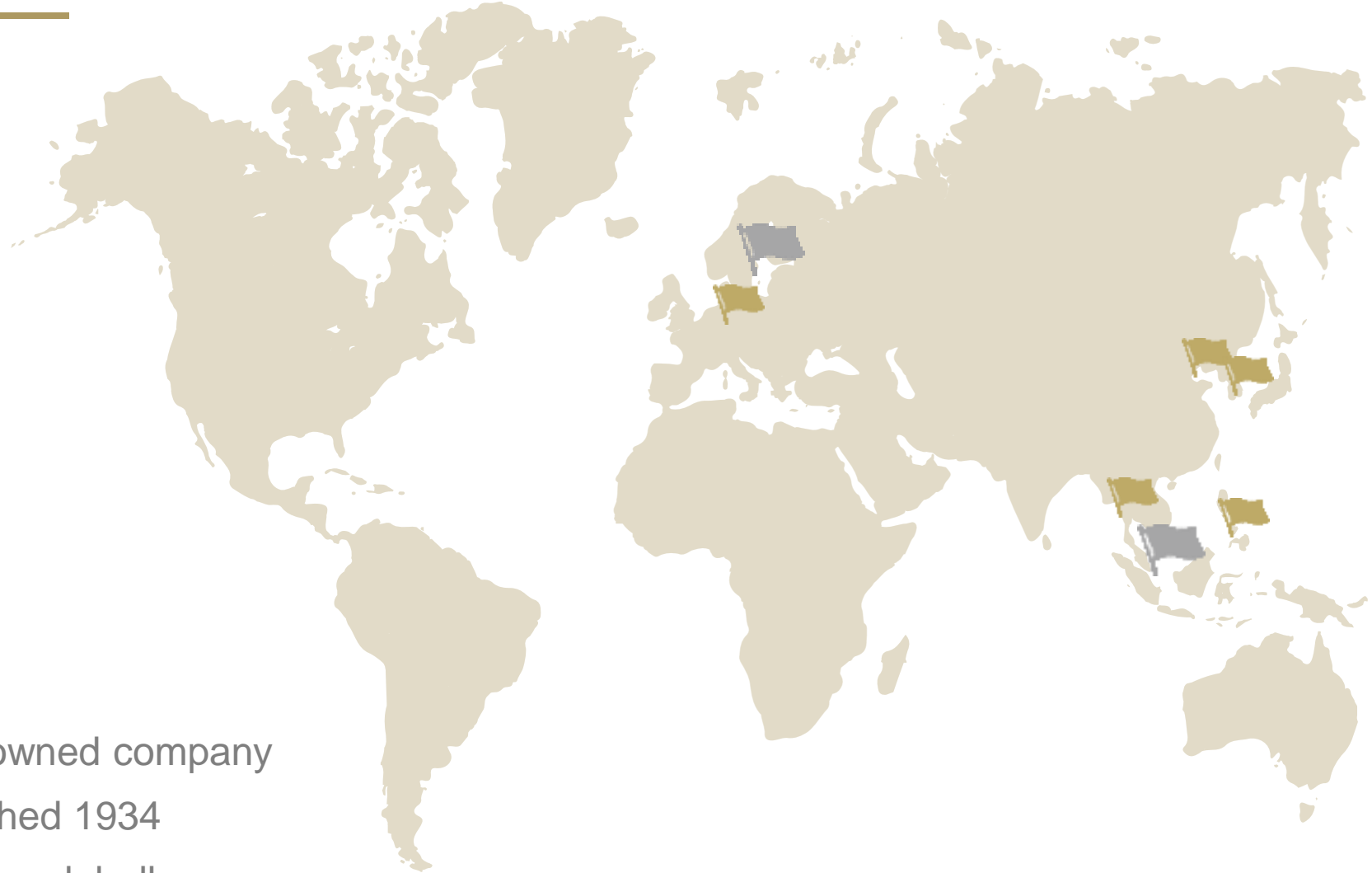


# Leading the way towards truly sustainable shipping

Carl Fagergren

Project Manager, Ship Design, Newbuilding and Innovation

MAX LOAD 320T 50K CLEAR H. 2.2<sup>m</sup> / 2.7<sup>m</sup> / 4.6<sup>m</sup> / 4.9<sup>m</sup> / 6.5<sup>m</sup>

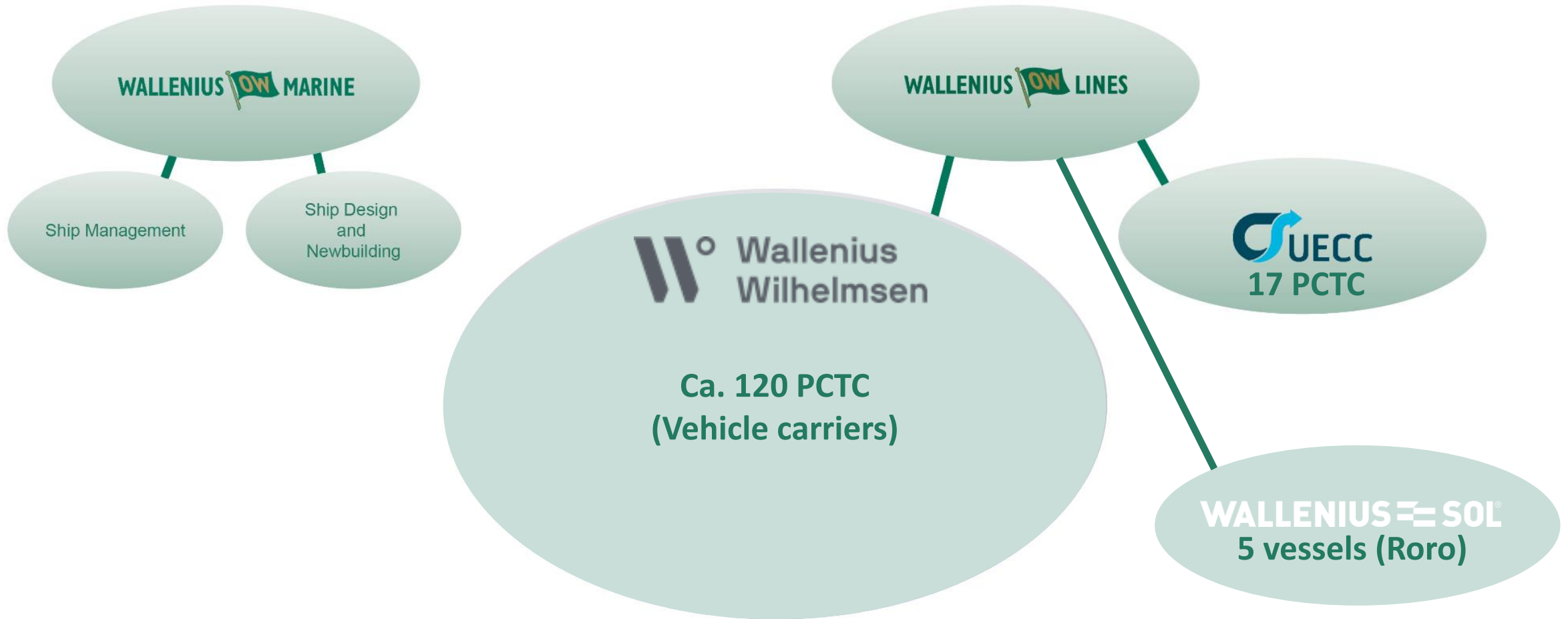


**800**  
employees

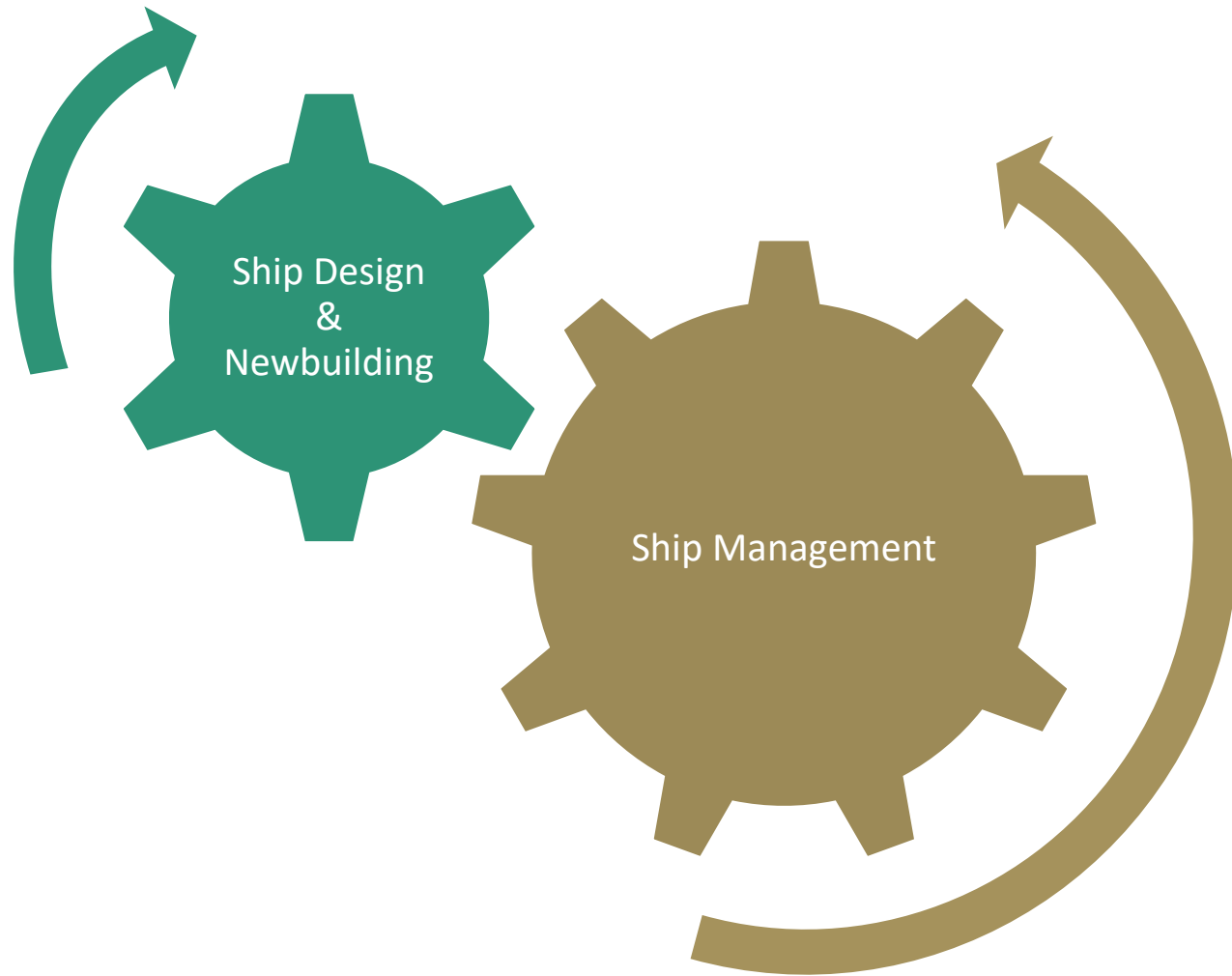
**70**  
Designed and  
built vessels  
since mid -90

**20**  
Managed  
vessels

- Family owned company
- Established 1934
- Operating globally



# What we offer



# Ship Management

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## Technical Management

- Dry-docking & Repair
- Maintenance
- Upgrades, improvements
- Consultancy

## Crewing

## Performance Management

## Purchasing

## Insurance & Legal

## IT & System Support



# Ship Design, Newbuilding and Innovation

## Ship Design

- Feasibility studies
- Concept Development

## Newbuilding Management

- Ship acquisition
- Project management
- Site supervision
- Commissioning

## Technical consultancy

- Conversions
- Energy efficiency
- Cargo handling inquiries

TRANS & FLOOR SPACE : 3,600

**OUTLINE SPECIFICATION**  
Pure Car and truck carrier for worldwide service  
**BAL TIC**  
(Baltic Ice Class)  
2012-01-20

**Concept Design**

Length over all	180 m
Breadth	30.0 m
Design draught, TD	9.0 m
Speed	18.5 knots
Fuel consumption @ 16.5 knots	equal to 33 ton HFO/day
Cargo deck area	36,500 m <sup>2</sup>
RT Capacity	4,200

WALLENIUS WILHELMSEN

**SHIPBUILDING CONTRACT**  
FOR  
THE CONSTRUCTION OF  
7,400 UNIT CLASS ROLL-ON ROLL-OFF CAR CARRIER  
BETWEEN  
HYUNDAI SAMHO HEAVY INDUSTRIES CO., LTD.  
(AS BUILDER)  
AND  
EUKOR CAR CARRIERS INC.  
(AS BUYER)  
HULL NO. S830

# The vessels

Delivered: 2011

Length: 228 m

Yard: DSME

Beam: 32.3

Engine power: 19 000 kW

Capacity: 7,900 cars

Speed: 20 kn



Designed/built: 68

Management: 20

# Newbuildings for WWO

4 PCTC

Xingang Shipyard,  
Tianjin, China

8,000 cars capacity

Delivery 2018-21





# Newbuildings for UECC

2 PCTC

NACKS Shipyard,  
Nantong, China

4,000 cars capacity

First PCTC with LNG  
propulsion

1A super Finnish/Swedish  
ice class

Delivered 2016



# Newbuildings for UECC

---

3 PCTC

Jiangnan Shipyard, China

3,600 cars capacity

LNG Electric hybrid  
propulsion

Delivery 2021-22



# Newbuildings for Wallenius Sol

2 Ro-ro vessels

CIMC Raffles, Yantai, China

5,800 Lane meter

LNG propulsion

Delivery July 2021



**Speed** ◦  
The new ships  
will have a sailing  
speed of 20 knots



**Width**

The ships will be 35,2 m  
wide, with a capacity  
of 5,800 lane meters

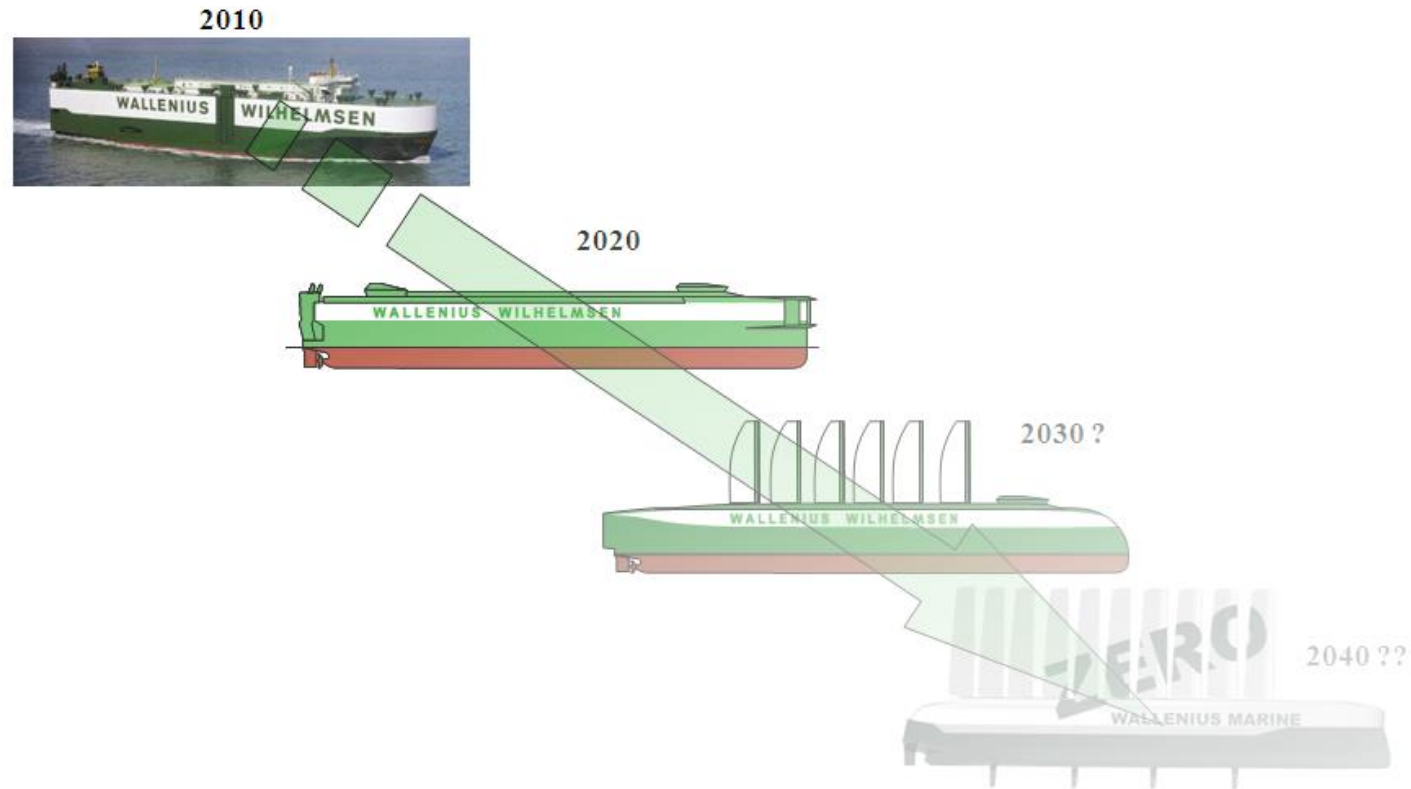
◦ **Length**

They will be 794 feet  
(242 meters) long

# ZERO (Zero Emission ROro)

Roadmap towards our vision:

**“Leading the way towards truly sustainable shipping”**



# Register of new technology and R&D

<b>Hull concepts</b>
Longer and narrower Vessel
Wider Vessel
Catamaran
Trimaran
Pentamaran
Air Cavity System
<b>Hull materials</b>
Aluminium
FRP
<b>Propulsors</b>
Fixed pitch propeller
Controllable pitch propeller
Foils
POD
Voith-Schneider
Contrarotating propellers
Pre-Swirl Stator
<b>Friction reduction</b>
Low-friction paint
Air bubbles

<b>Engines - combustion engines</b>
Dual-fuel engines
Gas engines
Heat recovery
Exhaust Gas Recirculation, EGR
Scavenger Air Moisturizing, SAM
Selective catalytic reduction , SCR
Scrubbers
<b>Engines - others</b>
Hybrid
Electric
Gas turbines
Steam turbines
Stirling engines
Fuel cells
<b>Equipment, interior fittings</b>
Energy saving technologies for the habitat
<b>Solar-, wind- and wave power</b>
Solar cells
Solar heat
Sails / wings
Flettner rotors
Kites

Windmills
Wave power
<b>Biofuels</b>
Methanol
Ethanol
Biodiesel
Biologic diesel
Biogas
Synthetic fuels
Hydrogene
Biochar
Pellets
<b>Fossile fuels</b>
Liquefied Natural Gas, LNG
<b>Energy storage</b>
Batteries
Flywheels
<b>Others</b>
Carbon hydrates cracking to hydrogen
Transformation of carbon dioxide into carbon-neutral liquid fuels
Skin friction elimination
IGBT Converter

# Research projects

Benämning	Projektägare	Deltagare	Finansiering från
IVL Ammoniak som sjöfartsbränsle	IVL	Chalmers	Chalmers (Masterthesis)
Vinddrivet biltransportfartyg (wPCC)	Wallenius	SSPA, KTH	Trafikverket
Lätta elfartyg Lighthouse	RISE	ABB, Stena, Scandinaos	Trafikverket
LASH FIRE	RISE	Interferry, Stena, m.fl.	EU
Vätgas, ammoniak och batteridrift för framtidens sjöfart	CTH	IVL, SSPA	Trafikverket
Introduktion av förnybara drivmedel inom sjöfarten	IVL	Stena, Färjerederiet, Myndigheter, Gasum	Tripe F
OverSeaMachinerypart	OW	ABB, KTH	Energimyndigheten
Metanoldrift	StrathclydeUniv.		
Strukturera och effektivisera FOU för att påskynda vägen mot fossilfri fartygsdrift	IVL	Chalmers, Lighthouse	Lighthouse
OverSeaRouteoptimization	OW	ABB, FKAB	Trafikverket
Reducing the cost of large batteries	ABB	Northvolt, ABB	EU (H2020)
Ett nationellt koncept för smarta fartyg	RISE	Chalmers, VTI, TS	Trafikverket

# Roadmap

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Road map for....:

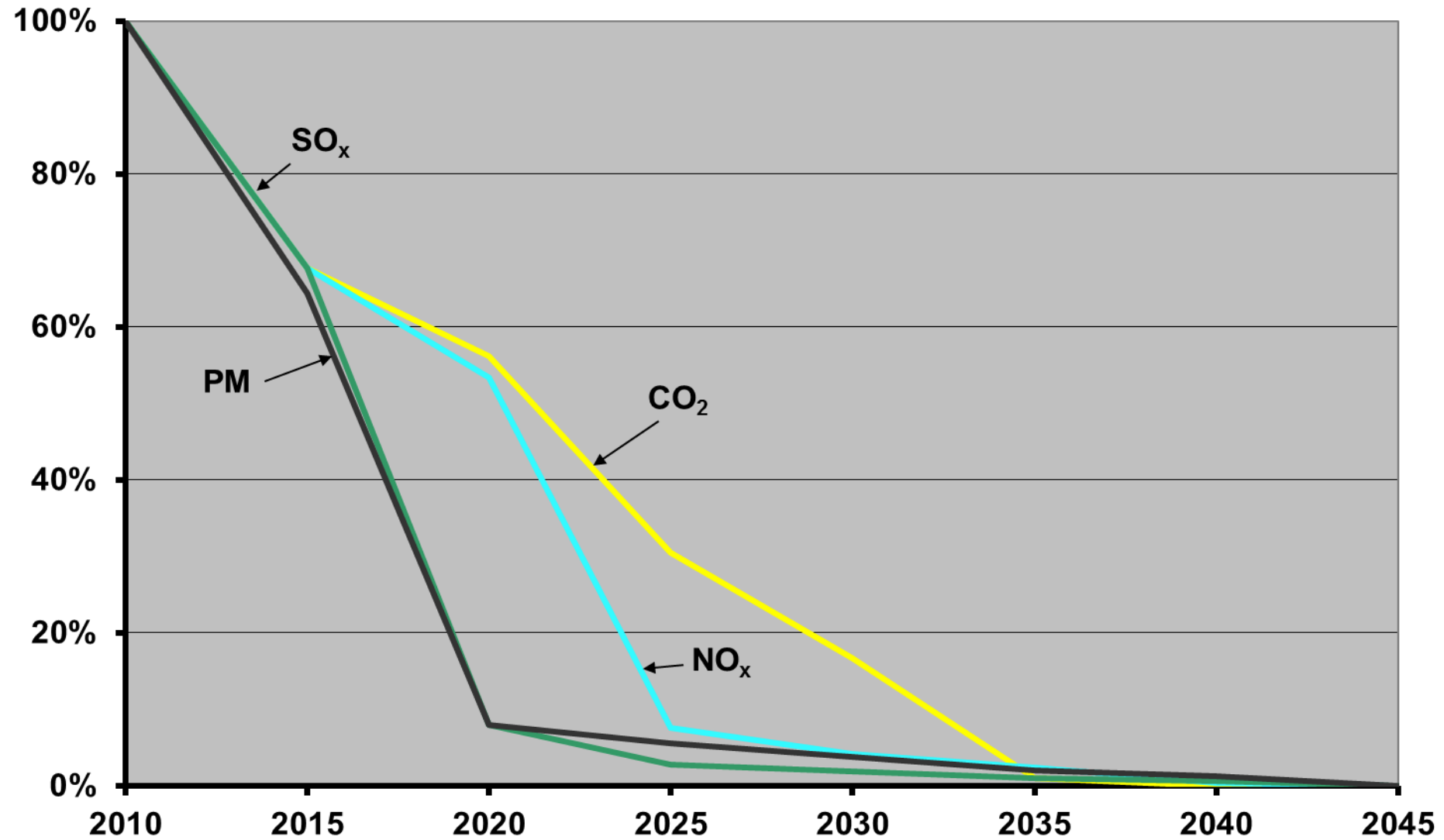
- operation
- energy carriers
- technology
- Wallenius' ship designs
- energy consumption
- emissions
- Wallenius Marine's competence

# Roadmap for ships

	2015	2020	2025	2030	2035	2040	2045
Capacity	Multi purpose roro 8000 cars	Multi purpose roro 8000 cars	Multi purpose roro 6000 cars	Multi purpose roro 6000 cars	Multi purpose roro 6000 cars	Multi purpose roro 6000 cars	Multi purpose roro 6000 cars
Speed	17 knots	16 knots	14 knots	12 knots	11 knots	10 knots	10 knots
Range	42,000 nm	20,000 nm	18,000 nm	15,000 nm	15,000 nm	18,000 nm	20,000 nm
Hull concept	Monohull Low friction paint	Monohull Air bubbles Low friction paint	Monohull Air bubbles Low friction paint	Monohull Air bubbles Low friction paint	Monohull Air bubbles Low friction paint	Monohull Air bubbles Low friction paint	Monohull Air bubbles Low friction paint
Primary energy carrier	HFO	HFO 0.5%	Biofuel	Biofuel	Biofuel	Biofuel	Hydrogen
Energy carrier 2	MGO	LNG	Batteries	Batteries	Batteries	Hydrogen	Batteries
Energy carrier 3						Batteries	
Propulsion	Two stroke diesel Fixed pitch propeller	2 stroke DF diesel Fixed pitch propeller	Wings Hybrid machinery 2 x POD	Wings Hybrid machinery 2 x POD	Wings Hybrid machinery 2 x POD	Wings Hybrid machinery 2 x POD	Wings Hybrid machinery 2 x POD
Auxiliary 1	Diesel engines	DF engines	Gas engines	Gas engines	Gas engines	Fuel cells	Fuel cells
Auxiliary 2	Shaft generator	Shaft generator	Photovoltaic panels	Photovoltaic panels	Fuel cells	Photovoltaic panels	Photovoltaic panels
Auxiliary 3					Photovoltaic panels		



# Roadmap for Emissions to the air



# Conclusions

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The emission free ship can be realized only through a combination of:

- Reducing the energy consumption
  - Reduced speed
  - Automation/digitization
  - Improved operation
- Making use of emission free energy sources
  - Wind
  - Sun
  - Waves
- Making use of emission neutral energy carriers
  - Bio fuels/Electrofuels
  - Batteries

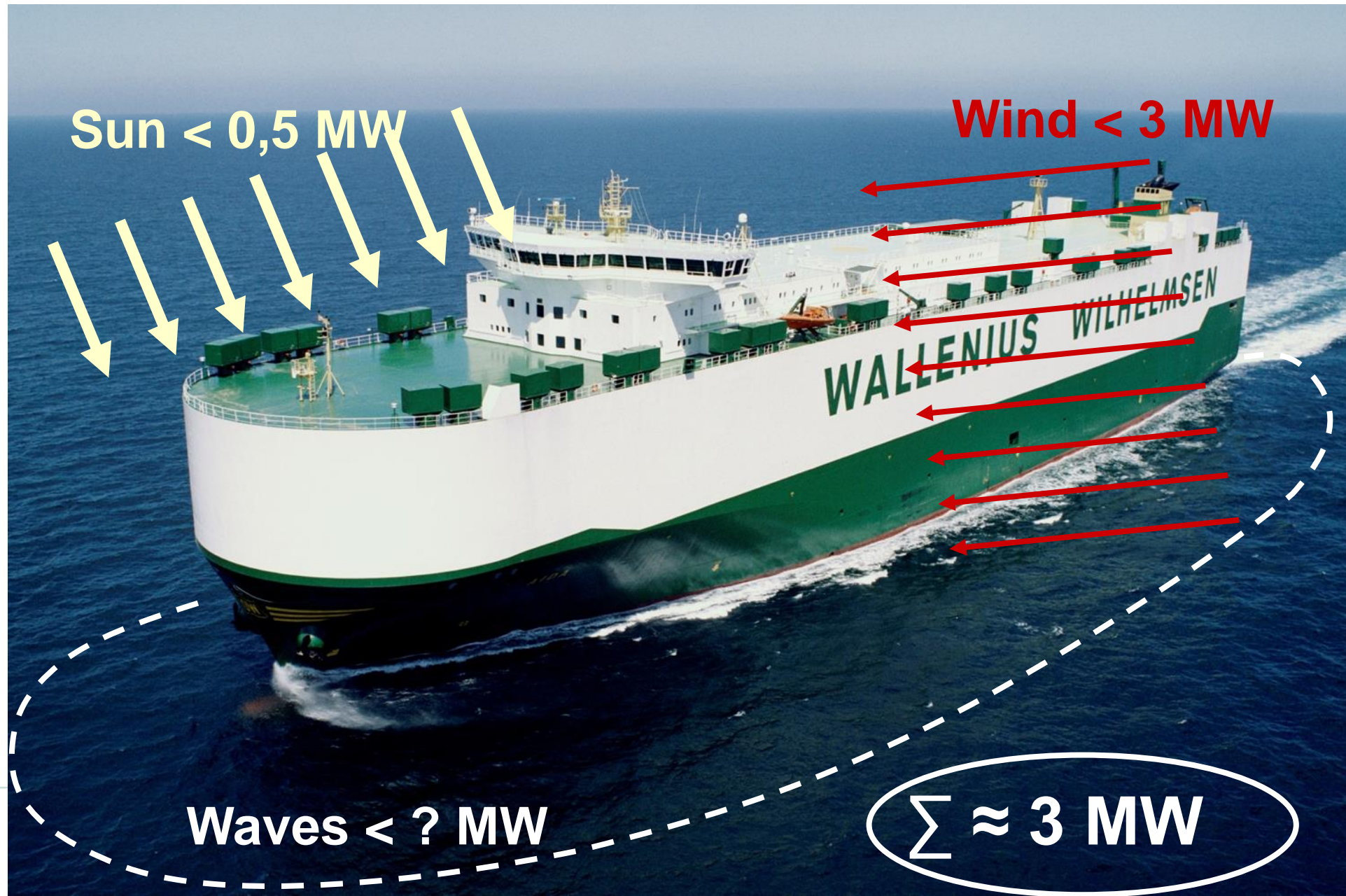
# Conclusions

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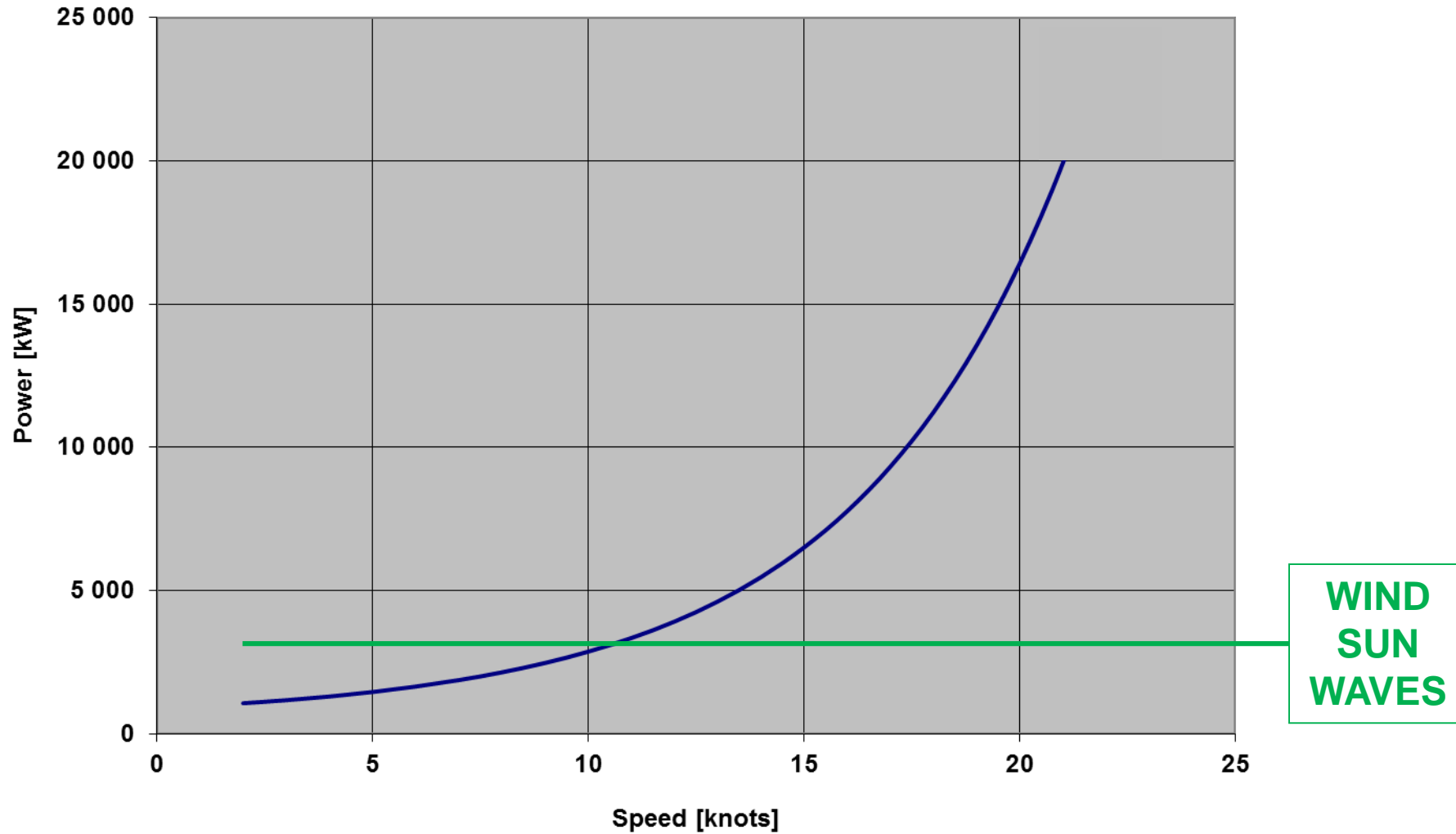
It is fully possible to build an emission free ship today, with existing technology.

It is NOT only about new technology!

# Emission free energy sources



# Speed – power

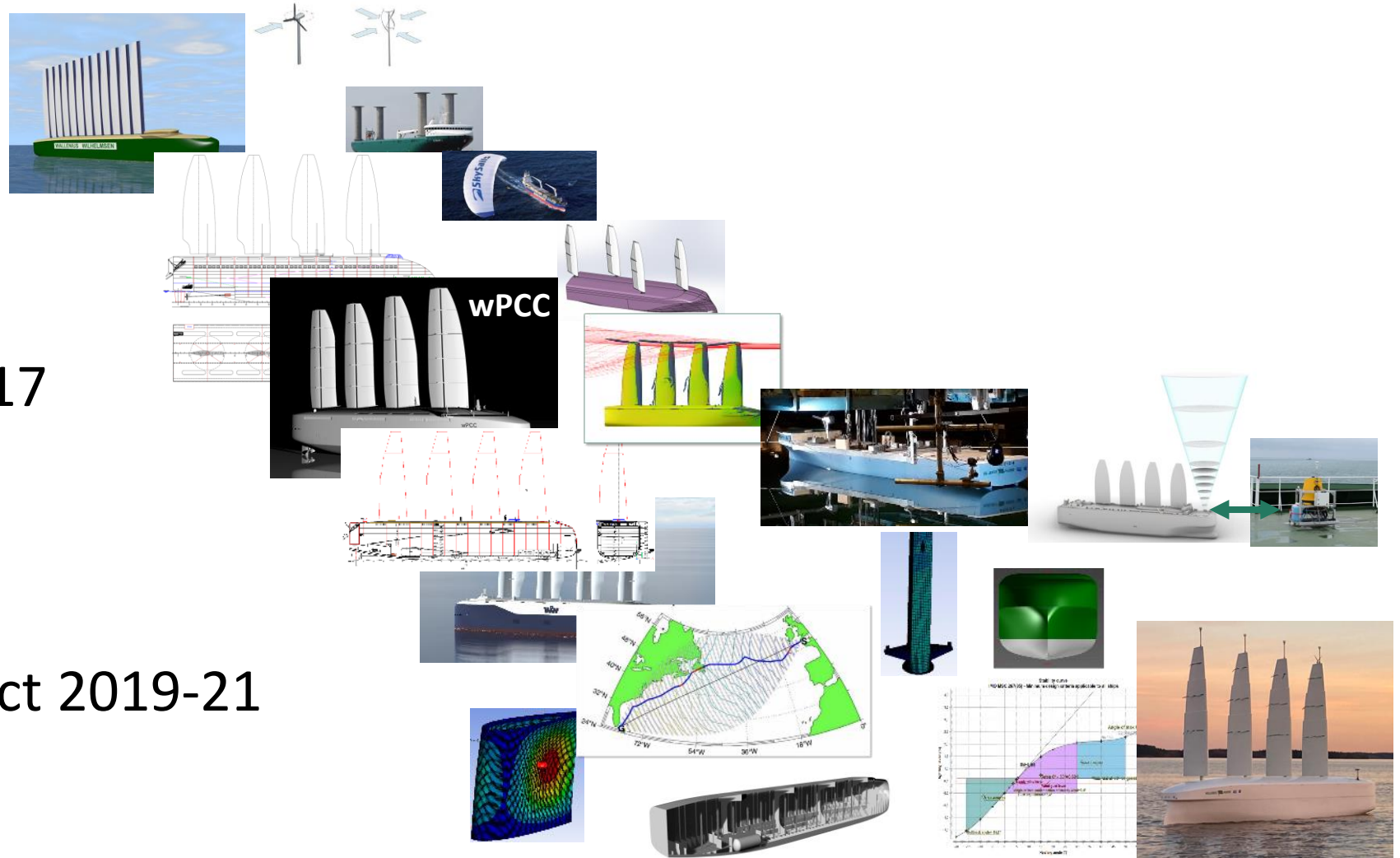


# Feasibility studies, Wind driven PCTC

Master thesis 2010

Concept study 2017

Research project 2019-21





Wind powered PCTC  
90% reduced emissions  
Ready to order 2022

Frågor?



[www.walleniusmarine.com](http://www.walleniusmarine.com)

[www.oceanbirdwallenius.com](http://www.oceanbirdwallenius.com)



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Tack !

# Diskussion

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Prioriterade forskningsområden:

- Biobränslen/elektrobränslen
- Energilagring
- Emissionsfria energikällor (Vindkraft!)
- Energieffektivisering

# Diskussion

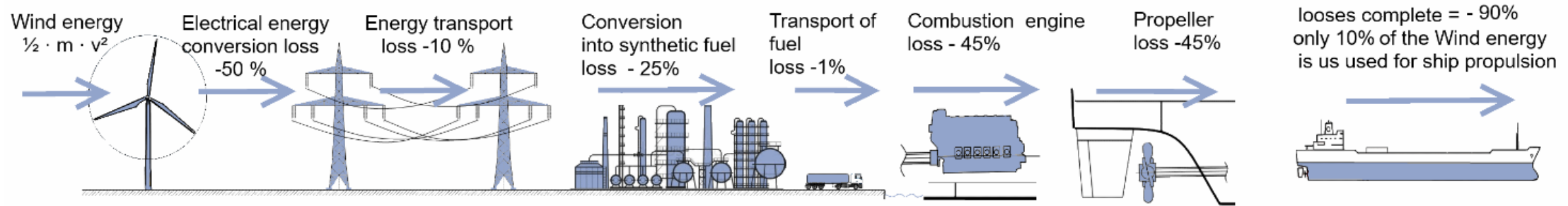
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Vad är viktigast och vad påverkar möjligheten till forsknings- och innovationsarbete?

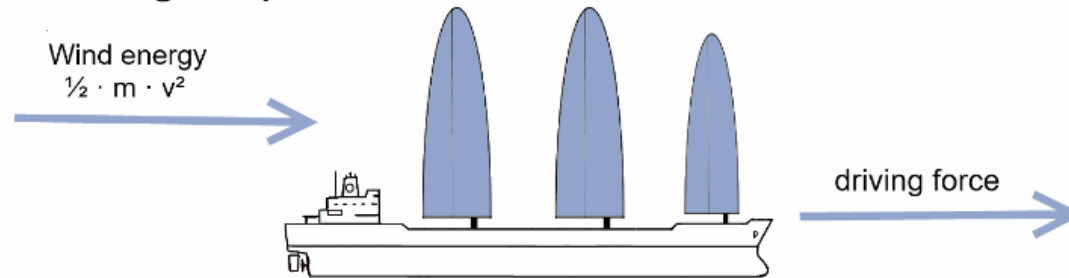
- Samordning av de resurser vi har
- Samordning av forskningsprojekt
- Samarbete
- Ekonomiskt stöd till pionjärprojekt
- En stark Svensk sjöfartsnäring
- ...
- Beskatta CO<sub>2</sub>

# Diskussion

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