

Green vs Profitable Shipping

Are they mutually exclusive?

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An example!

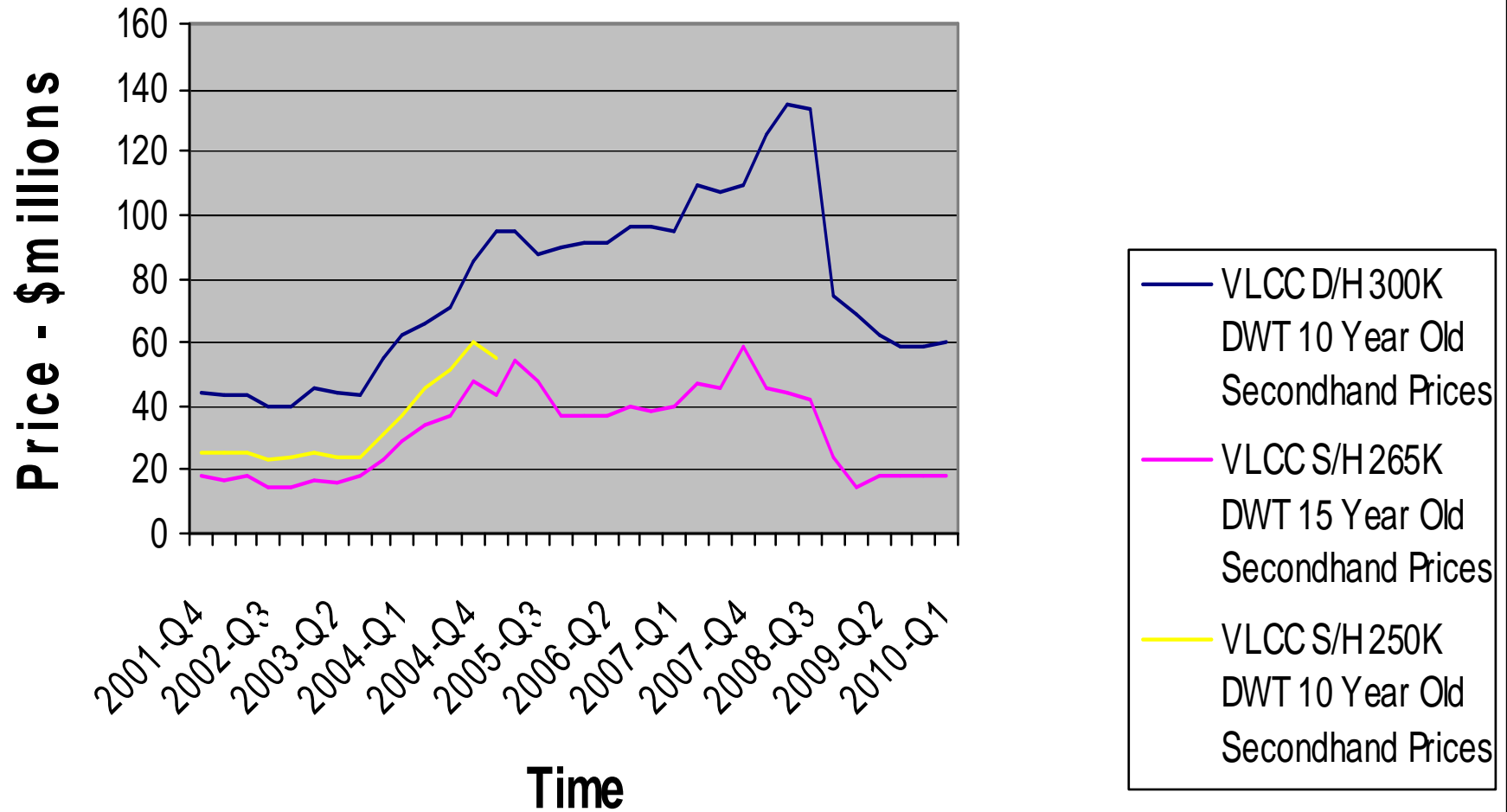
- In 1992 Annex 1 reg. 13F
- Impact was huge!
- Owners of single hulls caught off guard!
- Diminished values
- Leap from a cost of \$35million to \$100million
- Favoured the deep pockets



The industry adjusted

- Initially income could not support a switch
- Erika and Prestige accelerated process
- Market improved and ordering increased
- CAS and conversion arbitrage created flexibility
- Thankfully dynamics of the market improved for all owners (2004)!

2nd hand values - VLCC



Positive Note!

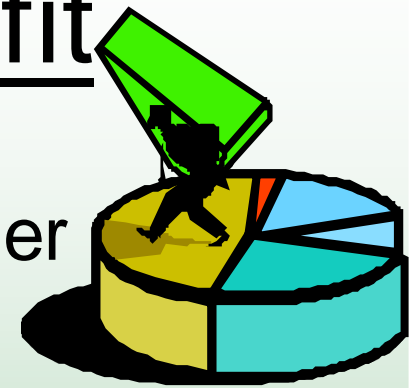
- Shipping is the most environmentally friendly form of transport, with about **2.7%** of the world's **CO2** emissions.
- Carries over **90%** of world trade on over **60,000** vessels.
- Every single day International Shipping covers **500 Billion** ton miles.
- Still, the industry is concerned with reducing its environmental impact.
- Studies show that **CO2** can be reduced by **15%** over the next **10** years.

Collective Action Required!

- People can be sensitive to the environment but also need guidance.
- Individual application is not sufficient. Actions must be taken **collectively!**
- Sensible Regulation is **unfortunately** the only way to ensure that a majority take responsibility.
- **IMO** and **UN** have a tough time bringing all states in line with the requirements, as exemplified by the **UNFCCC** being unable to reach agreement in Copenhagen in **December 2009**.

Business Must Make a Profit

- Every business must make a profit in order to survive long term.
- Regulations can create restrictions in the short term.....but also opportunities through change and gaps in the market.
- Although **Single Hull Tanker** phase out regulation established in **1992**, still there are states providing exemptions or extensions today.
- Level playing field required – to be impartial.



The Ship is an Easy Target

- **Shipowners** bear the brunt of regulations.
- **Charterers** demand adherence to the regulations, but they are not always supportive in the sharing of the cost.
- **Yard's** do not follow through after delivery, especially after a year's warranty. They do not cover consequential expenses/delays etc
- **Classification Societies** face pressure by the yards to cut corners.

Regulation and Rules Overload

- The Shipping Industry developed a **Green** Conscience for the environment many years ago.
- The **MARPOL CONVENTION** of **1973** and **1978** were the beginning of specific regulations of how to protect the environment and make maritime transportation clean.
- The table below indicates the **IMO** regulations that protect the Sea and the Environment:

1983 Annex I	1987 Annex II	1992 Annex III	2003 Annex IV	1988 Annex V	2005 Annex VI
OIL	Noxious Liquid Substances in Bulk	Harmful Substances in Packaged Form	Sewage	Garbage	Air Pollution

Annex VI: Current Status

- On the **19th May 2005** ANNEX VI was entered into force to the **MARPOL CONVENTION**.
- These regulations set limits on **Sulphur Oxide** and **Nitrogen Oxide** emissions from Vessels.
- These include a global cap of **4.5% m/m** on the sulphur content of bunker fuel. They also contain provisions for the establishment of '**SOx Emission Control Areas**' such as **SECA** and **ECA** (locations described in the next slide).
- In these areas, the sulphur content of fuel oil must not exceed **1.5% m/m**.
- The Annex also sets limits on emission of Nitrogen Oxides (**NOx**) from diesel engine and prohibits the incineration of certain products such as contaminating packaging materials.
- The main changes to MARPOL ANNEX VI stipulate a progressive reduction in **SOx** from vessels from **4.5%** to **3.5%** effective **1st January 2012**, then progressively to **0.5%** effective **1st January 2020**.
- The limits to be applied to **SECAS** areas will be reduced to **1%** in **July 2010** and will be further reduced to **0.10%** in **2015**.
- **NOx** emissions from Shipping represent **7%** of Global Emission, while **SOx** represent **4%** of Global Emission.

Rules are Necessary although they Need Support

- **ISM** and **OPA'90** has helped with general safety awareness onboard, emergency preparedness and environmental incidents thus reducing eventual accidents by **50%** over the last **20** years.
- More must be done for states to cooperate with shipowners.
- Today, we are going through a period whose focus is the reduction of **CO2** (GREEN house Gases), Nitrogen Oxide (**NOx**) and Sulphur Oxides (**SOx**).
- These pollutants are generated from the combustion of Fossil Fuel in a Diesel Engine.
- In this respect, **Low Sulphur Fuels** are being supplied to the vessel with specific regulations introduced in Emission Controlled Areas such as **SECA** and **ECA**.
- SECA concerns **Europe** in the Baltic and North Sea while ECA resides around the **USA** and Canadian Coast.

Illegal Discharge in European Seas

- **One third** of Global Maritime Oil transportation passes through European Waters. Not only Oil Tankers, but various other Cargo ships pose a constant threat of small to medium scale oil pollution from illegal dumping of oily wastes with at least **3000 major events per year around Europe**.
- Oil Tanker crews release noxious residuals at sea. It is estimated that at least 3000 major illegal hydrocarbon dumping incidents take place in European waters yearly, amounting to total amounts of between **1750** and **5000** tonnes in the Baltic Sea and more than **400,000** tonnes in the Mediterranean. Oil released into European seas as a result of operational discharges greatly exceeds the amount released during accidental spills.

Illegal Discharge: What is released And Why?

- Yearly in the Med, they can add up to **20** times the amount that was spilled by the 'Prestige' off northern Spanish coasts in **2002**. Despite international and domestic conventions and legislation, oil dumping in the sea remains a troubling, unsolved and uncontrolled environmental problem.
- Releasing ballast water is discharged, oil residues are released as well. Releasing ballast water should be done in special receiving facilities in ports, but is generally done at sea, to avoid extra costs (**0,15 € per m³**). When switching cargoes, hulls are washed to remove oil residue on hull walls (about **0,5%** of the total load).
- Tank washing must be done at sea, as the vaporous and fumes emitted during the process violate air quality standards in the urban areas where ports are located. Such washings may be done by spraying pure oil or water into the tanks in order to remove oil residues.
- The remaining residue from a tank washing should typically be stored in **slop** tanks, discharged at reception facilities and tanks inspected at each port of call. But this is rarely done, and cleaning residues are also left at sea.
- For the reception facilities, the value of oil may be small relative to the cost that it takes to treat and refine it. There are also regulatory concerns, as laws may classify any unwanted water associated with slops as **toxic waste**, thus subjecting the port facilities do not want to handle the waste oil.

Environmental and Economic Consideration

- Sea freight is set to grow by **20%** over the next **10** years.
- Ships spend half their time at sea and burn **1.5MT/hr**.
- Typical annual fuel bill is **\$3million** and rising with oil prices and consumes **3%** of the fuel of global transportation.
- The global fleet burns about **Half a Billion** tonnes a year.
- Over **1.2** billion tonnes of **CO2** emissions yearly and could rise by **30%** by **2020**. **25** million tonnes of **Nitrous Oxide**.

❖ **WE CAN DO SOMETHING ABOUT IT!!**

❖ **The Scrubber could save \$1m/yr with clean emissions. Difficult for retrofit.**

Energy Efficiency

- **Innovative Technology** and new **Operational Procedures** have to be introduced in order to comply with the Emission Control Regulations.
- To deal with the new regulations we have to firstly achieve **Energy Efficiency** for the **Diesel Engine**.
- In the **Optimum Operating Range**, fuel efficiency is considerably higher and pollution lower at certain speeds, so ideally a solution is to keep engines running in the optimum range.
- Efficiency can also be achieved by optimisation of the **Propeller**, **Rudder**, the **Trim** of the vessel and the usage of the correct **Paints**.
- While the **60th Session** of the Marine Environmental Protection Committee (**MEPC**) is over without final verdict and the **MEPC 61** is being prepared, the industry is preparing itself with innovative machinery and equipment able to monitor and measure **NOx**, **SOx** and **CO2**.

Reducing Energy Demand

Technical Measures/Ship's Structure

Figures suggest significant **reductions** in Energy Demand through:

- **Hull Form**
- **Hull Coating**
- **Hull Lubrication**
- **Lightweight Material**
- **Bulbous Bow**
- **Stern Flap**

Reducing Energy Demand

Technical Measures/Engineering Systems

- **Electric Propulsion**
- **Advanced and Superconducting Propulsion Motors**
- **Variable Speed Drives**
- **Waste Heat Recovery**
- **Propeller Design**

An example of a Reduced Energy Demand Technique System:

The Greenwave Programmes

Improve the ship's aerodynamics:
Use this wind to power the ship:



DRACS

WASP

PASS

HYDRIS

Improve the ship's hydrodynamics:
Demonstrate and monitor the benefits



Greenwave ... Sailing into a greener future

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Re: Charitable Status
(Application presented and awaiting confirmation from the Charities Commission)

Spring 2001

Improve the ship's aerodynamics

DRACS

Drag Reducing Aerodynamic Components for Shipping

While the greatest source of drag on large vessels is between the hull and the water, the way that the air travels around the above-surface structures can significantly affect the ship's speed and fuel efficiency.

When a single ship's fuel costs are running at over US \$3m a year, any saving has an economic as well as an environmental benefit.

Today's global fleet of cargo vessels was built when fuel was more plentiful and less costly than today. Aerodynamic drag was not a prime consideration.

Consequently it is little surprise to find that bulk carriers, supertankers and container vessels might be described as being about as aerodynamic as a concrete block. The DRACS programme set out to identify where the main sources of wind resistance were; typically the main accommodation superstructure and the cranes.

Using scale models, from an actual fleet of bulk cargo carriers, the Greenwave Project Team commenced wind tunnel tests to identify precisely those aspects of the ship's structures that created wind turbulence – the factor that has the most negative aerodynamic impact.



Once the key trouble spots had been both identified and quantified, the team began creating solutions that would guide the wind round the points of greatest resistance.

These designs, which can be easily fitted to existing ships, were again tested on large scale models in a wind tunnel. Computer linked sensors measured 'before and after' improvements.



The results were fed into a specially designed analysis system. Using extensive records from actual ships' logs (apparent wind angles and speeds) the programme can accurately predict just how much positive impact the aerodynamic improvements are having.

These easy-to-fit aerodynamic improvements, unveiled at the Posidonia international maritime exhibition in Piraeus, Athens in June 2008, will make an immediate fuel reduction.

Our 26% drag reduction saves 60 tonnes of fuel!



Drag Reducing Aerodynamic Components for Shipping

 DRACS

Gas-Fuelled Engines

- Potential for significant reduction in emissions compared to marine fuel oils:
 - **30%** lower **CO₂** (Low Carbon Fuel)
 - **85%** lower **NO_x** (High Air/Fuel Ratio), very low **SO_x** and **PM**.
- However- limited availability and even less as Liquid (LNG) Storage.
- Volume even for **LNG** up to **4 x** greater than for **MDO**.
- **Gas Fuelled Ships** for all types of gas-fuelled machinery including **Single** and **Dual Fuel Engines**, **Gas Turbines** and **Boilers**.

Shipowners and NGOs must take Control of Ship Designs

- Currently ship designs are sold to shipyards on a **Copy – Paste** basis.
- Shipping economics are naturally opportunistic.
- **Yards** will prioritise resales and near-term economies.
- **Classification Societies** must do their job better, helped by government agencies such as Flag States.
- **Charterers** must become more involved and support owners/classification societies who focus on environmental performance improvement.

Ship Recycling

❖ Ratification of an International Convention:

- Campaigns by environmental groups concentrating on ship scrapping practices have led to the development of an Industry Code of Practice on **Ship Recycling**.
- This fed into the International Maritime Organisation (discussions & resulted Non Government Organisations IMO) guidelines on Ship Recycling (**Dec 2003**).

❖ International Labour Organisation (ILO) Guidelines on Safety & Health in Ship Breaking:

- Basel Convention **Environmentally Sound Management of Dismantling of Ships**.
- Basel Convention on **Transboundary Movement of Hazardous Wastes** began to be applied to ships.

❖ Evolving Regulatory Environment

- A new legally binding International Convention for the **Safe and Environmentally Sound Recycling of Ship** rules will cover ship design and construction.

Political Correctiveness vs An Effective Shipping Industry/ Efficient Global Trade: What can be done?

- Efforts should be devoted to creating uniform and consistent vetting platforms between charterers in respect of inspecting/approving vessels for charter, which would both reduce wastage in terms of cost and time attributable to vetting processes, whilst still preserving the environmental integrity of ships and operators.
- Streamlining processes in shipping and coordinating efforts
- The IMO and, where applicable, governments and societies, have to strike the right balance between an effective, safe and environmentally responsible shipping industry which facilitates efficient global trade, and the flood of environmental regulations introduced under the banner of '**Promoting Green Shipping**'.

Investing

- **SCRAPPING-** Sustainable 'GREEN' recycling of obsolete vessels without regulatory risk.
- **Vessel Technology- GREENWAVE:** 'Sailing into a Greener Future'.
- **Owning- SAFE SHIP INVESTMENT FUND:** "Collating and providing resources to Greener Shipping while making a profit

Very Complex Environment

- Market needs to be positive
- Ordering a ship today becomes confusing
(different fuels, ballast water management, sewage treatment, new STCW requirements etc)
- What about existing fleet?
- Do shipyards, with a production line and owners with a market income budget really have the flexibility to incorporate these regulations ?

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- Invests in New Buildings with better technology.
- Is a sponsor for new Environmental concepts in shipping, such as **Greenwaves, Scrubbers** and **Green Scrapping**.
- Active on **NGO** boards to stay at the forefront of regulatory activity
- Looks to combine Safe and Environmental approach with a healthy investment.
- Strives to take a Pro active stance in relation to Green Shipping, positioning itself at the forefront of environmental awareness and transparency.

Here's a thought!

- Whether the scientific studies are to be believed (**New Scientist 20th March** provocatively claims that Sulphur emissions actually have a **cooling effect** on Global Warming) or whether legislation is being passed for the sole purpose of public appeasement of the industry, or whether these measures will actually reduce the impact of pollution to the environment are all to be seen in the future.