

SNAME Maritime Convention 2022  
27 September 2022

## Powering Ships by Wind

James Rhodes

- Executive Committee Member, ISWA
- CEO, Magnuss Corp.





# Decade of Wind Propulsion 2021-2030

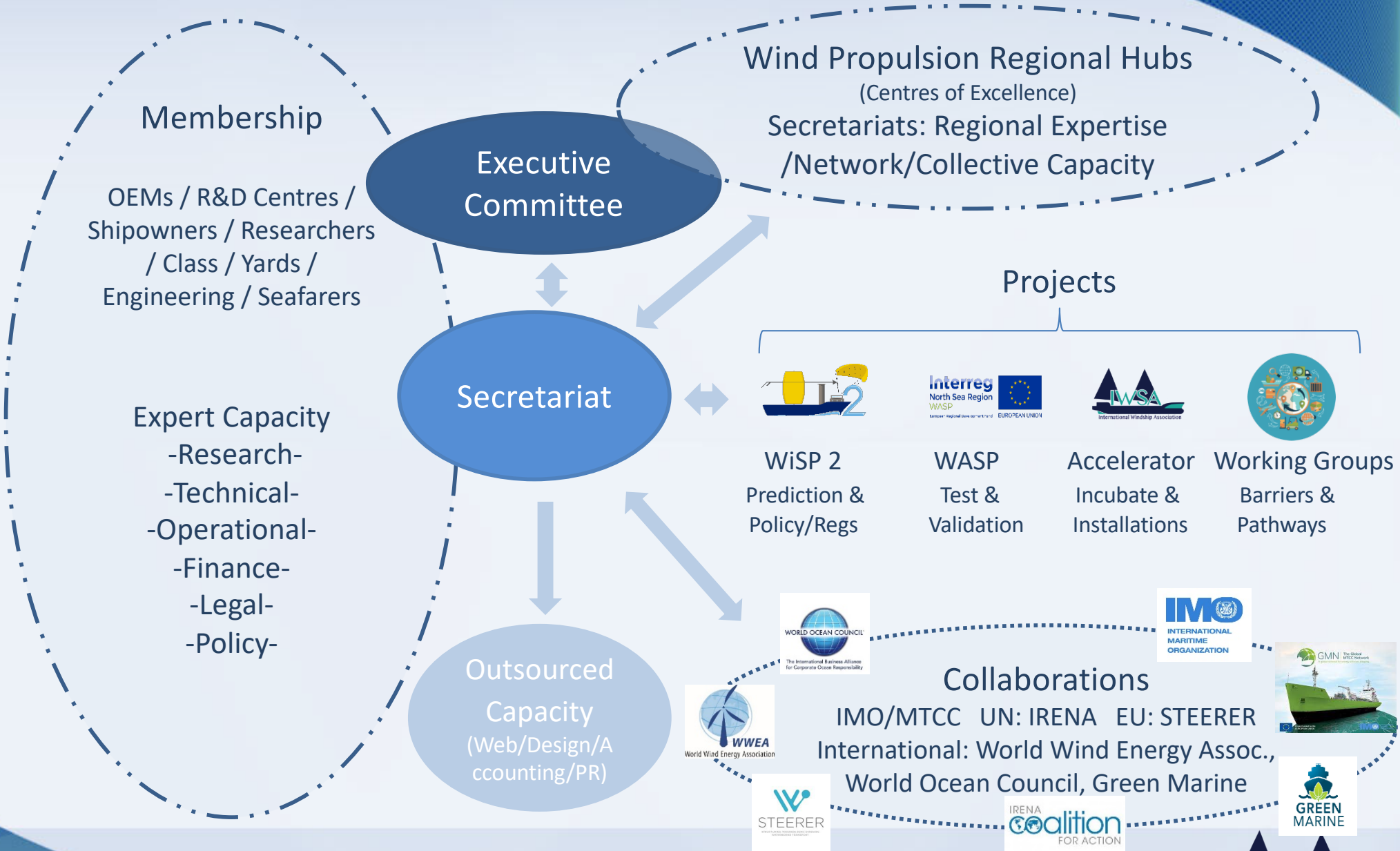
Delivery | Optimisation | Facilitation

[www.decadeofwindpropulsion.org](http://www.decadeofwindpropulsion.org)










# IWSA Structure & Activities



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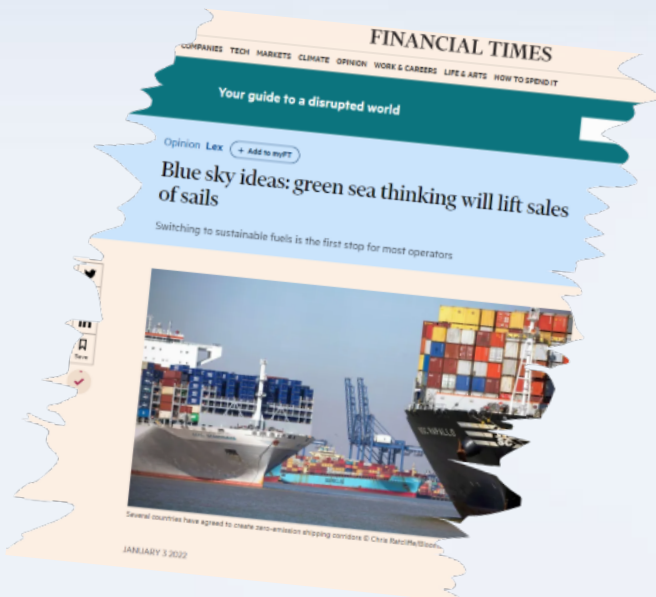


# General Drivers, Barriers & Solutions

	Drivers	Barriers	Solutions
<b>Policy</b> 	IMO GHG strategy – EEDI/EEXI/CII Speed/Power restrictions Fit 55/National Maritime Pathways Paris + IPCC 1.5C report	Efficiency vs Resilience COLREGS, Charter terms Inclusion in Decarbonisation Reports, Silo'ed approach etc.	Market analysis & reports – WASP & IWSA WiSP – EEDI/EEXI circ .896, 3 <sup>rd</sup> party IWSA – engagement
<b>Price</b> 	Upward pressure - LNG Uncertainties – price/avail. Carbon Price increase/EU ETS High price/avail. - low carbon fuels	Split incentive Difficulty in adopting global CO2 pricing + LCA Commodity vs Saving	Ringfenced Carbon levy Lease/Rental/Module Pay-as-you-save models
<b>Providers</b> 	Increasing number/Robust pipeline Toolbox – Horses4Courses Hybrid approach + Class	R&D finance Long lead times/compliance: SMEs Scaling & Scattershot Strategy	Demonstrators – WASP Wind Hubs/Clusters Accelerator program 3 <sup>rd</sup> Party platforms & Class
<b>People</b> 	New Boardroom Pressure = B2B + C2B Collaborative approach	Not uniform Risk management Lack of Edu/training resources	Multi-stakeholder projects Education program Access to experts/network
<b>Perception</b> 	Clear Change Credible, Viable, Profitable Positive Environmental Statement	Old/Unreliable - persists Not-fuel based + visibility Report/Policy exclusion	Demonstrate tech widely Transparency – news, savings, reports etc.



# Wind Propulsion Momentum...



# LR Survey of Shipping Operators

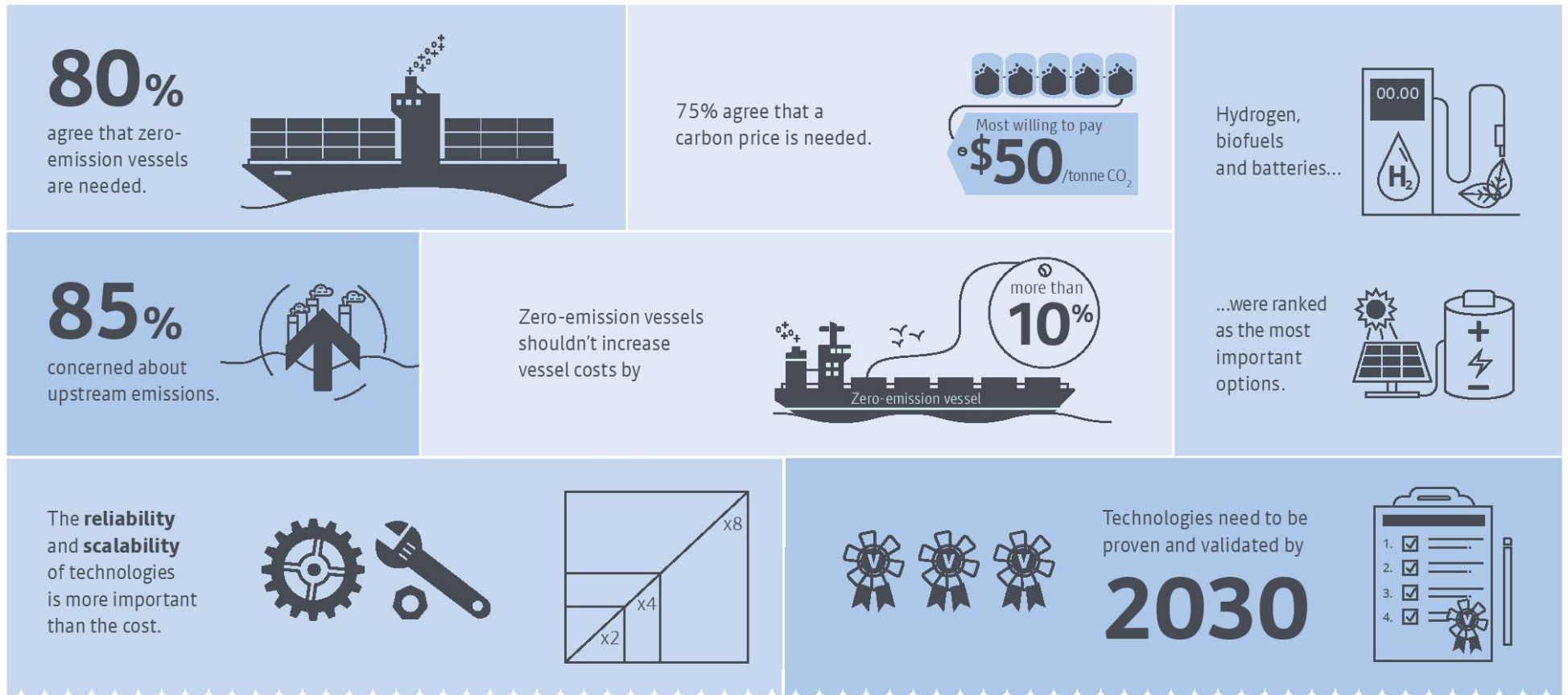
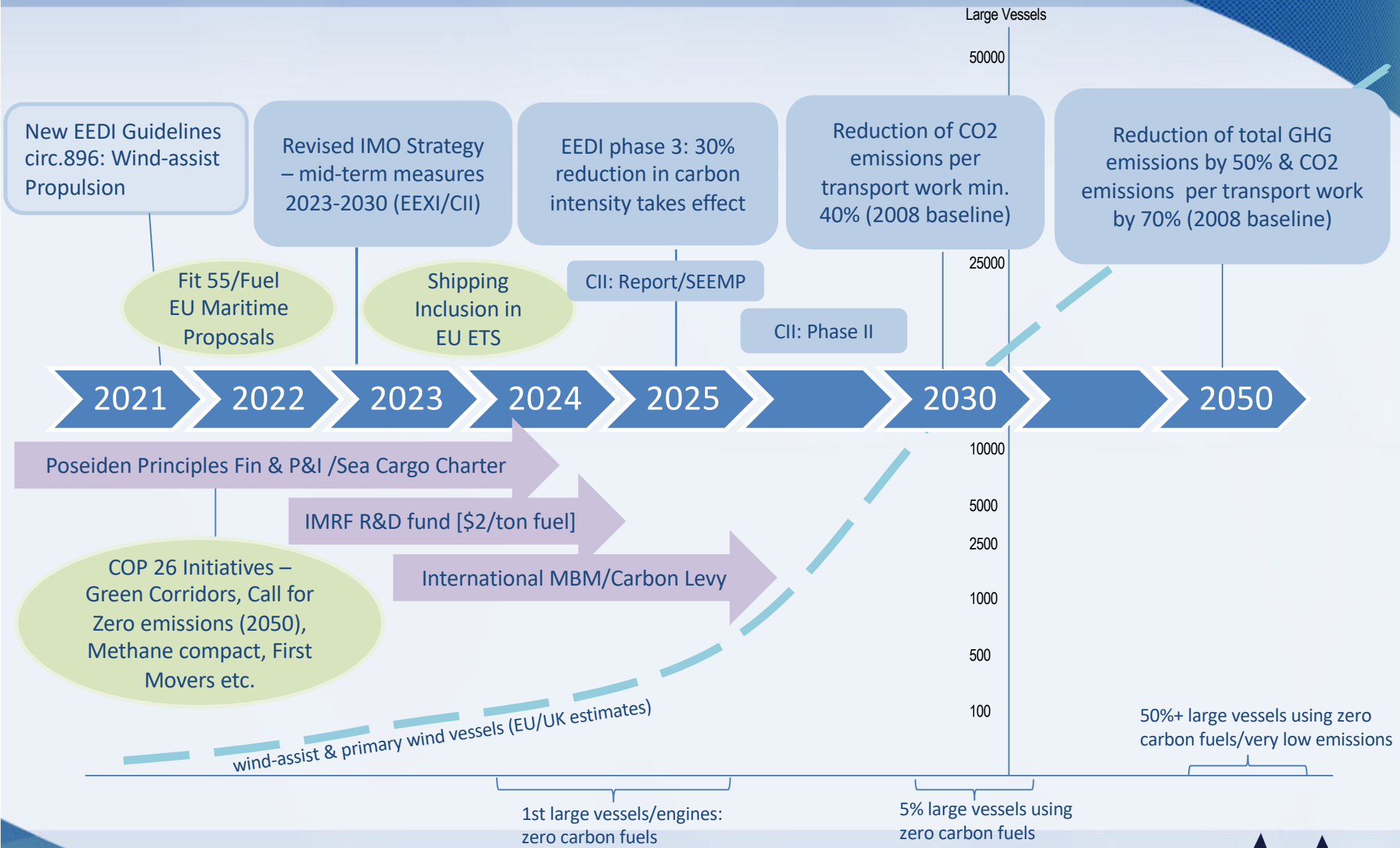


Figure 3 Shipping stakeholder survey responses<sup>2</sup>

<sup>2</sup>Research conducted jointly by LR Group Ltd and UMAS.

Source: Zero-Emission Vessels 2030. How do we get there? <https://www.lr.org/en/insights/global-marine-trends-2030/zero-emission-vessels-2030/>

# Policy Pipeline & Wind Propulsion





# Technology Toolbox



# Technology Toolbox

- 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





# Sail types – soft/wing/kites



soft sails



suction wing

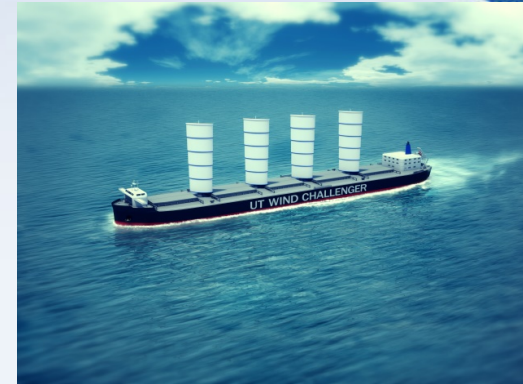


towing kites





# Sail types - rigid sails



**CHANTIERS  
DE L'ATLANTIQUE**

 招商局能源运输股份有限公司  
CHINA MERCHANTS ENERGY SHIPPING CO.,LTD



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# Sail Types - Rotor Development



Flettner Rotor: the original, sea trial on Bachau 1925.



E Ship 1: Enercon launches RoLo, validates savings from rotors



Norsepower: Bore's RoRo MV Estraden

Maersk: LR2 Pelican (ETI R&D fund demo)

Norsepower: ferry MV Viking Grace

## Planned Project



Magnuss partnering w industry on largest ever, full-scale, retractable wind propulsion build-out and deployment

## Joint industry reports



SSI: published case study on Magnuss

First classed rotor: Magnuss VOSS



CWR/UCL issues two ground-breaking reports touting savings potential of rotors (2011, 2014)



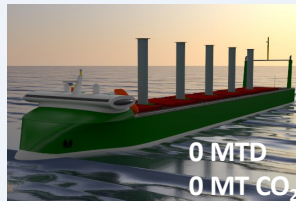
'Delta Challenger' Deltamarin



Eco Flettner: Wind Hybrid Coaster



Magnuss: Zero Emissions bulker



Anemol: rotors on rails for MV Afros



Eco Flettner: MV Fehn Pollux



Announced: Scandlines MV Copenhagen

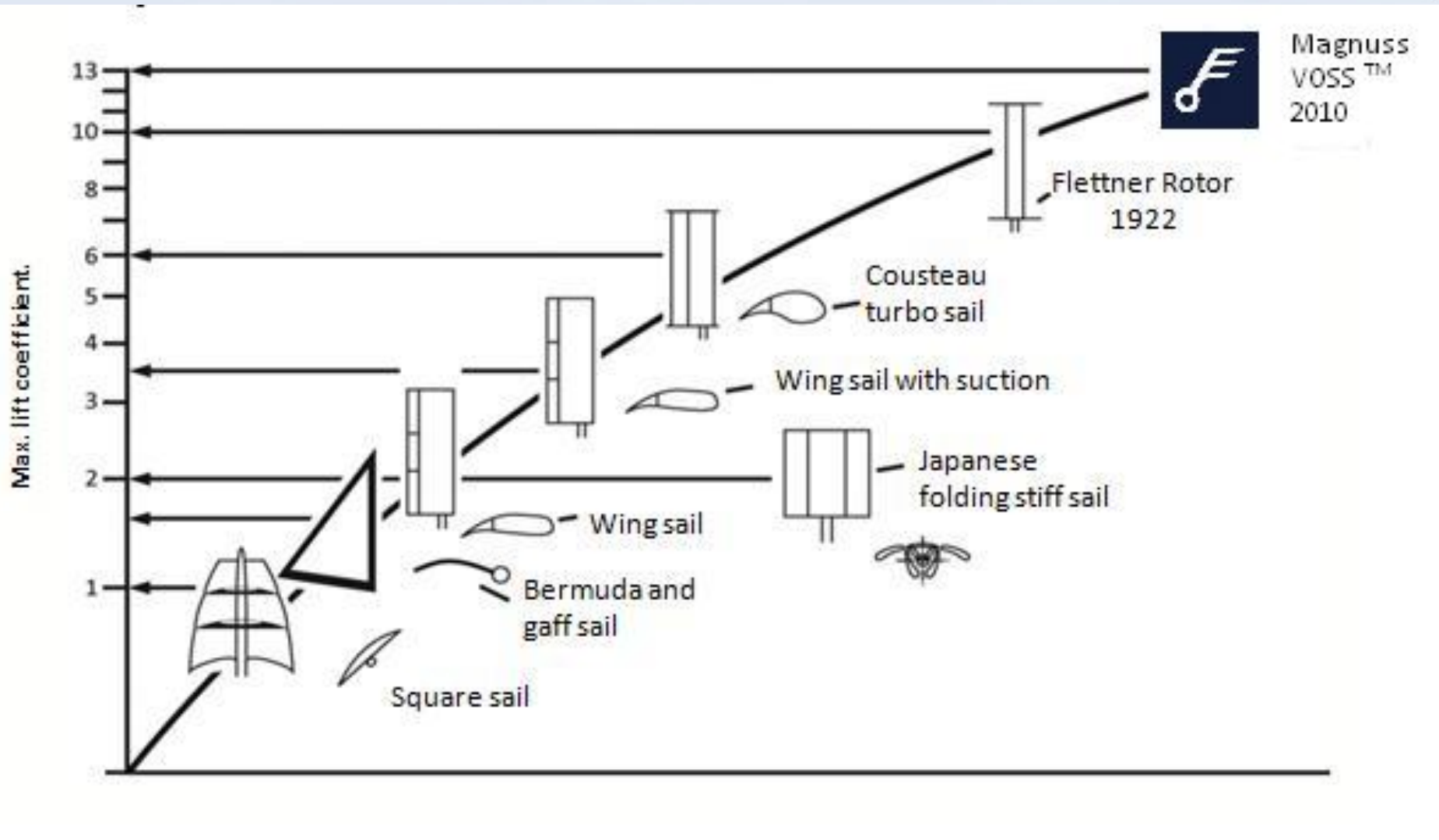


## Ship designs

## Demonstrations

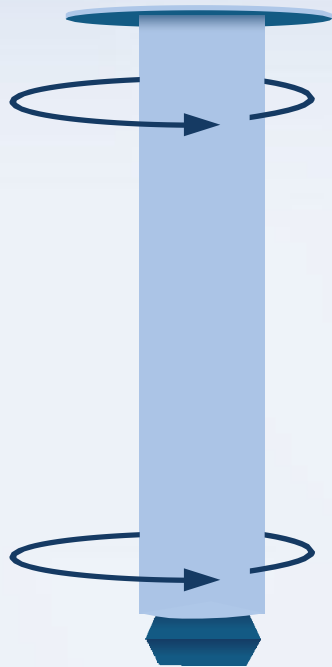


# Wind technology landscape





# Flettner Rotor sails



## Considerations

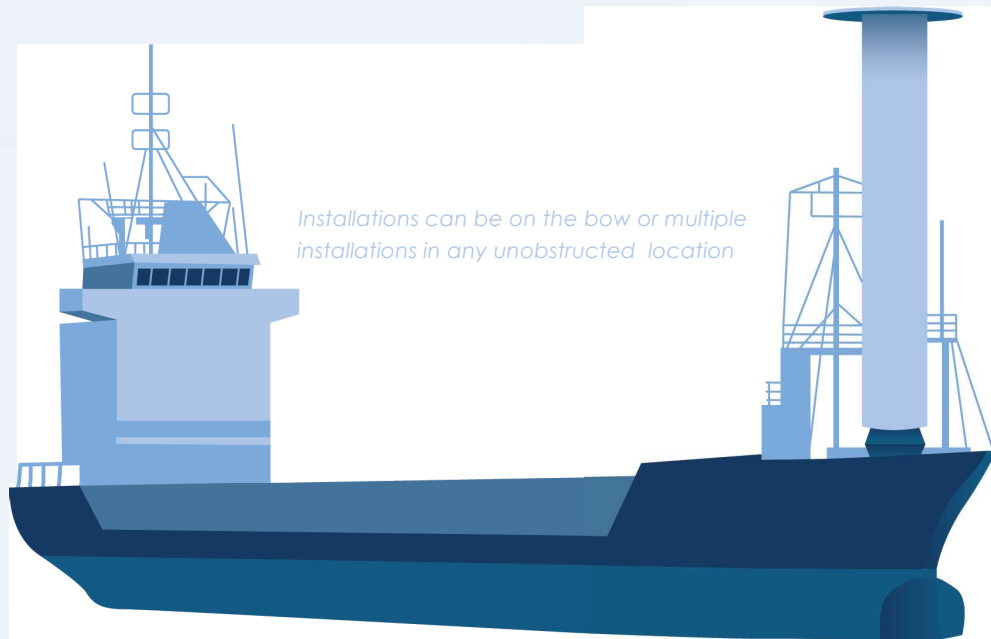
- Deck space
- Retractability
- Navigation/Line of Sight
- Beam/Head Wind Performance
- Vibration/Motor

## Installed Sizes (to date)

1m x 18m – 5m x 35m

## Rotor sail

Flettner Rotor or Rotor Sails are rotating composite cylinders with a top disc and possibly a bottom disc that are rotated at up to 300 rpm (dependent on size/application) by low power motors and as the wind catches the rig, they use the Magnus effect (difference in air pressure on different sides of a spinning object) to generate thrust. Systems already designed include ones deployed on rail systems, hinged and telescopic versions. The original concept was developed in the 1920's with a small number of installations, however the modern, upgraded version of these sails were first installed on modern vessels in 2010's.



*Installations can be on the bow or multiple installations in any unobstructed location*



# MAGNUSS

WIND POWER FOR THE WORLD'S SHIPPING FLEET



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# Retractability is a game-changer



The Key Innovation Is  
*Retractability*, Which Is  
The Means To Stow The  
Sail Below Deck & Free  
Up Port Operations.





# Retractability – robust, powerful



# Taking on the Iron Triangle

## Technology Available Now

Robust R&D pipeline & designs for primary wind vessels

## Ease of Retrofit Installations

Standard dry dock/port calls + modular developments

## Predictability/Future Proofing

Secure % of fuel price & availability  
EEXI/emissions legislation,  
stranded assets, MBMs/CO2 tax



## OPEX Approach

Pay-As-You Save / Wind as a Service / Lease & Modular Rentals reduce CAPEX

## CAPEX Approach

ROI's - \$600/ton+

## CARBON Approach

No external costs / upstream emissions  
& very low carbon/eco- footprint

**Certified** Classification Societies: Wind-Assist Guidelines.

**Compliant** COLREGs, Ports, Environment/Carbon.

**Modern** Automated, Materials, EMS Integrated, Weather Optimised

**Validated** 3rd Party Validation Platforms Development



# Large Vessel Installations Today...

**21 Ocean Going Vessels with Wind-Assist Systems installed by Q2 2022**  
 & 1 Wind-ready + more than 20 small sail cargo, fisheries & cruise vessels in operation

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

## Ship Types

**Tankers x 2**  
 (1 x pending newbuild + 2 order)  
 1 x VLCC, 1 x LR2 Tanker

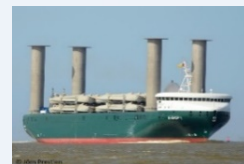
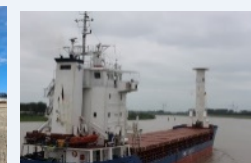
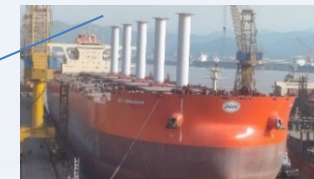
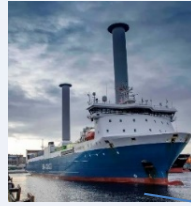
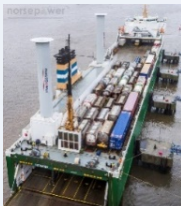
**Bulkers x 3 (+1)**  
 (5 x pending + 5 order)  
 1 x VLOC, 1 x Ultramax  
 1 x Kamsarmax (wind ready)

**RoRo x 4**  
 (2 x pending + 1 new build)

**Ferry/Cruise x 3**

**General Cargo x 8**  
 (3 x pending)  
 Various sizes: 2–12,000dwt

**Large Fishing Vessel x 1**





# Major industry participants....

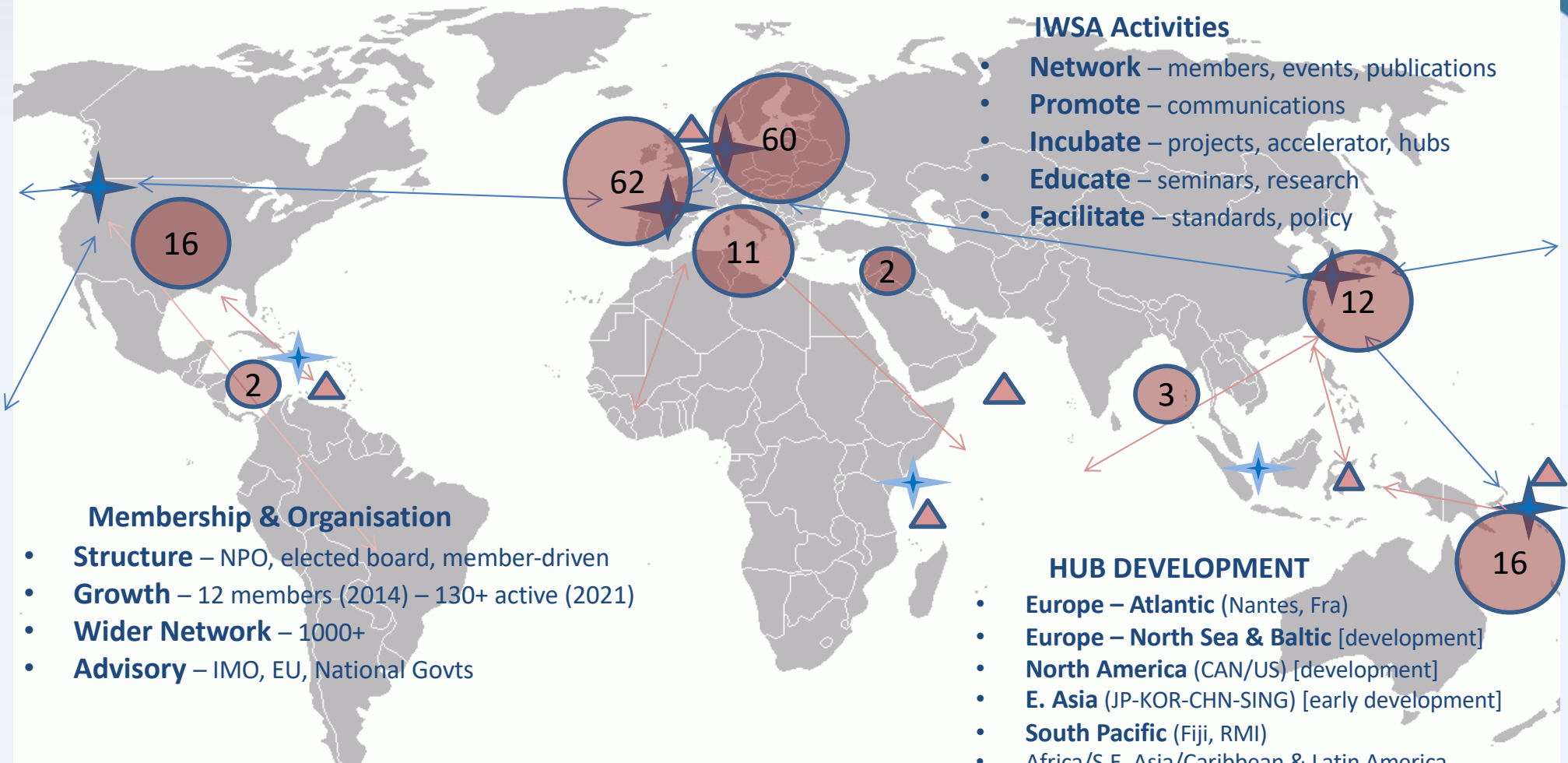


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# International Windship Association Network

A unique, fast growing tech segment: significant decarbonisation & operational cost reduction potential



Wind Propulsion Hubs    
 IWSA Members    
 Traditional Sail Cargo Networks  
 Additional WP Hubs (proposed)

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**International Windship  
Association**  
[www.wind-ship.org](http://www.wind-ship.org)



**Magnuss Corp.**  
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