GHG Emission Reduction
- Challenge for the Shipbuilders -

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Session 2: How is industry responding to green growth imperatives?

OECD Council Working Party on Shipbuilding (WP6)
Workshop on Green Growth in Shipbuilding
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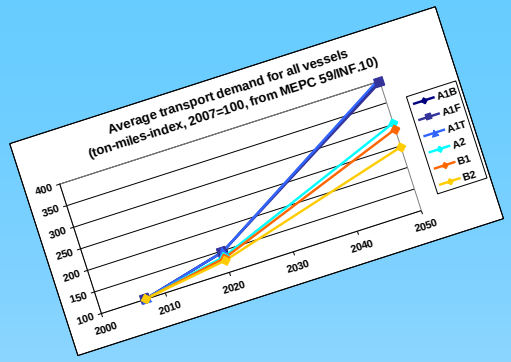
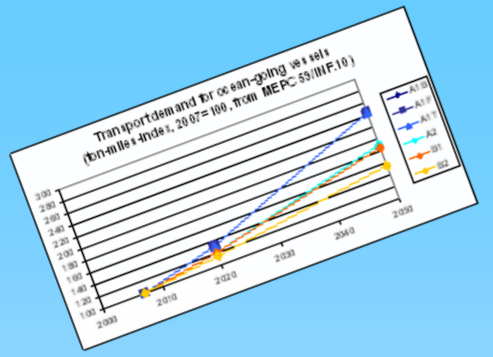
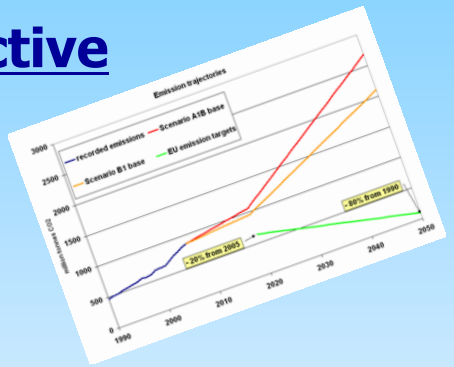
THE SHIPBUILDERS' ASSOCIATION OF JAPAN

Background





Shipping industry will need to be proactive

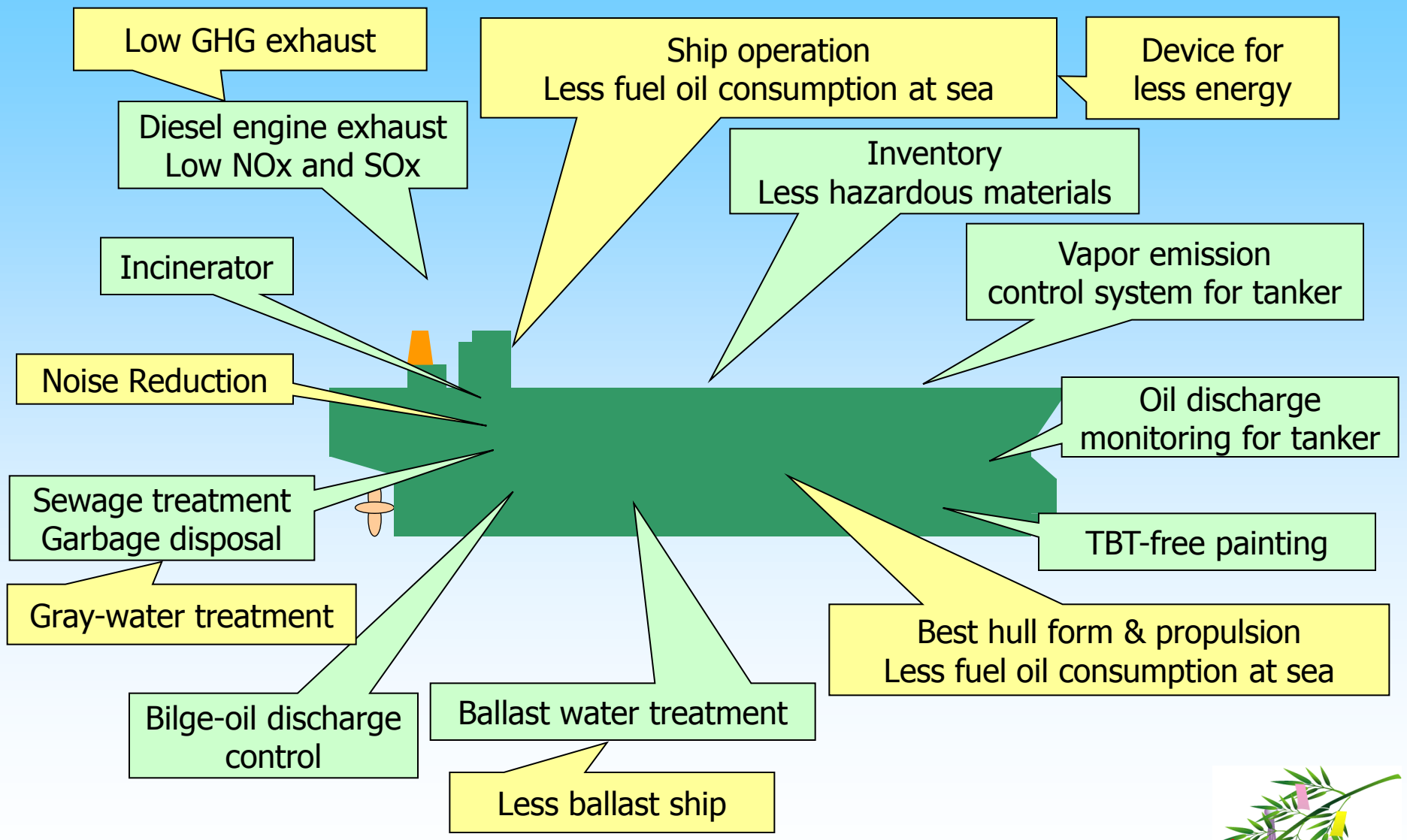


CO2 emission from ships:

- 2007: 870 million tonne level
- 2050: GHG emission will triple according to IMO prediction
  (if no attentive action is taken)

Shipping is more suited for globally unified control compared to inter-regional adjustment, and efforts are being made by IMO.

Green Ship Design



The framework of our challenge

$$\frac{\left(\prod_{j=1}^{M} f_j\right)\left(\sum_{i=1}^{nME} C_{FMEi} SFC_{MEi} P_{MEi}\right) + P_{AE} C_{FAE} SRC^{*}_{AE} + \left(\sum_{i=1}^{nPTI} P_{PTIi} - \sum_{i=1}^{nWHR} P_{WHRi}\right) C_{FAE} SFC_{AE} - \left(\sum_{i=1}^{neff} f_{eff} P_{eff} C_{Feff} SFC_{MEi}\right)}{f_t Capacity \quad V_{ref} \quad f_w}$$

Shipbuilders role in rule making is to focus on newbuilding design index EEDI*.

** EEDI: CO2 emission in grams to carry one tonne of cargo for a distance of one sea mile.*

For owners and operators, energy saving in history of modern shipbuilding was at all times a great concern.

→ Shipbuilder's are well aware of the importance of this challenge.

- If EEDI comes into force…

It will become essential to recognize further that builders and owners need to work together to find best solution from available choices to meet regulatory requirements.

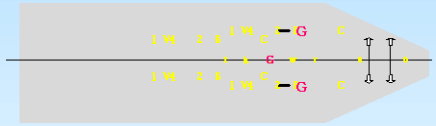
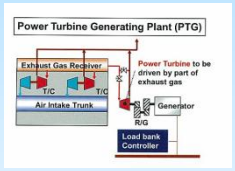
The framework of our challenge (cont.)

Shipbuilders can provide a menu of reliable solutions.

(e.g.)
Japanese shipbuilding industry have enhanced their technological achievements made through previous efforts to refine their menu.

But…

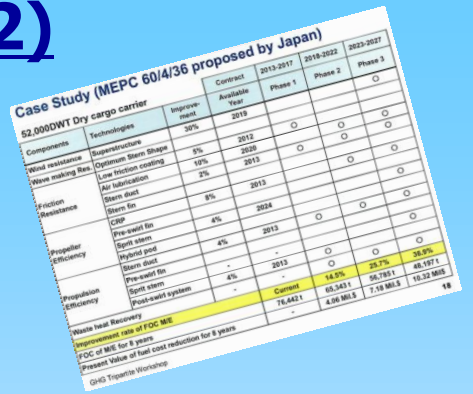


All solutions do not add up together to a big emission saving.

→ Role of shipyards is to promote good understanding of combined solutions.

The framework of our challenge (cont. 2)


Case Study (MEPC 60/4/36 proposed by Japan)

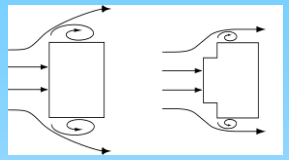
52,000DWT Dry cargo carrier		Improvement	Contract Available Year	2013-2017 Phase 1	2018-2022 Phase 2	2023-2027 Phase 3
Components	Technologies	30%	2019			○
Hull resistance	Superstructure	5%	2013	○	○	○
Wave making Res.	Optimum Stern Shape	10%	2030	○	○	○
Friction Resistance	Low friction coating	2%	2013		○	
	Air lubrication					○
	Stern duct	8%	2013			
	Stern fin					○
Propeller Efficiency	CRP	4%	2024		○	○
	Pre-swirl fin					○
	Spirit stern	4%	2013			○
	Hybrid pod		-	○	○	36.8%
Propulsion Efficiency	Stern duct	-	2013	○	25.7%	46,197 t
	Pre-swirl fin	4%	-	14.5%	56,785 t	16.32 Mt$
	Spirit stern	-	Current	65,343 t	7.19 Mt.$	18
	Post-swirl system		76,442 t	-		
Waste heat Recovery						
Improvement rate of FOC M/E						
FOC of M/E for 8 years						
Present Value of fuel cost reduction for 8 years						

GHG Tripartite Workshop

Future development of technology to reduce GHG emission is assumed and incorporated.

→ **Efforts to reduce emission need to continue with ambition, and technology is expected to support such continuation.**

What are the solution elements?

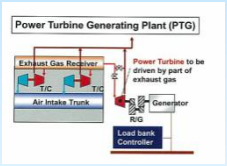


- **Resistance reduction solutions**

Various shapes and curvatures used on ships may be changed to reduce ships resistance. Stern areas are no doubt to focus on.
Air lubrication is known to have potential in reducing hull resistance.

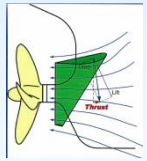
- **Power recovery solutions**

- will greatly contribute to efficiency, if better recovery can be found. Contra-rotating propeller is one example. In engine room, where heat or energy is wasted and there is a long history of improving waste heat recovery.



- **Propeller efficiency solutions**

- will largely depend on its shape, system and size.



- **Naval architecture solutions**

Optimised speed, lighter construction will contribute to less emissions.

What are the solution elements? (cont.)

- **Engine and power source solutions**

Engine with better combustion will contribute to reduction.

Alternative fuel will also be an interesting area.

✓ LNG burning engines

✓ Non GHG emission fuel cells

Solar energy is already being used.

- **CO2 capture solutions**

Scrubbers that will work for CO2 is a possibility in the future.

There are variety of solutions for GHG reduction and some of them are already available or about to be available, and some need more time.

GHG emission issue is not static and will be evolving with technology development.

Key points of summary

- **Ships can be made more energy efficient with technological development**

EEDI concept will help promote continuation of GHG reductions in the industry.

→ Real solution towards this issue goes hand in hand with advancement of technology.

- **Solutions are widespread, and can be chosen by ship owners depending on availability of technology**

Shipyards oriented solutions will play an important role in finding right solution.

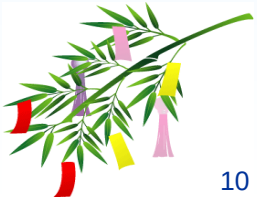
Key points of summary (cont.)

- **Continuing such efforts will be difficult without properly being rewarded**

Some technologies should be well protected with intellectual property rights – otherwise shipyards will be discouraged to make further efforts and lose passion.

- **Fact that rule making enters into scene, it will be necessary to promote incentives to parties who are making more challenging attempts**

It is our hope that OECD will take this point seriously and consider allowing some support in export credit scheme.



Thank you.

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