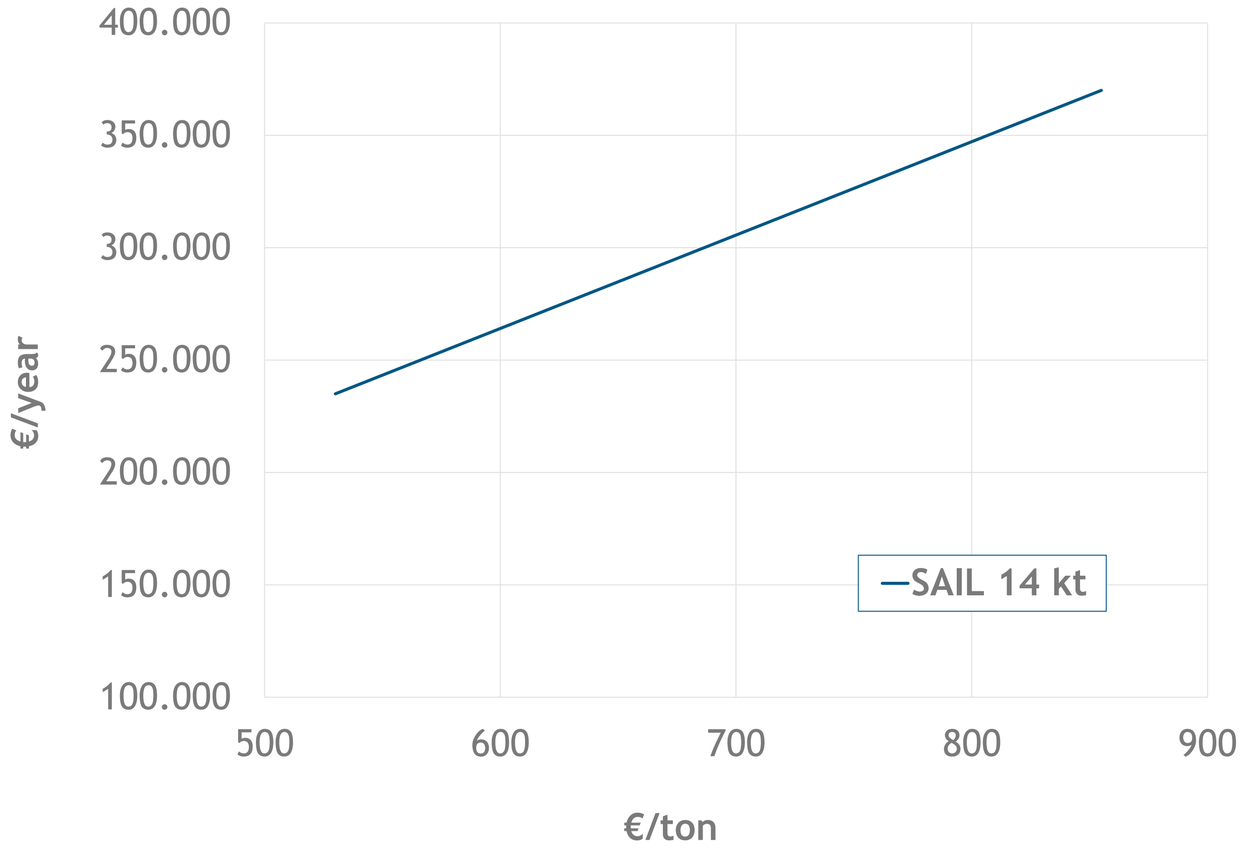
Wingsail Units	2
Wingsail size	25x10 m
Average engine power savings	360 kW
Fuel savings (275 days/year at sea)	**435 Tn/year**

ANNUAL SAVINGS

ROUTE: Europort - Teesport

2 WINGSAILS - 25x10m

Fuel savings	434.04 Tn/year



BOUND4BLUE

ABOUT US

TEAM

BOMBARDIER AÉRONAUTIQUE

gmv INNOVATING SOLUTIONS

INTA

CSIC CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

ADELTE THE BOARDING COMPANY

AIRBUS

Applus+

ABENGOA

MECALUX

PREMIOS EMPRENDEDOR XXI

FPdGi Fundació Fundación Princesa de Girona

MIT Technology Review INNOVATORS UNDER 35

Forbes 30 UNDER 30 EUROPE

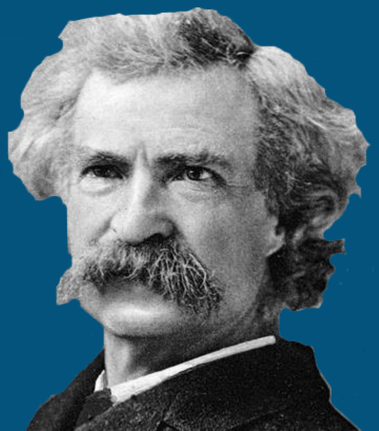
SOLAR IMPULSE JULY 2018 EFFICIENT SOLUTION

hello tomorrow GLOBAL SUMMIT

European Parliament TOP 50

Twenty years from now, you will be more disappointed by the things you didn't do than those you did. So throw off the bowlines. Sail away from safe harbour. Catch the wind in your sails. Explore. Dream. Discover.

Mark Twain



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