

NYK SES2050



Motivation

- The marine industry is in a period of rapid change that is only to become faster
- IMO and the shipping community has made a strong commitment: By 2050, greenhouse gases must be **reduced by 50%**
- Roadmap for future development
- NYK SES 2050 is a concept ship of optimistic, provocative and inspiring **vision of future**



Background

From NYK SES 2030 to NYK SES 2050

- **NYK SES 2030 study conducted by Elomatic in 2009**
- **40% Energy demand reduction**
- **Solar panels, sails, upper and lower holds with simultaneous cargo operations, etc...**
- **NYK SES 2050 updates the information, diversifies the focus, and provides a quantified science-based target for future research**



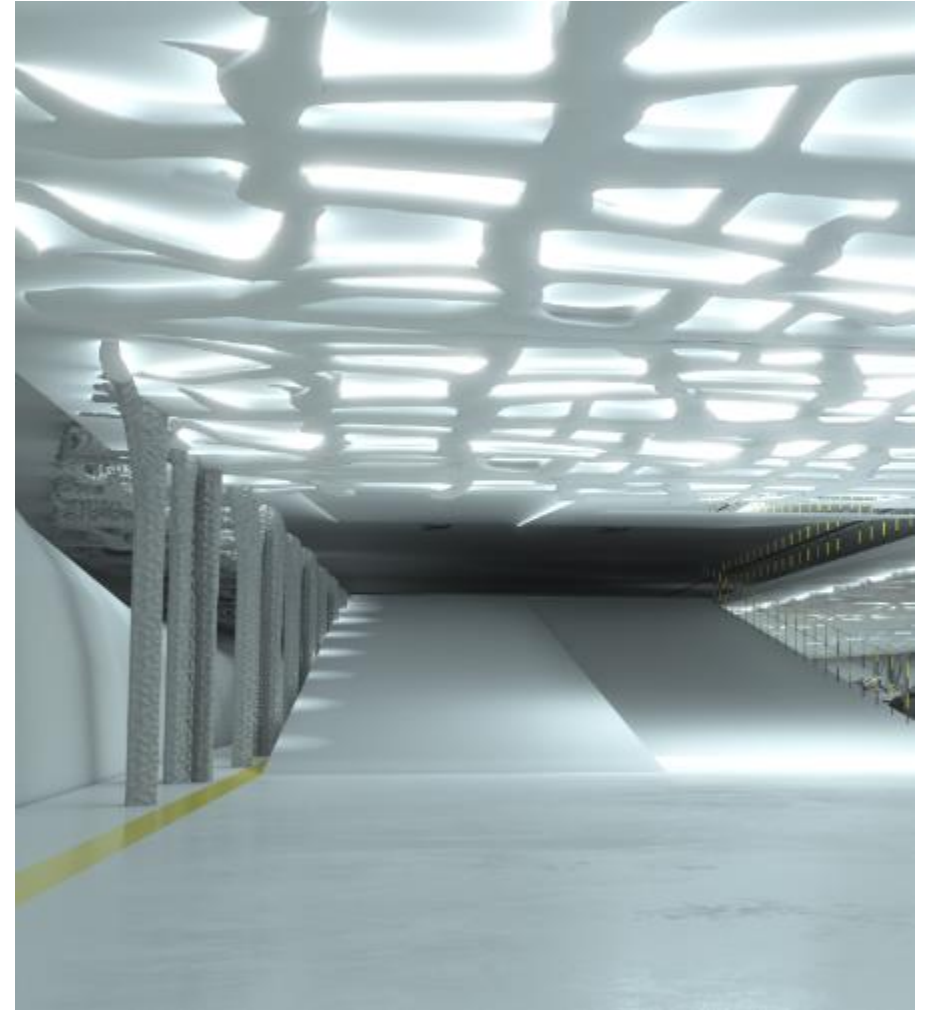
Starting point

- PCTC (Pure Car and Truck Carrier)
- Deep sea shipping
- 7000 RT
- L 199.9m
- B 35.8m
- D 45.6m



Lightweight

- **Novel ideas** for structures
- 3D printing, new optimisation methods and new materials will allow for **lighter design**
- Deck structure optimised by **freeform optimisation algorithms**
- Lightweight reduced by **30%**



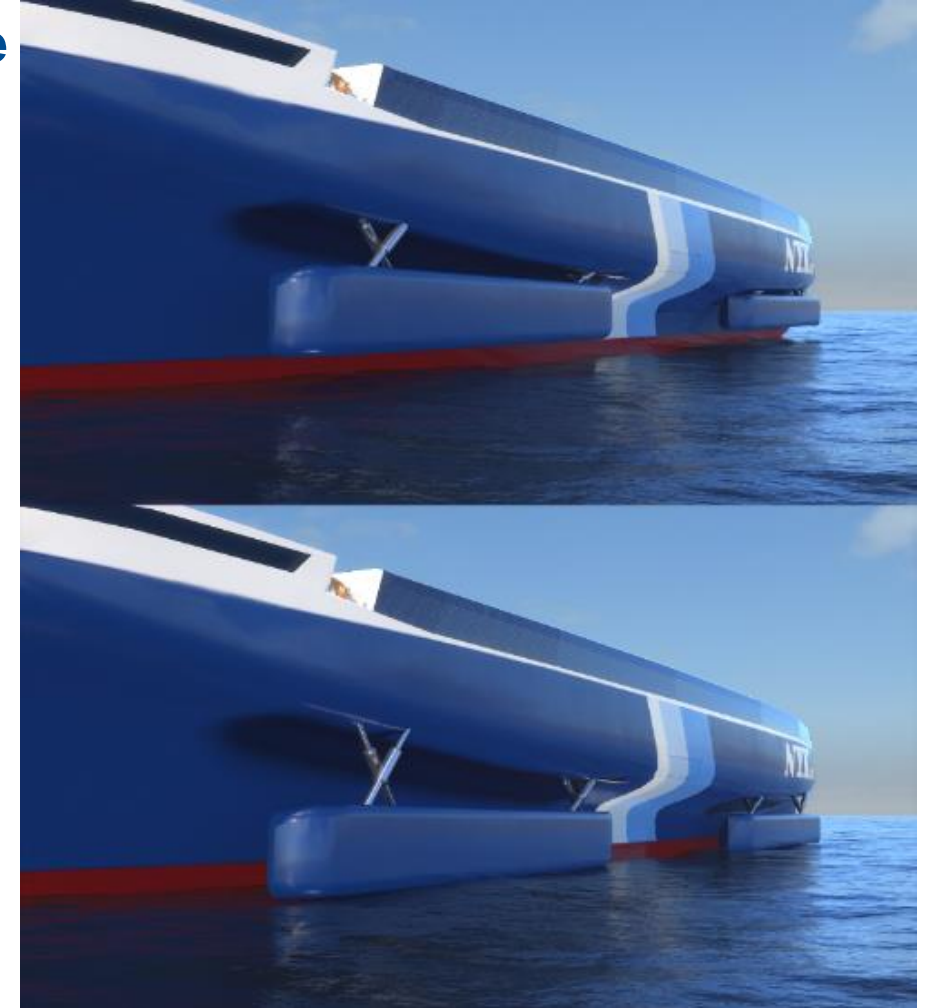
Hull form

- **Lower lightweight** enabled for rethinking of hull
- Hull **optimised for displacement**; stability is sufficient for normal operations
- Hull is only **30m wide** at waterline, 49m at max
- Hull and superstructure with **clean hull design**, minimised resistance
- Resistance **35% lower** than in current ships of same size



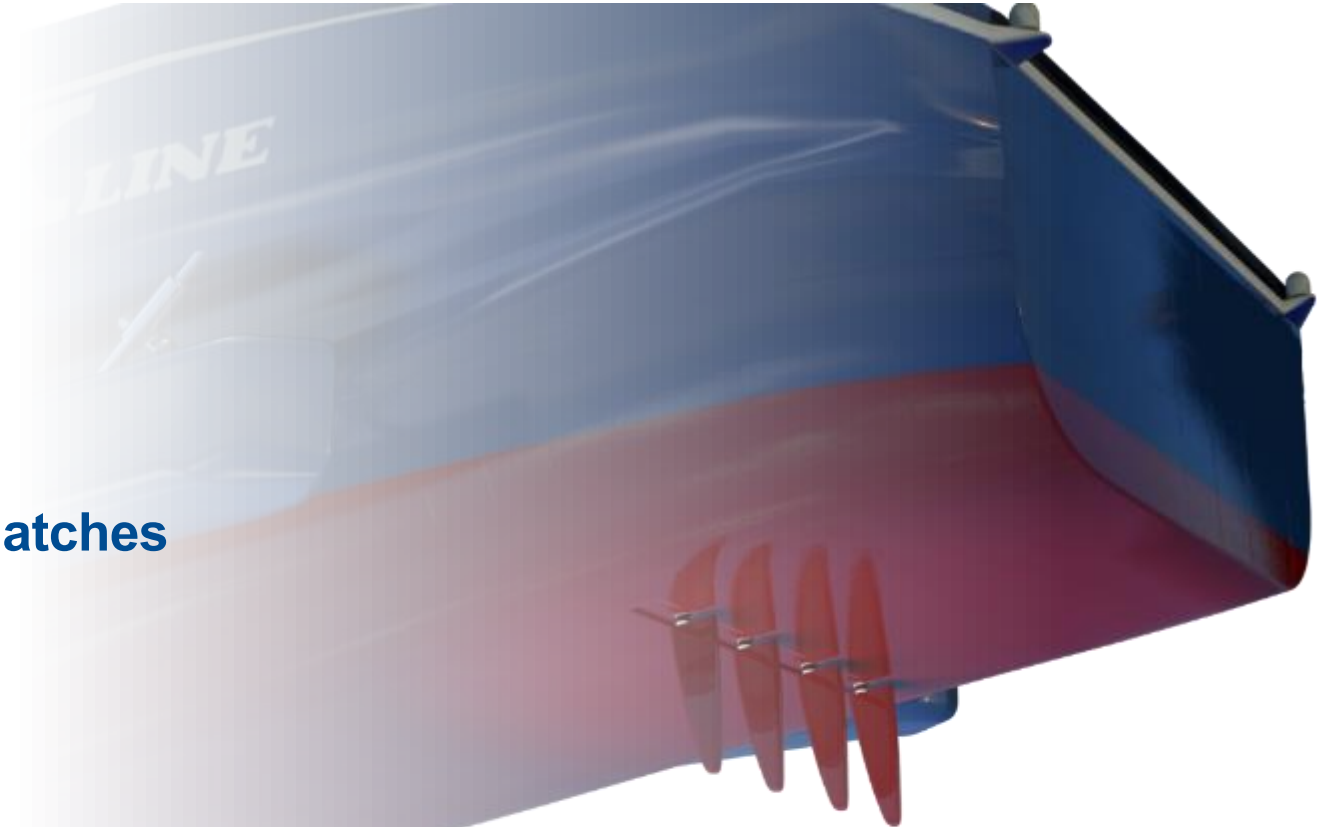
Stability

- **Unstable by design** utilising computer controlled active stabilisation devices
- Stability for all situations ensured by **active means:** lowerable pontoons and gyroballs
- Normally pontoons in **sea skimming** mode



Propulsion

- **Flapping foil** propulsion
- Mimic the movement of **dolphin**
- Efficiency beyond **85%**
- No need for rudder
- Bow thruster **hidden** behind “torpedo” hatches while not in use



Energy production

- **SOFC** fuel cells operating on liquid hydrogen
- Electric power distribution: **DC grid with battery** for peak load shaving
- **Waste Heat Recovery** and **Cold Recovery**
- **Solar panels** with maximised area, two-axial tracking
- Openings in the aft for **ventilation machinery**



Digitalisation

- Digitalisation will lead the technology development
- **Big data** collection with **IoT**
- **Digital twin** allows for better optimisation, system integration, simulation, etc...
- **Total optimisation** by using digitalisation is combination of people, processes, technology and organisation



Automation & Optimisation

- Minimising of **human error** - safer ships
- Navigation is **highly automated**
- **Crew** smaller than today will stay on-board for certain tasks and rare situations
- **Sensors** are monitoring the ship from every angle at all times
- **Mooring** operations are fully automated
- Route optimisation based on **real-time data**



Picture courtesy of Ulstein

NYK Super Eco Ship 2050

Towards carbon free future

ENERGY

-

35% Lower
ship resistance

EFFICIENCY

-

70% Lower
energy demand

ENVIRONMENT

-

Zero emissions to air
and water



