UNMANNED VESSELS – THE DNV GL “REVOLT” PROJECT

Hans Anton Tvete, Senior Researcher, DNV GL

DNV·GL

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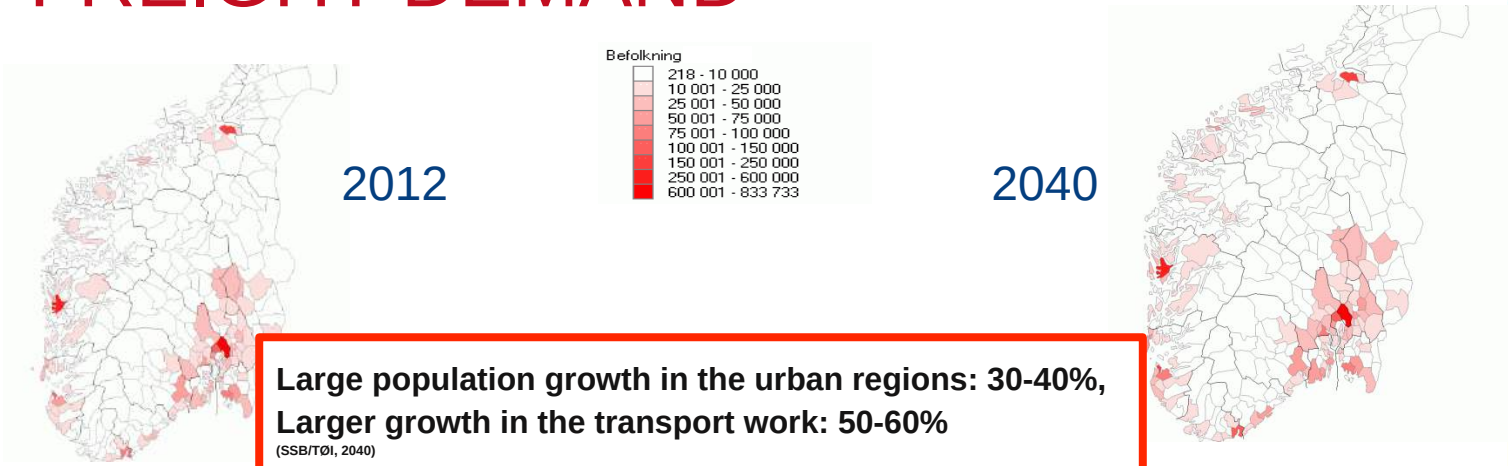
AGENDA

- Background and motivation
- Operational profile
- Design features
- Safety and automation
- Environmental and financial performance
- Summary and conclusiones

transnova
- for bærekraftig mobilitet

BACKGROUND

POPULATION GROWTH AND FREIGHT DEMAND



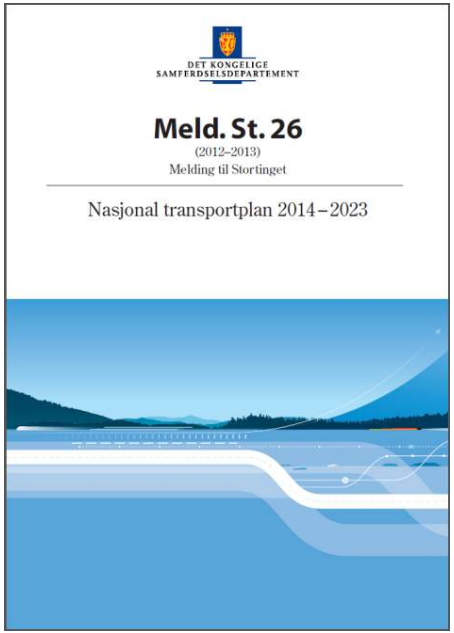
Large population growth in the urban regions: 30-40%, Larger growth in the transport work: 50-60%
(SSB/TØI, 2040)

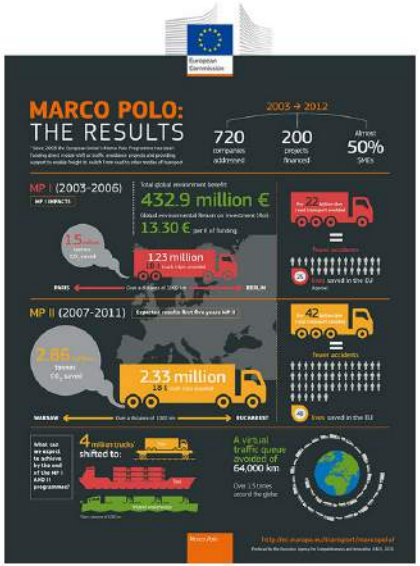
Stavanger (region)	359 643	486 547	35,3 %
Bergen (region)	324 111	439 587	35,6 %
Trondheim (region)	215 954	279 741	29,5 %

Source: Statistics Norway

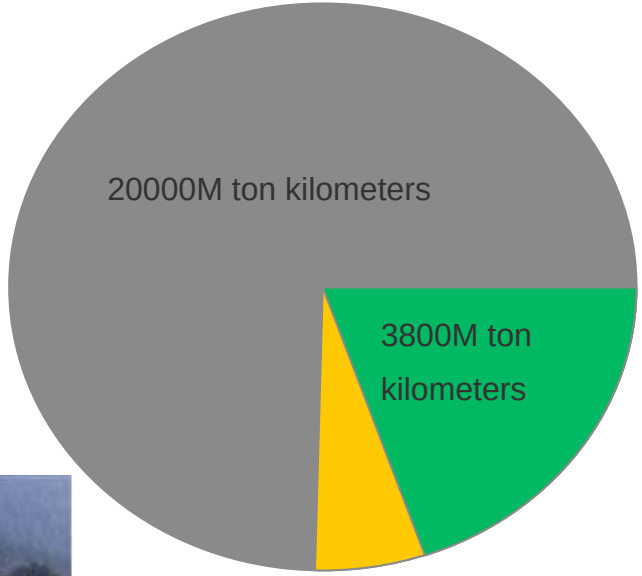
GOVERNMENTAL INITIATIVES

- Transfer more freight from land to sea
- Increase the competitiveness
- High on the agenda in EU





FREIGHT TRANSFER POTENTIAL



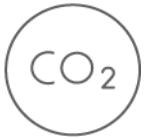
STATUS: SHORT SEA SHIPPING TODAY

- Age average: 21,8 years (NIS/NOR)
- High fuel consumption
- High operational expenses
- High taxation level

Small margins

DNV GL: AMBITIONS FOR THE SHIPPING INDUSTRY

CO_2 emissions



900

million tonnes per year

Ambition:

60 % reduction in CO_2 emissions

Freight cost

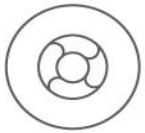
7-11%

of cargo value

Ambition:

Maintain or reduce present freight cost levels

Lives lost at sea



900

ship accident fatalities per year
Average 2003-2012

Ambition:

90 % reduction in fatalities in shipping

REVOLT

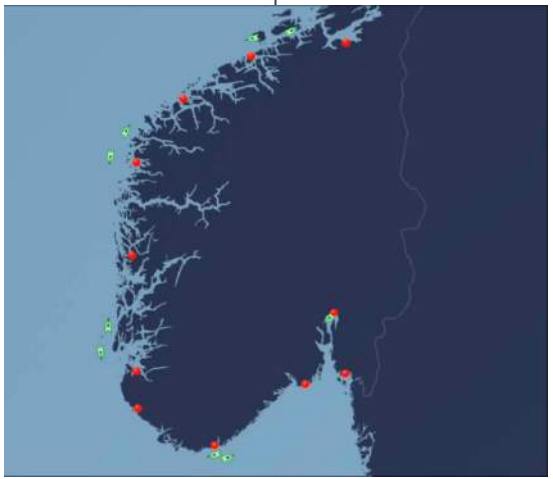
OPERATIONAL PROFILE

AIS benchmark

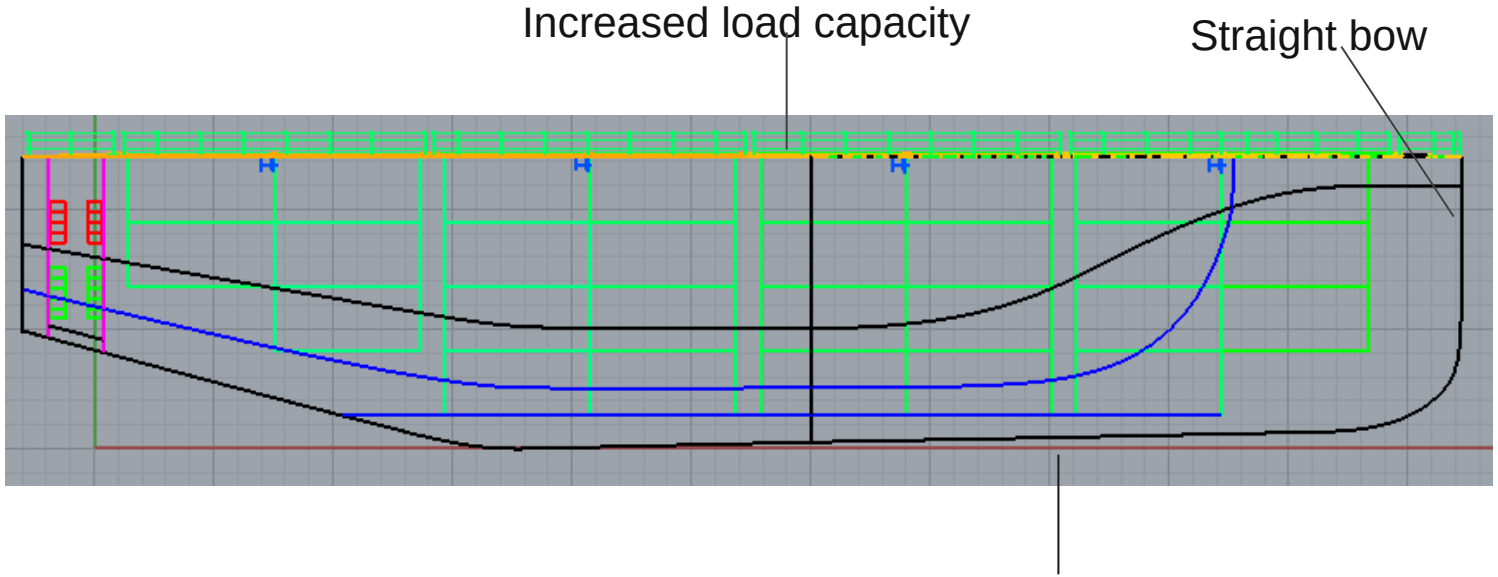
- General cargo vessels represent 23,4% of the total number of ships.
- Speed: 8,7 kts
- Frequent port calls.
- Capacity: 107 TEU

ReVolt

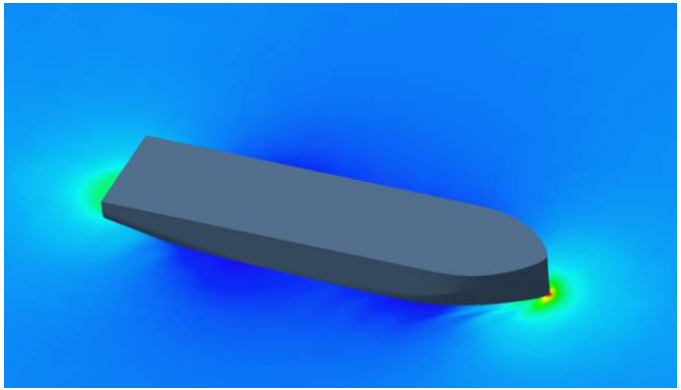
- Coastal traffic from Oslo to Trondheim
- Speed: 6 kts
- Operational range: 100nm
- Capacity: 100 TEU



HULL


Increased load capacity
Straight bow
Inclined keel – ballast free design

RESISTANCE

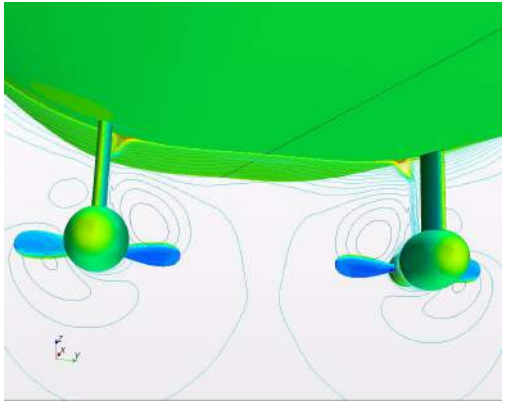


Calm Water: 53 kW @ 6kts = Toyota Yaris

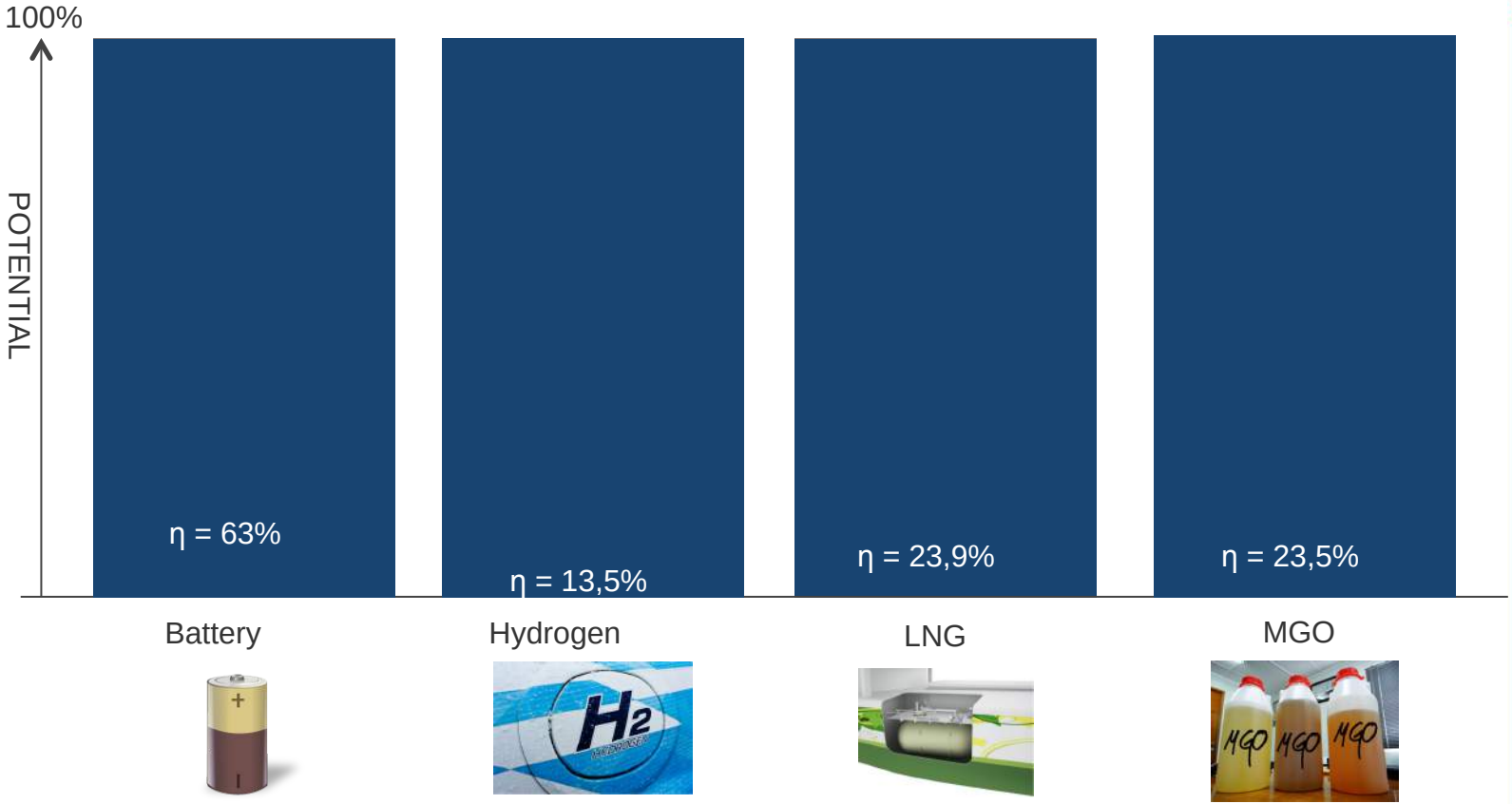
Average weather: 132 kW @ 6kts = BMW 5 Series

PROPULSION SYSTEM

- Twin screw
- Podded propulsion
- 2 bladed propellers
- 79% efficiency
- No cavitation
- Retractable bow thruster for manoeuvrability



EFFICIENCIES



BATTERY POWERED

Pros

- No direct emissions
- High efficiency (97%)
- Low maintenance
- Low OPEX
- Low C-rate

Cons

- High CAPEX
- Less proven technology

Required battery capacity:

- 2300 kWh average weather
- 5500 kWh including bad weather (97 %)

CHARGING INFRASTRUCTURE

- Charging in on every port stay
- Average port stay duration of 4 hrs
- Low charge rate – longer life

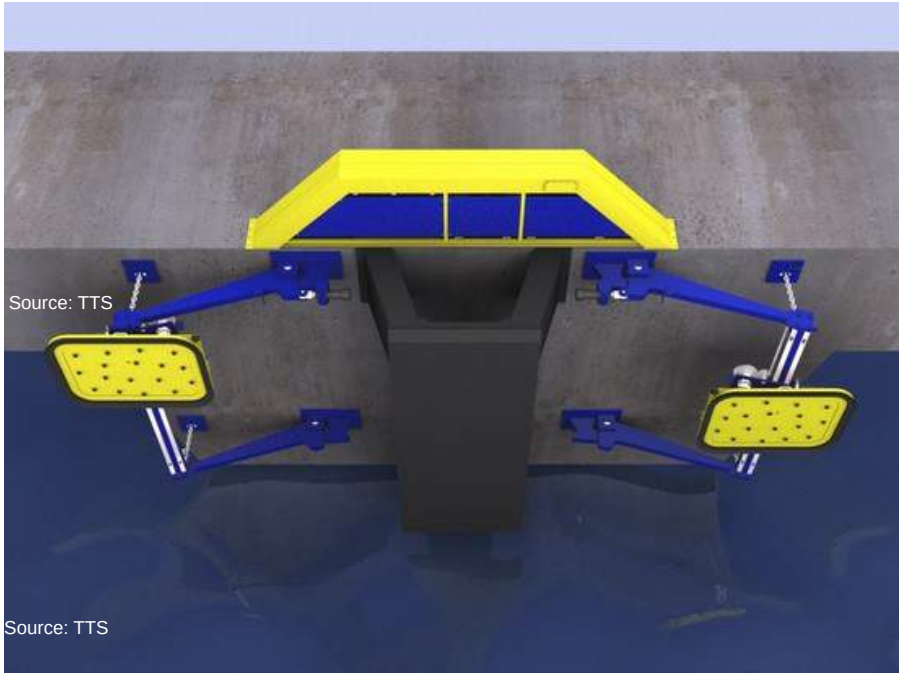
e expanded

REVOLT ENERGY REQUIREMENTS

ENERGY EFFICIENCY MEASURES

- Solar panels
- Flettner rotors
- Sails
- Wave assisted propulsion

AUTOMATIC MOORING



Vacuum based

Grip arm

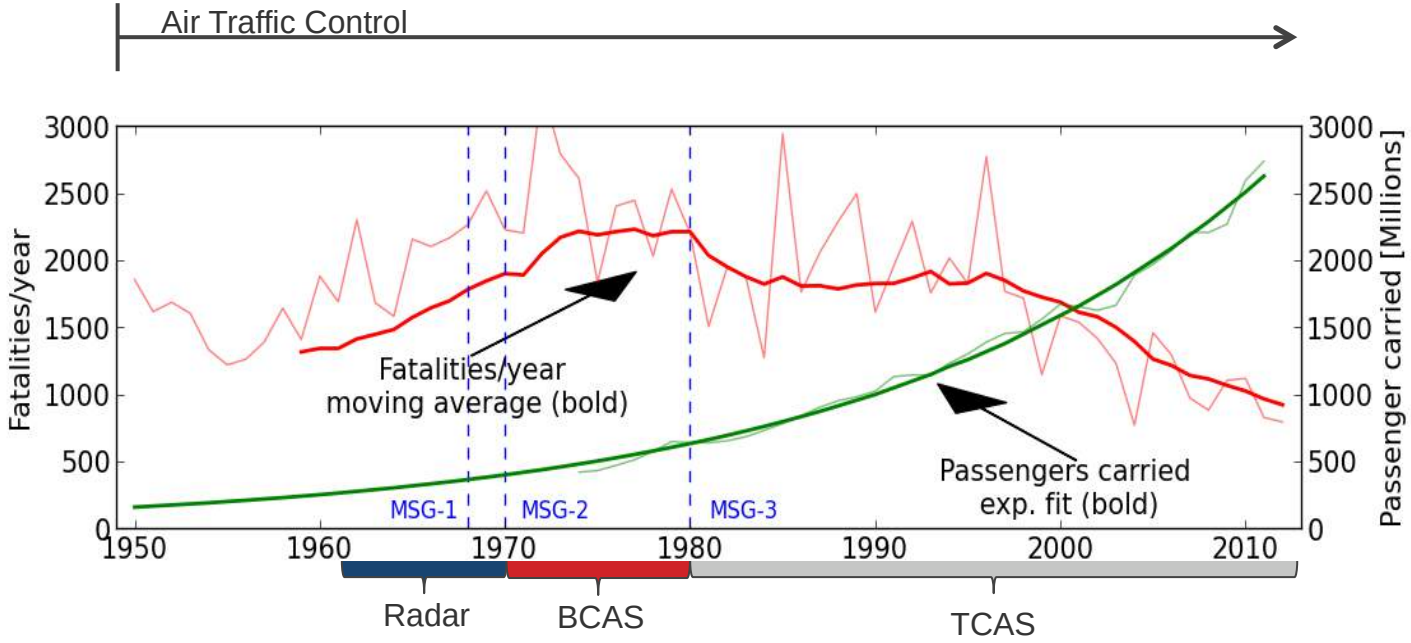
CARGO HANDLING

Dedicated cargo terminals for fast cargo handling

Source: Green Door Logistics

Extended hull sides to eliminate the need for extra lashing

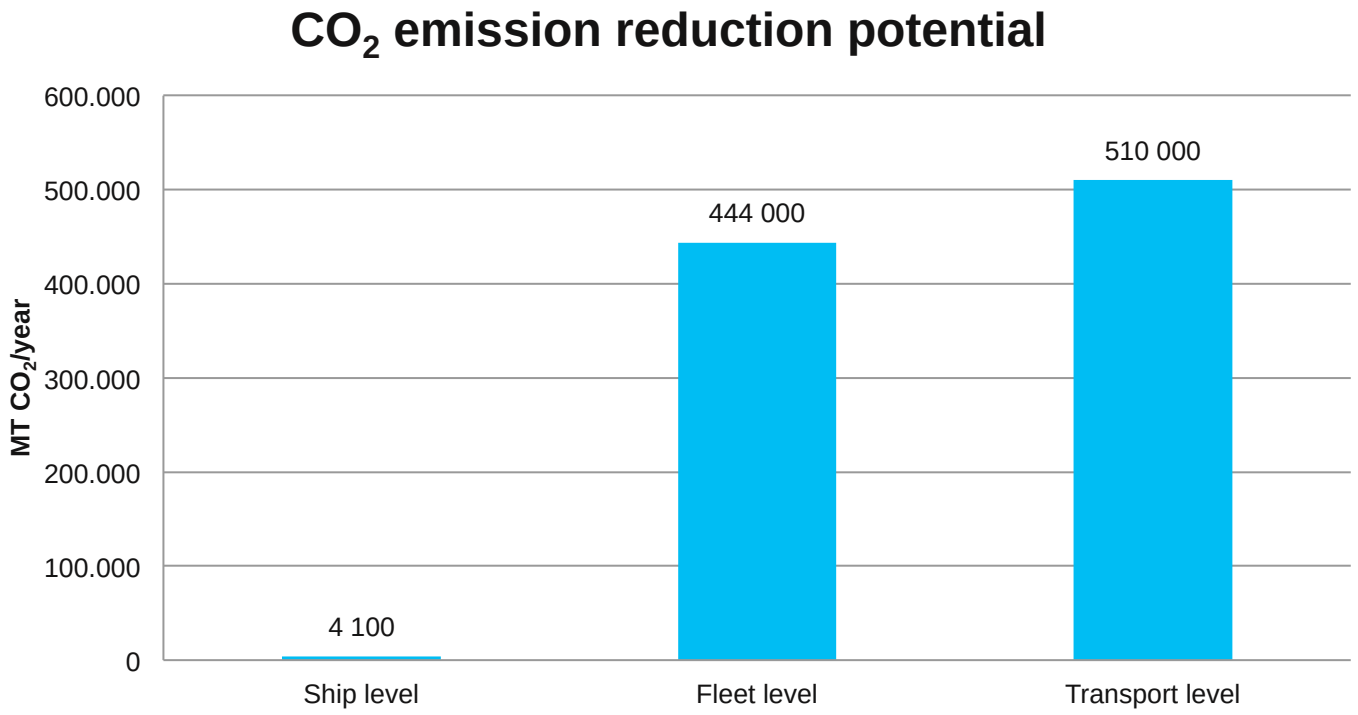
SAFETY IN SHIPPING



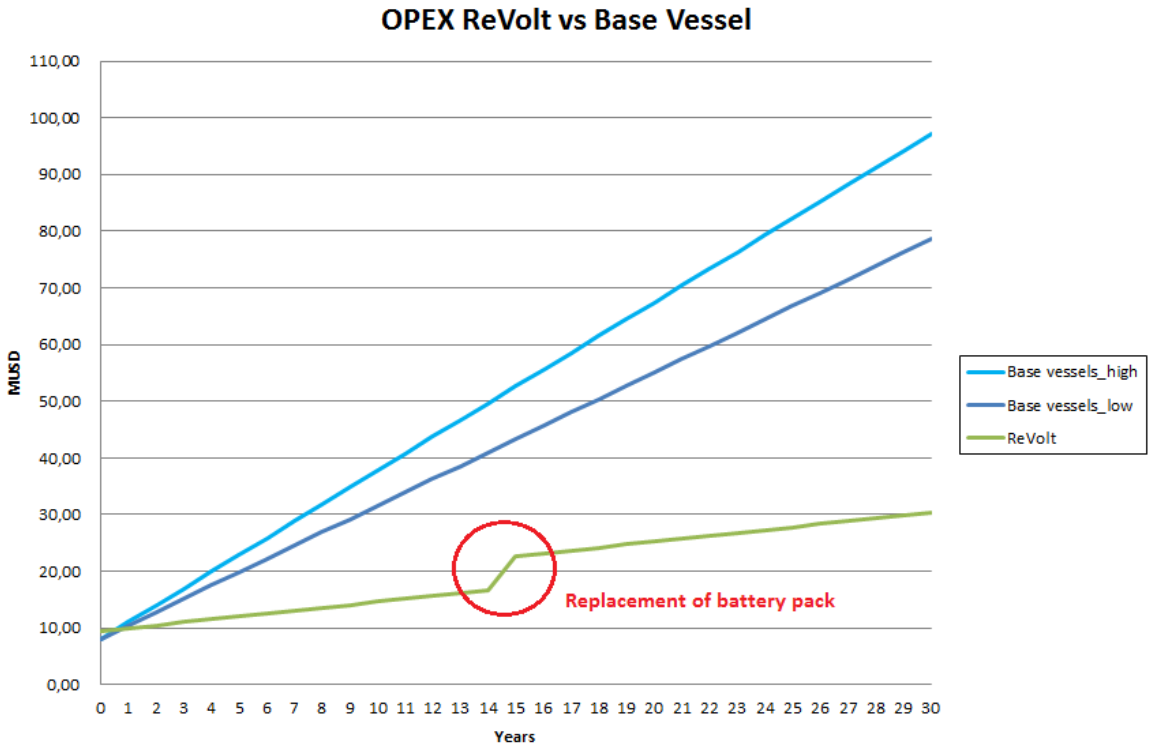
REVOLT AND AUTONOMY

MODEL DEMONSTRATOR

EMISSION REDUCTION POTENTIAL



LIFETIME COST



CONCLUSION

- The need for shifting transport from road to sea is pressing
- Todays technology hold great promise for more efficient, environmentally friendly and safer ships in the future
- Challenges related to regulation, security and liability must be addressed

VOTE: WHEN WILL WE SEE THE FIRST COMMERCIALLY OPERATED UNMANNED SHIP?

- 1) 0-10 years
- 2) 10-20 years
- 3) 20-30 years
- 4) It will never happen

A VISION FOR THE FUTURE

Thank you!

Hans Anton Tvete
Senior Researcher, DNV GL
hans.anton.tvete@dnvgl.com
+47 95927110

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