

# Green Ship of the Future



## Combining Forces towards Greener Shipping



Presented by Christian Schack  
At Global Energy Basel 2011

# Green Ship of the Future



'Green Ship of the Future' is a **Joint industry project** for innovation and demonstration of technologies and methods that makes shipping more environmental friendly.

With respect to airborne emission the aim of the project is to provide the necessary technologies and operational means to reduce emissions as follows:

- 30 % reduction of CO<sub>2</sub> emissions
- 90 % reduction of NO<sub>x</sub> emissions
- 90 % reduction of SO<sub>x</sub> emissions

The focus was initially towards new buildings, but the focus has been increased on retrofitting on existing ships.

**The JIP is an open invitation for all to participate in making shipping greener.**

# Green Ship of the Future Partners



# Green Ship of the Future



To meet the reduction targets, the following four main areas are considered:

- **Machinery** WHR, scrubbers, EGR, etc.
- **Propulsion** Propellers, rudders, trim optimization, etc.
- **Operations** Route planning, performance monitoring, etc.
- **Logistics** Better interaction between transport forms, development/modification of existing ship types etc.

At present there are 22 project in progress.

# 'Low emission concept ships'



The challenge was to take an **existing modern design** and evaluate the technologies suitable and to generate a picture of the improved performance of the vessel.

We have evaluated two different vessel types.

We have **not changed** the hull form, the DWT or other main parameters in order to make clean comparisons.

# 'Low emission concept ships'



 Grontmij | Carl Bro



**SEAHORSE 35**  
**35.000 DWT Bulk Carrier**  
**By Grontmij Carl Bro**

**A-Class**  
**8500 TEU Container Ship**  
**By Odense Lindoe Shipyard**



  
Odense Steel Shipyard Ltd.

# Low Emission Bulk Carrier



## SEAHORSE 35 Bulk carrier, optimised with:

- Speed nozzle/optimized propeller
- Twisted spade rudder with Costa bulb
- Water in fuel (WIF)
- Exhaust gas recirculation (EGR)
- Waste Heat Recovery system (WHR)
- Exhaust Gas Scrubber
- Ducted/direct air intake for main engine
- Optimised coolers and cooling pumps
- Auxiliary engine operation on marine diesel oil (MDO)
- High capacity fresh water generator



Extra costs due to the above mentioned technologies 3,5 million EURO to approximately 20 million EURO (approximately 20% increase compared to a 'standard ship' without 'green technologies')

**In order to achieve the target of a 30 % reduction in CO<sub>2</sub> we need to reduce the speed by approximately 2 knots**

# Low Emission Container vessel



## 8500 TEU container vessel, optimised with:

- Water in Fuel technology (WIF)
- Exhaust gas recycling (EGR)
- Waste heat recovery exhaust boilers
- Power and Steam turbine technology
- Exhaust gas Scrubber



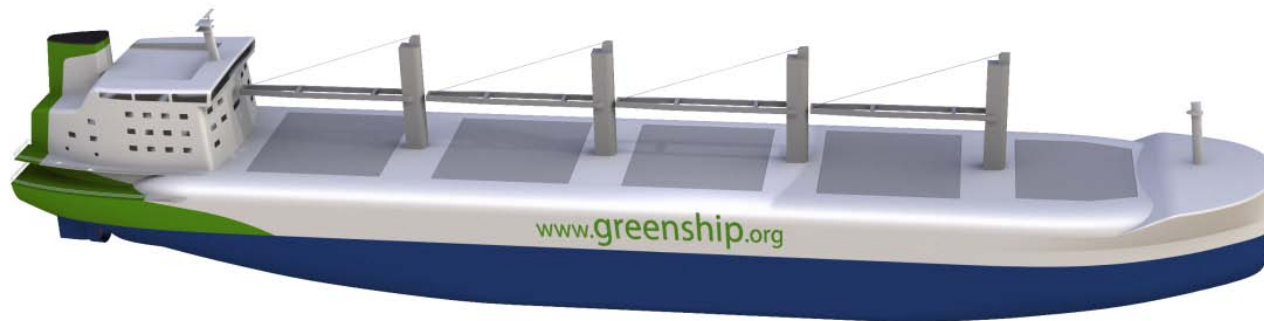
Extra costs 10 million EURO (approximately 10% increase compared to a 'standard ship' without 'green technologies')

**In order to achieve the target of a 30 % reduction in CO2 we need to reduce the speed by approximately 1.5 knots**

# The way ahead in 2011



- Green ship of the Future have launched a new project on the **Future ECA operations** when the new SOX regulations comes into place in 2016 (max 0,1 % SOX). The study will focus on the retrofit of an existing MR tanker. The project will include a techno economical comparisons of LNG as propulsion, Conventional propulsion with HFO fitted with a Scrubber, and Low Sulfur fuel propulsion system.
- Green ship of the future will launch a new low emission project – this time a **Low Emission Ferry** where there will be new areas such as AC, windows and insulations to investigate and naturally we also will look at propulsion, machinery etc.



# The Major Challenges



- We have Rules & Regulation in place for **SOX and NOX** and there are several technical solutions to solve the problems. This will have a huge impact on the environment as they come in to full force.
- With regards to **CO2** we are still awaiting the EEDI – which hopefully will come into place in soon through MARPOL Annex 6 in order to establish a level play ground for new buildings.
- Today contracts are signed on vessel of **yesterdays design** where there have not been done any effort to reduce emissions – hopefully this will changes soon in greater numbers - We have see an increased effort from the major operators to study and invest in green technologies but we need all owners to follow in their path.
- GSF see our role a being a **promoter of the possibilities** and to present them in projects which are highly realistic and feasible.
- **Optimization of vessels** – The big steps are done when we are lifting the constraints such as conservatism, port limitations, safety, etc.

# Green ship of the Future @ Sea



More than 75 ships @ sea with GSF technologies onboard

.....And more to come