

**ICS Executive Committee Working Group on  
Greenhouse Gas Emissions and Market Based Instruments**

**MBI Analysis Report**

**Prepared by Giraffe Innovation Ltd on behalf of ICS.**

**March 2009**

## **Contents**

### **Section 1 Introduction**

- 1.1 Analysis Pro Forma
- 1.2 Acronyms

### **Section 2 MBI Maturity Matrix** (Executive Summary)

### **Section 3 Models for carbon reduction**

- 3.1 Emission Trading Schemes
- 3.2 Mandatory Compensation Fund
- 3.3 Voluntary Levy System

### **Section 4 ICS GHG MBI – Analysis Pro Forma**

- 4.1 Effective in contributing to the reduction of total GHG
- 4.2 Binding and equally applicable to all ships to avoid evasion
- 4.3 Cost effective
- 4.4 Able to limit or effectively minimise competitive distortion
- 4.5 Environmentally sustainable without penalising global trade and growth
- 4.6 Goal based approach
- 4.7 Promote innovation & R&D
- 4.8 Accommodates leading energy efficiency technologies
- 4.9 Practical, transparent, fraud-free and easy to administer
- 4.10 Credible to stakeholders and able to demonstrate compliance with climate change goals, including monitoring
- 4.11 Credit for actions already taken which have resulted in GHG reductions
- 4.12 Certainty – High degree of certainty so that business can invest with confidence

### **Appendix 1 – PR Value**

## Section 1 Introduction

This paper has been prepared following a request from the ICS Executive Committee for an analysis of market-based instruments for carbon reduction by the shipping industry. The instruments have been discussed at IMO or in the context of possible European measures. Since the analysis is intended to stimulate further discussion on the topic, no position is adopted concerning a preferred measure for international shipping. Neither does the paper assume that a market-based instrument will be an inevitable outcome of IMO or UNFCCC debate. However, a scoring matrix has been used to summarise the findings of the document in an attempt to communicate the salient points when one considers the relative strengths and weaknesses of particular schemes against pro-forma criteria.

If ICS has to engage in discussions about carbon reduction within IMO, at UNFCCC or in Brussels, it is important the industry can make a well informed response to any firm proposal for a market based instrument that governments or others may table.

For the purposes of this paper, emission trading schemes and compensation/levy schemes were analysed against a set of assessment criteria adopted by IMO MEPC, as shown on page 5. It should be noted the nine criteria originally agreed for comparing MBI options have been supplemented by three further questions included in an IMarEST submission to MEPC 58<sup>1</sup>, the content of which also informed the overall analysis.

This review is timely in light of the European Commission's request for proposals from the shipping industry on carbon reduction commitment by December 2009. At the same time a global post-Kyoto climate treaty is expected following negotiations in Copenhagen also in December; more clarity is anticipated concerning future measures and targets to mitigate climate change, including the relationship between developing and developed nations.

The outcome of the discussions at Copenhagen will be important to IMO in making progress on the adoption of a market-based instrument, not least in reconciling the notion of '*common but differentiated responsibilities and respective capabilities*' (CBDR) underpinning the Kyoto Protocol with IMO's principle of '*no more favourable treatment*'. Kyoto's sympathetic approach to developing countries allows them to reduce CO<sub>2</sub> emissions via CDM at a lower cost than developed nations that is seen as fair. It also provides an incentive for the tacit reduction of CO<sub>2</sub> in developing countries by developed nations via knowledge and technology transfer because it is cheaper to do so. As a consequence of this policy there are in effect two carbon markets in the world today employing different mechanisms, instead of a single global market for optimum pricing of CO<sub>2</sub>.

The IMO estimates total CO<sub>2</sub> emissions from international shipping at 1,100 million tonnes in 2007. MBIs should provide an incentive to improve fuel efficiency of individual ships and/or a mechanism for paying other industries for offsetting measures or developing countries via CDM. Industry forecasts indicate CO<sub>2</sub> emissions from shipping will continue to rise even if a 58 – 75 per cent increase in efficiency is achieved by 2050. As a result, shipping is expected to be a long term buyer of carbon allowances or credits, irrespective of whether the market-based instrument adopted is an ETS concept or a levy scheme. Compliance costs for the industry are also expected to increase over time.

---

<sup>1</sup> (MEPC 58/4/21)

According to Clarksons, 2008 figures showed around 8,000 million tonnes of cargo destined for transport by sea worldwide, covering an average distance of 7,250 kilometres. Shipping is vital for international trade and by far the most efficient mode of bulk transport. The industry's energy consumption and associated CO<sub>2</sub> emissions per tonne/kilometre are on average 25 per cent of those associated with road transport and almost one per cent of transport by air.

## **1.1 ICS GHG MBI – Analysis Pro Forma**

1. Effective in contributing to the reduction of total GHG
2. Binding and equally applicable to all ships in order to avoid evasion
3. Cost effective
4. Able to limit or effectively minimise competitive distortion
5. Environmentally sustainable without penalising global trade and growth
6. Goal-based approach
7. Promote innovation and R&D
8. Accommodates leading energy efficiency technologies
9. Practical, transparent, fraud-free and easy to administer
10. Credible to stakeholders and able to demonstrate compliance with climate change goals, including monitoring
11. Credit for actions already taken which have already resulted in GHG reductions
12. Certainty – High degree of certainty so that business can invest with confidence

### **1.3 LIST OF ACRONYMS**

BDN	Bunker Delivery Note
CBDR	Common But Differentiated Responsibilities
CDM	Clean Development Mechanism
CO <sub>2</sub> e	CO <sub>2</sub> equivalent
EC	European Commission
ETS	Emission Trading Scheme
EU ETS	European Union Emission Trading Scheme
ICS	International Chamber of Shipping
IMO	International Maritime Organization
IOPC	International Oil Pollution Compensation Fund
JI	Joint Implementation
MARPOL	International Convention for the Prevention of Pollution from Ships
MBI	Market-based Instrument
MEPC	IMO Marine Environment Protection Committee
METS	Maritime Emission Trading Scheme
PSC	Port State Control
R&D	Research & Development
SOLAS	International Convention for Safety of Life at Sea
SO <sub>x</sub>	Sulphur Oxide emissions
UNFCCC	United Nations Framework Convention on Climate Change

## **Section 2 – Maturity Matrix (forming an executive summary)**

This MBI maturity matrix summarises the analysis in this document against the MEPC GHG MBI criteria.

### **Green – Strong Evidence**

Evidence present in source documents which directly supports the criterion.

### **Amber – Clear Supporting Evidence**

Clear argument put forward in source documents which are considered valid and applicable. No evidence of supported opposing view online or in source materials but no overwhelming evidence that the scheme offers “state of the art” solutions.

### **Red – Little or No Evidence**

No supporting evidence presented by the source documents or what little is presented is considered to display some bias.

## 1. Effective in contributing to reductions in GHG emissions

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS		Good regional coverage but unlikely to be global for some time allowing for avoidance	
Open Cap & Trade System	All regions - a global solution		
European ETS			Effective where in operation but restricted coverage and therefore lower GHG reductions
Mandatory Compensation Fund		Pump priming of R&D should lead to faster efficiency solutions but cannot be guaranteed	
Voluntary Levy			Potential for reductions but issues about longevity of scheme and therefore its long term viability.

## 2. Binding and equally applicable to all ships to avoid evasion

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS		Binding to all in the scheme but evasion possible by visiting out of region ports.	
Open Cap & Trade System	Although not likely to achieve 100% coverage, significant coverage equal to other IMO instruments		
European ETS		Binding to all EU operations and evasion unlikely but low coverage	
Mandatory Compensation Fund		Theoretically evasion is unlikely although there are unregistered fuel suppliers and some unregulated fuel sources that would allow evasion to take place.	
Voluntary Levy			Binding to those signed up but by its voluntary nature it invites "authorised evasion"

### 3. Cost effective

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS			Cost not quantified and proponents do not provide clear assessments: It could lead to high prices - depending on final allocation system (particularly if closed system adopted).
Open Cap & Trade System		Open system would lead to low cost abatement	
European ETS	Cost effective system in operation allowing purchase of credits in established markets and would only apply to EU shipping		
Mandatory Compensation Fund	Set at a level that won't exceed other systems and cheaper to run		
Voluntary Levy	Levy set by IMO - should be at a level that is proportionate to other MBIs.		

### 4. Able to limit or effectively minimise competitive distortion

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS		Initial regional application means cheaper for operators outside the scheme. The wider the scheme, the less distorted it will be.	
Open Cap & Trade System	Open scheme operating almost everywhere.		
European ETS			Distorted impact - EU based operators will have 100% responsibility but others only when using EU ports
Mandatory Compensation Fund	Global reach of open scheme. Enforcement likely to be strong (e.g. through MARPOL) and easier to administer.		
Voluntary Levy			Prices should be set to reduce non membership but the fact it is voluntary means there will be a distortion

## 5. Environmentally sustainable without penalising trade and growth

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
<b>Global Framework ETS</b>			Trade will be penalised from participating port which may even lead to extra port stops if cost effective and more fuel consumed as a result.
<b>Open Cap &amp; Trade System</b>	Trade should not be restricted as level playing field. More environmentally sustainable because of greater coverage.		
<b>European ETS</b>			Trade from participating ports will be penalised but as the whole of the EU is in, it shouldn't actually stop movement. It's not as sustainable as coverage is lower.
<b>Mandatory Compensation Fund</b>	Wide coverage and trade unlikely to be affected as level playing field established. R&D should lead to efficiency savings		
<b>Voluntary Levy</b>		Less environmentally sustainable as likely to be less coverage. Trade should not be penalised as otherwise bodies would leave the scheme	

## 6. Goal based approach

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
<b>Global Framework ETS</b>	All schemes are by definition goal based.		
<b>Open Cap &amp; Trade System</b>	All schemes are by definition goal based.		
<b>European ETS</b>	All schemes are by definition goal based.		
<b>Mandatory Compensation Fund</b>	All schemes are by definition goal based.		
<b>Voluntary Levy</b>	All schemes are by definition goal based.		

## 7. Promoting Innovation and R&D

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS		It should stimulate a level of innovation if costs are high enough	
Open Cap & Trade System		Some level should be stimulated but if costs are too high it may even divert money from R&D.	
European ETS		It should stimulate a level of innovation if costs are high enough	
Mandatory Compensation Fund	Specific fund to promote R&D at unprecedented levels should drive innovation.		
Voluntary Levy		Specific fund but the transient nature of the scheme means long term R&D will be difficult to plan.	

## 8. Accommodates Leading Energy Efficiency Technologies

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
Global Framework ETS		As well as the energy efficiency incentive of the cost of compliance, transferable technologies may be used which promote efficiency outside the shipping industry.	
Open Cap & Trade System		As above - with the addition that CDM projects will be funded by the industry which in turn will promote land based energy efficiency.	
European ETS		As above.	
Mandatory Compensation Fund		Mandatory fund will deliver this through R&D fund and financial incentive.	
Voluntary Levy		As above.	

**9. Practical, transparent, fraud free and easy to administer**

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
<b>Global Framework ETS</b>			Difficult to set cap and administer - an emissions trading system but needs whole new infrastructure.
<b>Open Cap &amp; Trade System</b>			Although using bunker delivery notes will ease the system, it is still true that a global system will be hard to administer.
<b>European ETS</b>		Established system with processes that result in better transparency. There is still an operational admin burden, however.	
<b>Mandatory Compensation Fund</b>		The IOPC offers a practical model on which fund management could be established and administration should be lower than an emissions trading scheme. Fraud, however, is possible with fuel suppliers.	
<b>Voluntary Levy</b>			Relatively complicated system proposed requiring bespoke spreadsheets for each ship. The sheer volume of data could lead to greater fraud.

**10. Credible to stakeholders and able to demonstrate compliance with climate change goals, including monitoring**

Market Based Initiative	Strong Evidence	Clear supporting evidence	Little or no evidence
<b>Global Framework ETS</b>		Credible system and can be made transparent. Only limitation is the extent of the scheme.	
<b>Open Cap &amp; Trade System</b>		Global scheme which if it has the right compliance strategy will deliver high GHG savings than other ETS.	
<b>European ETS</b>	Despite delivering lower GHG reductions because it is not global, it has a high degree of credibility among stakeholders as is the standard policy approach.		
<b>Mandatory Compensation Fund</b>		Providing a balance is struck between R&D and CDM projects to deliver carbon savings, this global system will be seen as a credible solution. However, the uniqueness of the approach may be considered a hindrance to wide stakeholder agreement or it may be viewed as an innovative, world leading approach.	
<b>Voluntary Levy</b>		Credibility dependant on extent of take up but voluntary approaches typically criticised by environmental stakeholders if they don't deliver high levels of participation.	

**11. Credit for actions already taken which have resulted in GHG reductions to date.**

<b>Market Based Initiative</b>	<b>Strong Evidence</b>	<b>Clear supporting evidence</b>	<b>Little or no evidence</b>
<b>Global Framework ETS</b>		Reductions since 1990 will lead to direction savings if the cap is set in proportion to those historic levels	
<b>Open Cap &amp; Trade System</b>		Reductions since 1990 will lead to direction savings if the cap is set in proportion to those historic levels.	
<b>European ETS</b>		Reductions since 1990 will lead to direction savings if the cap is set in proportion to those historic levels.	
<b>Mandatory Compensation Fund</b>	Directly proportional to fuel consumption and therefore any historic initiatives that have reduced GHGs will have a benefit.		
<b>Voluntary Levy</b>	Directly proportional to fuel consumption and therefore any historic initiatives that have reduced GHGs will have a benefit		

**12. High degree of certainty so that business can invest with confidence.**

<b>Market Based Initiative</b>	<b>Strong Evidence</b>	<b>Clear supporting evidence</b>	<b>Little or no evidence</b>
<b>Global Framework ETS</b>			A regionally applied system outside of EU ETS, for all its benefits within those areas, will always have questions over extending boundaries or replacement with other systems.
<b>Open Cap &amp; Trade System</b>		Globally applied, investors should be more confident about the longevity of the mechanism.	
<b>European ETS</b>	High degree of certainty due to EU ETS being an established system allowing trend analysis and forecasting.		
<b>Mandatory Compensation Fund</b>		Once scheme is established its global nature and R&D pump prime funding will encourage investor confidence in new technologies, providing the levy is correctly set.	
<b>Voluntary Levy</b>			Shorter term nature of the project is likely to damage confidence in investment despite similar operation to Mandatory Fund.

## **Section 3**

### **Possible models for carbon reduction**

In this section three broad models for carbon reduction are explained, including Emission Trading Schemes and variations thereof, Mandatory Compensation Funds and Voluntary Compensation Funds.

#### **3.1 Emission Trading Schemes**

Three distinct variants of Emission Trading Schemes (ETS) for Greenhouse Gas (GHG) reduction by international shipping have been analysed against the agreed pro forma to identify the advantages and disadvantages of each approach. The schemes differ mainly on geographical application: open to all countries wishing to take part (regional +); global; and specifically regional (EU). However, the first two schemes could probably only be partly adopted since even a global ETS is unlikely to be taken up by 100 per cent of states. Consequently, a mechanism will be required to cover non-signatories.

Within ETS, carbon credits can be initially allocated to existing ships by auction, free allocation or a mixture of both methods. Auctioning has cost implications for the shipping industry while, it could be argued, free allocation could lead to market distortion by penalising efficient operators and rewarding less efficient shipowners, who may have reduced their transport capacity compared to previous years. The effectiveness of ETS relies on the cap being set at the correct level, which may be difficult where there is a lack of appropriate information.

##### **3.1.1 Global framework ETS with regional application**

The general principal behind the 'regional' scheme, which is a cap and trade scheme, is all emissions have to be covered by appropriate allowances thus motivating participants to reduce the amount of GHG they emit. Ideally, all journeys by ships above 400GT should be covered by the scheme. It may not be possible to achieve global coverage from the outset, as this would require full support from developing countries (non-Annex 1 states)<sup>2</sup> as well as developed nations (Annex 1)<sup>3</sup>.

Consequently, three possible stages of development are envisaged for establishing a global ETS:

- A scheme endorsed by the IMO and UNFCCC open to voluntary participation by states and ports.
- An IMO/UNFCCC scheme covering all traffic in ports in Annex 1 countries.
- An IMO/UNFCCC scheme covering traffic in all parts of the world.

In the possible absence of support for a global system, there are arguments for starting with ports of Annex 1 countries in the first phase, with the IMO and UNFCCC inviting other states to participate as appropriate. Over the years the system could be gradually extended to include ports in advanced developing countries. To encourage entry of new participants, the ETS should include mechanisms to facilitate the inclusion of additional countries and ports.

---

<sup>2</sup> Non-Annex 1 States: Mostly developing countries - certain groups of developing countries are recognised by the UNFCCC as being especially vulnerable to the adverse impacts of climate change.

<sup>3</sup> Annex 1 States: Industrialised countries who were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (EIT), including the Russian Federation, Baltic States, and several Central and Eastern European States.

A number of papers have been prepared<sup>4</sup> (Per Kågeson, METS, and Interferry Scheme) proposing variations on a global scheme which provide useful background. Similarities include equating fuel consumed to fuel bunkered, applying a carbon factor to fuel bunkered to calculate carbon emissions, and using revenues from auctioning credits to fund shipping-specific carbon reduction initiatives together with administration of the scheme.

Key differences concern the setting of the cap and whether free allocation or auction should be used to establish the initial level of credits. For example, Kågeson advocates the cap should be set by all vessels calling at participating ports surrendering BDNs during the year prior to the ETS coming into force. Interferry proposes each vessel receiving an individual cap based on past performance, with the aggregate of individual caps representing the total cap.

Ideally, the design of the process should also make provision for the surrender of allowances from vessels being withdrawn from service, new entrants to the scheme as well as entrants to the scheme not taking part in the data gathering process, in addition to mechanisms to accommodate growth in trade.

### **3.1.2 Open Cap and Trade Scheme**

This is a full international or open global cap and trade scheme based on an IMO convention or other mechanism such as Annex VI Part B<sup>5</sup>.

By virtue of its global application, an open scheme is likely to yield significant environmental improvements. However, it could be difficult to implement in terms of gaining global agreement. It should also be recognised that any global scheme could take a long time to enter into force across all countries, with some nations probably never ratifying the IMO convention. For this reason, even a global scheme should consider how to address the issue of distortion of competition among those ships flying flags of non-accession countries. With availability of appropriate resources, the IMO could administer such a scheme on behalf of the shipping industry.

A potential disadvantage with ETS is transaction costs, which could become proportionally higher for smaller companies than for large. To that end the provision of an opt-in/opt-out clause to allow fuel suppliers to purchase credits on a shipowner's behalf (as adopted for the proposed Australian model) is suggested for smaller operators. Large shipping companies should presumably gain from being allowed to manage their own transactions; small companies could choose to ask either the delivering oil company or a broker to buy and submit the required allowances to their IMO account or similar. This service could in the first case be part of the fuel purchase, and in the latter a separate contract. However, any ETS could provide this opportunity so long as it allowed a variety of mechanisms for the submission of allowances/credits to the account of a ship (or shipping company).

---

<sup>4</sup> Per Kågeson, 'How to Link CO<sub>2</sub> Emissions from International Shipping to the EU ETS', Federal Environment Agency, Germany, 2007.  
METS (Maritime Emissions Trading Scheme)  
Interferry, 'Climate Change and the Maritime Industry', IMO, 2009.

<sup>5</sup> MARPOL Annex VI for the Prevention of Air Pollution from Ships. The rules set limits on sulphur oxide (SO<sub>x</sub>) and nitrogen oxide (NO<sub>x</sub>) emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances. One proposal for GHG legislation is to draft a new Part B to this Annex.

### **3.1.3 European ETS**

This is a European EU ETS modelled upon the provisions made for reducing aviation emissions, alongside those from large energy using industries, and is a purely regional scheme.

The EU Greenhouse Gas Emission Trading Scheme<sup>6</sup> (EU ETS) commenced operations in January 2005 and is currently the largest multi-country, multi-sector GHG ETS worldwide. Allowances traded in the EU ETS are not printed but held in accounts in electronic registries set up by Member States. A central administrator at EU level oversees the registries, checking each transaction through the Community-independent transaction log for any irregularities. In this way, the registry system monitors the ownership of allowances in a similar way to the banking system keeping track of the ownership of money.

However, with regard to the shipping sector there are various areas of concern, including the legality of an EU ETS for shipping under international maritime law and whether the implementation of an EU ETS may undermine international efforts to implement a global system. In addition, should the shipping industry be unable to pass on the costs of the scheme to its customers within a level playing field, a EU ETS may result in lower profits, possibly jeopardising the long term viability of EU shipowners and maritime cluster.

### **3.2 Mandatory Compensation Fund**

A mandatory compensation fund or fuel levy is another instrument for reducing the GHG emissions of international shipping. A levy in this context should not be considered a tax per se, since the imposition of a levy on bunker fuel oil (bunkers) is part of wider concept that also comprises a compensation fund to finance projects for the benefit of the shipping industry, including CDM projects, R&D activities aimed at enhancing the efficiency of ships, and alternative technologies. The fund is financed via a charge on bunkers by individual states.

Denmark produced an outline<sup>7</sup> for a mandatory scheme describing how such a scheme might work in practice, which highlighted many issues pertinent to the shipping industry and has also been used for a basis of the pro forma analysis discussed in the following sections.

#### *(i) Operational considerations*

Any effective mandatory scheme would require clearly defined responsibilities for all identified parties, including national administrations, fuel oil suppliers, port states, ships, and the fund management and administration.

There are sound reasons for assigning the principal reporting and collection burden to fuel oil suppliers, including their smaller numbers around the globe compared to the world's fleet, and because they involve a more discrete group of regulated entities. As a function of their existing business, fuel oil suppliers maintain records of fuel sales and are also familiar with collecting national and state taxes levied on fuel.

---

<sup>6</sup> Based on Directive 2003/87/EC, entered into force 25 October 2003.

<sup>7</sup> MEPC 57/4/4, 57 INF.13, 58/4/22 & GHG-WG 1/5/1

A certification system should easily be achieved as fuel oil suppliers in the 50 states party to Marpol Annex VI are already registered under Regulation 18.7. Registration of suppliers in non-party states could be made directly with a central administration.

The fee could be rolled into the market cost of the fuel oil with a specified amount per tonne of fuel allocated as a carbon reduction levy, consistent with the amount specified in the international agreement. The supplier would be responsible for reporting total marine fuel oil sales on a periodic basis (monthly, quarterly, etc.) and making payments to the designated administrator of the compensation fund. Other suggestions are put forward for consideration as follows:

*(ii) Responsibilities of national administrations*

Enforcement of the scheme would be the responsibility of government administrations party to the agreement, both flag and port states, working in cooperation with the compensation fund administrator. In this scenario, government administrations would need to promulgate reporting and record-keeping requirements to ascertain total sales volumes together with verification of payments submitted to the fund administrator. In the case of non-compliance, penalties could be assessed consistent with national implementing legislation or through a formula agreed upon in the treaty.

*(iii) The Bunker Delivery Note*

MARPOL Annex VI requires that bunker delivery notes accompany all fuel oil sales. Annex VI also specifies what characteristics must be reported on the form, including how long the note must be retained and made available for inspection. Current bunker delivery notes could be amended as necessary to include any additional information that may be deemed relevant for enforcement of the scheme.

*(iv) Responsibilities of ships*

Ships would be required to purchase fuel only from fuel oil suppliers certified under the scheme and retain copies of bunker delivery notes, making such copies available for inspection. Annual reporting by each ship (identified by its IMO number) would include the date and volume of fuel purchased, taxes paid to suppliers (including a unique vendor number), and taxes paid directly to the fund if the fuel was purchased from a non-licensed vendor. This would enable cross-referencing of data submitted by the fuel supplier with that submitted by vessels.

*(v) Responsibilities of the fund administrator*

These should include accurately recording and monitoring fuel oils sales from all certified fuel oil suppliers and maintaining a global registry of certified fuel oil suppliers, fees collected, and fuel sold to a given vessel with each ship account identified via its IMO number. In addition, fund administrators should make available lists of certified fuel oil suppliers to the shipping community and cancel or suspend certification of fuel oil suppliers found to be non-compliant by national administrations or via other mechanisms identified in the agreement. They should also maintain funds in a secure account, performing the necessary fiduciary responsibilities associated with management of financial assets.

*(vi) Possible model for the administration of a mandatory levy*

A well-established system exists under which refiners and oil terminals declare volumes of heavy grades of oil on an annual basis to facilitate contributions to the International Oil Pollution Compensation (IOPC) Fund. IOPC Fund contributions come from organisations in member states, receiving more than 150,000 tonnes of crude or heavy fuel oil in a year for use in sea transport. Governments provide the Fund secretariat with reports of oil quantities received and send invoices directly to each contributor. It would appear a straightforward process to add fuel oil to this system, collecting and controlling a global levy scheme on marine bunkers in the same manner as for the IOPC Fund. The IOPC Fund is independent of IMO, although the Fund was established under conventions adopted within IMO, and retains independence as a legal entity apart from the UN system. Instead, the Fund comprises intergovernmental organisations outside the UN, but following procedures similar to those of the UN.

An International Maritime Greenhouse Gas Emission Fund could be a separate legal entity run under conditions similar to those of the IOPC Fund.

*(vii) General principles*

An important premise for shipping is that an international solution is preferred over regional legislation. This is not to say that the success of a system is by definition related to the scope of its application in geographical terms, since both international and regional systems can be designed on the basis of ‘*no more favourable treatment*’ or other criteria applicable to the needs of the shipping industry. For the effective operation of a mandatory system, there should be no potential for competitive advantage of large companies over small, or for companies in developed as opposed to developing nations, and in all other regards. Any mandatory system adopted should also be as simple as possible for the industry to administer.

### **3.3 Voluntary Levy System**

A voluntary levy applied to international shipping via bunker fuel oil (bunkers) also warrants consideration as an industry-wide measure to reduce emissions. Consideration has been given to an outline<sup>8</sup> for a voluntary levy, showing how such a system could work in practice, prior to conducting the analysis documented in the following sections alongside the market based instruments discussed earlier.

It is not realistically expected voluntary measures will effectively pre-empt the imposition of regional and/or national carbon reduction regimes. However, they might be sufficient to postpone such action if this gives more time to agree a global solution and consequently avoid a hybrid system (or collection of systems) which would probably have an adverse effect on shipping as a whole.

The prime driver for deciding whether or not to establish a voluntary fund should be the effectiveness of such a fund in improving efficiency and/or otherwise reducing GHG emissions from shipping. However, it should be recognised that relating the potential for actual GHG reduction to a quantified amount of money invested in R&D activities will be quite difficult in practice without extensive modelling.

---

<sup>8</sup> IMarEst (MEPC 58/4/21)

*(i) Fund management*

In a voluntary system a private entity, such as a management board, would need to be established. The effectiveness of the system would to a great extent be dependant of the skills of the fund's management. The management board would be required to develop guidelines for its operations covering:

- Criteria for considering and ranking projects for selection
- The scope of projects for consideration
- Criteria for measuring the success of projects
- Requirements for monitoring and reporting on the outcome of projects
- The scope of institutions and other entities for the submission of projects for consideration

For such a management entity to be credible, it would need to be independent as well as acceptable to shipping companies from developing and developed nations in order to encourage participation in the scheme.

*(ii) Looking ahead*

In the long term, shipping companies will benefit most by improving efficiency and deploying technologies to reduce GHG emissions. Since many shipping companies are not able to invest beyond a very small extent in R&D related to their specific operations, the main advantage of establishing a voluntary fund is that significant sums can be invested in R&D that would otherwise not be spent. This applies even more to long term R&D activities aimed at alternative technologies for GHG reduction. A voluntary levy system, therefore, has the potential to fulfil a vital industry-wide R&D role for shipping, providing an incentive for improved efficiency. In addition, participation in a voluntary scheme would allow companies to demonstrate to their various stakeholders and audiences that they take their environmental responsibilities seriously.

## **Section 4**

### **ICS GHG MBI – Analysis Proforma**

This section sets out the analysis of the MBI options against the 12 pro forma categories listed on page 5 of this document. As explained in the introduction, these criteria have been adopted by IMO MEPC as the most appropriate means of comparing the various emission trading schemes and compensation/levy schemes under review.

#### **4.1 Effective in contributing to the reduction of total GHG**

It can be assumed any mechanism adopted must provide for efficient CO<sub>2</sub> reduction. Depending upon the scope of the measure, it may be limited in its effectiveness if it does not apply to all ships carrying all flags. If some areas and ships remain unaffected, they are unlikely to contribute to a general shipping-wide measure for carbon reduction.

##### **4.1.1 Emission Trading Schemes**

The strength of a cap and trade system is that it places an absolute limit on the total amount of emissions permitted to occur. Consequently, the system has the potential to guarantee ecological effectiveness through the reduction of total GHG emissions. The cap is non-negotiable once it has been set. The other side of the coin is that the cost is not known in advance.

There is a question concerning the setting of an appropriate baseline for shipping emissions, since by comparison aircraft emissions and associated fuel usage data are far better known. The IMO Operational Index could provide one way for establishing a baseline although indexing is often seen as an unnecessarily bureaucratic system.

##### *(i) Global framework ETS with regional application*

The scheme proposals mentioned in Section 3.1.1 would contribute to a reduction of total GHG emissions both by way of the incentive offered by the reducing cap as well as the purchase of additional credits via CDM (Clean Development Mechanism) and JI (Joint Implementation) schemes. The extent of the application of the ETS would determine how much of the industry's GHGs came under the scheme's remit and the expected exclusion of non-Annex 1 countries will significantly reduce the climate benefits of the scheme.

##### *(ii) Open Cap and Trade scheme*

A GHG reduction scheme under IMO could contribute to a significant global reduction in emissions, provided a sufficient number of countries ratified the agreement, including non-Annex I countries. This would result in unprecedented global coverage offering tangible GHG benefits.

##### *(iii) European ETS*

Reductions in GHG emissions will depend upon the model used and what is considered effective, since in general shipping will tend to look for relative rather than absolute reductions. Consideration of the carbon credit allocation method will also be important for the scheme's success and if caps are incorrectly set the GHG benefit may be small. If auctioning is used, some of the revenue generated can be directly channelled into reduction schemes. Any scheme can be more effective if it allows trading of credits between different sectors as this enables the most efficient reductions to take place.

The overall GHG impact of a sole EU scheme would be much lower, however, as it would exclude all non-EU owned activity outside EU waters.

#### **4.1.2 Mandatory Compensation Fund**

A compulsory levy places a cost on GHG emissions globally and offers the potential for large reductions. There are two mechanisms within the fund option which act as incentives for reductions.

Firstly, the economic cost associated with paying the levy serves as a driver to reduce this cost in order to maintain profitability; the optimum benefit will flow where the party paying for the emissions takes every measure to reduce emissions for a positive payback. The second mechanism feeds back revenue collected via the fund to reduce emissions further through innovation and R&D, stimulating research which should deliver the future sector-specific reductions vital if any global targets of 80% reductions of 1990 levels are adopted (as is recently the case with the UK's climate change bill).

In order to reduce net emissions, the funds collected must be assigned to emission reduction projects where the cost of the reduction (\$/tonne reduced) is less than the cost allocated to the emission by the fund (\$/tonne emitted). To be economically efficient, the fund administration should accept all projects up to the total available, where the marginal benefit exceeds the marginal cost, irrespective of geographical location or industrial sector. This equates to decisions made to fund capital investments.

Where no projects related to shipping R&D are found to be acceptable using these criteria, it is likely little or no additional GHG reduction from the shipping sector would be achieved. Because of this possible outcome, the choice of disbursement of revenue collected depends on a policy decision about whether the fund's remit is to maximise emission reductions without regard to their source or to maximise emission reductions from shipping. Given the MEPC (IMO Marine Environment Protection Committee) principle to adopt measures to reduce shipping emissions, it follows that a levy on the industry should be allocated to R&D and other measures leading to actual reduction of vessel emissions.

Allocating the distribution of project finance and management of the R&D programme to IMO is a possible option for consideration. In the Organization's favour, IMO has the unique ability to convene a group of experts to oversee this work, drawing upon its ranks of regulators, interested bodies, ship and equipment designers and builders, fuel suppliers and environmental representatives, all with a direct interest in ensuring the programme's success.

#### **4.1.3 Voluntary Levy System**

As previously stated, shipping companies stand to benefit most in the long term by improving efficiency and deploying technologies to reduce GHG emissions. It is strongly suggested revenues raised via a voluntary system for shipping should only be used for shipping-related R&D, since many companies in the sector do not have the resources to invest in R&D related to their own operations. This approach should help persuade companies to participate in the system. In addition, it could be argued that by improving efficiency, operating costs should decrease over time.

Universities could be invited to participate in such a system potentially involving substantial funds for shipping R&D, including long term projects.

## **4.2 Binding and equally applicable to all ships to avoid evasion**

Without a global solution, it is unlikely all ships carrying all flags will be under similar obligations to reduce carbon emissions. National or regional emission reduction measures will be limited by the jurisdiction in which they are applied, leading to probable competitive disadvantage for those required to comply or rendered ineffective through flag swapping for evasion.

### **4.2.1 Emission Trading Schemes**

#### *(i) Global framework ETS with regional application*

The system would be binding and offer equal treatment to all ships, regardless of flag, size and port of origin, calling at participating ports. A fundamental concept of the Maritime ETS (METS) is to tie permission for a ship to call at a port to the vessel's participation in a scheme for emissions trading in an open system under a common cap.

Any ship calling at a participating port would not be able to avoid the scheme. A global scheme designed in this way would cover emissions generated by ships above 400 gt, travelling solely in waters of Annex 1 countries, and in addition all ships travelling to and from the ports of these countries on trans-continental voyages. This means that countries in other parts of the world would be affected only to the extent that they use shipping for trade with Annex 1 countries

However, such a system could lead to evasion and derogations for voyages not affecting European ports. Ships could evade the scheme by calling at intermediate ports (for example, in North Africa or Russia) where they would not normally have stopped. To counter this, the scheme would require ships to break down their fuel deliveries into the constituent parts of long distance voyages.

#### *(ii) Open Cap and Trade scheme*

A global GHG reduction scheme under IMO could be equally applicable to all flag states if a sufficient number of countries ratified and there was no exclusion of non-Annex I countries (i.e. as per all other IMO instruments) and noting the caveats regarding implementation timetables and reaching global agreement expressed in 3.1.2 above.

Although complete adoption worldwide of any IMO instrument is improbable, lessons drawn from regional schemes offer various alternatives for how a global scheme could cope with non-ratifications and delay in ratification by various member states.

#### *(iii) European ETS*

By its nature, an EU ETS would only apply to ships under the EU flag and have limitations in terms of its applicability to all shipping. In addition, setting the boundaries for the scheme and countering potential evasion could be major challenges.

The EU ETS is a large, well-established emission reduction scheme, which will increasingly apply to the transportation sector, for example the imminent inclusion of aviation. The EU acknowledges it is vital the mechanisms employed to reduce emissions do not create any unnecessary regulatory burdens, allow businesses to choose their own priorities and minimise costs.

Other modes of transport, such as road transport, should have to comply with similar measures in case of customers considering a modal shift to cheaper alternatives. However, this is well understood at a policy level and in the absence of a current EU-wide approach, national initiatives such as the UK's Fuel Duty Escalator are designed to increase the cost of using fossil fuels for land based transportation.

#### **4.2.2 Mandatory Compensation Fund**

Based on the premise that fee collection would be most efficient via the fuel oil supplier, it is important to consider the bunker delivery note and a strong certification system for fuel oil suppliers to avoid evasion.

To simplify the scheme's enforcement, it is proposed the agreement should include an obligation to purchase fuel oil only from registered suppliers, licensed or certified under the scheme. In order to be certified, fuel oil suppliers would agree to specific reporting and record-keeping requirements as well as requirements concerning payment of the relevant funds to the fund administrator. Fuel oil suppliers located in the territory of non-party states would likely be motivated to participate in the scheme, since most ships would not purchase fuel from a non-certified supplier. This approach would address the problem of suppliers located in the territory of non-party states, since shipowners or operators will be subject to flag and port state enforcement in a scheme where ships are obliged to purchase fuel from registered or licensed fuel oil suppliers. The registration requirements also present a mechanism for the fund administrator to render evasion (i.e. failing to report sales or pass on fees collected) of the scheme much less likely.

Where non-compliance is suspected, the fund administrator would coordinate with the relevant national or port authority to inspect records of fuel sales. In addition, the national administration where the fuel oil supplier is located would be free to conduct inspections of relevant accounting and financial records. Enforcement actions, such as fines, etc., would be the responsibility of the government where the fuel is supplied. Collection and enforcement of the respective fees at facilities residing in a country not party to the agreement could be difficult.

In cases where fuel is purchased and taken onboard in a country not party to the agreement and where the fuel oil supplier is not voluntarily reporting and collecting the levy, the shipowner or operator would be responsible for submitting records as well as the fees collected to the fund administrator. At least two market effects could be anticipated in such a system:

- Global fuel suppliers are likely to collect fees worldwide, including bunkering facilities located in non-party states, since it should be in suppliers' interests to utilise uniform and transparent collection systems.
- Many ship operators would avoid using bunkering facilities that further increased the documentation and reporting requirement upon their own operations, providing a motivation for responsible players.

Since ships are required to maintain copies of bunker delivery notes, port State authorities will be free to inspect the notes to ascertain that the ship has purchased fuel from a certified fuel oil supplier and sufficient quantities are on board consistent with the volume of fuel consumed and purchased. This type of procedure is available today to ascertain compliance with low-sulphur fuel/emission requirements applicable in SO<sub>x</sub> Emission Control Areas.

### **4.2.3 Voluntary Levy System**

Enforcement procedures for a voluntary levy system are obviously quite different from those required within a mandatory framework. Port state would have no role and there would be no certification scheme for fuel oil suppliers, making for a consensual approach for responsible and compliant behaviour.

To ensure the system is fair for all participating companies, some form of credible enforcement will nonetheless be required. Since data concerning fuel oil consumption is sometimes commercially sensitive, there could be a role for national associations to collect and forward payments as part of a transparent system. Participating companies would submit information about their ships and fuel consumption to the designated associations, who could in turn be audited by an external party. As this is a voluntary initiative by the shipping industry, it would seem appropriate the shipping company pays the levy and not the charterer in case of time chartered vessels.

For independent auditing purposes, quantities of fuel oil could be verified by means of the bunker delivery note. In case of non-compliance, it would seem inappropriate to impose fines and the company given a chance to pay its dues. In case of repeated violation or reluctance to pay after non-compliance has been proven, this could lead to the exclusion of the company from the scheme, including associated benefits.

By participating in the scheme, a 'bottom-up' baseline can be established for participating companies based on the collection of relevant data, with the subsequent effects of carbon reduction measures and phasing in of new technology independently assessed and verified.

### 4.3 Cost effective

For the purposes of this document, it is assumed the term ‘cost effective’ applies to the cost effectiveness of delivering CO<sub>2</sub> reduction measures for the shipping industry as a whole. It is questionable whether a measure could be considered cost-effective if it applies only to a segment of the industry or to some flags and not to others.

#### 4.3.1 Emission Trading Schemes

If an adopted ETS for shipping were to mirror a system for land-based installations, where free allocation is gradually reduced to zero over a period of approximately eight years, the average amount to be recycled would be in the order of €10 billion per year. Revenues from auctioning allowances could be reinvested into the shipping sector, for example, via the IMO Technical Cooperation Programme. As long as land-based emitters receive all or some of their allowances free of charge, some recycling of scheme proceeds appears to make sense. However, this form of recycling might not be appropriate for any really large resource stream.

##### *(i) Global framework ETS with regional application (such as METS)*

In terms of administrative costs, it is suggested a company operating fewer than five ships would require one full-time employee who would probably ‘double hat’ as the company’s fuel purchaser. However, when verification is also taken into account, the cost of administration could be high. While some of the cost could be offset by auction revenue, it is nonetheless an additional cost for the industry. It is possible under such a scheme that most of the administrative costs could be borne by the port authorities with minimal outlay in administration by the shipowner.

The cost of METS is not known in advance and also depends on the method of allocation. The METS proposes the initial allocation of allowances by auction. Allocation free of charge based on the historic emissions of individual ships would mean having to decide on allowances for many different types and different sizes of vessels. In the shipping sector the problem with new entrants and the risk of rewarding companies that sell or scrap ‘facilities’ is more pronounced than with land-based activities.

A way of gradually introducing full responsibility in the shipping sector proposed by METS would be to rule that ships initially only have to surrender allowances equal to a certain portion of their emissions. If a decision is taken to raise gradually the liability to 100 per cent by 2020, companies ordering new ships should presumably consider the long term effect of the METS rather than short term conditions when deciding on the design and operational speed of vessels.

##### *(ii) Open Cap and Trade scheme*

An ETS scheme with an open system architecture may not result in sufficient reduction of GHG emissions in the shipping sector. This is because the shipping industry is considered likely to be a net buyer of emission allowances and credits.

The theory behind emission trading schemes recognises they are effective in driving investment towards the lowest cost of abatement. Although shipping may be a net buyer of credits, by definition this will be cheaper than investing in alternative technologies or other mandatory carbon reduction requirements.

### *(iii) European ETS*

The allocation system used will have a bearing on cost effectiveness. There is an advantage insofar as there is already an infrastructure in place to manage such a scheme. Cap and trade remains the most cost effective way to provide meaningful emission reductions and has been proven in practice. However, a regional ETS scheme would only impose additional costs on EU-flagged carriers, along with their specific abatement costs, without necessarily having a far-reaching environmental effect on global shipping outside the EU.

For allocation by auction, the expenses involved would come on top of higher fuel costs and the additional certificates companies have to buy for their future growth. Experience from other industry ETS indicates these additional costs impose heavy burdens on EU companies operating globally. In the aviation sector a 2008 Ernst & Young analysis of the impact of ETS on the EU aviation industry estimated additional costs of €9 billion for the period between 2011 and 2022, with a worst-case scenario of €65 billion. This assumes a realistic scenario of increasing auction shares of 3 per cent to maximum of 40 per cent with an allowance price €30/t CO<sub>2</sub>.

### **4.3.2 Mandatory Compensation Fund**

The shipping industry is a projected long term buyer of allowances irrespective of whether via an ETS or a levy/compensation fund. The relative share of CO<sub>2</sub> emissions from shipping is likely to grow over time with compensation costs also likely to increase.

Reduction in shipping emissions requires substantial R&D. The problem with funding R&D is the lack of a direct relationship between the amount funded and the potential for reducing CO<sub>2</sub> (i.e. the marginal reduction costs of 1 metric tonne CO<sub>2</sub>). CDM provides the cheapest reduction possible, but this is not necessarily the same as the most efficient reduction. Solely investing in R&D could in theory lead to a revolutionary breakthrough within say 10 years. Within a 40 year time frame, this could lead to more emission reductions at lower costs than yielded by only investing in CDM, which could make sole investments in R&D more efficient. There is of course also a possibility that such a breakthrough might not be achieved. A preliminary conclusion, therefore, is that CDM and R&D should not be mutually exclusive, rather they should complement and enhance each other.

Use of fund payments in this way has clear benefits for the shipowner or operator. Firstly, R&D should lead to innovative means of improving the carbon efficiency of shipping, resulting in reduced operational costs which in turn should reduce payments to the fund. Secondly, the industry will be able to demonstrate its commitment to lower emissions by reporting actual GHG reductions, instead of being perceived of buying its way out of climate change issues through payments to a fund.

### **4.3.3 Voluntary Levy System**

Investment in R&D funded via a voluntary levy should lead to innovative means of improving the carbon efficiency of shipping, since in theory the sector should have more control over the use of the funds received. This should lead to a reduction in operational costs through fuel savings and lower voluntary payments to the fund.

To invest in substantial R&D activities, a levy of 1 – 5 Euros seems appropriate. If 20% of all companies engaged in international shipping participate, this could yield 55.4 million to 277 million Euros annually, based on a fuel consumption of 277 million tonnes (2007). A levy in this range is not likely to present a serious obstacle to shipping companies participating in the scheme.

Many of the cost issues relevant to a mandatory levy system also apply to voluntary funds.

#### **4.4 Able to limit or effectively minimise competitive distortion**

Any measure applied regionally or nationally will inevitably create some degree of competitive distortion for shipping in the absence of a global solution. Disadvantaged sectors could be ships of particular types (if singled out for special reduction measures), ships trading in a certain region, or flying a particular flag.

Operators could achieve some mitigation through re-flagging, ceasing to trade to affected regions, or passing costs on to customers.

##### **4.4.1 Emission Trading Schemes**

###### *(i) Global framework ETS with regional application*

Equal application of the system to frequent and infrequent traders will tend to work against infrequent traders. However, the higher the number of participating ports, it should follow any competitive distortion will be correspondingly lower. In the case of a regional METS, a ship trading within a region participating in the scheme will have higher costs than ships operating out of the scheme.

In order to contribute to cost-efficient GHG reduction, a METS should be able to provide a marginal incentive equal to that enforced in other sectors, neither distorting competition within maritime transport nor between shipping and other modes of transport including land based installations.

An ETS may offer large shipowners potential trading advantages gained at the expense of smaller competitors. However, this is essentially a question of fixed versus variable costs and large companies would have an advantage to the same extent they currently enjoy with fuel prices.

###### *(ii) Open Cap and Trade scheme*

Distortions could be avoided by applying PSC (Port State Control) as well as SOLAS (International Convention for Safety of Life at Sea), etc., to ships flagged with non-contracting governments

Trading advantages for large shipowners at the possible expense of smaller operators discussed in item (i) above also apply to an open cap and trade scheme.

###### *(iii) European ETS*

Competitive distortion is a major concern for the shipping industry, where additional costs could make trading in Europe more expensive than outside.

A regional ETS could also exaggerate competitive distortion between operators having a large share of business in EU voyages and those with a small share or trading more between non-EU countries. This is comparable with the aviation sector: with an EU ETS coming into force from 2012 onwards, EU carriers, such as AirFrance, KLM or Lufthansa, will require certificates for their entire fleet of aircraft. By comparison, non-EU airlines, for example Emirates would only have to submit certificates for their flights to and from EU airports, and not between other regions such as the US and Asia Pacific.

#### **4.4.2 Mandatory Compensation Fund**

Evasion by the fuel oil supplier would be subject to a specified penalty, such as treble damages or three times the amount that should have been remitted. Failure of suppliers to comply on a repeated basis would result in loss of certification, limiting their ability to sell in the international market.

Evasion by the shipowner or operator could be addressed through flag and port state penalties. Such penalties could be stipulated in the agreement directly or vary according to the respective implementing laws of the various national administrations, as in MARPOL and other instruments. It should be noted that the port State could also take action with respect to non-party vessels entering its port if the agreement includes an obligation *to give no more favourable treatment* to non-party vessels.

#### **4.4.3 Voluntary Levy System**

As a voluntary levy system basically consists of a coalition of the willing, a levy in a voluntary system needs to be set at such a level that it is not perceived to distort an otherwise level playing field.

A levy in the range envisaged (see Section 4.3.3) is unlikely to prevent shipping companies from participating.

#### **4.5 Environmentally sustainable without penalising global trade and growth**

It is fair to assume any measure applied through the UNFCCC, or via a regional or national mechanism, will be environmentally sustainable. However, the cost of trade will vary depending upon the extent of global coverage and the adopted scheme's appropriateness in respect of specific characteristics of the shipping industry.

##### **4.5.1 Emission Trading Schemes**

The following factors can influence the effectiveness of an ETS, including the way in which global trade and growth could be penalised:

- Level of the cap
- Method of allocation
- Energy-efficiency of the fleet

###### *(i) Global framework ETS with regional application*

The cost of the scheme including any additional administrative burden will have the effect of penalising trade to and from participating ports. In addition, ways of avoiding the system could change trade in and around participating ports.

A lot depends on the level of the cap and on which basis the cap is set. In the EU ETS land-based installations need to reduce GHG emissions to achieve 1990 levels by 2020. Where international aviation is concerned, a cap equal to the average annual emissions between 2004-2006 has been established. Similar approaches to setting a cap on shipping emissions could be used for a global METS.

How expensive a GHG ETS is for the shipping industry will depend on how shipowners manage their risks. If such a scheme is treated as a compliance matter, it will likely work as a fuel surcharge set by a 'market rate'. If enough preparation takes place at an early enough stage and a dynamic risk-management strategy adopted, opportunities will arise for cost minimisation and gaining a competitive advantage over rival and unprepared competing businesses.

###### *(ii) Open Cap and Trade scheme*

The scheme should prevent the growth of emissions under the cap without restricting global trade.

###### *(iii) European ETS*

Since this scheme is solely regional, it will presumably penalise global trade somehow. It would also be difficult to argue for sustainability, since non-EU carriers without additional CO<sub>2</sub> costs could take business from EU shippers without necessarily having to reduce their GHG emissions.

#### **4.5.2 Mandatory Compensation Fund**

The compensation fund/levy concept allows for initiating sustainable developments in other sectors and/or developing nations. It also allows for stimulating or subsidising sustainable developments for ships. As such it poses no constraint on the growth of world trade. This constitutes a win-win situation for shipping, other sectors and developing nations. Since the payments to the fund add to transportation costs in general, there may be an increase in inflation.

#### **4.5.3 Voluntary Levy System**

A Levy as such will not restrict the growth of global trade and has the added benefit of providing R&D opportunities to help the shipping industry achieve sustainability looking ahead.

#### **4.6 Goal based approach**

Any emission scheme will have the goal of CO<sub>2</sub> reduction from shipping as part of a larger global warming mitigation programme. In this sense it will be goal-based with the setting of emission targets on an ambitious scale. Consideration should also be given to the extent to which goal setting for the shipping industry can be undertaken in isolation from other industries or sectors.

##### **4.6.1 Emission Trading Schemes**

For ETS generally, carbon reduction goals are predetermined but the employment of methods permitted to reduce emissions is left open. This applies to:

- (i) Global framework ETS with regional application*
- (ii) Open Cap and Trade scheme*
- (iii) European ETS*

##### **4.6.2 Mandatory Compensation Fund**

The aim of an economic instrument is by definition goal based.

##### **4.6.3 Voluntary Levy System**

The above also applies to a voluntary system.

#### **4.7 Promote innovation and R&D**

If the cost of compliance is large enough, it may be a driver for investment from within the sector for additional R&D in better technologies and strategies to reduce the financial burden on shipowners. Large-scale emission reduction schemes applied across industries or sectors will not necessarily provide a mechanism for innovation or R&D related to international shipping.

##### **4.7.1 Emission Trading Schemes**

The success of ETS in promoting innovation and R&D will largely depend upon the allocation system for credits. Many companies may only be looking to meet their obligations and not have the necessary mass (number of vessels) to invest in new technology, unless the value of credits is sufficient to drive innovation and the cap keeps dropping.

###### *(i) Global framework ETS with regional application*

The incentive for greater efficiency through ‘taking away’ credits by the application of the cap should encourage innovation and R&D.

###### *(ii) Open Cap and Trade scheme*

This is a question of the cost of GHG reduction in the shipping sector versus the cost of credit from outside. The scheme would not necessarily provide an incentive to progress R&D projects if the cost of credit from outside is cheaper. However, this situation may have changed with the tightening of credit availability across global markets.

The degree to which revenues can be raised to invest in R&D will depend to what extent there is an initial auctioning of allowances. If there is 100 per cent auctioning, or a percentage thereof, those funds could be channelled into R&D projects. These could be extensive given the size of the shipping industry.

###### *(iii) European ETS*

Again this will very much depend upon the allocation system used. If all allowances are grandfathered, this will reduce the scheme’s effectiveness. Many companies will be only looking to meet their obligations and not have the mass (number of vessels) to invest in new technology, unless the value of credits is sufficient to drive innovation and the cap keeps dropping.

Generally, buying CO<sub>2</sub> certificates plus possible higher costs of auctioning will reduce operators’ available funds for R&D or investments in new technology. This stands to be especially true for shipping, as the sector is forecast to become a net buyer in such a scheme.

##### **4.7.2 Mandatory Compensation Fund**

An important consideration related to funding R&D projects is whether payments from the fund result in new R&D or simply replace other existing investment. Currently, engine manufacturers and others are assigning funds to R&D as a means of increasing their competitive position when marketing new engines and other products to new-build ships. In this instance, there is concern that payments from the fund would serve only to replace existing investment and not lead to new innovations. An important consideration in this regard is the need to address emissions from existing ships, as this is a field where R&D spending is less likely to occur. It will be important to include existing ships in this initiative, since it is expected current market conditions will lead to a reduction in demand for new tonnage. It is also expected more detailed research will show the current level of R&D related to improving shipping energy efficiency is below the level required to optimise effectiveness.

### **4.7.3 Voluntary Levy System**

A voluntary levy system would not only promote innovation and R&D, it would facilitate and finance it, contributing to the long term sustainability of shipping. This would particularly assist smaller shipping companies unable to allocate sufficient funds to R&D to improve their own operations.

#### **4.8 Accommodates leading energy efficiency technologies**

This Pro Forma is more specific than promoting innovation and R&D in a broad sense, since it focuses on energy-efficient technologies that have a direct effect on emission reductions.

In large cross-industry schemes there may be technical spin-offs as a result of R&D in energy efficiency technologies for land-based industries. However, such schemes are unlikely to employ emission reduction technology directly for shipping.

##### **4.8.1 Emission Trading Schemes**

Any cap and trade system should accommodate energy efficient technologies, as there are obvious benefits in reducing emissions.

###### *(i) Global framework ETS with regional application*

Since the means of increasing efficiency are left to the shipping company, this should encourage increased development of energy efficient technologies

Parallel with the mechanism for handling the proceeds from auctioning aviation allowances, under a METS they could fund contributions to the Global Energy Efficiency and Renewable Energy Fund as well as measures to avoid deforestation and facilitate adaptation in developing countries.

###### *(ii) Open Cap and Trade scheme*

The previous argument in terms of promoting innovation and R&D also applies to accommodating leading energy efficiency technologies. Because methods for carbon reduction within the ETS framework are not specified, any new technologies could be utilised.

###### *(iii) European ETS*

The cap and trade system should drive innovation in energy efficiency technology, not least in order to reduce compliance costs. Earlier comments with regard to promoting innovation and R&D also apply.

##### **4.8.2 Mandatory Compensation Fund**

As the system to a great extent is a fund raising mechanism for R&D related to the reduction of CO<sub>2</sub> emissions, it should also accommodate energy efficiency technologies.

##### **4.8.3 Voluntary Levy System**

Similar comments apply as for mandatory compensation funds above.

#### **4.9 Practical, transparent, fraud-free and easy to administer**

This is one of the most important of the pro forma analyses, since a scheme fulfilling all of the above criteria stands a good chance of achieving success. As already indicated, national and regional schemes will be essentially a compromise between the needs of the various industries involved, which may have a bearing on the practicality of any given scheme and how easy it is to administer.

##### **4.9.1 Emission Trading Schemes**

###### *(i) Global framework ETS with regional application*

From the shipping-industry perspective, the system described is not particularly practical, nor would it be fraud-free or easy to administer. While the theory of running a METS appears relatively straightforward, in practice many issues would need to be resolved to ensure its seamless operation, primarily the establishment of caps on operators or individual ships.

###### *(ii) Open Cap and Trade scheme*

It would seem to be practical to utilise a system based on bunker delivery notes to show CO<sub>2</sub> emissions from each ship. This would have the benefit meeting all the pro forma criteria, given proper scrutiny and enforcement.

In terms of ease of administration, the burden for this is expected to lie with the ship, ship operating company, port and port State control.

###### *(iii) European ETS*

Given the well-developed existing framework, this should be an advantage of EU ETS. A pure EU ETS should be quite easy to administer, enforce and monitor and also have a degree of built in transparency.

#### **4.9.2 Mandatory Compensation Fund**

An International Maritime Greenhouse Gas Emission Fund could be a separate legal entity running under conditions similar to those of the IOPC Funds. The IOPC is an intergovernmental organisation outside the UN but which follows procedures similar to those of the UN. As previously mentioned, bunker suppliers would seem to be an appropriate party to collect the levy, given the clearly defined supplier network, potential ease of certification, and existing record keeping arrangements.

#### **4.9.3 Voluntary Levy System**

In a mandatory system it seems appropriate that fuel oil suppliers are responsible for collecting and forwarding the levy. This would probably not be the best approach in a voluntary scheme, where responsibility should instead fall on the ship or shipping company to calculate the total charge and forward it to the fund. Calculations can be made on the basis of the bunker delivery note or actual fuel consumption (which in most cases is sent by ships to shore on a daily basis in their noon report) on a periodic monthly or quarterly basis. A simple software tool (or spreadsheet) should make this a straightforward process. A complicating factor could be whether ships are operating on the spot market or are under time charter. As this is a voluntary initiative by the shipping industry, it would seem appropriate the shipping company pays the levy and not the charterer in case of time chartered vessels.

#### **4.10 Credible to stakeholders and able to demonstrate compliance with climate change goals, including monitoring**

The shipping industry has a right to expect regional or national schemes are credible to stakeholders in the welfare of the shipping industry and climate change goals capable of being achieved.

##### **4.10.1 Emission Trading Schemes**

###### *(i) Global framework ETS with regional application*

The system would be credible to governments favouring caps and give a simple measurement of emission reduction. To measure emission reductions, a central maritime authority could control the trading of credits in the open system for monitoring purposes.

###### *(ii) Open Cap and Trade scheme*

The calculation of carbon reduction in GHG emissions from international shipping should be accurate and easy. It is possible the IMO Study could perform this on a yearly basis, if required.

###### *(iii) European ETS*

An EU ETS in pursuance of climate change goals would by its very nature have the necessary authority to be credible to stakeholders.

##### **4.10.2 Mandatory Compensation Fund**

A compensation fund or levy system aimed at offsetting CO<sub>2</sub> emissions and increasing R&D related to improving the efficiency of ships (through alternative propulsion or energy use) provides a credible means for shipping to demonstrate its commitment to tackling climate change and promoting sustainability. Moreover, the global reach of the system is a unique approach which could be used as a basis for future climate change mechanisms.

Although cap and trade as a process is sometimes mistakenly viewed as the only mechanism by interested parties, some stakeholders are increasingly considering other measures. NASA's climate modelling team consider cap and trade as only one process, coming to the conclusion that Copenhagen should not exclusively look at a single MBI solution because "a cap and trade with offsets and escape hatches [which] will be guaranteed to fail in terms of getting the required rapid reduction in emissions." There is an opportunity for the shipping industry to lead policy and achieve sustainable GHG reductions through an innovative global approach.

##### **4.10.3 Voluntary Levy System**

A similar finding to mandatory compensation funds discussed above.

#### **4.11 Credit for actions already taken which have resulted in GHG reductions to date**

At present most discussion appears to reference 1990 baselines. Whilst the shipping industry has probably delivered significant emissions reductions prior to 1990, the same could be argued for other industries. Shipping industry sectors that were slow to become efficient, and have made the greatest improvements in efficiency improvements since 1990, could benefit from a 1990 baseline but it is accepted that a line has to be drawn somewhere.

##### **4.11.1 Emission Trading Schemes**

A feature common to ETS schemes but not specifically addressed within the pro-forma questions concerns the initial allocation of carbon credits to existing ships. As previously discussed, 100 per cent free allocation could lead to market distortion by being perceived to penalise efficient operators and reward non-efficient shipowners.

###### *(i) Global framework ETS with regional application*

As with any emission reduction scheme, the setting of the cap on historical emissions would tend not to encourage efficiency measures until the system is in place.

###### *(ii) Open Cap and Trade scheme*

This would depend upon how the baseline was defined. Insofar as allowances are issued free of charge, allocating by preference to an industry average level of emissions is considered to be a fair approach.

###### *(iii) European ETS*

In principle, credit for previous actions could be accommodated, depending upon the allocation method and baseline date chosen.

##### **4.11.2 Mandatory Compensation Fund**

A compensation fund or levy system is based upon fuel consumption. This implies actions already taken that have resulted in the reduction of GHG emissions are credited by definition. Lower charges would result from reduced fuel consumption.

##### **4.11.3 Voluntary Levy System**

A similar finding to mandatory compensation funds discussed above.

#### **4.12 Certainty – high degree of certainty so that business can invest with confidence**

The inclusion of shipping into existing emission schemes has in some case the advantage of tested measures for baseline setting and emission quotas, with some market adjustment having already occurred.

It is difficult to make predictions about investor confidence, since any indication that a regional scheme could lead to widespread flag hopping could presumably lower confidence in the performance of the shipping sector. This could be further reduced if there was a general belief that shipping was not making an adequate contribution to the climate change problem.

##### **4.12.1 Emission Trading Schemes**

###### *(i) Global framework ETS with regional application*

There is apparently little degree of certainty concerning the future price of credits at present. However if a cap is correctly applied, this could be contrasted with a high degree of certainty in terms of environmental outcome. A new framework system without a track record could result in a reluctance to make significant investment in case the system is significantly amended in the future.

###### *(ii) Open Cap and Trade scheme*

The existence of a defined cap together with the perceived longevity of the carbon market should assure operators of a permanent price for carbon. The price will fluctuate in accordance with market conditions, with investment confidence linked to the stability of the market.

###### *(iii) European ETS*

An EU ETS backed by appropriate legislation would provide a high degree of certainty for businesses in the shipping industry. If shipping was mandated to take part in the EU ETS, the industry should gain from EU experience in operating the scheme, including lessons learnt and stabilisation of carbon prices. The entry of a new very large group of trading partners (i.e. shipping in Europe) could presumably destabilise the carbon market, with a large free allocation reducing the price of carbon at least for a period of time.

##### **4.12.2 Mandatory Compensation Fund**

As the levy or charge on bunkers is fixed it provides for certainty. However, it would perhaps be unwise to set a charge at a certain level indefinitely, as improved energy efficiency might justify a lower level. In the event of rising CO<sub>2</sub> prices, the charge might also need to be increased in order to remain credible. Any system should therefore include future reviews to determine the most effective level of the charge based on predefined criteria.

##### **4.12.3 Voluntary Levy System**

A similar finding to mandatory compensation funds discussed, except that investors may view the voluntary system as a stop gap or short term measure and, therefore, not provide the necessary investment (for example, match funded R&D research) to make the scheme a success.