

**027** – November 2010

## **Green shipping hype and high-risk cost saving measures must not compromise engine room safety**

### **General**

The motto of the CIMAC Circle in Hamburg on the 9<sup>th</sup> of September 2010 during the world's largest shipping, shipbuilding and marine equipment exhibition SMM 2010 has given a strong signal in stressing the other side of the "green shipping" coin – cost of ownership proceeding from the assumption that the ownership of the engine and the ship is still the same.

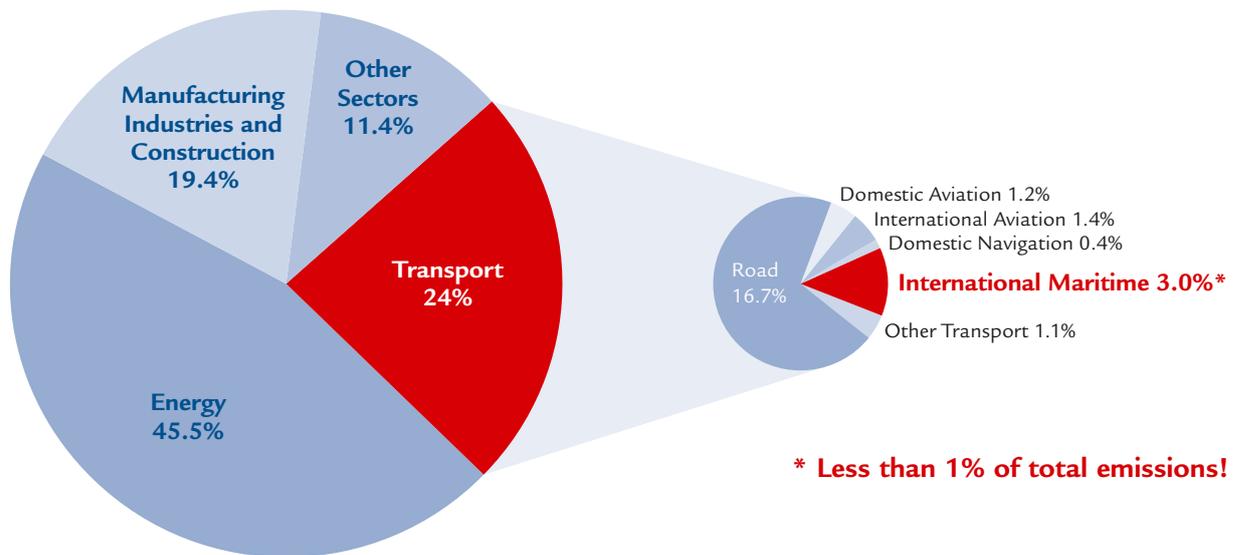
If unrestricted capitalism is allowed to prevail, scrupulous investors will start again to order ships for pure speculative reasons and might even extend their obscene activities. A variant of a cross boarder like leasing system could change this situation and a scenario becomes thinkable where the "power house" of a ship will be leased to obscure investors and released by the ship owner at the same time.

By doing an analysis on total cost ownership and looking into the future of shipbuilding

and shipping, the diesel engine community has clearly pointed out in Hamburg that all the fancy green technologies, products, processes and ideas – the majority of them not really new but impressive enough to attract fluffy politicians – embody the need for extra financing.

But who will be ready to pay for a modest rise of the ecological footprint of shipping in the future? There was no explicit answer given by the panellists. Usually an innovation is clearly defined by precisely calculated economic and ecological returns!

It can't be repeated enough in this context that shipping's share in world transport is around 90%, its share in global CO<sub>2</sub> emissions – for example – is 3%! A figure which was too small to be discussed during the COP 15 Copenhagen 2009 climate summit!



## Emissions of CO<sub>2</sub> from shipping compared with global total emissions

Source: IMO/MEPC 59/4

## Cost

The question – who is bearing the financial burden of developing new technologies and products with no adequate protection of the intellectual property – can be easily answered: it's the mature European marine equipment manufacturing industry partly assisted by not only European shipyards. For good reasons, indeed. But is there also a firm commitment by king customer – the owners and charterers of ships? Will they join the industry in transforming the dictate of the mainstream driven law makers? What will be the position of the Flag States? Will IMO succeed in taming “busybody” – European Union and its unilateral measures?

## Ownership

The industry is confronted with a paradigm shift in the ownership of ships and engines as a consequence. The ship owner as a person, as an entrepreneur that intentionally bears risk, responsibility and liability combined with a certain social commitment, the one that exercises true control of what his vessels do, and the purpose to which the revenue generated by his ships can be put to, will be rapidly fading away.

Admittedly there are still personalities around like Micky Arison (Carnival), Dr. Helmut Sohmen Pao by the way Austrian by birth (World Wide Shipping), Yung Fa Chang (Evergreen), Gianluigi Aponte (MSC), Phillipe Louis-Dreyfus (GLD), Guido Grimaldi (Grimaldi Group) not to forget the Ofer Brothers (ZIM Israel Navigation),

to name only a few, but the trend is towards the anonymous financiers in combination with the anonymous owners, whereas the arch spans from reputable as well as scrupulous investment banks, ordinary money laundering organisations, private equity firms, pension and hedge funds, to high risk speculators and ruthless racketeers.

Transparency in the ultimate, beneficial ownership and control of ships is one aspect, the other is anonymity for a variety of reasons. In order to operate internationally, a vessel must be registered in a recognized ship register, which will then permit the vessel to fly its flag. The UN Law of the Sea Convention is silent on ownership requirements.

“Open Registers” in combination with the creation of corporate entities are the main instruments to achieve anonymity. Stavros Hatzigrigoris, Maran Tankers Management said in his presentation that *ownership should also be differentiated into two categories: state run shipping companies and liner companies.*

If we think only about the Peoples Republic of China merchant fleet, we will be confronted with a unique phenomenon in the near future – a state owned and operated Chinese fleet, financed by predominantly government owned Chinese banks, ships built by Chinese yards, flying the Chinese flag, manned by a crew of Chinese sailors, under the command of a Chinese master of the ship and Chinese officers, registered and classed by the Chinese Classification Society CCS, insured by a Chinese P&I club, transporting goods “Made in China”.

State owned shipping companies care less about the initial investment costs as this

is considered more to be a political issue and – in comparison with liner companies – financing (with the taxpayer’s money) is quite easier.

What both alternatives have in common is to minimize cost and maximize cargo income (profit). A coherent explanation why shipping companies are not really enthusiastic about technical improvements especially if they are not explicitly specified by IMO, unless they have a pay-back time of maximum 2-3 years and contribute to a substantial increase in profit over the rest of the lifecycle.

## Lesson learned from the CIMAC Circle

The three predominant cost related expenditures for main propulsion (diesel engine) operation are:

- **Capex** Capital Expenditure (first costs)
- **Opex** Operating Expenditure (engine running costs)
- **Fuel(s)**

### Capex

The capital cost for main propulsion and auxiliaries are usually integrated in the new building price.

## Opex

The operating costs comprise

- manning (crew cost)
- planned maintenance (predictive and preventive maintenance) spare parts and manpower
- contingency (emergency) maintenance spare parts (express delivery) and additional manpower (air fare)
- lubrication oil

Operating costs (and voyage expenses) usually are split between the owner and the charterer based on a contract called charter party. They have taken on greater significance in the pursuit of business survival. Fleet owners have been reducing maintenance schedules as much as possible but the rising costs of crew, raw materials and crude oil will – in the long run – be forcing general maintenance costs up. As a consequence, the manning level for first line maintenance i.e. tuning of engines, overhauls of turbo chargers and fuel (injection) components is such that this kind of work can't be conducted by the ship's crew any longer.

Although ship operating costs have dropped for the first time in 8 years in 2009, with the exception of crew costs, there are well founded reasons that such a development will increase the dependency on specialists for maintenance. Accompanied by an ever increasing complexity of computer controlled systems (digital ship) this will result in a surging demand for external specialists and a significant increase of maintenance costs.

## Repairs and Maintenance

Fleet owners have been reducing maintenance schedules as much as they dare, but rising cost of raw materials – crude oil and therefore paints, coatings etc plus the complexity of installations and processes are forcing repair and maintenance costs up. The discussion on ownership cost sometimes gives the impression that ship operators have overlooked repair and maintenance cost in the past. Not only the Greek ship owners but the majority of the global shipping industry has been buying spare parts on the gray market since decades as their business always was governed by the urge to maximise profits!

## Who pays for what?

### • Time charter

In a time charter, the vessel is hired for a specific period of time. The owner still manages the vessel but the charterer gives orders for the employment of the vessel. Capex and Opex are fixed, fuel costs are paid by the charterer while LO lubrication oil and maintenance are covered by the ship owner. Time charter generally includes loading and unloading costs in the charter rate.

### • Spot or voyage charter

This is a short term contract for a single voyage between one load port and one discharge port where normally the ship owner pays for the fuel costs.

### • Contract of Affreightment (COA)

Relates to the carriage of specific quantities of cargo with multiple voyages over the same route and over a specific period of time normally a couple of years. All of the ship's Capex, operating, voyage costs are borne by the ship owner.

## Fuels

When discussing marine fuels one should always bear in mind that marine diesel engines never will become an air purification plant! Owners and charterers will be dealing with a variety of different preferably biodegradable fuels and lubricants in the future, all requiring additional space and storage capacities apart from higher procurement costs.

Future propulsion plants will need a high level of operational flexibility to handle different fuel for different modes of operation in order to cope with different ECA Emission Control Areas and operation on liquid fuel (e. g. diesel) or gas. Not to mention the storage facilities all over the world for different fuels.

- HFO Heavy Fuel Oil
- Low Sulphur Content Diesel Fuel
- MDO Marine Diesel Oil
- LNG Liquefied Natural Gas

Not only the unilateral emission legislation of the US and the European Union will lead the shipping industry into chaos, but also the abandoning of one more or less single fuel for worldwide shipping! A very essential element of the future marine fuel equation is missing – refineries! Obviously nobody is questioning the crude oil refining industries how they see the trends towards cleaner fuels. Heavy Fuel Oil was what was left after the third and fourth generation of re-refining processes.

How will they deal with these huge amounts of toxic waste?

How and where to get rid of this stuff?

Is there an excessive new demand for HFO in other segments of the industry?

Are they ready to invest in a new generation of refining plants and processes, are they capable to supply low sulphur content diesel oil all over the world?

At what cost? At what price?

If the industry is to comply with the 2015 sulphur reductions required by IMO, applicable first in the English Channel, Baltic and North Seas as well as 200 nautical mile zone around the USA and Canada as the rules are now, the only available fuel alternative to traditional bunker fuel will be “marine gas oil”. The current annual global supply of marine gas oil is about 15 million tons. The demand will jump up to 60 million tons in 2015, as a result of the IMO rule. The effect on shipping companies will be severe! Maersk estimates the increase in annual operating costs to be around USD 300.000!

## Reliability / Availability of the propulsion system

Irrespective of life cycle costs and green technologies, reliability and availability of the entire propulsion system will be – better should be – the ship owners/operators major concern. Kobune Goto from NYK clearly stated that *engine room safety should not be compromised* when presenting his cost comparison “conventional versus electronically controlled engines”!

Chief engineers and crew likewise are not only inundated by a flood of legislation and administrative work these days, but they are also confronted with over sophisticated equipment. Owners and operators alike want to have Volkswagens – preferably Golfs not Ferraris – taking goods from A to B thereby generating the highest possible profit!

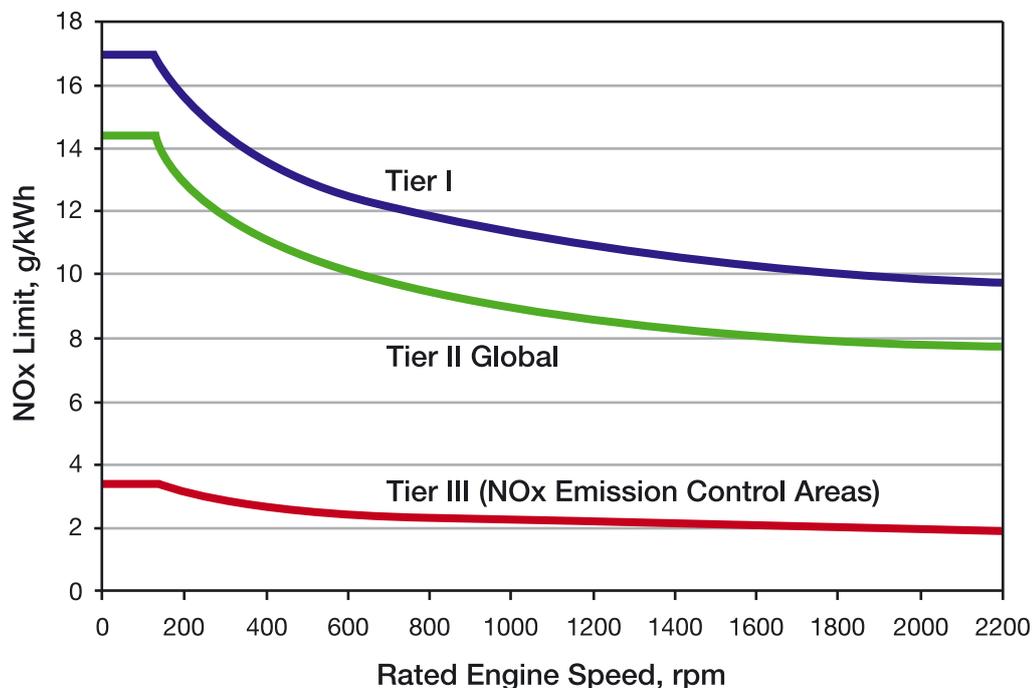
Ole Graa Jakobsen, Maersk put it quite clear: “We (the ship owners) *do not specify advanced engines – we like to have reliable and simple propulsion systems*” in full compliance with current legislation! And “*nobody can tolerate break downs of the engines*” Stavros Hatzigrigoris, Maran Tanker Management, added in this context.

The shipbuilding and marine equipment industry should take this as a clear mandate to follow much closer their customers’ expectations than engage themselves in mainstream dictated pseudo environmental legislation strongly promoted – among others – by the pro-nuclear lobby and fraudulent emission traders!

### MARPOL Annex VI NOx Emission Limits

Tier	Date	NOx Limit, g/kWh		
		n < 130	130 ≤ n < 2000	n ≥ 2000
Tier I	2000	17.0	$45 \cdot n^{-0.2}$	9.8
Tier II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
Tier III	2016 †	3.4	$9 \cdot n^{-0.2}$	1.96

† In NOx Emission Control Areas (Tier II standards apply outside ECAs).



Source: [www.dieselnet.com](http://www.dieselnet.com)

## IMO Tier III

The presentation of Udo Schlemmer-Kelling from CAT-MaK was dealing with the writing on the wall “*IMO Tier III is knocking at our door*”!

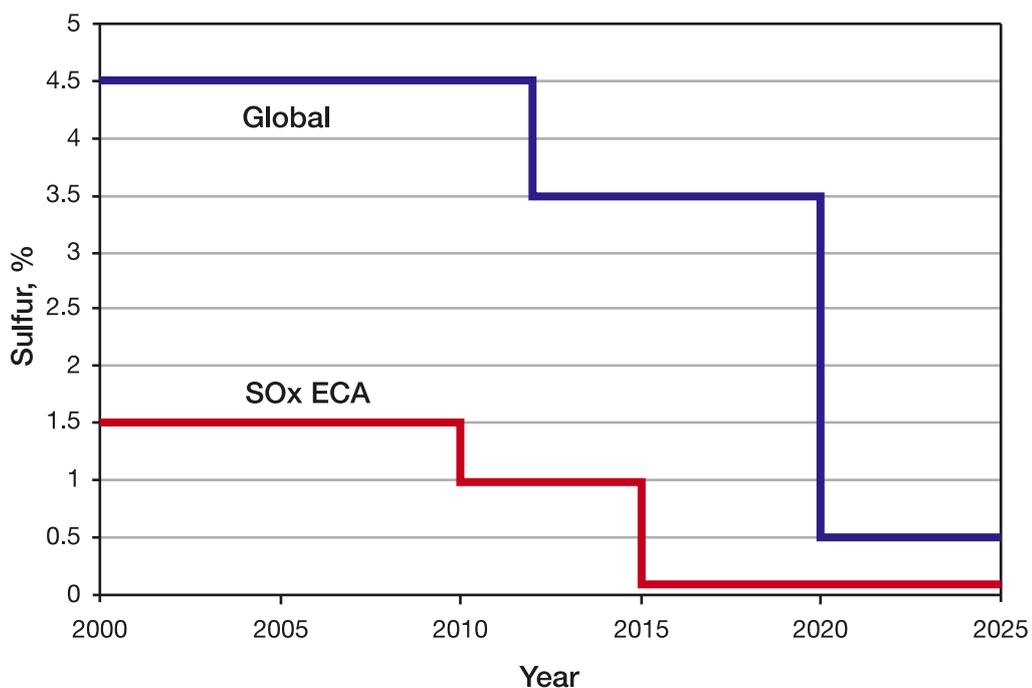
The most stringent Tier III emission standards apply to ships constructed on or

after 1 January 2016, operating in Emission Control Areas. These stringent emission standards and fuel sulphur requirements for ships primarily target SO<sub>x</sub> and NO<sub>x</sub> plus PM (particulate matter) emissions reductions in so-called SECAs Sulphur Emission Control Areas in Europe (EU countries), the United States, Japan, Singapore and Australia.

## MARPOL Annex VI Fuel Sulfur Limits

Date	Sulfur Limit in Fuel (% m/m)	
	SO <sub>x</sub> ECA	Global
2000	1.5%	4.5%
2010.07	1.0%	
2012	0.1%	3.5%
2015		0.5%
2020 <sup>a</sup>		

a – alternative date is 2025, to be decided by a review in 2018



Source: [www.dieselnet.com](http://www.dieselnet.com)

This contributes to a massive dilemma for ship/engine operators. They are ready to reduce operating costs but they do not like to raise engine room complexity as a consequence of emission reductions. It also will have a negative effect on the free movement of ships on the seven seas and the second hand market. Global standards will split – for the first time – global shipping into two “regional areas” creating two technological breeds of vessels and establishing – in a certain sense – unfair conditions for competition. To sell a Ro-Ro that operated in the Baltic to non SECAs will make this deal almost impossible.

## Emission Reduction Concepts

All emission reduction concepts come along with increased investment and operational costs, complexity of the processes and the demand for increased maintenance skills. LSF Low Sulphur Fuels are expensive, SO<sub>x</sub> systems have to be adapted to marine use, DF Dual Fuel lacks the infrastructure, Otto Gas might be a long term solution and gas obviously is the most efficient technology for CO<sub>2</sub> reduction.

The diesel engine community and their suppliers have been developing an impressive number of emission reduction technologies since the late 80ies already, which are praised today as ground breaking innovations:

- High pressure, two-stage TC turbo charging
- Exhaust Gas Recirculation EGR
- Charge Air Humidification
- Direct Water Injection

- Water Fuel Emulsion
- Selective Catalytic Reduction SCR

Let us take two stage-high pressure – Miller cycle – based turbo charging as one example, or another example – the Urea-Selective Catalytic Reduction technology originally developed and patented for the Hydrocarbon Processing Industry by Haldor Topsoe in Denmark (licensed by Snamprogetti, Italy). It has been adapted to the needs of the combustion engine manufacturers and operators in the early 90ies already. Legislation, regulations and standards were lagging behind and the shipping market was not ready for voluntary investments in low emission propulsion systems.

One thing is clear. The new emission standards and fuel requirements will weaken the position of the marine diesel engine. Some in the industry will recall the market research forecast of Wärtsilä in the late 80s, at that time a sole 4-stroke diesel engine manufacturer, which earnestly predicted the elimination of all other power systems from two-stroke diesel, via nuclear to steam and gas turbine in marine propulsion and stationary power systems by the end of the century.

Combined with a global decline of the number of ships on order by the end of 2010, it can easily be predicted that demand for diesel engines will stall – if. If not major disturbances will be shaking the shipbuilding market! The speculative demand for ships was mentioned already, but there are several sleeping bombs deployed on the market! Worldwide Shipping and especially European shipbuilding could very well face yet another crisis in the following years!

## Cap and trade

The Emission Trading Scheme ETS was a major pillar of the EU climate policy, but – after 5 years – it has fallen victim to fraud and corruption. The carbon credits under the ETS grant companies permits to emit CO<sub>2</sub> up to a specific “cap”. Beyond that they must buy permits. This system between GHG emitting organizations in developed countries and carbon cutting projects in developing countries has proofed to be an imperfect mechanism. Carbon fraud is the white-collar crime of the decade and it costs taxpayers millions of Euros of VAT.

Carbon credits traders, leading banks (Deutsche Bank) and financial services providers together with the media (Al Gore), the electricity branches of the energy sector, classification societies (DNV) and, inspection, verification, testing and conformity assessment companies (SGS) were accused of infractions. Nevertheless they continue their fraudulent activities forming – together with organized crime and assisted by politicians – the driving forces behind the GHG hype. Their lobbying is so obtrusive although a number of cases of outright fraud have been confirmed by various courts of law all over the world.

**The first decade of the new century will forever be known as the decade of fraud and corruption!**

Carbon (CO<sub>2</sub>) credit fraud is a variation of the VAT carousel fraud. It is estimated that more than 90 per cent of the market value in 2009 was abused by fraudulent activities. Tax fraud associated with carbon (CO<sub>2</sub>) emission trading is estimated to have cost

EU member states in 18 months up to 4 bn € in lost tax revenue! These criminal activities (severe fraud and theft) have destroyed the creditability of the European Union Emission Trading System.

### How to cope with this overheated situation?

- **Stay calm and stop all exuberant support for the crime driven climate change hype!**
- **Bear in mind that the debate on emissions simply is a substitute for another ill fated hype – Information Technology!**
- **Be aware that monitoring, reporting and verification are the weak points of Emission Trading Systems!**
- **Give safety at sea your prime priority!**

It can only be hoped for that IMO and the Member States commit themselves not to too stringent emission standards during the COP16 Cancun Climate Change Conference as carbon (CO<sub>2</sub>) trading is a charter for criminals and an ideal instrument for money laundering! It is the responsibility of the Member States to put an end to this financial nightmare and beef up safety of shipping instead!

## Overcapacities

### Shipping, shipbuilding and equipment industry

The economic downturn has hit shipbuilding late, but very heavily. An extraordinary large order book, partly boosted by pure speculation, had – to some extent – cushioned the immediate impact of the

crisis. There is considerable uncertainty as to the timing of any improvements in the shipbuilding sector and a slightly more critical situation applies to the marine equipment industry.

Continuing cancellations and deferred contracts are negotiated under high secrecy. It might be quite possible that cancelling an order with one shipyard and re-ordering with another, turns out to be very lucrative for a ship owner as prices for new buildings fall rapidly while overcapacities pose a growing – to be precise – the biggest problem to the entire industry (shipbuilders and equipment industry).

**Overcapacities accompanied by falling newbuilding prices together with the green shipping hype must not compromise safety!**

Unfortunately, the future will teach us that the governments of Japan, Korea and the Peoples Republic of China, representing more than 80 per cent of the world order book, will not agree on a fair and binding agreement on shipyard capacity reductions. They – for sure – will continue to subsidize their yards – directly and indirectly.