



Uptake and Market Development of Wind Propulsion Technologies: A Hybrid Solution



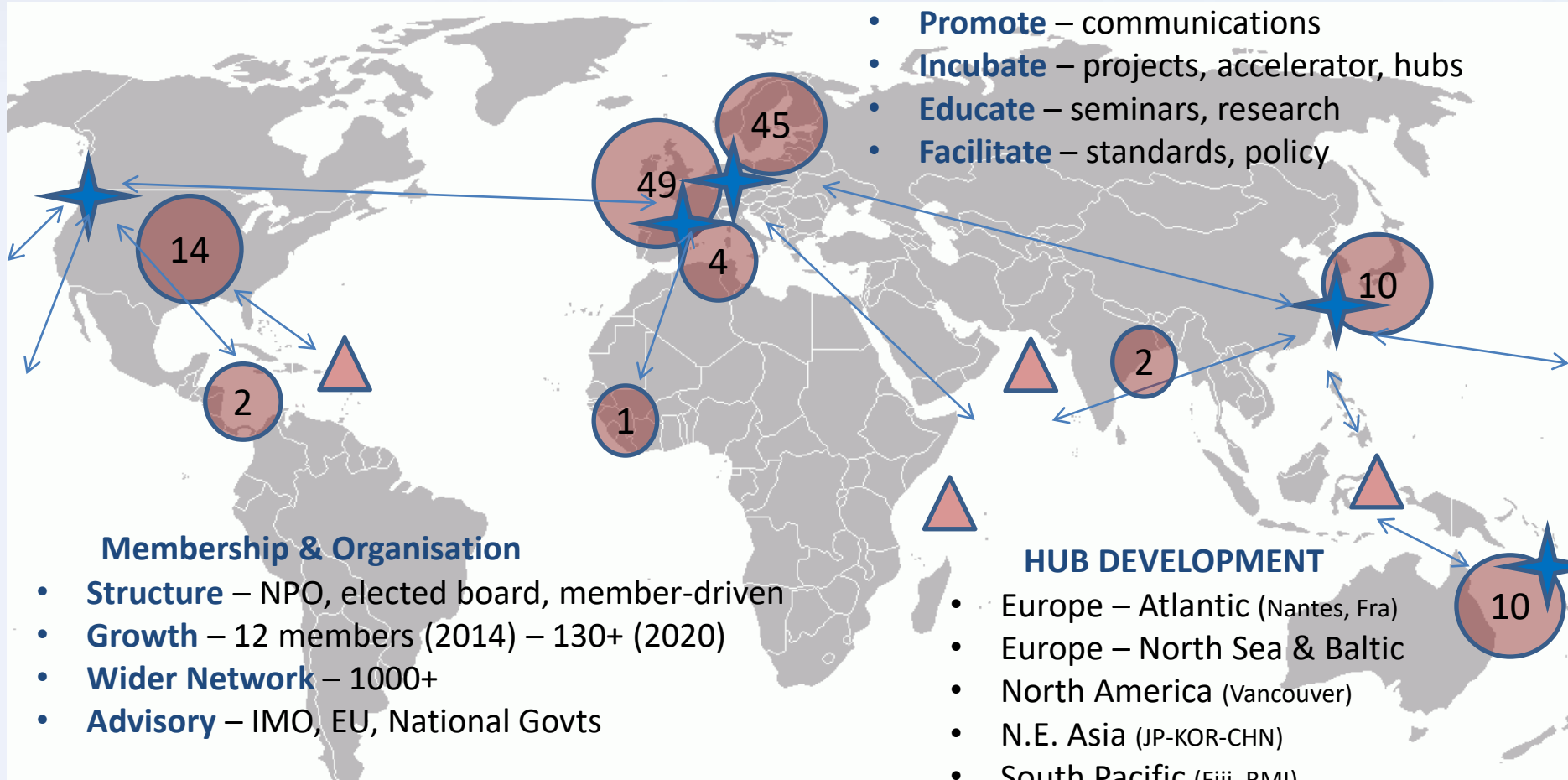
**Gavin Allwright, Secretary-General
International Windship Association (IWSA)**



International Windship Association Network

IWSA Activities

- **Network** – members, events, publications
- **Promote** – communications
- **Incubate** – projects, accelerator, hubs
- **Educate** – seminars, research
- **Facilitate** – standards, policy




Membership & Organisation

- **Structure** – NPO, elected board, member-driven
- **Growth** – 12 members (2014) – 130+ (2020)
- **Wider Network** – 1000+
- **Advisory** – IMO, EU, National Govts

HUB DEVELOPMENT

- Europe – Atlantic (Nantes, Fra)
- Europe – North Sea & Baltic
- North America (Vancouver)
- N.E. Asia (JP-KOR-CHN)
- South Pacific (Fiji, RMI)



“1.5C Target: All ships designed and built today must operate in a net zero emissions world at the end of their service life.”

What can Wind Propulsion Deliver?

ZERO-EMISSIONS ENERGY COMPONENT TODAY

RETROFIT: 5-20% propulsive energy delivery & potential up to 30%

OPTIMISED NEWBUILD: 50-80%+ possible with operational changes

RESILIENCE & EFFICIENCY

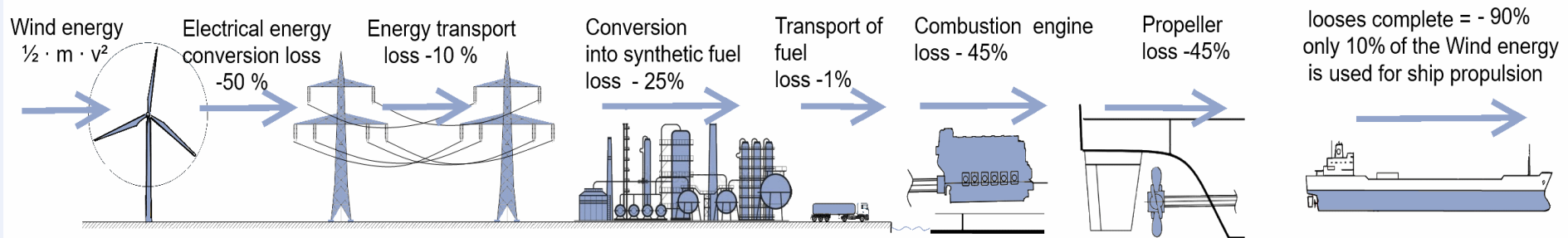
UNIQUELY AVAILABLE TO SHIPPING

Direct Application of Wind Power

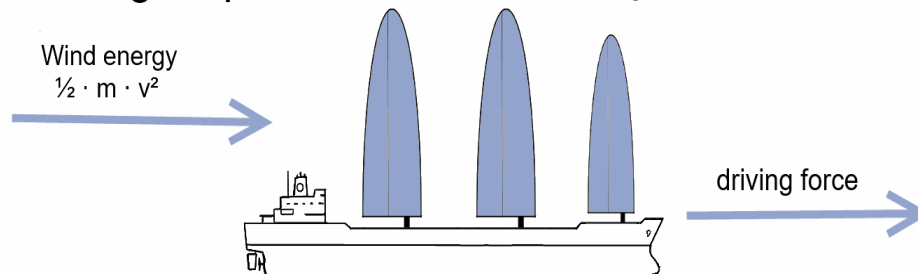
Primary Renewable – abundant energy, delivered directly at the point of use, no cost for life of vessel + no new infrastructure ++ no onboard storage

Facilitates Secondary Renewables (H, NH₃, Battery etc.) - by reducing power requirements, +++ range extender +++ speed/power option +++ onboard production potential

power 2 fuel concept: the long way from wind energy to driving force...



sailing ship : the short way from wind energy to driving force



advantages of a sailing ship:

- uses high wind potential on the open sea
- No losses due to energy conversion
- No losses due to energy transport
- No land-based infrastructure necessary
- One sailing ship replaces 10 land based wind power plants
- No fuel costs for the shipping company (wind is for free)
- less dependency of shipowners on fuel producers

Herbert Blümel ,2019

Hybrid W.A.V.E.

WIND	+	ACTIVITY	+	VESSEL	+	ECO-FUELS
Wind –assist or Primary wind power (Primary Renewable)		Operational optimisation		Vessel optimisation		Renewable energy or waste-derived fuels (Secondary Renewables)
-retrofit wind-assist (5-20% savings – possible up to 30%) -newbuild primary wind 50%++ -today's tech +optimise & cheaper -lease/OPEX approach		-voyage & fleet management -weather routing -speed reduction -virtual arrival -crew training -data/ blockchain -new business models etc.		-design -size & capacity -energy management system -energy efficiency measures -air lubrication -reduced engine power etc.		-2 nd gen biofuels -batteries -synthetic fuels + CCS -bio-gas/liquids -H2 & H2 carriers *Electric propulsion systems enables modular approach
20-30%	+	20%	+	20-30%	+	20-40%

Note: All figures are estimates. Any one measure in each category could provide a significant % of the proposed total.

Technology Toolbox



The Iron Triangle Challenge

Technology Available Now
Ease of Retrofit Installations
Predictability & Future Proofing
– secure % of fuel price & availability vs emissions legislation, stranded assets, carbon levys etc.



OPEX Approach: Pay-As-You Save Financing – Wind as a Service - Lease & Modular Rentals reduce CAPEX
CAPEX Approach - ROI's - \$600/ton+
CARBON Approach – No external costs – carbon/eco- footprint

Certified - Classification Societies: Wind-Assist Guidelines.
Compliant –COLREGs, Ports, Environment/Carbon.
Modern - Automated, EMS Integrated, Weather Optimised
Validated - 3rd Party Validation Platforms Development

Large Vessel Installations Today...

**13 Ocean Going Vessels with Wind-assist systems installed by end of Q1 2021
+ more than 20 small sail cargo, fisheries & cruise vessels in operation (following slide)**

NOTE: More WPT vessels in operation than all new alternative fuelled ships combined (excluding tankers & LNG)



Ship Types

Tankers
1 x VLCC
1 x LR2 Product Tanker

Bulkers
1 x Ultramax
1 x Kamsarmax (wind ready)

RoRo x 2

Ferry/Cruise x2

General Cargo x4
(2 x pending)
Various sizes: 2,000–12,000dwt



Small Vessel & Traditional Sail Developments

Operations: Cargo



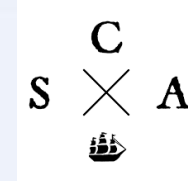
Operations: Fisheries



Operations: Cruise



Technology & Networks



Ship Designs

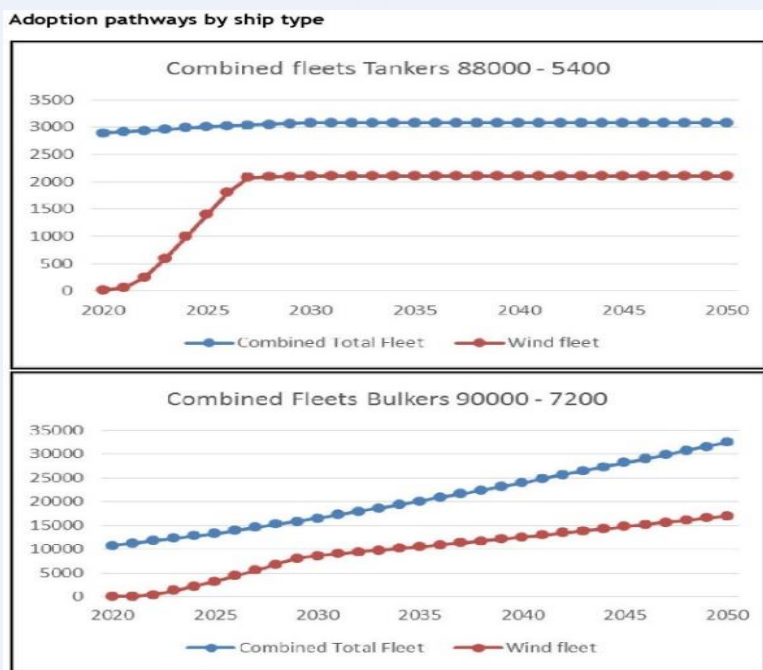


Builds & Retrofits

Market Forecasts & Pipeline Status

End of 2022/23: Existing Pipeline – 47+ retrofit & newbuild vessels sea trialling & commercial operations + >30 smaller vessels. (NOTE: excludes any new commercial contracts made 2020-22)
Robust R&D Pipeline: 30+ Additional technologies & projects under development worldwide

2030



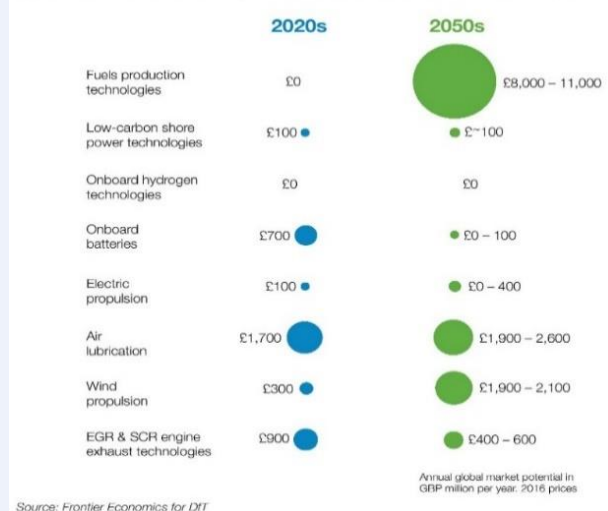
EU Report ‘...max. market potential for bulk carriers, tankers & container vessels = 3,700-10,700 installed systems until 2030 (varied by fuel price, speed, discount rate)

‘Study on the analysis of market potentials & market barriers for Wind Propulsion Technologies for ships’. (CE Delft 2016/7)

2050s

UK Government Clean Maritime Plan (July 2019), research: 37,000 – 40,000 vessels with wind propulsion systems installed or roughly 40-45% of the global fleet.

Figure 4: Potential annual future global market for maritime emission reduction options⁴⁹



Project News...



Windchallenger ClassNK AIP-
bulker newbuild 2022 5%+ savings per sail

Canopee – Build started on 121m
RoRo launch 2022 - 4 wing sails
+ LNG = 35% GHG savings



Ventifoil/Suction Wing 2x10m installation – Van
Dam Shipping. 2nd: Boomsma Shipping Q1,2021,
Tharsis Sea-River Shipping 2 x wing sails Q2 2021



Neoline – Build contract with
Neopolia – 2 x 136m RoRo
primary wind vessels <80%
fuel savings - launch 2023

Kite systems –fully automated +
dynamic - LDA/Airbus Roro 2021,
K-line contract <50 installations -2021

CHANTIERS
DE L'ATLANTIQUE



Rotorsail Installations & Projects – New
Build Bulker – delivery Q4 2021 + Rord
Braren vessel Q1 2021 + Sea-Cargo 2 x
tiltable rotors Q1 2021. Oldendorff Carriers
JDP - 207,000 dwt Newcastlemax - 2022
Wartsila Service/Support +



WALLENIUS MARINE

Car Carrier design – Oceanbird -
new build 2023/4: x wing sails <10
knots wind only. Launch 2024.



SGS –Feasibility study
complete + ESA develop fuel
saving prediction system

Silenseas Range
210m, 23,000GT, 410
pax./crew, 17kn wind
+Solid sail system



SEA-CARGO



WÄRTSILÄ



Cargill

Wing sail system – retrofit + operation
system = 30% fuel saving – detailed
design stage – installation on 1st tanker
2022 – CHEK H2020 project

Projects and Collaborations



WASP: EU Interreg North Sea Project

- Five wind-assist installations - monitor & verify
- Develop business models
- Recommendations to help facilitate wind propulsion uptake.

WiSP: Joint industry Project

- Improve methods for transparent performance prediction + provide ship owners/operators with fast low-cost predictions for their fleet
- Review the regulatory perspective including status of rules and regulations, EEDI etc.



Wind Propulsion Accelerator

- Support WPT development: concept to market
- Five Wind Propulsion Hubs + Incubator Fund
- Test Fleet for WPT + Research + Training
- Installation & Newbuild Support Facility



IWSA Collaborations



The Royal Institution of Naval Architects
Wind Propulsion Forum 2021
17 February, Online Event

In Association with:

Open for Registration

The Royal Institution of Naval Architects is committed to the promotion of Wind Propulsion. The current use of alternative fuels and renewable energy sources within the shipping industry is still relatively scarce, so we are proud to present Wind Propulsion Forum in cooperation with the International Windship Association. This will serve as a great start to the other RINA alternative propulsion events such as our popular Wind Propulsion 2021 Conference.

www.rina.org.uk/Wind_Propulsion_Forum

Win-Win-Wind Propulsion....



















































