



PROPELWIND

Wind propulsion for cargo ships

Wind, the only fast way
to zero-emission shipping

Innovsail - May 31, 2023



Ref.: PLA 05 168 r04



PROPELWIND s.a.s.

- **2008: Pioneered** the idea of using the proven technology from ocean sail racing for cargo ships **main** propulsion
- Founder's vast experience in **shipbuilding & offshore** newbuilding projects



- Co-founder of **IWSA** (International Windship Association)





Founder's track record of successful, disruptive maritime innovations:

- 1989: Very first offshore **nursery fishfarm** near Monaco
- 2006: LNG Ship-to-Ship (**STS**) transfer system, today's industry standard on all floating regasification plants



Next target : develop zero-emission vessel concepts



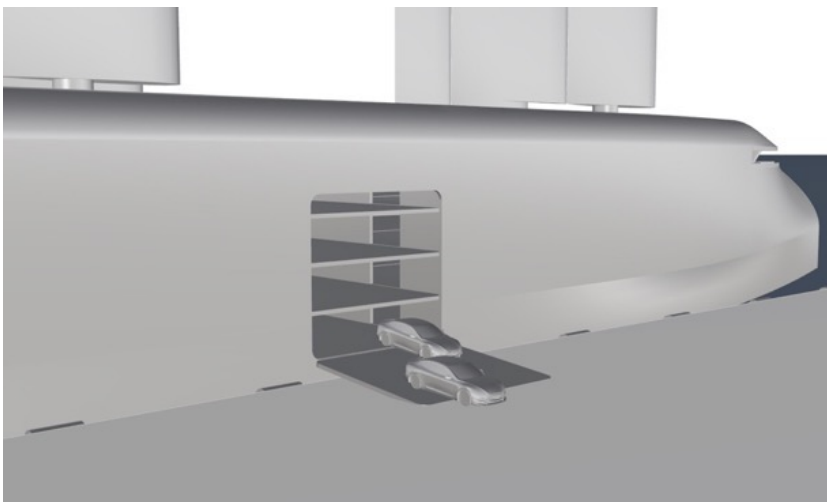
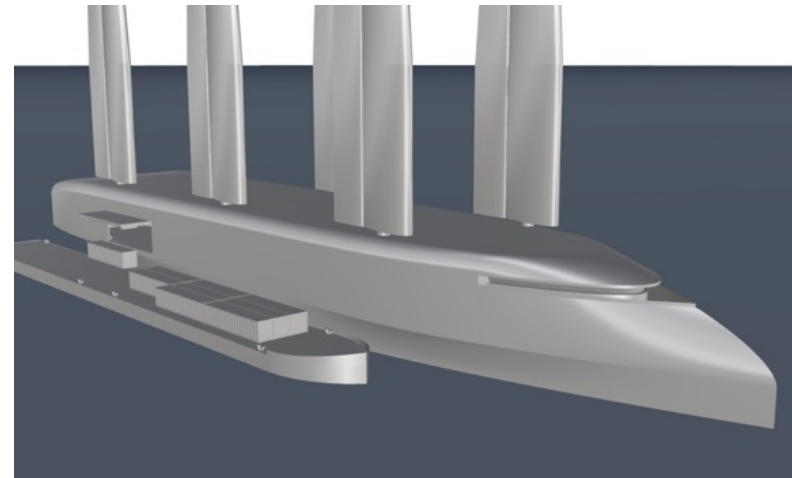
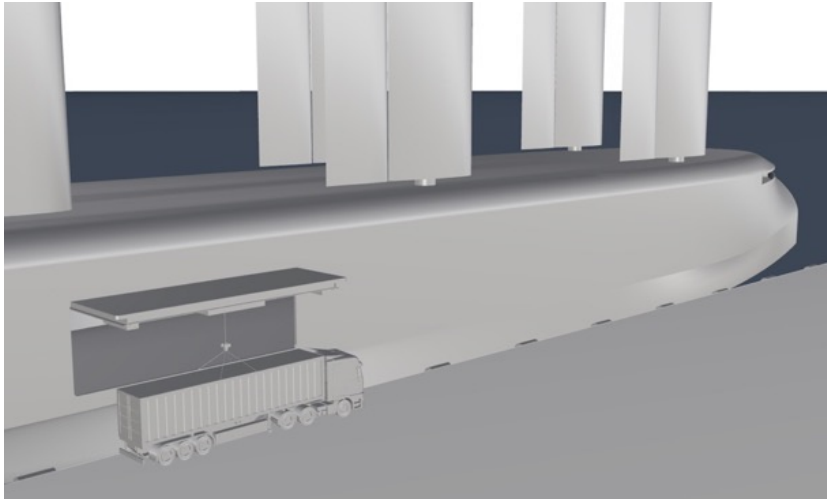
PROPELWIND Initial Handysize Monohull



Main particulars	value
LOA	140.0m
Beam	26.0m
Draft	5.0m
Deadweight / heavy containers 12 t	3,000 dwt / 250 TEU
Cargo hold volume / light containers, project cargo, cars, ..	24,000 m ³ / 420 TEU
EV capacity / nr of compartments	600 EV's / 12 compartments
Wind main propulsion devices	2 rows of 3 rigid articulated wingsails
Mechanical Propulsion (assistance)	10 kts, 2 azipods, H ₂ from methanol reformer
Harbor friendly	High manoeuvrability - Short Quay Self loading - unloading (<i>patented</i>)



Innovative Cargo Handling



Container vessel (*patented*):

- Reduce exposure to terminal congestion
- Bring the cargo closer to final destination
- Direct intermodal operation

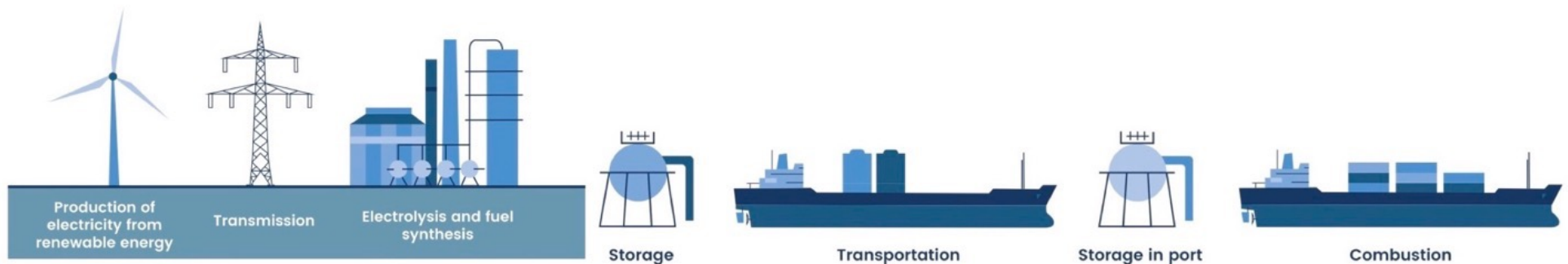
Car Carrier (*concept*):

- Passive and active protection against EV fire

Shipping Decarbonization : Green Fuel



- **Industry is obsessed by the new « Green » Fuels:**
 - Zero-emission: hydrogen (*explodes*), ammonia (*toxic*)
 - CO₂ – recyclers, « *nett zero* »: biofuels, methanol
 - Transition: LNG
 - No clear winner, so shipowners are waiting to invest
- Trillions of US\$ and a decade (at least) needed for any new fuel global infrastructure
- Only 15% of input wind energy available for propeller output => **85% Green Energy is wasted** in the complete process !



Source: Wind Ship Association White Paper – Oct. 2022



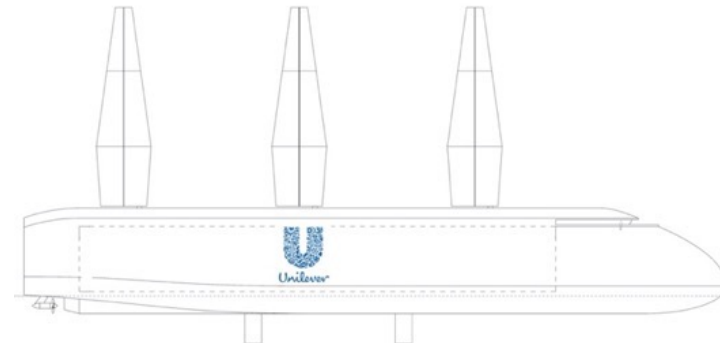
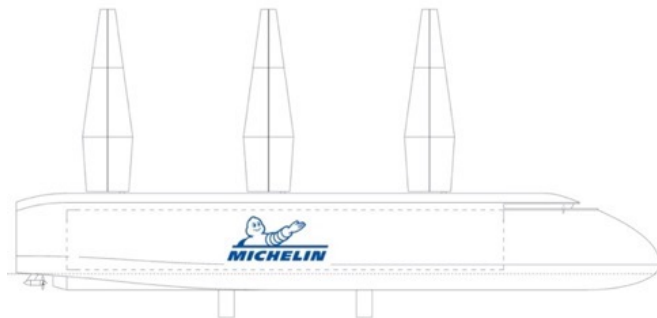
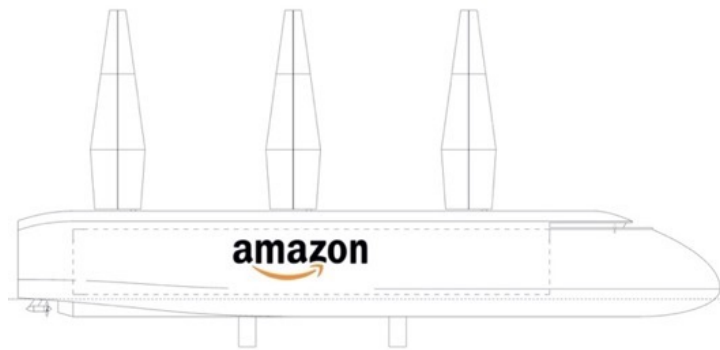
Wind Perception by Shipping

Objections from **shipowers**:

- *We work on green fuels*
- *High CAPEX – Unproven technology - Uncertain payback*
- *ETS / Carbon Price too low*
- *Technology abandoned 100 years ago*
- *Wind is for dreamers*
- *Wind is not available everywhere*
- *Just – On – Time needed*
- *Not for large vessels*

Only 20% consider wind seriously .. for **assistance** to propulsion

October '21: before COP 26, major brands urge the shipping industry to fully decarbonize by 2040 by using only green fuels.



Shipping Decarbonization for **Branding**



November 21: during COP26: 19 countries - including shipping powerhouses such as the US, Japan, Germany, Norway, the Netherlands, the UK and Australia – joined the first ever framework to create zero-emission ocean shipping **green corridors**; this is the Clydebank Declaration





Wind Use in Shipping

Category	Emission reduction	Cargo types	Vessel size
Wind for Assistance to Propulsion	Up to : - 15% (retrofit) - 30% (new)	Bulk: iron ore, coal, grain Oil: crude, refined product Ro-Ro, Passengers	Up to 400,000 t
Wind for Primary Propulsion	Up to 60% (average)	Containers Ro-Ro	Length 100 .. 140m
Wind for Main Propulsion	Above 85%	- Niche products - Light cargos: <ul style="list-style-type: none">• Containers• Cars• Ro-Ro	Length 30 to 80m PROPELWIND: <ul style="list-style-type: none">• 2026: 250 TEU• 2030: 600 TEU• 2040: 2,000 TEU



Wind for zero emission

Only Wind for Main Propulsion makes zero-emission shipping feasible because only a small quantity of green fuel is needed for back-up mechanical propulsion:

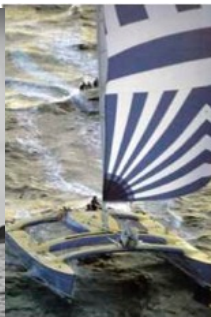
- No scarcity issue
- No infrastructure issue: supply chain with trucks or ISO-tainers

Wind (a lot) + Green Fuel (just a little) = Zero Emission Shipping



Ocean Sail Racing = a Mature Technology

	1960 – 70	1980 – 90	2000	2010	2021
Area of activity	South Brittany	Charente Maritime	South Brittany	South Brittany	South Brittany
Technology	Monohull, trimaran	Catamaran	Trimaran	Rigid Articulated Wingsail	Sail above the Waves
Methods	Art & intuition	Numeric	Hydro / aero CFD	Hydro / Aero / Structure CFD	Enhanced CFD
Reference speed	10 kts	20 kts	30 kts	40 kts	50 kts





*Think Big,
Start Small,
Scale Fast.*

Jim Carroll, futurist



Questions?

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