Global Sustainable Shipping Initiatives: Audit and Overview 2011

A REPORT FOR WWF

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Executive Summary

Environmental performance of shipping continues to be an area of increasingly intensive scrutiny, which has driven governments, ports and shipping operators to focus on ways of improving the sustainability of the shipping life-cycle and initiatives that encourage them to do this. 'Sustainable shipping initiatives' refer to innovative schemes that encourage shipping to go beyond standard compliance of environmental behaviour and become exemplary in their approach to shipping operations and the environment. Key drivers of sustainable shipping initiatives are considered to be their economic benefits, Corporate Social Responsibility (CSR) and marketing, environmental protection and shipping and international regulation with respect to compliance.

This report updates research conducted in 2004 and highlights the fundamental changes to sustainable shipping initiatives since then. It identifies drivers of these changes and shifts in opinion regarding the best methods of delivering global, sustainable shipping.

Finally it provides a summary of the key conclusions of the Global Sustainable Shipping Framework Workshop held on the 19th April 2011 and identifies the way forward.

An audit of the initiatives suggests that they fall into one of four categories. Firstly, research and innovation which can be high or low technological investment responses, led by classification societies and shipping companies. These encourage the design and implementation of improved or cutting-edge environmental management technology. Secondly, CSR and marketing opportunities through achieving accreditation for high specification equipment and high quality operational management, led by port states and international shipping bodies. This is encouraged through economic rewards and external recognition. Thirdly awareness raising and environmental education delivered through a number of more holistic, proactive initiatives. These are co-ordinated by NGOs and/or are driven by operators and owners to enhance CSR. Finally, the initiatives delivered by voluntary class notations through which the classification societies promote their own schemes and initiatives.

It is concluded that despite the increased drive for sustainability within all areas of the shipping industry, fragmented initiatives remain the predominant response with only a few focusing on a more holistic approach. In order to mainstream sustainable shipping initiatives and achieve universal acceptance and participation, it is important to look at shipping from an inclusive perspective. Existing global sustainable frameworks such as The Marine Stewardship Council (MSC) and The Forestry Stewardship Council (FSC) could provide examples of good practice that may apply to shipping in respect to a holistic and global sustainable approach. With this as a leading hypothesis, future work for phase two will commence with research that outlines the key global sustainable frameworks currently in operation. These will be investigated, compared and presented in relation to their applicability to the shipping industry.

Keywords: Sustainable shipping, Green shipping initiatives, Clean ships, Corporate Social Responsibility.

1. Introduction

Shipping is responsible for the transportation of approximately 90% of world trade and is also one of the most environmentally benign forms of transportation when considering goods transported on a tonne mile basis. However ships continue to be large producers of CO2, SOx, and NOx emissions. Other pollutants such as wastes, persistent chemicals from anti-fouling, cleaning agents and lubricants are associated with the shipping industry to the potential detriment of the marine environment despite the growing awareness of environmental issues and corporate social responsibility with regards to shipping and the environment. The International Maritime Organisation (IMO) plans to improve the sector's carbon footprint by technical and operational reduction measures and market-based mechanisms stressing the importance of a global approach in furthering improvements to energy efficiency and emission reduction (IMO, 2010a). However because global legislation is slow to address these issues, other responses have tended to be country specific with a myriad of initiatives generally focusing on specific environmental shipping issues, rather than a coordinated, standardised approach which looks at shipping in a holistic manner.

Since 2004, it is noticeable that some initiatives have been short lived or part of a finite project such as the French led 'Keep it Blue' initiative that conducted an awareness campaign focused on reception facilities for ship generated waste, and 'TRESHIP' (from Norway) which was a one-off research project focused on environmental technological solutions for shipping. The 2003 Group, led by WWF which focused on the removal of TBTs from antifouling paints also had a limited lifespan. However the project served as a catalyst to encourage wider environmental buy-in from the industry. Since 2004 some original initiatives such as Rotterdam's Green Award remain and have to incorporate different shipping sectors. New initiatives have also been established and are discussed below with focus on four main categories. There is a notable increase in high-investment technological innovations and those in the area fulfilling CSR. Generally sustainable shipping initiatives have tended to address specific environmental issues with few taking a truly sustainable or holistic view. This is still the case, with the recent 'Green Ship Technology' conference in Oslo (March, 2011) highlighting the issue, despite wider

recognition that a sustainable approach to shipping should be the way forward and a logical progression for the industry.

1.1 Definition of Sustainability

Defining sustainability is not straight forward but it is important for this project to establish a shared understanding of what is meant by the term, particularly when moving forward with a shipping framework that is entirely focused on the issue. In 1987 the World Commission on Environment and Development developed a definition of sustainability that was subsequently incorporated into the Brundtland report (1987). It stated that:

> *'Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.'*

Although this definition is widely accepted, the term sustainability is not limited to one concise definition. However in the context of sustainable development, three key areas emerge, which are identified by the pillars of sustainability and include the environment, economics and society (DESA, 2011). Organisations such as WWF additionally argue that governance is a factor that influences all these three areas.

1.2 Background

Sustainable transport is recognised as one of the biggest challenges of the 21st century (Fet and Ing, 2003). It is recognised that whilst shipping is relatively safe and clean, compared with other transport modes, the industry does have a significant impact on the environment. As shipping is a global industry the impacts of increasing pollution and illegal discharges are felt world-wide. However shipping is subject to less stringent environmental demands than those placed on land-based transportation and business (EMSA, 2005). The precautionary principle, sustainable development policies and ideals, greater public concern about global environmental issues and pressure from other

sectors all serve to reinforce the need for the industry to behave in a more sustainable manner. To an extent this is being achieved through the Marine Environmental Protection Committee (MEPC) of the IMO using legislative instruments, codes and guidance[1]. In general, therefore, significant progress has been made in terms of effective environmental management, with the consensus of the wider shipping industry, but much of it is reactive and based on a command and control philosophy. Furthermore, shortcomings persist, including inconsistent application of international legislation, the use of flags of Convenience by owners whose ships maybe of substandard construction and manned by substandard crews, compounded by inconsistent enforcement of regulations by the Flag State, insufficient penalties and a legacy of older less seaworthy vessels.

1.3 What are sustainable shipping initiatives?

Within the last decade a number of proactive efforts to encourage environmental management improvements within the shipping industry have emerged. These have variously and collectively been referred to as sustainable or green shipping initiatives. This report focuses on these initiatives and also discusses other key developments moving shipping towards a more sustainable future, such as the structured environmental management currently being implemented by many individual ports holdings groups, quality assurance systems, such as ISO 14001, ISO 26000, and the rules of vessels' Classification Societies. Arguably they have the potential to address environmental impacts associated with shipping for which legislation is new and/or emerging. The initiatives are diverse but can be grouped by the following:

- **Research and innovation (Technological investment)**

  These are initiatives aimed at reducing or obviating harmful environmental emissions, and include investment into research and technological design to make

[1] Complementary protocols (SOLAS, IMDG, ISM, MARPOL) have also encouraged environmentally sound operations.

ships safer and more sustainable. These initiatives break down into those where high investment has been made for specific solutions and lower investments or solutions that could be applied to many ships to reduce their environmental impact.

- **Corporate Social Responsibility (CSR) and marketing**

  The European Commission defines CSR as, *"A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis."* (EC, 2010). CSR is incorporated as part of Europe's 2020 strategy for sustainable and inclusive growth. Shipping operating to high environmental standards can achieve indirect benefits such as company promotion, through improving the company's image. CSR is usually incorporated into the company's marketing strategy.

- **Awareness raising/ environmental education**

  Initiatives aimed at educating and raising awareness, encouraging environmental management improvements across the sector.

- **Voluntary class notations and certifications**

  Environmental class notations provided by the different classification societies help to improve environmental safety design, construction and practice. During their annual surveys, the classification societies can review the certification and the environmental performance of the ship.

1.4 Drivers

The initiatives and schemes discussed in this report are of a voluntary nature and are designed to go beyond legal compliance with environmental regulation. The current key drivers of these initiatives are discussed below whilst recognising that decreasing natural resources and increased fuel prices also have a major role to play.

- **Economic benefits**

  Economic benefits reward good environmental shipping operations and practices that go beyond legal compliance. The rewards are varied but often include reduction of fairway and harbour costs.

- **CSR/ Marketing**

  CSR is concerned with the success of a company with respect to ethical values, people, communities and the environment. Leading edge companies will attract ethical business; environmental efficiency is strongly linked with safety; a relationship with environmental regulators is important and corporate sustainability reporting relies on good news and continual progress.

- **Environmental protection**

  Shipping operations that maintain a healthy environment are of benefit to the greater human good and the shipping industry as a whole, particularly as awareness grows with respect to climate change and the need for 'green credentials'.

- **Shipping and International Regulation/ compliance**

  Sound environmental management reduces the risk of fines and law suits. Specific liability improvements can be recognised by insurers and other service industries and cost savings are possible particularly when attention is given to avoiding or minimising waste, and increasing operating efficiency. Environmental regulation is often concerned with the safety aspects of a ship such as the SOLAS and MARPOL 73/78 Conventions, the ISM Code, and the Standard Certificate for Watch Keepers (STCW).

1.5 Global Sustainable Frameworks

It is recognised that global sustainable frameworks already exist in other industries which can provide useful examples of best practice for the shipping industry as they strive to develop their own framework. Three prominent sustainable frameworks are discussed below in light of their organisational structure, benefits and potential applicability to the shipping industry.

MSC

The Marine Stewardship Council (MSC) was founded in 1997 by the World Wide Fund for Nature (WWF) and Unilever, and became fully independent in 1999. The MSC is an independent non-profit organization which operates a fishery certification and eco-label programme. Fisheries that meet the MSC assessment standard are eligible to use the MSC blue eco-label. The MSC mission is to reward sustainable fishing practices and through their eco-labeling help consumers make sustainable choices when purchasing seafood. The eco-label indicates to consumers that a fishery operates in an environmentally responsible way and does not contribute to overfishing.

The MSC environmental standard for sustainable fisheries was developed over two years through a consultative process based on three guiding principles:

1. The condition of the fish stock(s) of the fishery
2. The impact of the fishery on the marine ecosystem
3. The fishery management system (MSC, n.d.)

Fisheries wishing to become MSC certified are assessed against the MSC standard by a third party, independent certification body which has been independently accredited to perform MSC assessments by Accreditation Services International (ASI). A chain of custody certification along the supply chain, from boat to point of sale, ensures that seafood sold with the MSC eco-label originated from an MSC certified fishery.

The MSC is headed by the Chief Executive who reports to the Board of Trustees. Support is given by the Technical Advisory Board and the Stakeholder Council and the programme operates through a multi-stakeholder partnership approach. In 2010 there were 7,220 seafood products being sold globally with the MSC eco-label and 97 independently certified fisheries meeting the MSC sustainable fishing standard. A further 1,535 companies have met the MSC Chain of Custody standard for seafood traceability.

MSC promotes sustainability within the fishing industry through market incentives created by the existence and operation of the MSC program, and its uptake by major global buyers of seafood (MSC, n.d.).

MSC use a basic sustainability concept that 'current catches should be at levels that ensure fish populations and the ecosystems on which they depend remain healthy and productive for today's and future generations' needs' in order to ensure sustainability of fisheries.' Additionally many well operated fisheries initially undertook MSC assessment and had little changes to make to meet the standard. These fisheries provided the foundation for MSC's establishment and the market's recognition of them provided the incentive for other fisheries to follow.

FSC

The Forest Stewardship Council (FSC) is a global non- profit organisation established in 1993. FSC is an international association of forestry stakeholder members promoting responsible management of the world's forests through tools such as standard setting, independent certification and labeling of forest products. In a similar way to MSC, FSC customers can choose products from socially and environmentally responsible forestry. FSC is a voluntary initiative and the logo should guarantee customers that the product comes from responsible sources that are 'environmentally appropriate, socially beneficial and economically viable' (Pattberg, 2006). The FSC label applies to a wide range of timber and non-timber products from paper and furniture and a certified product can only carry the FSC logo if the production chain can be reliably traced from the forest through

each processing stage to the shelf. There are three FSC labels: FSC pure, FSC mixed sources and FSC recycled. To verify whether an FSC label is valid, the certificate number on the label can be reviewed on the FSC certificates list or the FSC on-line certificate database.

The FSC works outside of state regulations and is an example of a non-state market driven (NSMD) form of environmental governance which indicates a market driven sustainable management of forests. The FSC NSMD network does not have political authority and governments are forbidden from becoming members of the FSC and can only act as the land owner. The authority of the FSC is determined by the approval of external audiences, such as environmental NGOs.

The FSC Label is consumer driven and works by providing an incentive in the market for responsible forestry by offering a competitive advantage to manufacturers and thus increasing access to new markets whilst maintaining access to existing ones. The FSC governance system has built in checks at the local, national and international levels giving the FSC advantages over existing governmental arrangements, as it includes interests regardless of their geographical location. The FSC uses governance networks because they increase the quality of environmental goals through knowledge sharing.

When a forest is certified the products that come from it should be traceable throughout the supply chain to ensure credibility and verification. The FSC chain of custody certification is a voluntary process and a tracking system allowing manufacturers and traders to demonstrate that timber is sustainably managed in accordance to FSC standards. Certified wood is tracked through the supply chain and across borders through every processing stage. A company is responsible for initiating the certification process through an independent certification body that will carry out inspections of its internal tracking procedures. FSC does not conduct certification audits itself. Only FSC-accredited certification bodies can evaluate, monitor and certify companies to FSC standards. To become FSC accredited, certifiers have to comply with a set of procedures which are verified by Accreditation Services International, ASI (a wholly owned and controlled subsidiary of the FSC). ASI monitors accredited certification bodies to ensure

their operations can be guaranteed. ASI conducts at least one office and one field audit for each FSC accredited certification body. If an FSC accredited certification body is not found to be fully compliant with FSC rules and procedures, Corrective Action Requests (CARs) are raised which have to be carried out within a given time frame. A certification body will be suspended and lose its FSC accreditation if it fails to comply with FSC requirements within the required time.

Green Globe

The Green Globe brand is owned by Green Globe Ltd., a UK-based company and is licensed to Green Globe Certification and Green Globe Asia Pacific. Green Globe was founded on the sustainable development principles set out by Agenda 21 at the Rio Earth Summit in 1992 during which an action plan was drawn up for the travel and tourism industry. In 1994, The World Travel and Tourism Council (WTTC) established the Green Globe programme in order to provide support and guidance for industry stakeholders trying to achieve sustainable outcomes in the Agenda 21 target areas. In 1999 the programme was expanded to incorporate the Green Globe Standard which was developed in conjunction with the Sustainable Tourism CRC and included criteria and indicators as well as a web based certification system and independent auditing. Certifications are offered in several languages and delivered by Green Globe's accredited auditors and consultants. The Green Globe certification standard consists of 41 criteria and 337 indicators which cover the areas of sustainable management, socio-economic, cultural heritage and the environment (Green Globe, 2011).

2. Current Sustainable Shipping Initiatives

A concise summary of key initiatives are presented within the categories highlighted earlier and are not prioritised. These initiatives range from individual schemes to more holistic approaches taken towards environmental shipping, some of which have become accepted practice within the industry. It should be noted that this is not a complete list of initiatives, but rather a 'snapshot' of current progress within sustainable shipping initiatives.

2.1 Research and Innovation: Technological investment

As governments turn their attention to climate change issues discussed through international conferences such as the United Nations Climate Change Conferences in Copenhagen 2009 (IIEA, 2009) and Cancun 2010 (UNFCCC, 2010), there is a growing focus on shipping emissions and abatement technology. In response to this the classification societies and individual shipping companies have been investing heavily in research and technological solutions to further the sustainability of shipping. Due to the quantity and diversity of initiatives in this area, the following section highlights some of the key projects focusing on high and low technical responses to these issues.

2.1.1 High Investment Technological Responses

***Eco Ship Project: NYK* (Japan)**

NYK's Super Eco Ship 2030 is a concept ship viewed as the 'container vessel of the future' which won Japan's Good Design Award in 2009. The Eco Ship should be able to cut CO2 emissions by reducing the amount of energy required to propel it by lowering the weight and drag of the vessel. It will also be equipped with new environmental technologies such as fuel cells and renewable energy sources including solar and wind power and navigational improvements which collectively should reduce its CO2

emissions by 69% (Designboom, 2010). The concept ship will be a show case for the technologies presented, and will be incorporated in future ship design (NYK Line, 2010).

***EcoShip* (Sweden)**

Volvo Penta-led Swedish consortium's small 'environmentally friendly' containership known as the EcoShip was an early innovator in sustainable ship design. The EcoShip vision takes a life cycle approach and aims to "create a complete, environmentally responsible vessel for efficient energy use with minimal emissions from the propulsion unit and other ship's systems" (EcoShip, 2006).

Ecoship was established in 1995. The key elements of this project were:

- A new patented hull shape to produce a 10% reduction in hull resistance compared to the then existing conventional designs, with reduced wake formation.
- Low NOx diesel-electric propulsion, low fuel consumption and lower emissions (15% less power requirement) running on low-sulphur diesel; and
- A complete double-hull and closed sewage system.

The EcoShip concept builds on the following principles:

- Use of more environmentally suitable materials
- Use of more environmentally suitable production methods
- Reducing materials consumption
- Increasing energy efficiency in a new propulsion system
- Increasing efficiency of transport and logistics
- Optimisation based on the vessel's function
- Reducing emissions and operational risks
- Prolonging the useful life of the product
- Closing material flow cycles (EcoShip, 2006)

This project illustrates the integrated nature of environmental improvements, simplifies construction as well as conferring better seagoing performance in heavy seas. The Eco-Ship Mark is awarded to logistics companies who contribute to the "Eco-Ship Modal

Shift Project", which aims to promote environmental protection by adopting environmentally friendly and efficient ocean freight transportation and logistics. Qualifying companies may display the Eco-Ship Mark, which is a recognised quality symbol, on their vessels and equipment such as containers, trucks, chassis, which helps to promote their contribution to environmentally friendly logistics services. OOCL Logistics (Japan) Ltd. and IKEA Japan K.K. were recently awarded the Eco-Ship Mark. (OOCL, 2009).

Post-Panamax ships – S-class: Evergreen **(Taiwan)**

The Taiwanese company, Evergreen Marine Corporation set up a voluntary initiative targeted at the environmental integrity of large container ships. The Evergreen group have placed an order with Mitsubishi Heavy Industries Ltd. in Japan for ten post-Panamax ships which incorporate many environmental features that go beyond international compliance. The S-class ships incorporate a double-skinned hull, and a high capacity oily water separator enables the oil content of waste water to be reduced below 15 ppm and a larger separator bilge oil and bilge oil holding tanks provide more storage capacity than normal, enabling the vessels to avoid any discharge when sailing in sensitive areas. Similar arrangements are in place for handling black and grey water.

Another S-class feature includes 'Cold-ironing' capability; this is also being applied to other vessels in the Evergreen fleet when they undergo routine dry-dockings. Evergreen has chosen to class S-class vessels allocated to Hatsu with Lloyd's Register while those operating for Evergreen Marine Corporation being classed with the American Bureau of Shipping (ABS). It has obtained Lloyds Register's Environment Protection notation and ABS's equivalent environment safety notation for these vessels (Evergreen, 2006).

Rotor Sails: Greenwave Wind Engines

Greenwave is a UK registered charity that is involved in shipping environmental research, with a strong focus on emissions reduction. Current research focuses on the use

of wind engines that can be utilised to provide an auxiliary power source for ships. Wind engines are based on Flettner rotor sails that were first trialled in 1926. Rotor sails consist of large vertical cylinders which utilise the Magnus effect to create forward thrust. Experts in aerodynamics and hydrodynamics from the UK and New Zealand have recently completed trials on 25:1 scale ship models, which indicate that rotor sails generate between 8 - 10% more thrust than sails of an equal surface area. These trials were conducted at Warsash Maritime Academy under the supervision of Lloyd's Register. Results suggest that the expected reduction in Greenhouse Gas emissions and other exhaust pollutants such as NOx and SOx would be in the region of 13% per ship (Lloyds Register, 2010a). Sea trails are expected to take place on a fully operational ship in the near future. Whilst not all ships would be suitable for this type of technology, bulk carriers and tankers which make up the majority of world tonnage would be able to take advantage of the auxiliary power provided by rotor sails (Greenwave, n.da).

FellowSHIP Programme: DNV (Norway)

The FellowSHIP Project is a joint industry project[2] launched in 2003 to develop the basic design of fuel cell technologies for vessels by 2005. In 2006, the project started development of an auxiliary electric power pack (320kW) fueled by LNG and this was successfully installed in aboard the Viking Lady, and offshore support vessel owned by Eidesvik Offshore on charter to Total. The final phase of the project, will test, qualify and demonstrate a main fuel cell electric system.

DNV has approved the system considering all safety and risk aspects of the installed equipment. The development of class rules for installation of fuel cells onboard is a critical part of the project. The project's success to date indicates fuel cell technology is close to a commercial application. This has resulted in a regulatory review to establish frameworks for moving the technology forward (DNV, 2009).

[2] The FellowSHIP Project is managed by Det Norske Veritas, Eidesvik Offshore, Wärtsilä Ship Power, Wärtsilä Ship Design and MTU Onsite Energy (DNV, 2009).

Air Cavity System (ACS): DK Group (The Netherlands)

The DK group is one of the world's leading maritime technology companies and has been developing ACS or air lubrication technology for over a decade (Blue Comms, 2010). Using less than 1% of the ship's engine power, compressed air is pumped through holes in the ship's hull reducing water drag. Drag being created by friction between the hull surface and the water. As air has less than 1% of the viscosity of water it essentially lubricates the ship as it moves through the water thus reducing the frictional resistance of a hull's surface and the amount on fuel required to move the vessel. When applied, this technology has a 'pay back' in 18 – 30 months with a fuel reduction of 5 – 15% depending on the vessel type. The group has recently launched a retrofit version of their ACS for the current global fleet which has the same benefits as that for new builds.

Ecospec Global Technology **(Singapore)**

Ecospec, a research and technology company specialising in advanced water and oil technologies presented its CSNOx™ technology at the MEPC59 meeting at the IMO in 2009. The technology reduces green house gases from marine vessels exhaust including pollutants including SO_2, NOx, and significantly CO_2, all within one process and a single system. This is an important technological breakthrough as no current solutions exist capable of removing CO_2 from ship's emissions. CSNOx™ is the first commercially viable solution to be able to do this cost effectively in one process in a single system. In performance tests the scrubbing efficiency of the CSNOx™ and the following removal of emissions was observed by the American Bureaux of Shipping (ABS): SO_2 92.9%, NOx, 82.2% and CO_2 74.4% (Ecospec, 2009).

Recently, Canada Steamship Lines (CSL) installed CSNOx onboard one of its vessels operating in North America's Great Lakes (Carbonpositive, 2010). Collaborative work between Ecospec and CSL will take place to develop the technology for fresh water use to validate and obtain certification for its performance within that environment. This is significant due to the higher levels of regulation on shipping emissions in inshore waters, further promoting the three-in-one cleaning technology.

The maritime industry and regulators are awaiting further confirmation of the effectiveness of CSNOx and the IMO is considering various proposals for implementing market-based measures, including emissions trading and a carbon tax on fuel, to help limit greenhouse emissions with the global shipping fleet (Carbonpositive, 2010).

***Sea Water Scrubbing System: Hamworthy Krystallon* (UK)**

The mechanism of removing marine engine exhaust gases such as SOx and Particulate Matter (PM) can be achieved using sea water scrubbing systems such as the one developed by Hamworthy Krystallon. The water absorbs and nutralises SOx and traps PM. Sea water scrubbing and Continuous Emissions Monitoring (CEM) technology helps to facilitate CSR and go beyond legal compliance whilst protecting the environment (Krystallon, 2009).

2.1.2 Lower Investment Technological Responses

Weather Routing

Ship weather routing develops the optimum passage for vessels based on weather forecasts, sea conditions and the individual ship, for a specific passage. The principles of weather routing are founded on the maximum safety and comfort of the crew, the minimum fuel consumption and minimum time in transit, with obvious environmental benefits. In 1983 the IMO adopted the Recommendation on Weather Routing. The Resolution recommended that governments should advise ships flying their flags of the availability of weather routing information, especially that provided by services listed by the World Meteorological Organisation (WMO).

Knowledge of weather conditions is essential to navigation at sea. As well as onboard observations, there are many data sources available for seafarers, including satellite images, ice model data, weather observations and forecasts. Despite this it is impossible to effectively take into consideration all of the available data without the use of

technology, hence the increasing sophistication of weather routing technology and services. Recent advances focus on the characteristics of vessels carrying the technology as well as data about conditions ahead. They endeavour to answer the question: 'if I maintain my route into worsening weather, how secure are my crew, vessel and cargo? Some of the many organisations set up to assist vessels with the optimum weather routing include; Metworks (Metworks, n.d) and Applied Weather Technology (AWT, 2011).

Virtual Arrival

The concept of Virtual Arrival was first introduced by BP. It has since been developed by Oil Companies International Marine Forum (OCIMF) and Intertanko, and is concerned with managing time as well as speed. The principal aim of Virtual Arrival is to reduce the CO2 emissions that a vessel produces. Vessels tend to steam at full speed between load port and discharge port and as a result often have to wait at anchor because of congestion in the port. This practice increases fuel consumption and the CO2 emissions of the vessel. Using weather analysis and an agreed notional arrival time allows the vessel to arrive at port 'just in time'. Demurrage or waiting time compensation is also reduced (BP, 2001). Savings made on fuel costs or carbon credits are then divided between counter-parties which work as an obvious financial incentive. Additionally by reducing the steaming speed of a vessel, its arrival time can be better managed and helps to reduce port congestion and overall fuel consumption, including CO2 emissions (The Motorship, 2009).

Speed reduction

Speed reduction is a simple, low cost solution that reduces air emissions. This is particularly the case with vessels that have traditionally operated at higher speeds such as containerships and RoPax ferries. Depending on the actual speed reduction, there are some negatives associated particularly for companies offering a scheduled service or operating under specific charter requirements. To maintain speed reduction it may involve increasing the number of ships in the fleet and increased cargo inventory costs which could outweigh the benefits (Psaraftis *et.al.* 2009).

Stream lining: Turbo-Foil – Greenwave

Unlike cars, ships are not particularly well streamlined due to the way components are manufactured at the building stage. This consists of a series of blocks being brought together and as such ships generate large amounts of drag when in transit, both above and beneath the waterline. The greatest drag is generated underwater (hydrodynamic), but a significant drag is also created above the water line (aerodynamic) by the vessel's superstructure and deck equipment (cranes, containers and so on). By reducing the aerodynamic drag of a ship through the use of foils and streamlining, current research indicates that drag can be reduced by up to 20%, which equates to a reduction between 50 – 150 tonnes of CO2 emissions per ship per year (Greenwave, n.db).

Hull and prop cleaning/ polishing

Hull and propeller cleaning are other measures that help to improve the energy efficiency of shipping and reduce air emissions including CO2. Companies investing in the research and development of these technologies include Wartsila and the British Ship Research Association (BSRA)

Fuel additives: Infineum **(Global)**

Fuel additives play an important role in adapting to the new fuels and speeds required by changes to legislation and the economic climate. Infineum is a petroleum additives group of companies, a joint venture which is owned by Shell and Exxon Mobil. They address shipping fuel issues through the development of marine additives which can provide solutions to issues associated with marine fuel handling and combustion (World Bunkering, 2009).

Table 1: Examples of currently available emission reduction measures.

Measure	Reduction in CO2 Emissions
Operations	10 – 50%
Slow Steaming	30% below BAU by 2013
Weather Routing	2 – 4%
Just-in-Time 'Virtual'Arrival	1 – 5%
Optimisation of Trim and Ballast	1%
Propeller Polishing and Maintenance	3%
Engine Tuning	1 – 2%
Technology	10 – 50%
Hull Coatings	10%
Propellers	5 – 10%
Vanes, Vane Wheels, Swirl Devices, Fins, Ducts, Rudders	5 – 10%
Waste Heat Recovery	10%
Alternate Fuels and Propulsion	
Marine Diesel Oil	5%
Kites	10 – 35%

Source: Adapted from Oceana, 2010.

2.2 CSR and Marketing

Clean Shipping Project (Sweden)

The Clean Shipping Project focuses on a holistic approach to environmental shipping which includes the reduction of green house gases, SOx and NOx emissions as well as waste from heavy chemicals from anti-fouling, cleaning agents and lubricants. The project was initiated to increase focus on the environmental impacts of shipping (Clean Shipping Project, 2010). The project is responsible for the Clean Shipping Index which is an online tool which provides a rating to ships and shipping companies based on their environmental performance. This information is recorded in a database where cargo owners can then compare the environmental performance of the shipping companies. Information can be viewed for a single ship or an entire fleet as well as just a single issue such as waste (Shipping News, 2010). The Clean Shipping Index goes beyond

environmental regulation and currently 11 of the largest global container carriers have entered their environmental data into the index. Companies including Volvo, Ericsson and H&M use the Clean Shipping Index to identify clean carriers. The benefits of the Index are perceived to be its simplicity, affordability, and the significant contribution it can make towards CSR policies.

Green Shipping Award and Blue Label **(Rotterdam, NL)**

The Green Award Foundation was set up in 1994 as an initiative of the Rotterdam Municipal Port Authority and the Dutch Ministry of Transport and Water Management. The Foundation has been independent since 2000 and has established market incentives promoting quality shipping. Cost reductions are made at contracting ports for vessels that have achieved this award. There is an annual cost to the ship owner covering application and audit services which depends on the DWT of the vessel.[3]

The Green Award Initiative is seen as a pioneer in the field of promoting a maritime, environmental and safety conscious culture. Eligibility is limited to high quality operators, rewarding them for compliance with international and national legislation, the achievement of specific requirements for the crew and management, and attainment of requirements for the technical equipment of vessels. Certification can now be obtained by product tankers and bulk, and LNG carriers will soon be joining this list. The Green Award is now also applicable to inland shipping, specifically inland barges. Ship certification remains valid for three years, but audits are made on an annual basis. Recently monitoring of ship exhaust emissions, MARPOL Annex VI and 'Hot Work' procedures have been included in the Green Award requirements.

A board of experts maintains and develops the requirements of the certification in-house ensuring they keep pace with regulations and changes within industry, thus retaining their

[3] Current costs can be found at http://www.greenaward.org/file.php?id=189&hash=860417c496b008e807d47ad6e37d733a (Green Award, 2011)

relevance. In this respect the development of the 'Blue Label' is an additional award to the Green Award, marking low ship exhaust emissions. Ships will receive the Blue Label when their ranking scores meet exhaust emissions requirements. This does not effect the Green Award itself (Green Award, 2009).

Green Award incentives include a percentage discount off port fees at 45 participating ports in Belgium, Canada, Latvia, Lithuania, the Netherlands, Oman, New Zealand, Portugal and South Africa. Additional discounts are received variously from pilot organisations, tug boat companies, chandlery services, port reception facilities and line handling. The awards distinguish the vessels that have achieved them and confer environmental recognition with customers, service providers and ports. The Green Award works closely with PROSea who provide environmental training for seafarers and with the Environmental Ship Index to promote the holistic approach towards sustainable shipping.

***Blue Angel* (Germany)**

The Blue Angel was launched in 2002, and is an integrated and internationally applicable incentive scheme for quality shipping representing the German version of the Green Award. The German Federal Environment Agency adopted a list of quality shipping criteria to give a rating for environmentally friendly ships, promoted as a quality shipping initiative. Qualifying vessels are accredited with a Blue Angel 'label'. Like the Green Award the criteria include ship specifications, equipment, company operations and personnel management. The project has been a collaborative effort with representation from many shipping stakeholders (GAUSS, 2002).

The criteria for the Blue Label were reviewed and refined in 2009. Three key areas were identified under the theme of 'environment conscious ship operation', with respect to reduction of emissions and pollution discharges from ships into the marine environment. To meet the goals there is firstly a requirement for high standards of management by both shipping companies and ships. The second goal relates to design and equipment on board

vessels and finally measures undertaken to reduce emissions. The scheme is available to ships sailing under the German flag or foreign flagged vessels; however it does exclude tankers falling under MARPOL Annex I and II (including gas carriers) vessels falling under the High Speed Craft Code, Fishing vessels and recreational vessels (Blue Angel, 2009).

In order to qualify for the environmental label, vessels have to meet 10 compulsory criteria and must also be committed to addressing at least a further three criteria from a list of 20 optional requirements. Whilst there is no financial benefit associated with this label, it is suggested that it can be utilised as a valuable marketing tool. Ships and shipping companies that obtain either the Blue Angel Eco award or the Green Award are eligible for a 7% discount on environmental training courses offered by GAUSS (GAUSS, n.d).

Qualship 21 **(USA)**

Qualship 21 is the United States Coast Guard initiative which aims to eliminate substandard shipping and provide 'targeting schemes' identifying poor quality sub standard foreign flagged vessels that operate within US Coastal waters. Under the initiative it is felt that quality vessels should not be subject to the same annual inspection as vessels have to undergo. A quality vessel is associated with a well-run company; has been classed with an organisation that has a good track record; is registered with a Flag state with a superior Port State Control record; and has an outstanding Port State Control (PSC) record in US waters.

Qualship 21 distinguishes between different types of vessels, namely freight, tank and passenger. Approved vessels receive an initial two year certificate entitling them to a less rigorous inspection regime. Benefits can be summarised as:

- Freight ships – Port State Control oversight for a maximum period of two years. Inspections are reduced from annual to biannual

- Tank ships – annual examinations retained but discretion applied to reduce the scope of mid-period examinations; and
- Passenger ships, used as a marketing tool only

Freight vessels and passenger vessels which qualify under the Qualship 21 programme have their names listed on the United States Coastguard homeport web site and are also identified on the EQUASIS database.[4] There is no financial gain with the Qualship 21 accreditation; however the incentives could be identified as reduced PSC intervention and the potential as a marketing tool.

Eligibility for certification is based on Flag State performance, in conjunction with specifics relating to vessel detentions and 'ticketable' marine violations. Flag States are not eligible for inclusion on the list unless they have a detention percentage of less the 1% over a three year period. Consequently the number of eligible Flag States is limited and changes annually. On an annual basis the number of certified vessels is between 5 and 10% of eligible vessels which amounts to 400 – 800 vessels (Burgess, 2010). Vessels are immediately removed from the Qualship programme if the vessel changes registry to an ineligible state, or if a vessel is detained for a reportable safety offence in US Coastal waters, commits a violation or is involved in a serious marine incident.

Blue Circle Award **(Canada)**

The port of Vancouver in 2010 launched financial incentives for shipping lines with reduced emissions from their ocean going vessels, which is part of their Eco-Action program for shipping. The award is rated by Gold, Silver and Bronze based on the efforts made to reduce air emissions as well as the overall emissions and the type of fuel used by the vessel. Additional criteria taken into account includes: the ships classification society environment designation, emission reduction technology, as well as alternatives fuels.

[4] EQUASIS is an EC and French Maritime Administration database that collates safety related information which aims to improve maritime safety and reduce sub standard shipping, It is primarily a voluntary scheme.

This emission reduction program has earned the Port of Vancouver international recognition as they were awarded the Globe 2010 EcoFreight awards for Sustainable Transportation as well as being credited for it within the Air Action Program and being nominated for the International Sustainable Shipping Award (Port Metro Vancouver, 2010b).

The Bonus/ Malus System **(Sweden)**

This system is applied in Sweden and offers reduced harbour fees according to ship's emissions of SOx and NOx and is intended to be revenue-neutral. As such some ships have to pay higher dues and others are rewarded with rebates compensating them for higher operational costs resulting from their emission control measures. The system is considered very transparent and beneficial in respect to air pollutants only. Those vessels of a lower standard pay a 'malus' which mean they pay more dues in port and on the fairway than the service is worth (EMSA, 2005).

Carbon War Room **(Global)**

The Carbon War Room is a non-profit organisation that 'harnesses the power of entrepreneurs to implement market-driven solutions to climate change' (Carbon War Room, n.d.). The focus is on business leaders working in partnership with leading experts in order to implement changes leading to a post-carbon economy. The war room has three core functions, research and intelligence, communication and operations. Seven industry areas have been identified and are described as 'theatres', within which sub-sections known as 'battles' are identified. There are 25 battles which have been identified because each produces over 1 billion tons of CO_2 (equivalent to 2% of global anthropogenic CO_2 emissions). Shipping is identified as one of these battles.

The carbon war room has launched an online initiative called 'shippingefficiency.org' which allows commercial vessels to be assessed and scored according to their emissions. This initiative is aimed at reducing the environmental impact of global shipping by increasing the amount of available information regarding the energy efficiency of the global commercial fleet. Shippingefficiency.org rates in excess of 60,000 commercial

vessels this includes container ships, tankers bulk carriers, cargo ships and cruise liners. The rating uses a methodology developed by the IMO for the Energy Efficiency Design Index (EEDI) and data from the world's largest ship registry, IHS Fairplay' (Shipping efficiency, 2011).

***The Low Carbon Consortium* (UK)**

The Low Carbon Consortium is a collaborative project between five UK universities and other stakeholders including NGOs and organisations within the shipping industry such as Shell and Lloyds Register.

The Consortium examines the relationship between present and future UK shipping and emissions within a time period of up to 2050. They use a holistic approach to identify strategies for the reduction of carbon emission within the shipping industry. This will incorporate changes in ship design, ship operations and logistics as well as port improvements in terms of efficiency and development of land based freighters. The model produced from individual projects will be used to construct a global model for shipping which 'will then be run under a range of foreseeable future scenarios (regulatory, fiscal, economic) to determine the likely costs and impact of a variety of methods to reduce shipping's CO2 emissions' (Low Carbon Shipping, 2011). There are plans to introduce an incentive scheme to encourage participation.

***The Voluntary Carbon Standard* (Global)**

The Voluntary Carbon Standard has been developed to reduce emissions of greenhouse gases through consultation with global experts over a five year period. It provides a new global standard for voluntary carbon offsetting projects for both businesses and consumers. The carbon accounting system that the Voluntary Carbon Standard uses has established 'fundamental principles and requirements for accounting for real and verified GHG emission reductions and credits' (VCS Association, 2008). It aims to be the 'global bench mark standard for project based voluntary emission reductions' (Carbon Footprint, 2011). In order to achieve this it provides a set of criteria which is both credible and

uncomplicated. To meet the Voluntary Carbon Standard an emission reduction project must be verified, registered and meet the 10 minimum threshold criteria.

2.3 AWARENESS RAISING AND ENVIRONMENTAL EDUCATION

Environmental awareness through education in sustainable shipping is increasingly valued. As part of capacity building, seafarers need to understand the fundamental concepts of green shipping in order to bring about a change in ethos and approach to cleaner shipping. Some of the key areas of environmental training within the shipping industry include the following:

Standard Certificate Training for Watch-keepers (STCW)

The International Convention on Standards of Training and Watch Keeping for Seafarers (STCW), was adopted by the IMO in 1978, came into force in 1984, and was significantly amended in 1995. STCW sets standards for masters, officers and watch personnel on sea going merchant ships. All 133 IMO signatory countries issue a document demonstrating the extent of mariner certification and the capacity and limitations of each. Professional mariner certification must be STCW 95 compliant with the exception of some U.S. Mariners (STCW, 2010). The convention sets minimum standards with respect to training and certification and watch keeping which countries must meet or go beyond. The convention was the first of its kind to establish basic requirements for training, certification and watch keeping for seafarers on an international level. Prior to this, individual governments were establishing their own standards which often varied from practices in other countries. Wide acceptance of the convention is due to its applicability to ships of non-party States visiting ports of States which are party to the convention. This prevents favourable treatment of non-party ships and makes the system much fairer. A specific environmental element of training has recently been agreed for inclusion in the amended STCW[5], as the current convention only

[5] Manila, 2010 – entry into force 2012)

requires seafarers to have knowledge (dependant on rank) of rules and regulations pertaining to pollution prevention and environmental protection.

PROSea Foundation **(The Netherlands)**

The ProSea Foundation was established in 2001 and is a leading Dutch training and education organisation specialising in marine awareness courses for people who live and work at sea. The training focuses on ecological and financial sustainability within the daily practice of the marine industry and the links to stake holders. PROSea's training approach is based around seven principles, 'because marine awareness is more than knowledge, raising that awareness and challenging attitudes requires a thorough and participatory approach' (ProSea, 2011). ProSea have recently developed a model course for environmental education of seafarers specifically for the amended STCW convention, which was accepted by the IMO in February 2011.

North Sea Foundation (NSF) **(The Netherlands)**

NSF is an independent pressure group based in The Netherlands with an affiliation to Friends of the Earth International (allowing observer status at IMO and OSPAR). NSF takes a holistic view towards safe and clean maritime transport. This includes a solution-orientated approach, looking for different, environmentally friendly practices rather than merely seeking mitigation for environmentally damaging activities. For example, NSF argues that the long-term remedy to prevent release of greenhouse gas enhancing emissions is to design propulsion units that do not require fossil fuels (similar arguments can be applied to TBT and ballast water).

Success has been gauged by political acceptance of NSF clean ship concept ideas. Zero emissions shipping aspirations are now enshrined within debate at the North Sea Ministerial Conference (also extended to OSPAR), which has formed a Sustainable Shipping Group to take ideas forward. More recently NSF is collaborating with the

Clean Shipping Project on the Clean Ship Index and encourages its use outside of Sweden.

In respect to education and awareness raising the NSF organise six well attended[6] annual seminars in the Netherlands for the Dutch maritime industry. Specific issues are addressed and discussed with academics and manufacturers, promoting the need to behave environmentally and explaining the technical solutions in this respectively, thus providing a broad over view of environmental shipping.

The Green Ship Award, Blue Angel and Qualship 21, previously discussed, also operate various incentives which include environmental training and safety at sea for their operations' staff.

Business for Social Responsibility (BSR) and Clean Cargo Working Group (CCWG)

BSR is a global non-profit organisation of member companies administered from the US which operates a 'Clean Cargo' scheme that links suppliers and carriers in an effort to promote sustainable transportation. Members' of the scheme represent nearly 60% of global containerised cargo capacity (BSR, 2010). The scheme operates a Clean Cargo Working Group to help businesses who want to improve the CSR of their transport management.

Participation in the CCWG gives companies access to different tools which include an Environmental Performance Assessment tool which is an annual survey that assesses the carriers performance and an Intermodal Carbon Calculator, which compares the carbon footprint of several modes of transport (BSR, 2011). This initiative allows for greater transparency amongst its members including a significant amount of environmental data sharing between the participating ocean carriers in relation to CO2, NOx and SOx. The working group additionally aims to enable companies to develop best practice in transportation management as well as increasing their brand awareness and recognition.

[6] 60 -100 people attend these sessions.

Furthermore, it allows the companies involved to demonstrate to their green credentials and commitment to sustainable transport to customers.

2.4 VOLUNTARY CLASS NOTATIONS

DNV (Norway) and Lloyds Register (UK)

Both Det Norske Veritas (DNV) and Lloyd's Register (LR) have initiated schemes whereby the classification society will give approval when environmental quality measures are built into the vessel's design or where measures are taken on ships already in operation to reduce the environmental burden of the vessel as a whole.

DNV environmental class notation is voluntary and has two categories, including:

- **Clean**: Where the vessel is designed and operated in accordance with current and future regulations (MARPOL compliance with additions) for protection of the environment and where technical and management processes and procedures for collection, transfer and storage of waste have been adopted.
- **Clean Design**: Has the same goals as Clean but is much stricter. Additionally the design, construction and operation of the vessel should be such that impact on the environment is reduced to a minimum. Measures should also be in place to control accidental emissions to air and discharges to sea.

By October 2008 over 1000 vessels had been awarded Clean or Clean Design notation from DNV, 400 operational vessels (10% Clean Design, 90% Clean), 640 new building contracts or pre-build contracts (30% Clean Design, 70% Clean). Rules for DNV Environmental Class are constantly under development to take into account new legislation.

- DNV are currently trialling an environmental and energy efficiency rating scheme (DNV Triple-E). The purpose of which is to go beyond the requirements of the environmental class notations and to rate ships with respect to environmental management practices, environmental performances of ship design and operations and the monitoring and measurement of environmental parameters.

Lloyds Register's was the first classification society to introduce an environmental standard and provides the benchmark standard. Environmental Protection notation recognises ships' compliance with LR's provisional rules for Environmental Protection (originally published in 1998) and applies to both new builds and operational vessels. The environmental protection rules consist of two parts, with the first addressing core elements that look at levels of performance in excess of legislative requirements covering a range of IMO environmental regulations. The second part identifies optional elements covering similar areas to part one, but with more stringent qualifying requirements (Lloyds Register, 2010b).

RINA: Green Star

Green Star class notation is the scheme promoted by the Royal Institution of Naval Architects (RINA) who in 2000 recognised the importance of maintenance and on-board responsibilities and extended this in 2004 to design. The Green Star scheme has both a Clean Sea and a Clean Air element. The Clean Sea notation is linked closely with the requirements of MARPOL and other IMO environmental regulations. The Clean Air notation specifically addresses MARPOL Annex IV and measures to reduce ozone depletion. A new notation has recently been introduced called the Green Star Yacht, which addresses the same issues as Clean Sea and Clean Air, but is for large and super yachts (RINA, n.d.).

Initial take up of these schemes has been by cruise lines whose new ships incorporate low NOx emission gas turbines, advanced waste management systems, fuel tanks in protected

locations and the use of non-TBT anti-fouling hull coatings. The first Green Star issued to a chemical/product tanker was made in 2002.

Lloyd's Registry/MEPC / IMO: Green Passport

The Inventory of Hazardous Materials also known as the Green passport forms part of the requirements of IMO Resolution A.962(23) amended by Resolution A.980(24), namely Guidelines on Ship Recycling. Furthermore it is a key requirement of the IMO's Hong Kong International Convention on the Safe Recycling of Ships (Hong Kong Convention) which was adopted at a diplomatic conference in China in May 2009.

Details of the contents of the Green Passport are contained within Section 5 of resolution A962 (23). The concept behind the Green Passport is that of a 'cradle to grave' document, that stays with the vessel throughout its working life. The passport consists of an inventory of all potentially dangerous materials that could have an adverse effect on human health and/ or the environment. The listed materials include all those used in the construction of the ship and are amended throughout the working life of the ship. The inventory is divided into three sections including: Part 1 Potentially hazardous material in the ship's structure and equipment; Part 2 Operationally generated waste and Part 3, Stores. The Green passport is not solely for new ships. Existing ships can apply for a green passport by completing an inventory of hazardous materials on the vessel and submitting this at least three months prior to the ships next major Class survey. The findings will be appraised by the Classification society and providing all requirements are met and verified by the survey or during Class survey a Green Passport will be issued. As with the passport for new builds, the contents of the green passport will be checked at each subsequent survey (Lloyds Register, 2010c)

The passport is produced either at the construction stage by the shipyard or at a later date and is then passed onto the purchaser/owner. New owners of the vessel are obliged to maintain the accuracy of the Green Passport and to incorporate it into any relevant design

and equipment changes. It is the duty of the final owner to deliver the vessel and the passport to the recycling yard where virtually the entire ship will be broken down and reused. It is recognised that recycling of vessels makes a significant contribution to the global conservation of energy and resources. It also has additional benefits such as providing a labour market employing people in the recycling process.

However, as noted in 2002 at the 48th session of the IMO's MEPC (when the voluntary guidelines were adopted), whilst in principle ship recycling is a beneficial process, often in reality the working practices carried out in ship yards and their environmental standards, leave a lot to be desired. The responsibility for working condition standards ultimately rests with the shipyard and the country where it is located. MEPC suggested that stakeholders in this sector should be encouraged to promote best working practices and good environmental standards (Marinelog, 2002). Within the guidelines of 2004, the roles of stakeholders including the Flag state, recycling state and the role of the International Labour Organisation (ILO) are set out in order to address some of these issues. The issue of safe recycling of ships is also being addressed through the Hong Kong Convention (IMO, 2010b).

Germanischer Lloyd: Environmental Passport (Germany)

Germanischer Lloyd (GL) class society scheme initiated their voluntary notation, the Environmental Passport, in 1999. It is now well known amongst operators and demonstrates their commitment to the protection of the marine environment. GL claim that nearly 10% of its fleet in service now has the Environmental Passport (World Bunkering, 2010). The passport is a green card for ships that can overcome many international or national regulations and local inspection authorities. The scheme is centred around legislation such as MARPOL as well as some additional voluntary environmental standards.

A certificate is issued showing the ship's compliance with certain mandatory and voluntary environmental standards of a vessel which focus predominantly on technical issues such as emissions to air and sea, sewage or garbage pollution, refrigeration

systems, fire fighting, ballast water management anti-fouling systems and ship recycling. This differs in approach to the Netherlands Green Passport, which incorporates technical issues as well as management and operational issues. The Environmental Passport also applies to any class of ship.

3. Analysis and Conclusions

Over the last decade many sustainable shipping initiatives have come into being with a notable increase in those that fall into the high-investment research and innovation category and those driven by CSR. Regulation and environmental protection remain key drivers of initiatives but the economic bottom line is still dominant and needs to be targeted in efforts to deliver any sustainable shipping standard (See *Figure One*). The proliferation, variety, and *ad-hoc* way in which these initiatives have developed makes it difficult for industry to identify best practice and agree on a united way forward. Despite the general increase in initiatives there are still few that consider the entire life-cycle of a ship and its operational footprint, yet these have an advantage in being able to deliver a coordinated cost-effective response to sustainable shipping without the risk of duplication. Currently sustainable shipping initiatives are predominantly piecemeal, and there is a need for incentives to be rationalised, effectively articulated and presented as an accessible package.

Figure One: Sustainable Shipping Drivers

Figure Two: Sustainable Shipping Initiatives

The sustainable shipping initiatives have been grouped in this report under research and innovation, CSR and marketing, awareness raising and environmental education, and those managed through voluntary Class Notations. Additional initiatives have been developed in all these areas since 2004, indicating increased pressure from existing drivers for shipping to become more sustainable (See *Figure Two*) however many of them still focus primarily on the environment without embracing the true concept of sustainability. It is still apparent that there is only a relatively small percentage of take-up of sustainable shipping initiatives which to an extent can be contributed to the perception of additional costs. This in turn impedes the other benefits the initiatives might otherwise provide. Progression of environmental initiatives in shipping is generally being made by a fringe element of NGOs and enthusiasts. However wider awareness, coordinated efforts and general take-up is required for real progress to be made in this area.

4. Workshop Summary: Key messages, 'Towards a Global Sustainable Shipping Framework' workshop, OSPAR, London

Workshop Summary

On April the 14th 2011 WWF hosted a Sustainable Shipping Workshop at the OSPAR Commission with 24 participants who collectively represented nearly every major sector of the shipping industry. An overview of the workshop was detailed in a feedback report entitled 'Sustainable Shipping Workshop Notes 19 April 2011', which was produced and distributed to attendees by WWF. The section below provides an overview of the key messages that emerged from this event.

There was general consensus that a global sustainable shipping framework was required within the shipping industry whilst acknowledging the complexities of such an undertaking. It was felt that the shipping industry must be part of shaping the global framework, with emphasis on representation from all sectors. This would require additional work to encourage port participation and a further geographical reach than

currently established would be necessary. When considering the entire life cycle of the ship a global framework should also encompass the three areas of sustainability, which are the environment, the economy and society. Obtaining a critical mass of support for the framework would be crucial to its success. This report has highlighted the good and challenging work that is already undertaken by many accreditation and award schemes, class societies and the ISO standards that help ships to achieve environmental compliance and beyond. It was important to the workshop attendees that duplication of this work did not happen and that existing schemes are made use of in a new framework where they reflect best practice.

It was agreed that any sustainable shipping framework should go beyond compliance and should deal with the shipping industry in a holistic manner. Discussion also covered the need for a global portal that holds information about various existing sustainable shipping schemes to allow for greater transparency and simplification. There is an opportunity for this framework to be a *'one stop shop to efficiency'*. Above all it was deemed essential that the project must have a very clear aim and objectives and must achieve an efficient communication network with stakeholders.

Based on the workshop and research to date, the following conclusions can be made:

- A global standard for sustainable shipping is needed and desired by the industry.
- This standard would be most effective if a holistic, rather than a separate issue approach, is taken to the entire ship and its operational life cycle. This would include the environmental training of seafarers and the corporate social responsibility of shipping operators. Take-up would be more likely if it can be proven to have real cost benefits to the industry and incentives based around this bottom line are likely to be more successful
- Options may include a variety of approaches already in place that assess the entire ship, its operation, design and entire life cycle such as the Green Award (Rotterdam) and the Clean Ship Index. A combination of these schemes drawing on the strengths from each could be applied to all ships.
- Current direction and initiatives are focused in developed countries, predominantly Europe, the USA and Canada. Uptake by LEDCs will require additional and more focused work, where incentives may have a role to play.

The barriers to adopting a global framework can currently be identified as the following:

- Perception of cost to industry, a financial gain is essential and must be demonstrated through initiatives
- Political will to reinforce the need to operate in a sustainable manner
- The market, it is very important that initiatives are industry driven to ensure a wide take-up.
- Standardisation in measuring pollutants eg. CO2, SOx and NOx
- Alignment between different industry sectors

5. Phase Two: The Way Forward

For reasons of consistency, and in line with other sustainable frameworks, this group's name has changed to 'The Sustainable Shipping Council' (SSC). A Sustainable Shipping Working Group has been formed of active shipping experts who are willing to take forward the general principles agreed at the workshop to confirm the detail that will eventually form the global sustainable shipping framework. There is also a wider group consisting of the participants of the workshop and other interested parties. This group will be kept up to date with project issues and will be asked to comment on various reports and ideas when they are circulated. Although the appendices indicate the core members of each group, both are viewed as dynamic and subject to flux to comprise of people who have expertise in the subject area under discussion.

Meetings between WWF and the Working Group will take place over the next few months to solidify a detailed plan of action which will then be presented to the wider shipping community for comment and discussion. A meeting in Rotterdam has also been tentatively scheduled to encourage port participation in the framework and to facilitate discussions with them. Future phases of this project will address the best mechanisms to deliver a global sustainable shipping framework considering the guiding conclusions and challenges from the workshop.

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