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)

Uptake & Market for Wind Propulsion: A Hybrid Solution
IMO Symposium 09 Feb 2021
“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.

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

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

**Ship Types**

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tankers</td>
<td>1 x VLCC, 1 x LR2 Product Tanker</td>
</tr>
<tr>
<td>Bulkers</td>
<td>1 x Ultramax, 1 x Kamsarmax (wind ready)</td>
</tr>
<tr>
<td>RoRo</td>
<td>x 2</td>
</tr>
<tr>
<td>Ferry/Cruise</td>
<td>x 2</td>
</tr>
<tr>
<td>General Cargo</td>
<td>x 4 (2 x pending) Various sizes: 2,000–12,000dwt</td>
</tr>
</tbody>
</table>

**NOTE:** More WPT vessels in operation than all new alternative fuelled ships combined (excluding tankers & LNG)
Small Vessel & Traditional Sail Developments

Operations: Cargo

Ship Designs

Operations: Fisheries

Technology & Networks

Builds & Retrofits

Operations: Cruise
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.

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**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

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

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

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

**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

**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 – CHEK H2020 project

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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
Win-Win-Wind Propulsion....

www.wind-ship.org

Gavin Allwright
secretary@wind-ship.org