

ZESTAs.

International Trade Association
Founded March 2019

Membership

Full members:

- Project or technology that is Zero GHG Emissions at a ship level with minimal upstream impacts.
- One vote per organization.
- Access to BoD.

Associate members:

- Committed to achieving zero GHG's through collaboration with ZESTAs membership.
- Membership organizations / trade associations that comply with ZESTAs objectives.
- No voting rights or access to board.



Nedstack
PEM FUEL CELLS

To be sure.



POWERCELL

ECONOWIND



HYON

FutureProof Shipping



Airseas

evolve™



HYSEAS Energy



ZESTAs.

Who we are

Members are made up of companies committed to achieving zero emissions in commercial shipping.

We operate in 17 countries spread across 3 continents:

- China
- France
- Norway
- Canada
- Sweden
- Costa Rica
- Singapore
- India
- Switzerland
- India
- Denmark
- UK
- USA
- Finland
- Holland
- Switzerland
- Mexico

Categories - All technology and services needed to make zero-emissions shipping possible:

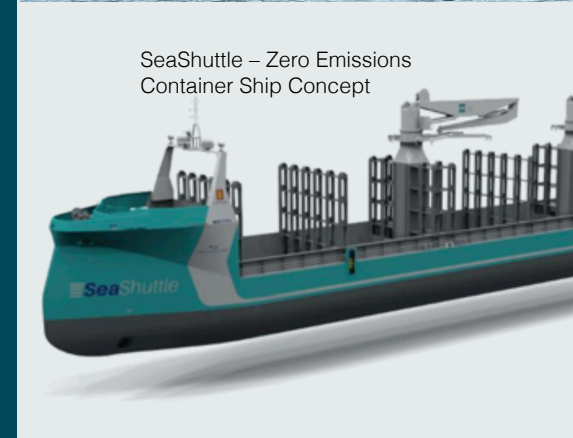
- Hydrogen Fuel Cells
- Marine Batteries
- Wind Propulsion
- ZE Ship Design
- ZE Ship Owners
- Hydrogen Safety
- ZE Ship Finance
- Hydrogen System Integration
- ZE Hydrogen Producers
- RE Electrical Charging
- Energy Storage



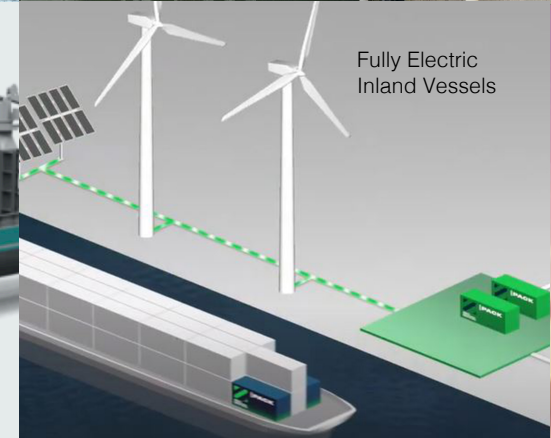
Fully Electric Aurora Ferry



The Maas - Inland container vessel, to be retrofitted to run on hydrogen in 2021



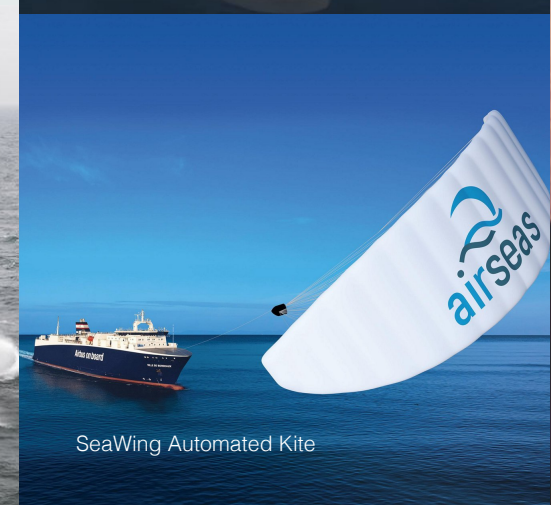
SeaShuttle - Zero Emissions Container Ship Concept



Fully Electric Inland Vessels



eConowind on MV Lady Christina



SeaWing Automated Kite

Zero Emissions Ship Tech in the Market

Over 400 vessels are fitted with emission reduction and zero emission technology solutions today.

Market grows by 400% per year.

Industry is ready to change but requires IMO to lead with strong clear regulations.

ZESTAs is a practical guide to both technology and implementation.

Marine markets where ZESTAs is working:

- Offshore Vessels
- Inland Waterway Vessels
- Oil and Gas Vessels
- Arctic/Antarctic Vessels
- Short Sea Vessels
- Ports
- Oil Rigs
- Passenger Vessels



The Technologies Required for Zero Emission Vessels are Available Today

ZESTAs will work with the IMO to achieve fair global market availability

Hybrid Propulsion:

- 10 x 30m EconoWind VentiFoil
- Conoship/MARIN E-motor 2500 kW /generator
- SPBES 25 MWh batteries
- Nedstack 2500 kW Fuel Cells'
- Liquid H2 tanks 2 x 400 m3
- Large Diameter Prop
- North Atlantic 11kn @ Bft 5:



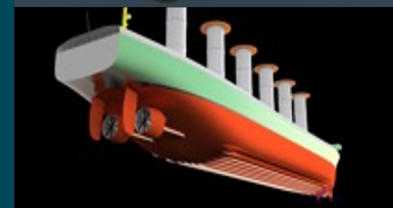
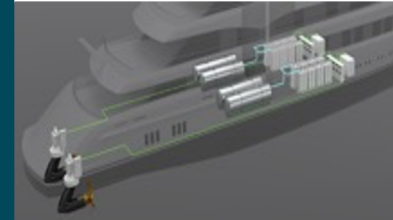
IMO Challenge : ISWG GHG 6

We asked the ZESTAs presenters to

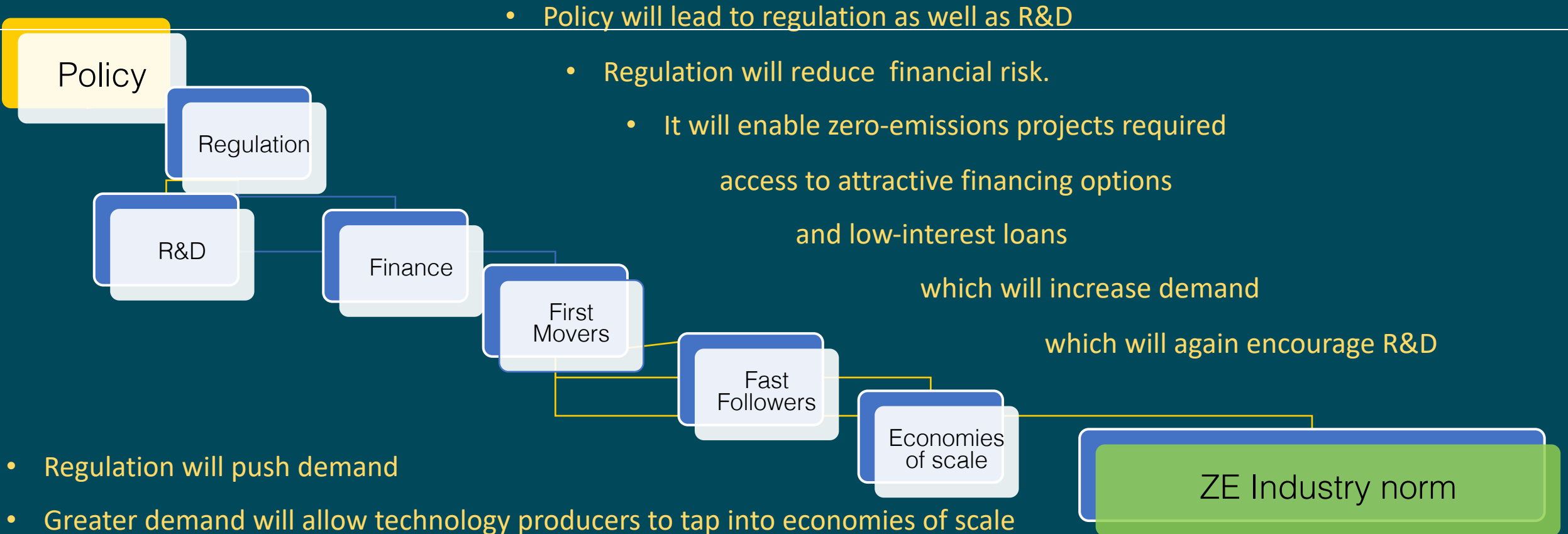
collaborate on a new Atlantic 350

Ready to Order : ZE Ship Tech

Technology	Conventional Vessel Use	Marinized	Remarks	TRL
Lithium-ion Batteries	Yes	Yes	Power Storage	9
Hydrogen Fuel Cells	No	No	Serializable > 2MW	9
Hydrogen Fuel Cells Marinized	No	Yes	500kw Serializable > 20MW	8
On-board Hydrogen Production	No	Yes	In use on submarines	8
Primary Wind Propulsion	No	Yes	In use: yachts, small cargo vessels	9
Auxiliary Wind Propulsion	Yes	Yes	Fully automated power extraction	8
Passive Foil	Yes	Yes	Standard model	9
Wave Propulsion	No	Yes	Standard model	9
Re-gen Propulsion	No	Yes	Wind to Hydrogen power	8
Roll Damping Energy Take-in	No	Yes	Common use in navigational buoys	9
Solar Power	No	Yes	Power for navigation, hotel etc.	9



Cascading impacts of Policy



- When prices have achieved economies of scale, policy makers and regulators can enforce stricter regulations making ZE the industry norm

ZESTAs a Beacon to True Zero

- The shipping industry is increasingly driven by societal and shareholder/investor objectives to decarbonize. In order to maintain a level playing field within the sector regulation and policy will have to keep pace with - and ideally lead - from the forefront.
- ZESTAs supports the development of forward thinking policy by informing on technology readiness, scalability and solutions to tackle challenges.

ZESTAs:

- Supports the IMO regulatory framework.
- Organizes events, seminars and workshops.
- Facilitates exchange of information, lessons learned, and best practices.
- Coordinates dissemination and flow of information between regulators, innovators and industry.

