

IWSA
International Windship Association

Decade of Wind Propulsion 2021-2030

Delivery | Optimisation | Facilitation

www.decadeofwindpropulsion.org



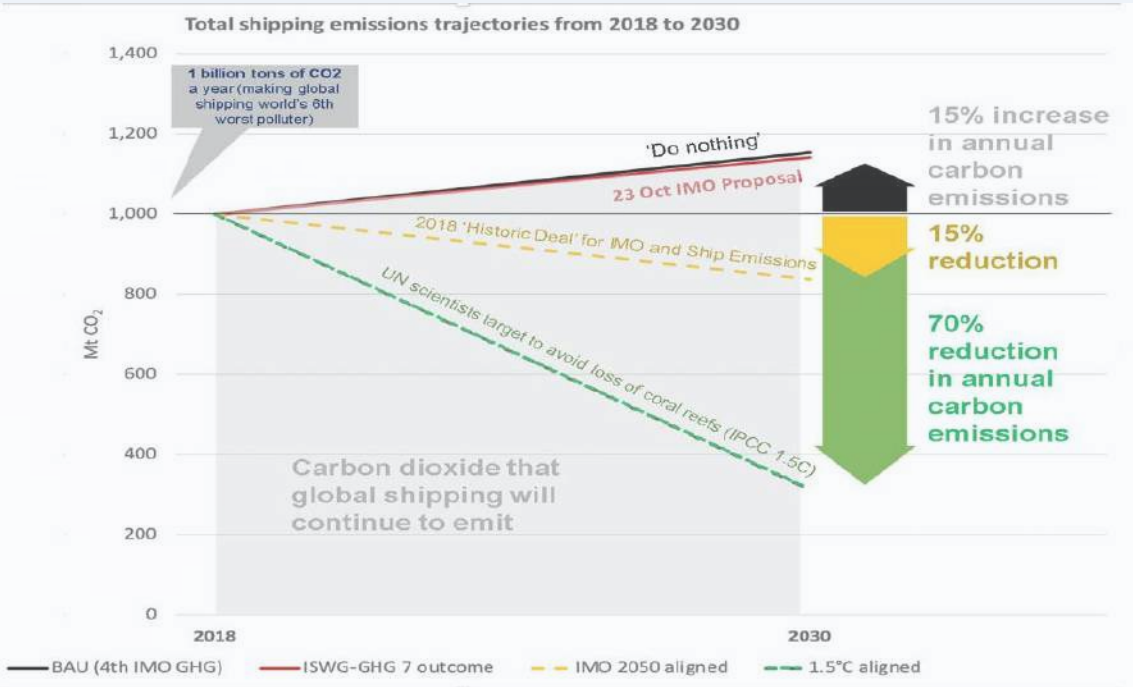






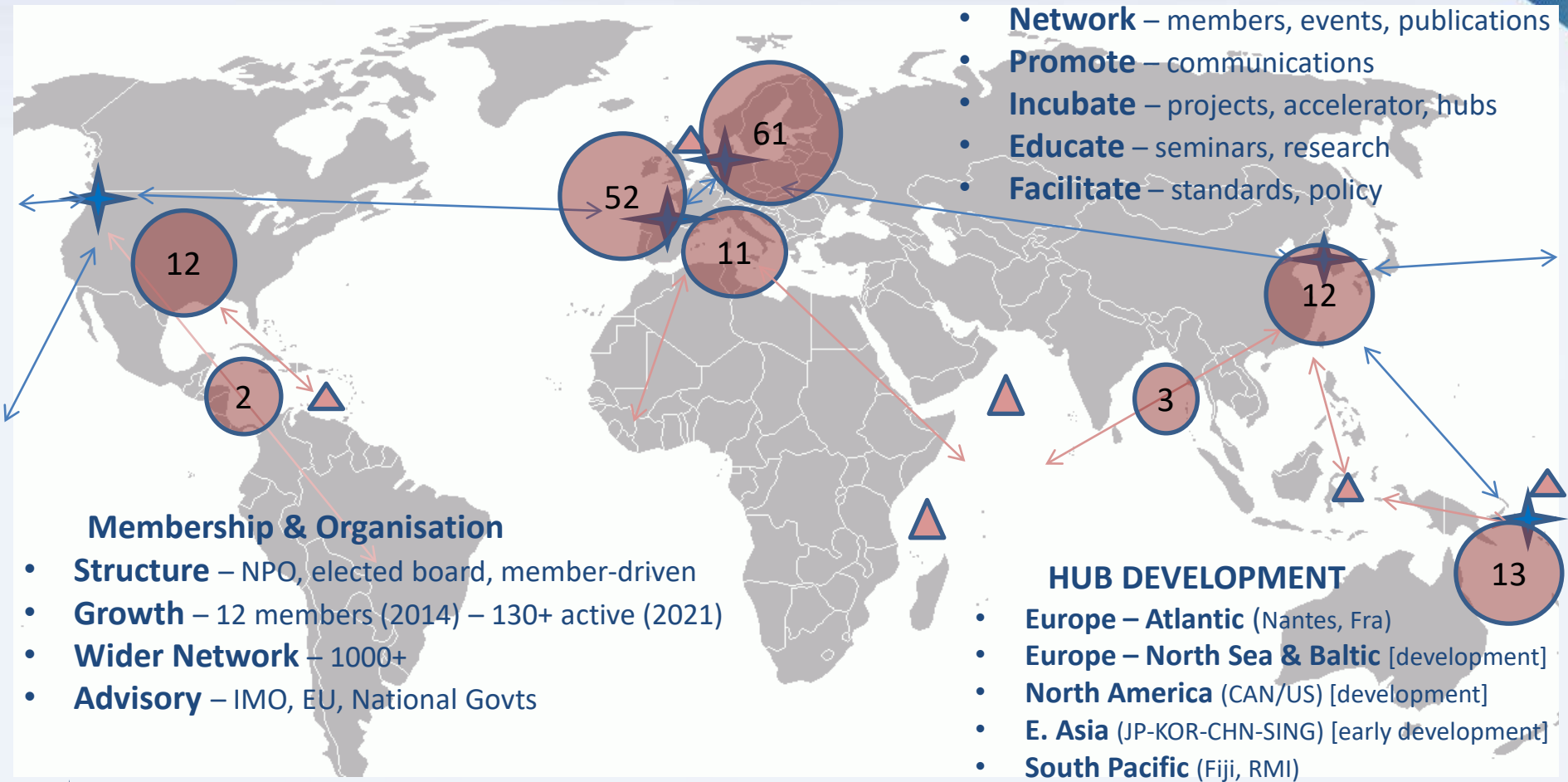
PARIS AGREEMENT

"All ships designed and built today must operate in a net zero emissions world at the end of their service life"



Source: International Council on Clean Transport (ICCT), Oct 2020

International Windship Association Network



IWSA Activities

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

Membership & Organisation

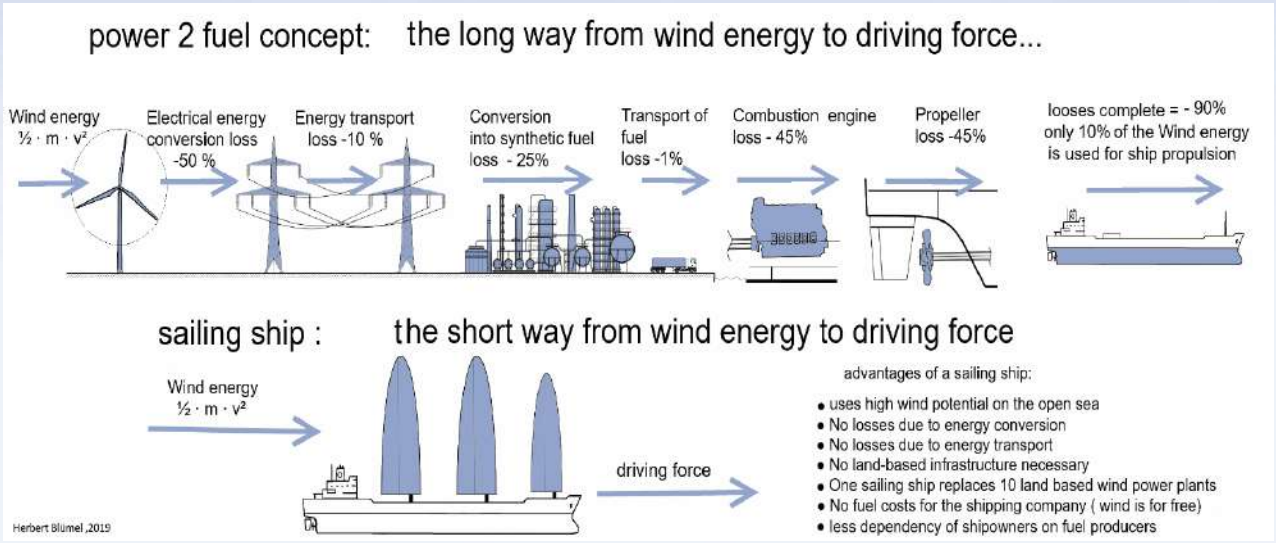
- **Structure** – NPO, elected board, member-driven
- **Growth** – 12 members (2014) – 130+ active (2021)
- **Wider Network** – 1000+
- **Advisory** – IMO, EU, National Govts

HUB DEVELOPMENT

- **Europe – Atlantic** (Nantes, Fra)
- **Europe – North Sea & Baltic** [development]
- **North America** (CAN/US) [development]
- **E. Asia** (JP-KOR-CHN-SING) [early development]
- **South Pacific** (Fiji, RMI)

Wind Propulsion Hubs | 2 IWSA Members | Traditional Sail Cargo Networks

Direct Application of Wind Power



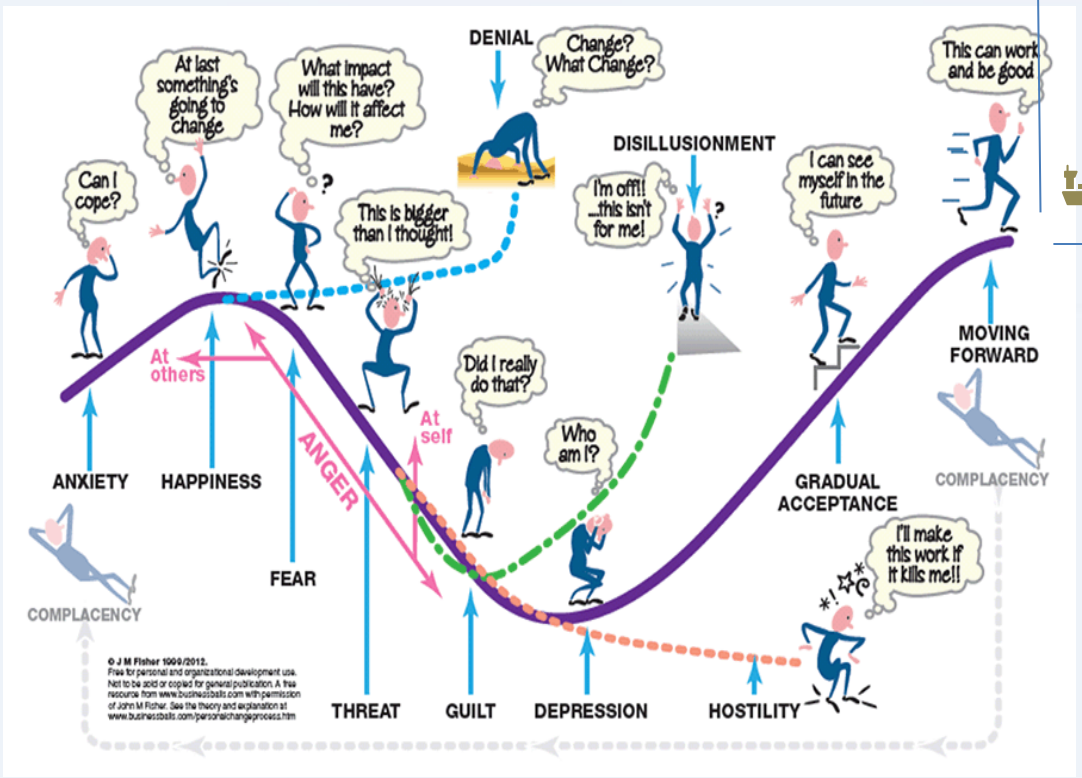
RETROFIT
5-20% propulsive energy & optimised up to 30%

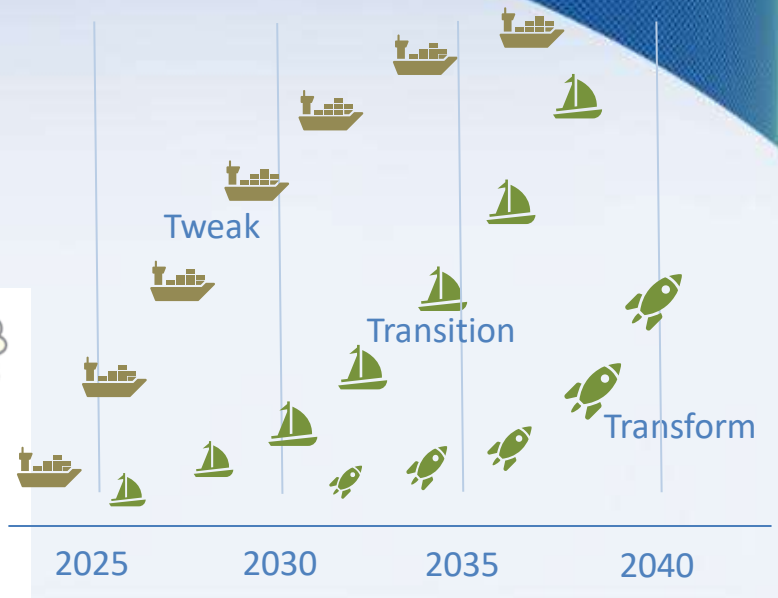
OPTIMISED NEWBUILD
50-80%+ possible with operational changes

- Pure **Zero-Emissions** Energy Source
- Abundant & Available Worldwide **Today**
- **Free** & Delivered to the Point of Use
- No New **Infrastructure** or Onboard **Storage**
- Harvesting Technology **Available** Now
- **Compatible** with All Fuels
- **Facilitates** Secondary Renewable Fuels
- **Uniquely** Available to Shipping
- Shift from CAPEX to **OPEX** possible

Pathways: Tweak, Transition & Transform

- **Tweak**: Retrofit current fleet of 60-100K large ships + 7 mill+ small vessels – extend carbon budget 20-30%





- **Transition**: Natural replacement with wind optimised wind-assist & primary wind vessels + operation adjustments to max. wind energy component

- **Transform**: Accelerated replacement of existing vessels with primary wind + 100% energy autonomous vessels

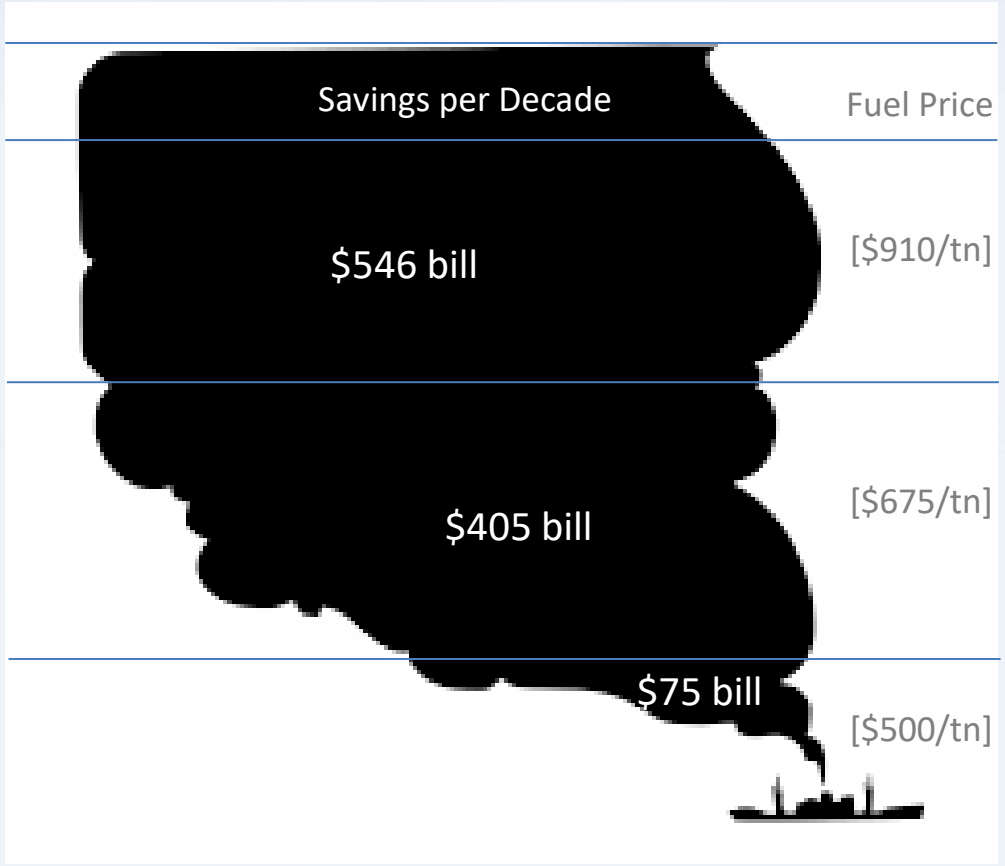
Hybrid W.A.V.E.

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.		-2nd 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.

The Shipping Decarbonisation Challenge….

Could Wind Propulsion Fund the Decarbonisation Transition of the Fleet?



- *Static fleet size*: 60,000
- *Fuel:* 300mill tn/yr
- *CO2*: 1bill tn/yr
- *Price*: $500/tn (VLSFO/04 May 21)
- *Increase*: 35%/decade from 2030s
- *Wind*: 20% (inc. operation change)

NOTE: No IRR/Currency rates etc included

UMAS/ETC Report
IMO2050 (50%) = $1trill
100% Decarbonisation = $1.4-$1.9 trill

[$1.4 trill = 23 mill per ship]

WPT cost = $5 mill/ship = **$300bill**
+ Reduce total cost by 10-20%

$300 bill invested (2020s+) = **$1trillion**+ savings by 2050 + lowers total cost to **$1.1-1.7 trillion**

Large Vessel Installations Today…

15 Ocean Going Vessels with Wind-Assist Systems installed by end of Q2 2021

& 1 Wind-ready + more than 20 small sail cargo, fisheries & cruise vessels in operation

Ship Types
Tankers x 2 (1 x pending new build) 1 x VLCC, 1 x LR2 Tanker
Bulkers x 2 (+1) (2 x pending) 1 x VLOC, 1 x Ultramax 1 x Kamsarmax (wind ready)
RoRo x 2 (1 x pending new build)
Ferry/Cruise x 3
General Cargo x 5 (2 x pending) Various sizes: 2–12,000dwt
Fishing Vessels x 1








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





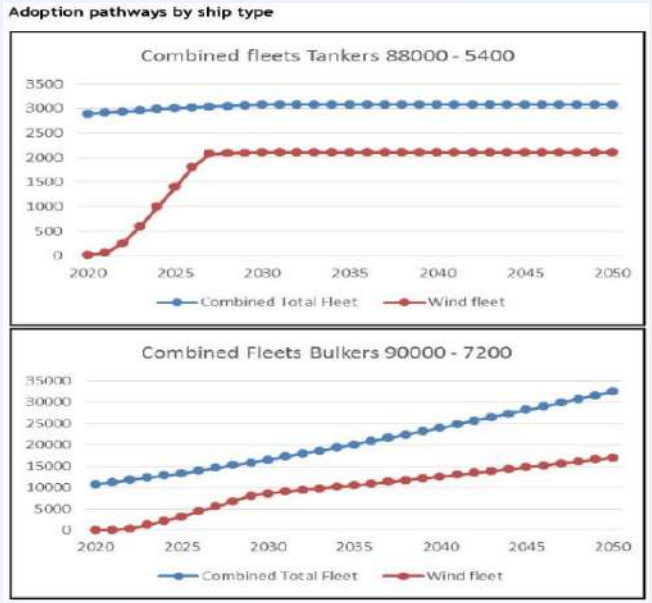



IWSA International Windship Association

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

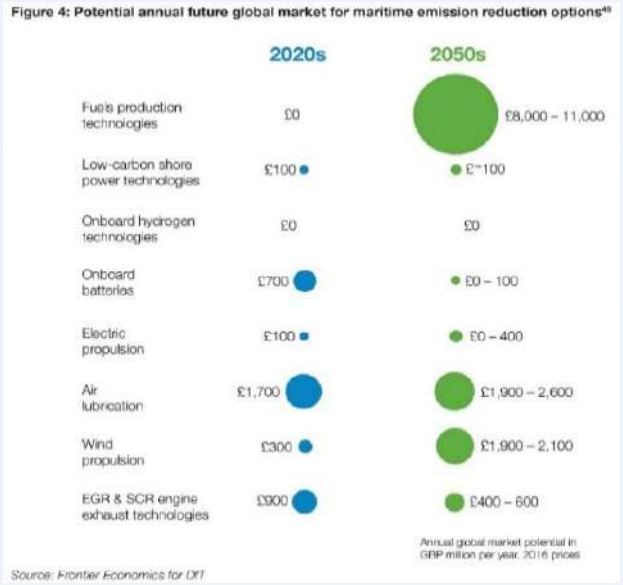
2030



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

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.**



Source: 'Market potentials & market barriers for WPT for ships'. (CE Delft 2016/7)

Project News...

Windchallenger ClassNK AIP Bulker. 2 x newbuild 2022 5%+ savings/sail. Windhunter project launched

Canopee – Build started of 121m RoRo launch 2022 - 4 Oceanwings + LNG = -35% GHG – AiP awarded

Ventifoil/Suction Wing 2x10m installation (ex.16m) – Van Dam Shipping, Boomsma Shipping, 500GT Fishing Vessel + Schram Shipping Q4,2021

Kite systems –fully automated + dynamic - LDA/Airbus Roro 2021, K-line contract <50 installations 2022 onwards

Neoline – Build contract with Neopolia – 2 x 136m RoRo primary wind vessels <80% fuel savings - launch 2024.

Silenseas Range 210m, 23,000GT, 410 pax./crew, 17kn wind +Solid Sail – 38m test rig'21, 95m '22

Rotorsail Installations & Projects – New build VLOC bulker – 325,000dwt – 5 x 25m rotorsails + Rord Braren vessel 1 x 18m + Sea-Cargo 2 x tiltable rotors Q1 2021. Oldendorff Carriers JDP - 207,000 dwt Newcastlemax - 2022 Wartsila Service/Support

Car Carrier design: Oceanbird: new build x wing sails <10 knots wind only. Orcelle Wind/ WWL Launch 2025.

Inflatable Wingsail – System unveiled by Michelin <20% savings

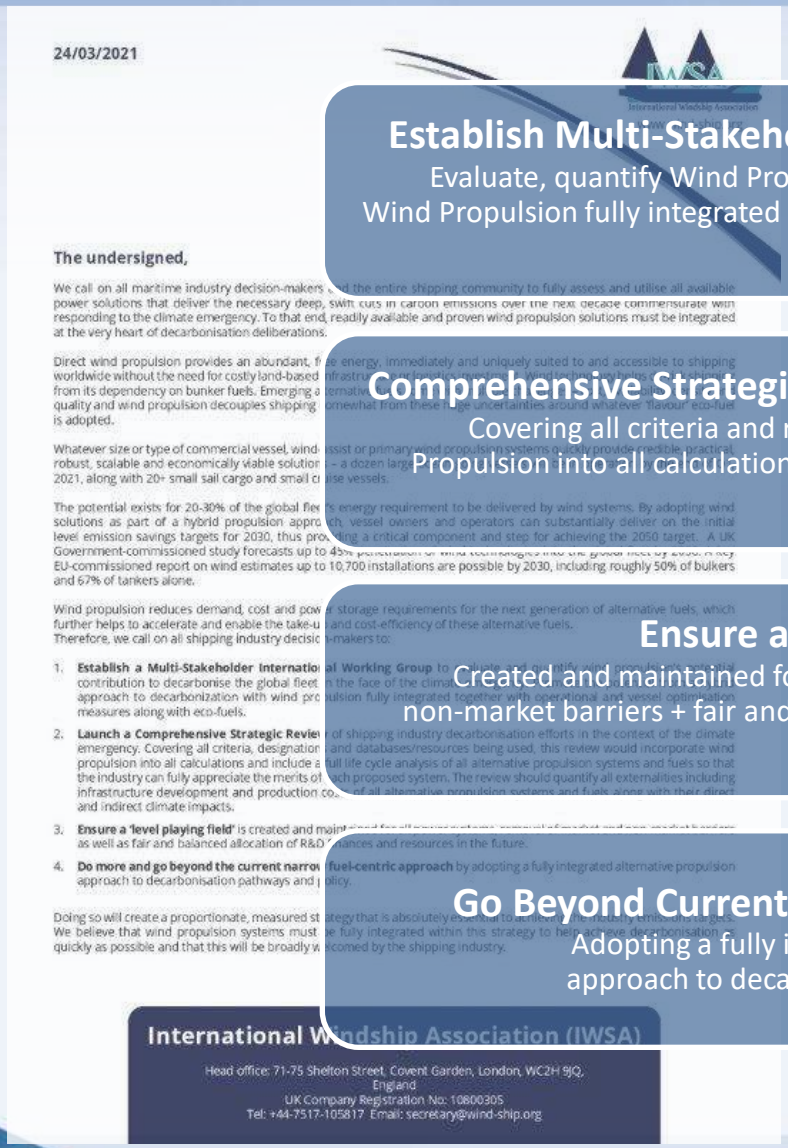
VLCC 300,000dwt: 2 x retractable wing sail sea trials completed – new build order 4 sails, 2022

Wing Sail system – retrofit + operation system = 30% fuel saving – detailed design stage – installation on 1st tanker 2022 – EU CHEK H2020 project launched Q2 2021

Drivers, Barriers & Solutions

	Drivers	Barriers	Solutions
Policy	IMO & EU GHG strategy Speed/Power restrictions Paris + IPCC 1.5C report	Efficiency vs Resilience EEDI/EEXI, Charter terms Inclusion in Reports etc.	Market analysis WiSP – EEDI/EEXI, 3rd party IWSA - engagement
Price	Upward pressure – New Fuels VLSFO/ULSFO premium Carbon Price increase	Split incentive Historic lows + untaxed Commodity vs Saving	Ringfenced Carbon levy Lease/Rental/Modular Pay-as-you-save models
Providers	Increasing number Toolbox – Horses4Courses Hybrid approach + Class Guidelines	Access R&D finance Long lead times: SMEs Scaling & Strategy	Demonstrators – EU WASP Wind Hubs/Clusters 3rd Party platforms & Class
People	New Boardroom Pressure = B2B + C2B Collaborative approach	Not uniform Risk management Education/training resources	Multi-stakeholder projects Education program Access to experts/network
Perception	Growing Experience - Clear Change Credible, Viable, Profitable Positive Eco-Statement	Old/Unreliable - persists Fuel-centric, Silo approach Policy/Pathway exclusion	Demonstrate tech widely Transparency & Visibility Growing

Open Letter to Industry Decision Makers



24/03/2021

The undersigned,

We call on all maritime industry decision-makers … the entire shipping community to fully assess and utilise all available power solutions that deliver the necessary deep, swift cuts in cargoes emissions over the next decade commensurate with responding to the climate emergency. To that end, readily available and proven wind propulsion solutions must be integrated at the very heart of decarbonisation deliberations.

Direct wind propulsion provides an abundant, … e energy, immediately and uniquely suited to and accessible to shipping worldwide without the need for costly land-based … from its dependency on bunker fuels. Emerging … quality and wind propulsion decouples shipping … is adopted.

Whatever size or type of commercial vessel, wind- … assist or primary wind propulsion systems can … robust, scalable and economically viable solution … – a dozen large … 2021, along with 20+ small sail cargo and small … se vessels.

The potential exists for 20-30% of the global fle… energy requirement to be delivered by wind systems. By adopting wind solutions as part of a hybrid propulsion appro… ch, vessel owners and operators can substantially deliver on the initial level emission savings targets for 2030, thus pro… ding a critical component and step for achieving the 2050 target. A UK Government-commissioned study forecasts up to 45% … EU-commissioned report on wind estimates up to 10,700 installations are possible by 2030, including roughly 50% of bulkers and 67% of tankers alone.

Wind propulsion reduces demand, cost and pow… storage requirements for the next generation of alternative fuels, which further helps to accelerate and enable the take-u… and cost-efficiency of these alternative fuels. Therefore, we call on all shipping industry decisi… -makers to:

1. **Establish a Multi-Stakeholder Internatio… al Working Group** to … contribution to decarbonise the global fleet … the face of the clima… approach to decarbonization with wind pro… ulsion fully integrated together with operational and vessel optimisation measures along with eco-fuels.
2. **Launch a Comprehensive Strategic Revie…** of shipping industry decarbonisation efforts in the context of the climate emergency. Covering all criteria, designation … and databases/resources being used, this review would incorporate wind propulsion into all calculations and include a … ull life cycle analysis of all alternative propulsion systems and fuels so that the industry can fully appreciate the merits of … ch proposed system. The review should quantify all externalities including infrastructure development and production co… of all alternative propulsion systems and fuels, along with their direct and indirect climate impacts.
3. **Ensure a 'level playing field'** is created and maint… for all power systems, removal of market and non-market barriers as well as fair and balanced allocation of R&D … nances and resources in the future.
4. **Do more and go beyond the current narro… fuel-centric approach** by adopting a fully integrated alternative propulsion approach to decarbonisation pathways and … olicy.

Doing so will create a proportionate, measured st… tegy that is absolutely essential to achieve the industry emissions targets. We believe that wind propulsion systems must … e fully integrated within this strategy to help … decarbonisation … quickly as possible and that this will be broadly w… comed by the shipping industry.

International W…ndship Association (IWSA)

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Establish Multi-Stakeholder International Working Group

Evaluate, quantify Wind Propulsion + potential from a hybrid approach.
Wind Propulsion fully integrated with operational/vessel optimisation + eco-fuels.

Comprehensive Strategic Review of Decarbonisation Efforts

Covering all criteria and resources being used + incorporate Wind Propulsion into all calculations + Full LCA of all propulsion systems & fuels.

Ensure a 'Level Playing Field'

Created and maintained for all power systems, removal of market & non-market barriers + fair and balanced allocation of future R&D resources.

Go Beyond Current Narrow Fuel-centric Approach

Adopting a fully integrated alternative propulsion approach to decarbonisation pathways and policy.

Chinese // Dutch // English // French // German // Italian // Japanese // Korean // Spanish

Projects and Collaborations

WASP: EU Interreg North Sea Project

- Five Wind-Assist Installations - monitor & verify
- Develop business models
- Policy recommendations to help facilitate WP uptake.

WiSP: Joint industry Project

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

Wind Propulsion Accelerator (under development)

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

IWSA Collaborations

Win-Win-Wind Propulsion….