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Market Based Measures to  
regulate CO<sub>2</sub> emissions from  
international shipping

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# Summary

Today there is consensus around the fact that emissions from human activity contributes to the climate change. States have entered into conventions, enacted legislations and taken various other measures to address the issue of CO<sub>2</sub> emissions. Statistically emissions from aviation are higher than those from shipping. However, as the latter is a major means of transporting cargo worldwide, it is important that the issue of CO<sub>2</sub> emissions from shipping is addressed. This paper aims to shed light on CO<sub>2</sub> emissions from shipping through the prism of States' actions so far concerning CO<sub>2</sub> emissions in general.

Under the United Nations Framework Convention on Climate Change both developed and developing States have responsibilities to stabilize global CO<sub>2</sub> emissions even though States with more abilities and resources are expected to do more. This is called the Common but Differentiated Responsibilities principle, CBDR. To define the responsibilities of different states more concrete, states have agreed under the Kyoto Protocol. International shipping is an area left for states to agree on outside Kyoto, and one obstacle to agree on is if a solution regarding shipping also should be guided by CBDR.

At present the proposals within IMO can be divided in two, to make emissions cost through a levy or to make emission cost with allowances that can be traded. This thesis describes two levy proposals, one Danish proposal of an International Fund and the International Maritime Emission Reduction Scheme. Regarding an Emission Trading Scheme, ETS, there is no, one clear proposal, this thesis raises issues that have to be considered when drafting a shipping ETS.

Shipping is an international business and IMO has a long tradition of universally applicable conventions, the same rules shall apply regardless of flag state. However, the legal framework concerning land-based emissions

does not put the same requirement on all States, with this in mind it would be possible to look at a diverse option for the shipping industry also.

Which parameter to use, flag, cargo destination, passenger origin etc, when allocating emissions must be decided since ship emissions occur outside territorial jurisdiction. Gathered from the existing proposals the ship seems to be entity most suited and the allocation to a state is bypassed by making the system exclusive for shipping, not calculated on state quotas.

The main focus behind both levy proposals are not major emission reductions within the shipping industry, but overall global reductions. Both proposals also try to consider the CBDR principle, the Fund through how the revenues are used and the IMERS by calculating the levy on the ratio of delivered cargo to annex I states. Both proposals involve an international Fund that needs to be able to act on its own. No such administration exists under IMO today, however, there is an example of an international fund that works, the IOPC Funds. The possibility to create an international fund thus seems feasible.

There are several entities that could be made to surrender allowances under an ETS. The owner/operator seems to be in the best position to collect information. An open market with diverse trading entities is most cost effective. Never the less, if allowances regarding shipping are not derived from state quotas the global market can be distorted.

Regardless of which solution IMO decides to develop for the future there are issues to solve, it is important that the intention is obtained. To secure the object it is important that it is not possible to avoid the regulations by changing flag and to try to prevent the possibility to unload in a non-participating port and shift to other transport mode. Regarding control measures, this could be done by port state control. To ensure that no transport mode get un-proportionately high costs or benefit on other modes emission reduction regulation it is important to seek a solution for the whole transport sector.

# Sammanfattning

Idag råder konsensus kring att människans aktivitet bidrar till klimatförändringar. Stater har ingått konventioner, utformat lagstiftning och tagit olika steg för att minska CO<sub>2</sub> utsläpp. Statistiskt sett är utsläpp från flyg högre än utsläpp från sjöfart. Sjöfart är dock ett av de större transportsätt för att frakta gods över klotet, därför är det viktigt att utforma en reglering för CO<sub>2</sub> utsläpp från sjöfarten. Denna uppsats ger en bakgrund till vad stater generellt har tagit för steg gällande CO<sub>2</sub> utsläpp och ser hur detta skulle kunna användas för sjöfarten.

Under FNs klimatkonvention har både industriländer och utvecklingsländer skyldighet att stabilisera globala CO<sub>2</sub> utsläpp, dock ska stater med mer resurser och förmåga göra mer. Denna princip kallas på engelska "Common but Differentiated Responsibilities", CBDR. Kyoto-protokollet inkluderar inte internationell sjöfart, en stötesten i utformningen av ett system för sjöfarten är om även dessa regler bör genomsyras av CBDR-principen.

För tillfället kan förslagen inom IMO delas in i två grupper, att få utsläpp att kosta med hjälp av en avgift eller att få utsläpp att kosta genom rättigheter som kan handlas. Denna uppsats beskriver två avgiftsförslag, ett danskt förslag att införa en internationell fond och ett fristående förslag kallat International Maritime Emission Reduction Scheme. När det gäller utsläppshandel finns inte ett tydligt förslag, denna uppsats tar upp frågor som måste tas hänsyn till när man utformar en handel för utsläppsrätter.

Sjöfart är en internationell bransch och IMO har en låg tradition av universellt applicerbara konventioner, samma regel ska gälla oavsett flaggstat. När det gäller landbaserade utsläpp finns inte samma krav oavsett stat, med tanke på detta skulle det kunna vara möjligt att ha olika regler för olika flaggstater. Då fartyg rör sig utanför territoriell jurisdiktion måste parametrarna för vad som ska länka utsläppet till vilken stat bestämmas,

flag, gods destination, passagerarursprung etc. Att döma av existerande förslag verkar fartyget i sig själv vara enheten och genom att göra handeln exklusiv för sjöfart undgås problemet med vilken stat utsläppet ska länkas till.

Huvudsyftet med de två avgiftsförslagen är inte stora utsläpps minskningar inom sjöfarten, utan globala minskningar. Intäkter som systemen får in ska användas för att göra minskningar inom det område där störst minskning kan göras till lägst pris. Båda förslagen involverar en internationell fond som kan agera självständigt. Idag finns ingen sådan administration under IMO, men det finns ett exempel på en fond som fungerar, IOPC Funds. Döma av detta verkar möjligheten att skapa en internationell fond möjlig.

Det finns flera olika entiteter som skulle kunna åläggas ansvaret att visa upp utsläppsrätter i ett utsläppshandels system. En öppen utsläpps marknad med handlande enheter från olika sektorer är mest kostnadseffektivt. Det gäller dock att se upp så antalet utsläppsrätter är härledda från samma kvoter, ett system med speciella sjöfarts utsläpps rättigheter, ej härledda från någon stat, kan störa den globala marknaden om de handlas utanför sjöfarten.

Oavsett vilken lösning IMO väljer att utveckla för framtiden är det viktigt att syftet bevaras. För att säkerställa syftet är det viktigt att reglerna inte kan kringgås genom att byta flagg eller besöka hamnar som inte är anslutna till konventionen och sedan byta transportsätt. Kontroll att reglerna genomförs skulle kunna utföras under hamnstatskontroll. Om kostnaderna för CO<sub>2</sub> minskningar inom sjöfarten blir stora jämfört med andra transportsätt finns en risk att gods transporteras på andra sätt, då sjöfarten har relativt låga utsläpp skulle detta kunna underminera syftet. För att säkerställa att detta inte sker är det viktigt att hitta en lösning gällande hela transportsektorn.



# Preface

I want to thank Jan Fritz Hansen executive vice president of the Danish Ship Owners' Association that opened my eyes to the interesting field of allocating moving emissions. Without that this thesis would probably not have started.

My gratitude to Kalle Keldusild at the Swedish Transport Agency, for always answering my questions quick and thoroughly, there are many practical implications that literature cannot answer. Thank you.

I am also very grateful for having the opportunity to be a part of the joint Maritime Law program, without World Maritime University I would never have had the opportunity to meet and listen to so many interesting and prominent persons within the shipping and climate field. Being a student under WMU also gave me an opportunity to discuss directly with an author regarding his paper, thank you for listening and giving me ideas, Professor Proshanto K. Mukherjee. Also thanks to Abhinayan Basu for practical help with finding information. I would also like to mention the competent staff of the WMU Library, Cecilia Denne and Mia Hedin, always with a smile.

Thanks to my supervisor Lars-Göran Malmberg, always calming me and doing his best to give inspiration within a field not totally on his playing field.

Finally, to my family; thank you for being my safety blanket always there with support and love.

# Abbreviations

AAU	Assigned Amount Unit
CBDR	Common But Differentiated Responsibilities
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
COP	Conference of the Parties
CO <sub>2</sub>	Carbon dioxide
DWT	Dead Weight Ton, the weight a ship can load till the maximum allowable immersion.
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Indicator
ERU	Emission Reduction Units
ETS	Emission Trading Scheme
EU	European Union
EUA	EU Allowance
GHG	Green House Gas
ICCFI	Impacts of Climate Change on the Maritime Industry
IMERS	International Maritime Emission Reduction Scheme
IMO	International Maritime Organisation
IPCC	International Panel on Climate Change
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environmental Protective Committee
MOC	Meridional Overturning Circulation
NO <sub>x</sub>	Nitrogen Oxides
OECD	Organisation for Economic Co-operation and Development
QELRC	Quantified Emissions Limitation and Reduction Commitments

SO <sub>2</sub>	Sulphur dioxide
UN	United Nations
UNEP	United Nations Environment Programme
UNCLOS	United Nations Convention of the Law of the Sea 1982
UNFCCC	United Nations Convention on Climate Change, 1994
WMO	World Meteorological Organization

# 1 Introduction

## 1.1 Background

The awareness of human actions' impact on our environment was raised in the 1960s. Three decades later the United Nations, UN, adopted the Framework Convention on Climate Change, UNFCCC. In December this year, 2009, the world is gathering in Copenhagen for the 15<sup>th</sup> Conference of the Parties, COP, marking a step towards an understanding about the post-2012 period.<sup>1</sup> At present emissions from international shipping and aviation is exempted from the Kyoto Protocol, but parties should work on a solution within the respective international organisations.<sup>2</sup> With more and more regulation for other areas, this question arises; when will there be a solution for these sectors? The European Union, EU, is growing impatient, the aviation sector will be included in the EU Emission Trading Scheme, and if the International Maritime Organization, IMO, does not show progress, EU intends to also include shipping in this scheme.<sup>3</sup>

Possible environmental impacts of shipping were clearly seen after the Torrey Canyon accident, and from the 70's IMO has worked with environmental issues related to shipping. CO<sub>2</sub> emissions from international shipping are currently not regulated. The "Regulations for the Prevention of Air Pollution from Ships", MARPOL VI, does not cover CO<sub>2</sub> emissions.<sup>4</sup> At its fifty-fifth session the Marine Environment Protection Committee, MEPC, recognized climate change as a serious threat and that the shipping industry, although an environmentally friendly and fuel efficient mode of transport, must take action. According to IMO resolution A.963 (23), the projected adverse effects of climate change calls for the implementation of measures to limit or reduce greenhouse gas, GHG, emissions from

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<sup>1</sup> Officially the talks started in 2006, see. Press release UNFCCC, "UN conference agrees agenda for negotiations on new emission reduction targets under the Kyoto Protocol"

<sup>2</sup> Kyoto Protocol, art 2.2

<sup>3</sup> Aviation; Dir 2008/101/EC, Shipping; See. COM(2009) 39. p. 7

<sup>4</sup> It covers SO<sub>x</sub>, and NO<sub>x</sub>, volatile organic compounds and some ozone depleting substances.

international shipping. MEPC 55 approved a GHG work plan and agreed that technical, operational and market-based methods to achieve limitation or reduction of greenhouse gas emissions from ships should be considered by MEPC 56 onwards. At MEPC 57, the parties of IMO agreed on some principles to guide the work on a GHG emission trade for shipping.<sup>5</sup>

In the effort to develop means to reduce CO<sub>2</sub> emissions from international shipping IMO has developed an Energy Efficiency Design Index, EEDI, and an Energy Efficiency Operational Indicator, EEOI.<sup>6</sup> EEDI is meant to stimulate innovation and technical development of all the elements influencing the energy efficiency of a ship, making it possible to design and build intrinsically energy efficient ships of the future.<sup>7</sup> The EEOI has been on trial since 2005 and it provides a figure, expressed in grams of CO<sub>2</sub> per tonne mile, for the efficiency of a specific ship, enabling comparison of its energy or fuel efficiency to similar ships.<sup>8</sup>

## 1.2 Purpose

Standards, like EEOI and EEDI, put restrictions on construction and operation of the ship. They do not, however, limit the actual emissions, even though it most likely will be the affect. Another policy instrument that can be used is market based measures, which is on the MEPC agenda, but is still only on a proposal level. The Kyoto Protocol is based on market based measures and several regional Emission Trading Schemes, ETS, are being developed.

What is the basis for market based measures and which legal aspects are important to think of when developing market based measures regulations for the shipping industry? What should be the next step forward after COP 15?

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<sup>5</sup> MEPC 57/21, p. 53-54

<sup>6</sup> Known as Energy Efficiency Operational Index before 13<sup>th</sup> March 2009.

<sup>7</sup> GHG-WG 2/WP.1 annex 2

<sup>8</sup> MEPC 59/4/15

## **1.3 Method**

The Impacts of Climate Change on the Maritime Industry, ICCMI, in Malmö 2008 was a very good base for knowledge about Climate Change and the Maritime business, about the effects of Climate Change and the role of Shipping and the business in general.

Reduction of CO<sub>2</sub> emissions is not purely a legal issue, it is political and economic theories and standpoints that lead to regulatory work. Hence, one cannot look at the issue through purely legal glasses, as one needs other methods also.

This thesis is a literature study and a study of legal framework. Mail conversation with Kalle Keldusild, at the Swedish Transport Agency, regarding aviation has served as an inspiration.

## **1.4 Limitation**

The scope of this thesis is market based measures, MBMs. As there are different means to reduce CO<sub>2</sub> emissions, these will be mentioned briefly if needed, and the focus will be on legal framework regarding MBMs. In literature Market Based Measure, MBM, and Market Based Instrument, MBI, are used interchangeably, in this thesis the term MBM will be used.

Due to lack knowledge, the author will not try to examine if technical suggestions and proposals are viable. Economic discussions are sometimes raised, but this thesis is not aiming to be an economic review, however the topic is relevant and thereby touched upon when needed.

Fishing vessels are not within the scope of this thesis and will thereby not be discussed further.

The term ‘allocate’ can be used both for how to decide which entity to govern how to allocate emissions to a certain State. It can also be used when deciding which entity it is who will be responsible for obtaining emission allowances, and how to handout these allowances to these entities. Author has tried to make clear which ‘allocate’ is referred to in the text.

The issue whether anthropogenic carbon has an actual impact on climate change is not a topic for this thesis.

The topic of this thesis is very current and new information is published every day, information after the last of May 2009 is not considered in this thesis.

## **1.5 Outline**

For readers more familiar with environmental law than shipping there will be an introductory chapter about the shipping industry to enhance their comprehension of the thesis. The second chapter gives brief information about shipping and CO<sub>2</sub> and some information about the affects of CO<sub>2</sub>.

The rest of the thesis is divided in to three parts, a general part about mitigating climate change with a focus on UNFCCC, background to the idea behind market based measures and the lessons that can be learned from trails with market based measures in other sectors and different parts of the world. Then following an account of the specific conditions of shipping is a description of two different proposals regarding market based measures and shipping and highlighting potential problems with the specific solutions.

Each sub-chapter will end with “Conclusions”, a summary of what is most important from that chapter. The Discussion chapter towards the end of the paper is an attempt to use the information from all chapters to analyze how market based solutions could work regarding shipping and what has to be solved to launch new regulations.

In the last chapter, there will be an attempt to answer the research question.



# 2 Facts about the Shipping Industry

## 2.1 Shipping an International Business

### 2.1.1 Diverse Business

Shipping is a diverse business and what is meant by “ship” can be very different depending on the context. Some like Ro-Ro ferries usually shuttle between two close ports on a very tight schedule. Another type of vessel is container ship. Intercontinental container ships are big and carry cargo between big ports, e.g. Shanghai – Rotterdam. Panamax is a term used to describe a ship with a width less than 32.3 meters, the maximum width to pass through the locks in the Panama Canal. Since 1988 vessels have been built with a width exceeding this; post panamax.<sup>9</sup> Containerships are often operated by companies different from the vessel owner and on their route make calls in numerous countries’ ports.<sup>10</sup>

Some ships carry containers with commodities from A to B while other vessels like oil tankers, start off with oil from port A and then the oil will be sold to buyers x, y, z during the voyage maybe ending up in port D.

### 2.1.2 Flag State

Ships in International traffic cross borders and depending on journey the ship can be on the high seas, territory belonging to no state, for long periods of time. Historically the Ship has been seen as a piece of the Flag State territory; the Floating Island Doctrine, as a result the flag state have had jurisdiction.<sup>11</sup> When no longer on the high seas the ship can be subject to dual jurisdictions, both flag state and coastal state. The main rule regarding this is the “Doctrine of internal economy” where the coastal state only has

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<sup>9</sup> Van Dokkum, *Ship Knowledge, Ship Design, Construction and Operation*, p. 54-55

<sup>10</sup> Review of Maritime Transport 2008, p. 45

<sup>11</sup> *S.S Lotus Case* and *R.v. Andersson*

jurisdiction if the ship affects the peace and good order in the coastal state, otherwise the ship is under the jurisdiction of the flag state.<sup>12</sup>

Traditionally Ships has been registered at the owners' domicile state, so called Closed Registers. A shipowner that for some reason, often economical, does not want to register the ship in the domicile state, can chose an open registry. These registers accept non citizens and normally do not impose taxes on the income of the ships.<sup>13</sup> The two major open registry flags, Panama and Liberia, represents about a third of the total world tonnage.<sup>14</sup> Not everyone see open registers as some thing positive, it has been argued that the lack of economic links between the flag state and ship make the control over the ship less stringent then in a traditional register. In the 80's there was an attempt to define the conditions for a genuine link, but the Convention did not enter in to force.<sup>15</sup>

In UNCLOS art 94 the duties of the flag state is set out where every state shall maintain a register of ships containing the names and particulars of ships flying its flag and assume jurisdiction under its internal law over each ship, its master, officers and crew in respect of administrative, technical and social matters concerning the ship. Each flag state is to see to the seaworthiness of ships and that the ship complies with safety and security regulations. In taking these measures states are required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.

### **2.1.3 Conclusion**

On the high Seas flag state jurisdiction prevails. The flag state is responsible for making sure that the ship complies with international standards.

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<sup>12</sup> . Internal economy, See. *R. v. Andersson* (1868) and Chorley & Giles p.20(?)  
UNCLOS gives some other cases when the costal state can impose jurisdiction on another states ship, one of them being pollution. See UNCLOS at 220

<sup>13</sup> Mukherjee, *Flagging Options: Legal and Other Considerations*, p. 32-33

<sup>14</sup> Shipping Statistics Year Book 2007

<sup>15</sup> See. McConell, *Business as usual: An Evaluation of the 1986 United Nations Convnetion on Conditions for Registration of Ships*, p. 438

## **2.2 Key Concepts regarding State and Ship**

### **2.2.1 Reg.Flag vs. Owners domicil**

66 per cent of the dead weight tonnage, dwt, of the merchant fleet owners is domiciled in OECD states.<sup>16</sup> 67.8 per cent of the total world deadweight tonnage was foreign flagged. For example 93 per cent of the Japanese controlled fleet was foreign registered as of 2008, while only 13 per cent of the Indian controlled fleet was foreign registered.<sup>17</sup>

### **2.2.2 Port State Control**

Both ships registered in traditional registers and open register are most of the time far away from the flag state. To make sure that substandard ships are localized there is Ports State Control, PSC. Under port state control the principle “No more favorable treatment” is used. All ships regardless of whether the flag state is a party to a particular convention or not, is to be treated the same. It would not be efficient if a ship’s technical standard would depend on flag state.<sup>18</sup>

### **2.2.3 Difference between Developed and Developing States**

Vessels trading in developed regions usually rather new and within regulations. Old ships re-flag and move to trade between developing states, where administration is restrained and port state control weak.

The six operators with the largest deliveries of geared containerships between January and May 2008 were all based in developing economies.

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<sup>16</sup> Shipping Statistics Yearbook 2007, p. IV-V

<sup>17</sup> Review of Maritime Transport 2008, p. 38

<sup>18</sup> E.g. art 5 (4) MARPOL, PSC, see. also IMO homepage

Operating costs for geared containerships are higher than on gearless ships, while loading and unloading speeds in the ports are lower. The large gearless containerships depend on the ports' container cranes for the handling of the containers. Many smaller ports, especially in developing countries with infrastructure constraints in their ports, cannot accommodate large or gearless containerships.<sup>19</sup>

Ships registered in developed countries are the youngest, followed by developing countries and transition economies. The average age of a ship as of January 2008 registered in developed state was 9.7 years, average in developing countries was 13.4 years and in transition economies 15.5 years. In the latter 48 per cent of the registered ships were 20 years or older, the same figure for developed countries was 15 per cent.<sup>20</sup>

## **2.2.4 Conclusion**

Ships are on the move all the time. Thus, even if a ship is registered in a traditional national registration the distance between ship and flag state can be far. In port the coastal state has the right to inspect that the ship complies with international standards. Not all flag states are parties to the same conventions, to make sure that a certain standard is withheld the inspections are done with "no favorable treatment".<sup>21</sup>

The fact that shipowners can change registers makes it important that legislation is flag state neutral if one wants the regulation to apply to all ships. Hence ships are different it is important that regulations to reduce ship emissions are ship neutral, to suit and be applicable to all ships.

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<sup>19</sup> Review of Maritime Transport 2008, p. 35

<sup>20</sup> Statistics compiled by Unctad based on Lloyd's Register – Fairplay data, Review of Maritime Transport 2008, table 10, p. 37

<sup>21</sup> See. different conventions and IMO homepage.

# 3 CO<sub>2</sub>

## Basic facts

Combustion of carbon compounds in oxygen leads to generation of carbon dioxide. Plants remove carbon dioxide from the atmosphere by photosynthesis so that the CO<sub>2</sub> generated when burning biomass, is absorbed in some content when new biomass is growing. When burning fossil fuel, carbon dioxide that has not been in the atmosphere for a long time is released and the CO<sub>2</sub>-content in the atmosphere increase.<sup>22</sup>

The emissions from shipping are, compared to the amount of cargo transported, relatively low; the numbers differ but somewhere between 1.6-3.7 per cent of the global emissions.<sup>23</sup> IMO's most recent study estimates that the CO<sub>2</sub> emissions from international shipping year 2007 were 2.7 per cent.<sup>24</sup> If nothing is done, emissions from shipping are expected to be 12-18 per cent of total global CO<sub>2</sub> emissions.<sup>25</sup>

Unlike oil or ballast water the main effect from CO<sub>2</sub> is not direct on the Oceans. The CO<sub>2</sub> goes up into the atmosphere and affects the climate in the same way as CO<sub>2</sub> from land based sources.<sup>26</sup>

CO<sub>2</sub> is not the only substance emitted from shipping fumes. Another substance is sulphur dioxide, SO<sub>2</sub>. When the oceans try to neutralize the acidic sulphur with bicarbonate ions, the reaction creates sulphate ions and releases CO<sub>2</sub>. Every kilogram of sulphur entering the ocean waters will release 2.75 kilograms of carbon dioxide. Lowering sulphur levels in fuel

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<sup>22</sup> Smith, p 632-633

<sup>23</sup> TD/B/C.I/MEM.1/2, table 1, p. 4, See Supplement A

<sup>24</sup> MEPC 58/INF.6, table 1, p. 6

<sup>25</sup> MEPC 59/4/7 1.33.7

<sup>26</sup> Mukherjee, *The Legal Framework of Exhaust Emissions from Ships: A Selective Examination from a Law and Economics Perspective*, p. 78

will hence have a reducing affect on CO<sub>2</sub> also.<sup>27</sup> Some argue that sulphur emissions have a cooling affect on the climate, by reflecting back solar radiation.<sup>28</sup>

Hence, CO<sub>2</sub> emissions are directly linked to fuel consumption one way to lower CO<sub>2</sub> emissions is to reduce speed. Another substance in ship emissions is NO<sub>x</sub>, an engine related emission, resulting from combustion of fossil fuel. The slower the engine speed, the higher the production of NO<sub>x</sub> in the combustion process.<sup>29</sup> In addition, the effect from NO<sub>x</sub> has to be resurged further; together with some gases, NO<sub>x</sub> creates gas ozone, but the emission of NO<sub>x</sub> also reduces the life span of the greenhouse gas methane.<sup>30</sup>

Much of the CO<sub>2</sub> emitted through the burning of fossil fuels are absorbed by the oceans.<sup>31</sup> When CO<sub>2</sub> is mixed with water it becomes carbonic acid. Up until now, this has not had a big effect on the oceans since oceans are naturally rich on carbonate ion, an antacid of carbon acid. The increased CO<sub>2</sub> levels in the atmosphere have resulted in a decrease in ocean pH and a decrease in ocean carbonate ion concentrations. Since the beginning of industrial revolution the ocean pH is estimated to have dropped by 0.1 units and is estimated to drop another 0.2 in the next 50 years.<sup>32</sup>

This shows that the relationships between different substances and chemical reactions are complex and need to be further studied. That shipping has a cooling affect is according to both IMO and EU not a reason to not take action.<sup>33</sup> However the positive and negative effects from ship emissions can be seen in the context of Aviation where, the impacts of aviation is

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<sup>27</sup> BLG 12/INF10, p. 22-23

<sup>28</sup> Fuglestvedt, *Climate forcing from the transport sectors*

<sup>29</sup> BLG 12/INF10, p. 26

<sup>30</sup> Cicero homepage; *All Clear for Shipping?*

<sup>31</sup> Falowski, p. 312

<sup>32</sup> *Marine Scientist*, no. 22 2008, p. 9

<sup>33</sup> IMO/ BLG 12/INF. 10/ Annex, p. 132, Greenhouse Gas Emissions for Shipping and Implementation of the Marine Sulphur Directive p. 181

estimated to be two to four times higher than the effect of its CO2 emissions alone.<sup>34</sup>

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<sup>34</sup> Preamble 19 of Dir 2008/101/EC

# 4 International Framework

## 4.1 History

Public awareness about human behaviour's impact on the environment was raised in the 1960's, owing mainly to Rachel Carson's *Silent Spring*, a book published in 1962 about fish death and pollution.<sup>35</sup> In 1972, there was a Conference in Stockholm, which resulted in the Stockholm declaration, a non-binding document, where "Common but Differentiated Responsibility" was mentioned for the first time.<sup>36</sup> The Stockholm Conference was followed by the first World Climate Conference in Geneva 1979. In 1988, the United Nations Environment Programme, UNEP, and the World Meteorological Organization, WMO, created the Intergovernmental Panel on Climate Change, IPCC, which still delivers reports about the state of global environment and Climate Change.<sup>37</sup>

With the UN General Assembly Resolution 45/212 the negotiations for a Climate Change Treaty was initiated in 1990 and the work was concluded at the Rio Conference in 1992 by the adoption of the UN Framework Convention on Climate Change, UNFCCC. The new Convention was signed by 165 governments and is today ratified by 192 states.<sup>38</sup> Recognizing the Common but Differentiated Responsibilities-principle the Convention divides states in to different categories with different responsibilities, annex I states (OECD plus some economies in transition), annex II (OECD only) and non-annex states (mostly developing countries). The first Conference of the Parties, COP, was held in 1995.

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<sup>35</sup> Buhr, p71

<sup>36</sup> Stockholm Declaration 1972, principle 23

<sup>37</sup> IPCC fourth assessment was presented 2007. IPCC was awarded the Nobel Peace Prize 2007.

<sup>38</sup> UNCCC Status of Ratification 22 August 2007



## 4.2 UNFCCC

### 4.2.1 Objective

The objective of the framework convention is not to reverse GHG-emissions, it is to stabilize them “at a level that would prevent dangerous anthropogenic interference with the climate system”. There is no time frame, the objective is to “be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner”. The aim does not seem to be to bring to an end climate change altogether, it seems that the parties accept some level of climate change, provided that it occurs so slowly enough for natural adoption.<sup>39</sup>

### 4.2.2 Responsibilities of the parties

All parties to UNFCCC undertake to make national inventories, to promote sustainable development and to promote conservation of sinks<sup>40</sup>, adaptation, education etc.<sup>41</sup> All states also should see to that there is national and regional programmes to mitigate climate change, by addressing GHG emissions.<sup>42</sup> Although Climate Change needs a global solution, the Convention recognizes that all parties does not have the same ability or historical “guilt” to take action, one important principle that permeates the Convention is “common but differentiated responsibility”. The significance of the principle is seen in art 4.2 were annex I states undertake certain obligations.<sup>43</sup> Annex I-States are to develop national policies and measures

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<sup>39</sup> UNFCCC art 2, Birnie, *International Law & the Environment* p 524

<sup>40</sup> The Oceans is one of the large CO<sub>2</sub> sinks, see. Falowski *The Role of Aquatic Photosynthesis in Solar Energy Conversion: A Geovolutery Perspective* p. 312-313 in Archer.

<sup>41</sup> UNFCCC art 4.1

<sup>42</sup> UNFCCC art 4.1(b)

<sup>43</sup> Freestone, *The UN Framework Convention on Climate Change, the Kyoto Protocol, and the Kyoto Mechanisms*, p 5

on the mitigation of climate change, take the lead in mitigating actions and have reporting requirements.<sup>44</sup> Other commitments, which also include annex-II states, are to provide financial resources to developing countries, assist developing countries in meeting adaptation costs and participate in technology transfer.<sup>45</sup>

### 4.2.3 Kyoto

To make the duties under UNFCCC more specified and concrete states have agreed under the Kyoto Protocol. Overall emissions from Annex I Parties shall be reduced to at least 5% below 1990 levels within the first commitment period, 2008-2012.<sup>46</sup> The Kyoto Protocol Sets quantified emissions limitation and reduction commitments, QELRC, for Annex-I Parties.<sup>47</sup>

The basis for emission trade under Kyoto is the Assigned Amount Units, AAUs, in Annex B of the Protocol the quantity of GHGs that each party is to limit emissions within is stated.<sup>48</sup> Kyoto Protocol concerns six GHG substances<sup>49</sup>, the AAU units are calculated as CO<sub>2</sub>, this means that the other five substances have to be translated in to CO<sub>2</sub> equivalents, and this is made based on the substances varying power to accelerate global warming.<sup>50</sup> Non-annex I parties are not able to issue AAU's.<sup>51</sup>

With the Kyoto Protocol market based mechanisms was introduced on the global arena, article 6 in Kyoto is based on UNFCCC art 4.2.b and the words “individually or jointly”. Art 6 allows any annex I state to transfer to,

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<sup>44</sup> UNFCCC art 4.2 a-b

<sup>45</sup> UNFCCC 4.3-4.5

<sup>46</sup> Kyoto Protocol art 3.1

<sup>47</sup> Kyoto Protocol annex A

<sup>48</sup> Freestone, p 15

<sup>49</sup> Kyoto Protocol Annex A; CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>

<sup>50</sup> See. De Witt Wijnen *Emission Trading under Article 17 of the Kyoto Protocol*, p. 407, Calculation based on IPCC index.

<sup>51</sup> Douma, *The Kyoto Protocol and Beyond – Legal and Policy Challenges of Climate Change*, p. 19

or acquire from, another annex I state reductions in GHG emissions achieved by project activities, so called Emission Reduction Units, ERUs.<sup>52</sup>

Also in line with the notion that it is not where the emission reduction takes place that is important, but rather that the total global emissions are reduced is art 12, Clean Development Mechanism, CDM.<sup>53</sup> CDMs can also be seen as a way of technology transfer between annex I states and non-annex states. Under CDM an annex I state undertake GHG emission reduction projects in another state, and the reduction is ascribed the annex I state as CERs units. CERs that the state then can use to emit more than the particular states' cap under Kyoto.

The present Kyoto period only covers 30 per cent of the global emissions, as the US and Australia are not parties and developing countries do not have specified targets.<sup>54</sup> In the post-2012 discussions, it will be important to broaden the commitments, to widen the responsibility of annex-I states and to look at what commitments some non-annex states could make.<sup>55</sup>

#### **4.2.4 Conclusion**

While UNFCCC does not let developing states “off the hook”, developed states has a larger responsibility to take action to reduce CO<sub>2</sub> emissions as developed states have bigger resources to do so. However, developing states that are parties to the convention have a responsibility to take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.

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<sup>52</sup> Freestone, p 11

<sup>53</sup> Freestone, p. 13

<sup>54</sup> Gao *The International Climate Regime: Where do we stand?*, p 7

<sup>55</sup> Asselt & Gupta, *The Role of Flexibility Mechanisms Beyond 2012 and Developing Country Concerns; Lessons Learned?*, p 27-28

# 5 Market Based Measures

## 5.1 Environmental Economics

### 5.1.1 Economic theory

Adam Smith argued in the late 18<sup>th</sup> century that every individual aims to make the best and most rational economic choice before taking action. Thereby the regulating power does not make extensive regulations since by handing it over to all individuals the best result will be obtained. <sup>56</sup>

This seems to be in contradiction with Hardin's "the tragedy of the commons", going back to Bentham. When a herdsman decides if adding an additional animal to the commons he asks, "What is the utility for me?" The positive component from an additional animal is the proceeds that come with an extra animal, +1. The negative component is the additional overgrazing by one additional animal, this is on the other hand is shared by all the herdsmen, X, making the negative component  $-1/X$ . A rational herdsman reaches the conclusion that adding an extra animal is the best thing to do. This conclusion is reached by all the herdsmen individually and thereby over-utilising the commons. Each man is locked into a system that makes him "increase his herd without limit in a world that's limited", hence the tragedy. <sup>57</sup>

Regarding pollution the tragedy of the commons works in a reverse way. It does not concern taking something out from the commons but putting something into the commons, e.g. chemicals, sewage or other substances that has negative effect on the environment. <sup>58</sup>

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<sup>56</sup> Parkin, *Economics* p. 109

<sup>57</sup> Hardin, *The Tragedy of the Commons*, p 9

<sup>58</sup> Hardin p 11

From an economic viewpoint pollution is an externality, an impact on a party that is not directly involved in the transaction. An externality is something that affects people, for good (positive externality) or for evil (negative externality), over which they have no hand in the decision-making process. As a result, the amount and the quality of the goods or service sold in the market might not maximize the welfare of society.<sup>59</sup>

The Coase theory puts the two previous theories together. According to Coase, a failed market is a market where property rights are not prized right. By making the affected person/s a part of the decision-making process the externality can be internalized. Coase points out that the problem is of reciprocal nature, to avoid harm on B, some harm is inflicted on A. If A is conducting a production that inflicts some kind of harm on B, by ordering A to stop the production will inflict at least economic harm on A. Thus, the thing to decide is which solution causes less harm by negotiating the optimal solution can be found and the externalities from A's production can be internalized. To make this possible every owner's property rights and limitations have to be clearly defined.<sup>60</sup>

### **5.1.2 Economics and CO<sub>2</sub> Emissions**

The Coase theorem is set in a world with zero transaction costs whereas in the real world many situations involve several parties and high transaction costs. CO<sub>2</sub> Emissions in one part of the globe will accumulate with the rest of the CO<sub>2</sub> emissions in the world, adding to the climate change, affecting the whole globe. In this case it is hard to overview the effects from one specific emitter and the counter parties would be several. A way to try to balance the market failure for GHG-emissions is to set a price on the externality and thereby internalize it. This solution is a combination of the Coase Theorem and the Polluter Pays Principle. It can be done in various

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<sup>59</sup> Rogers, *An Introduction to Sustainable Development*, p. 276

<sup>60</sup> Coase Theorem; Parkin, p. 347, Reciprocal; Coase p 96

ways; taxation, fees, tradable pollution allowances and can be done with a regulatory or private approach.<sup>61</sup>

### 5.1.3 Conclusion

The atmosphere is a “property right” with billions of owners. There are several emitters and the consequence of emitting CO<sub>2</sub> is not linear. Under these circumstances it is hard to negotiate the optimal solution, to mitigate market failure, regulation can give firms economic incitement to behave in a certain way.

## 5.2 Taxes vs. Allowances

### 5.2.1 Taxes

Taxes are a price-based policy instrument. A tax increases the price of a certain product and by this decreases the demand for that product.<sup>62</sup> States that have, for whatever reason, taxes on fuel have less demand for fuel.<sup>63</sup>

If a tax is imposed on a specific substance this will affect the use of this substance on all levels both industry and consumers and consequently taxes can be a good option when it is hard to monitor the emission sources.<sup>64</sup>

Taxes is familiar to firms, it is a tool that has been used for a very long time and have relatively low administration costs, since most entities have some kind of routines to deal with them. With a domestic tax, the regulator can make sure that the reduction is made domestically. A tax generates revenue that can be used in different environmental projects.<sup>65</sup>

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<sup>61</sup> Xu, *The Legal Framework of Exhaust Emissions from Ships: a Selective Examination from a Law and Economics Perspective*, p. 83, Polluter pays principle, see. Rio Declaration, Principle 16

<sup>62</sup> Baumert *Carbon Taxes vs. Emissions Trading: What's the Difference, and Which is Better?*

<sup>63</sup> Sterner & Hammar, *Designing instruments for climate policy*, .p 21

<sup>64</sup> Sterner & Hammar, p. 26

<sup>65</sup> Baumert

The down side of a tax is that it can be complicated to calculate the sufficient level of tax. If the level is too low, it does not achieve the desired environmental benefits and too high a level can have negative impacts on economic growth.<sup>66</sup>

Taxation is within state sovereignty, and the decision on which areas to tax, which levels are used and which types of taxes are used, differ from state to state.<sup>67</sup> To get consensus around an emission tax might be hard. One possibility to get support is to have a low threshold with a possibility for states to choose a higher level themselves. A risk is that the act would be more a step to show concern than an actual possible tool to lower emissions. If many other sectors, except the transport sector, will be included in an emission trade, the taxes for reaching the same emission cut in transport can become very high.<sup>68</sup>

## 5.2.2 Emission Trading

By internalizing the cost for emissions, total emissions are diminished in a cost efficient way and environmental issues are presented as an economic opportunity rather than as just a cost factor. De Witt Wijnen defines emission trade, or rather emission rights trade as “the right to emit a certain quantity of a specified substance during a defined period of time”. De Witt Wijnen divides this right in to four elements, the right to emit, a specific substance, of a certain quantity and over a defined period of time.<sup>69</sup>

The most common form of emissions trading is the cap-and-trade system; a competent authority establishes a cap on the maximum emissions of a substance during a specific period. The maximum amount is translated into some kind of rights, permits/allowances, which are allocated to participants in the scheme. This gives the emitter holding a certain amount of rights, the

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<sup>66</sup> Sterner, p. 29

<sup>67</sup> Eu states are not allowed to put tax on bunker fuel. See. Dir 2003/96 EG

<sup>68</sup> Kågeson, p 75, 102-103, Econ p. 41-42

<sup>69</sup> De Witt Wijnen, p 403-404

right to emit the substance as long as the amount emitted does not exceed the rights.

The first emission trade in a large scale was under the Clean Air Act in the US in the 1970's. The US emission trade was credit-based; credits are created by one emitter lowering the emissions under a pre-determined standard and these credits are then transferred to another emitter who can emit more than the standard. The ultimate decision to create credits and to transfer the credits in a credit-based system is at all times with the regulator. A permit-based system, as described in the paragraph before has lower abatement costs for each entity when seeking the approval from the regulator, than in a credit-based one, provided the market is functioning and it is easy to get in contact with other trading entities. This system gets a better environmental performance.<sup>70</sup>

As mentioned, in an emission trade scheme the entity obligated to hold a permit must be decided. In the EU ETS it is the operator of an installation or aircraft.<sup>71</sup> The entity obligated to hold a permit can be decided with an upstream approach or downstream approach; where upstream are the suppliers of for example gas and fuel, while downstream is the emitters. Consequently EU ETS has a downstream approach.<sup>72</sup>

When deciding a cap and which entity shall be obligated to retrieve allowances, the regulator has to decide how to localize the allowances. Allowances can be localized against payment by auctioning, for free based on efficiency parameters, so-called benchmarking, or for free based on historical emissions, so called "grandfathering". Rodi lists several issues to be aware of when deciding on localization of the allowances; the allowances affects property rights and the ability of new firms to compete. When localizing allowances it is important to avoid punishing early action.

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<sup>70</sup> Ellerman, p 82-83

<sup>71</sup> Land based See Dir 2003/87/EC, Aviation See. Dir. 2008/101/EC

<sup>72</sup> Climate Brief



Another thing to be aware of is to not make allowances an obstacle for those wanting to enter the market.<sup>73</sup>

Grandfathering is the most common way of allocating, the main reason being free allocation is a smoother way to get acceptance from the industry.<sup>74</sup> Some studies show that with grandfathering the industry is overcompensated. By allocating 10% of the allowances for free and auctioning the rest the industry could be compensated.<sup>75</sup>

Grandfathering, can lead to “hot air” where an emitter gets allocated allowances based on historical emissions, however, it is business-as-usual when receiving the emission is lower. This frees allowances without any action taken to reduce GHG and the operator can then sell the allowances. The binding target is still met since the allowances are within the ceiling, but the fact that allowances can be sold without any “real” reduction is viewed negatively from an ethical point of view.<sup>76</sup>

The legal status of emission allowances are unclear as neither under Kyoto Protocol nor under the EU ETS is the status defined. Within EU some States consider the EU allowances, EUAs, as financial instruments, while others consider them as normal commodities.<sup>77</sup> This can become an issue for the firms trading<sup>78</sup> with allowances in the future. Legal certainty is important and with a system that’s going to be implemented in both civil- and common law jurisdiction it is important to know what’s transferred.<sup>79</sup>

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<sup>73</sup> Rodi, p. 183

<sup>74</sup> Sterner & Hammar, p. 31

<sup>75</sup> Morgenstern, p. 122

<sup>76</sup> Woerdman, p 72-74

<sup>77</sup> Massai, p 19, Wemaëre, p. 71

<sup>78</sup> AAUs are not traded by private firms, but they can transfere CDMs. The EUAs are transferred between private entities.

<sup>79</sup> Wemaëre, p. 71-72.

### 5.2.3 Taxes vs. Allowances

Both taxes and allowances are "market-based" policy approaches, however they operate differently - carbon taxes fix the marginal cost for carbon emissions and allow quantities emitted to adjust, while tradable allowances fix the total amount of carbon emitted and allow price levels to fluctuate according to market forces.<sup>80</sup>

Both taxes and emission trade is in line with the polluter pays principle as both systems put a price on pollution.<sup>81</sup>

According to Schwarze the policy maker must consider which result the policy is aiming for and in which climate the regulation is intended to function. Allowances do not make it profitable for everyone to adapt to new technology, abatement cost makes it profitable to wait and see. This means that impact of new technology will take more time than with fixed prices. On the other hand, allowances are more dynamic.<sup>82</sup>

Schwarze compares US to Europe when it comes to SO<sub>2</sub>, in a system where allowances are used like US, the reduction goals are substantially lower. To be able to make the big cut downs as EU aims for, the prices of allowances would have to be so high that it would be unreasonable. This indicates that a fast tax is better when one wants to achieve rapid reductions.<sup>83</sup>

### 5.2.4 Conclusion

CO<sub>2</sub> emissions are directly linked to carbon combustion and by reducing the use of traditional carbon based fuel and carbon based energy sources emissions are reduced. A tax can target all emissions in all areas, hence taxes can be used to obtain large reductions fast. Taxes are national,

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<sup>80</sup> Baumert

<sup>81</sup> Baumert

<sup>82</sup> Schwarze, p. 54-55

<sup>83</sup> Schwarze p 54-55

different states have different views on the use of taxes, consequently it can be hard to reach an agreement on an international level.

Allowances give room for firms to find flexible solutions. One firm might be able to make reductions easily with small costs while another firm might need longer time and hence buy allowances to cover their emissions. This way firms can take action in their own time.

# 6 IMO

## 6.1 IMO

### 6.1.1 IMO Mandate

As a specialized agency under UN, IMO has its own mandate to regulate matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships.<sup>84</sup> IMO also has mandate to consider and make recommendations upon matters that “may be remitted to it by Members, any organ or specialized agency of the United Nations or by any other intergovernmental organization or upon matters referred to it under Article 1(d)”.<sup>85</sup> Pollution of the marine environment is defined in UNCLOS as “the introduction by man, directly or indirectly, of substances or energy into the marine environment”.<sup>86</sup>

Hence the biggest effect of CO<sub>2</sub> and other GHG substances is not on the Sea, but on the atmosphere and it is arguable whether IMO has mandate to regulate. Mukherjee argues that that, *prima facie*, controlling CO<sub>2</sub> emissions is not consistent with the mandate of IMO as set out in the IMO Convention, hence of the wording “...marine pollution...” and “...marine environment...”.<sup>87</sup> However, he continues his analysis by looking at the purpose of MARPOL<sup>88</sup>, “the need to preserve the human environment in general and the marine environment in particular...” With this in mind it is desirable for IMO to legislate through MARPOL Annex VI, if necessary, on CO<sub>2</sub> and other emissions from ships, to give effect to Article 2.2 of the Kyoto Protocol. Even though Climate Change does not fall within pollution of marine environment, to mitigate is to preserve the human environment in

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<sup>84</sup> Art 1 (a) and art 59 IMO convention, art 57 UN Charter

<sup>85</sup> Art 2 (a) IMO Convention

<sup>86</sup> UNCLOS art 1 (4)

<sup>87</sup> Mukherjee, p. 78

<sup>88</sup> MARPOL regulates ship source pollution

general, this is according to Mukherjee “consistent with the pragmatic and forward thinking approach that IMO has been adopting in recent times”.<sup>89</sup>

IMO started as an organization legislating concerning technical standards. However, the organization has made conventions concerning legal matters, like CLC. This shows that the mandate of IMO is stretchable as long as the matter concerned is safe navigation and clean Seas.<sup>90</sup>

### **6.1.2 Divided IMO**

If one chooses a policy that makes fuel or emissions cost more this would have an economic effect on developing states. Extra costs lead to higher freight which leads to higher cost for import/export. For some isolated island states with large import of food, this could have a huge impact. Higher price would probably also lead to a lower demand for cruise tourism.<sup>91</sup>

IMO works to get global harmonisation, among the 169 IMO member states all UNFCCC annex I States are represented except Belarus and Lichtenstein, both are countries without coastline and without any significant fleet.<sup>92</sup>

As mentioned before the Kyoto protocol refers the parties included in annex I to work through IMO to limit or reduce GHG emissions from Shipping. The wording “parties included in Annex I” have led to much discussion; does art 2.2 mean that any action IMO takes shall be in line with the principle of Common but Differentiated Responsibilities”?<sup>93</sup>

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<sup>89</sup> Mukherjee, p. 79

<sup>90</sup> Mukherjee, 2009-05-27

<sup>91</sup> Faber, Slide 12-15

<sup>92</sup> None of the countries appear in Shipping Statistics year book.

<sup>93</sup> Common but differentiated responsibilities, CBDR, is stated in UNFCCC art 3.3, the view is guiding Kyoto Protocol, were annex-I parties have more extensive responsibilities.

The Sub-Division for Legal Affairs of IMO has studied the issue and concludes that there is no conflict of treaties regarding the Kyoto protocol and any provisions that may be included in IMO conventions regarding combustion of marine bunker fuel as conflict of law only occur when the same subject matter is regulated in a contradictory way.<sup>94</sup> Article 2.2 of the Kyoto Protocol should be interpreted, rather, as an acknowledgement that the elaboration of provisions regulating GHG emissions from combustion of marine bunker fuels is a task that is properly within the purview of IMO.<sup>95</sup>

The rest of the Sub-Division for Legal Affairs argumentation seems to be concentrated on the fact that art 2.2 of the Kyoto Protocol doesn't clearly state that IMO must have CBDR in mind. Maritime regulations must, to be effective, be applicable universally to all ships and if shipowners could simply change flag to avoid the impact of any regulations that they might regard as too onerous, it would frustrate the objective of an IMO treaty and the Kyoto Protocol. IMO's mandate, as derived from the IMO Convention and UNCLOS, is based on the understanding that technical regulations must be developed based on universal rules, accordingly, concepts such as CBDR have limited, if any, application in IMO-based conventions.<sup>96</sup>

The Sub-divisions argument is a "wide and liberal constructive" interpretation of art 2.2 with this objective in mind: legislation is to be made to reduce CO<sub>2</sub>, hence the legislation must be applicable to as many as possible with no way to wiggle out of it.

### **6.1.3 Conclusions**

CO<sub>2</sub> has an acidifying effect on the oceans and by this, one could say that CO<sub>2</sub> emissions pollute the marine environment. The major reason to regulate CO<sub>2</sub> emissions from shipping seems, on the other hand, to be the effect CO<sub>2</sub> has on the climate, a non-marine reason. A literal interpretation

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<sup>94</sup> MEPC 58/4/20 paragraph 4.2

<sup>95</sup> MEPC 58/4/20 paragraph 4.3

<sup>96</sup> MEPC 58/4/20 paragraph 4.5-7

of the IMO Convention seems to suggest that IMO does not have mandate to regulate on the matter. However IMO is a well-established arena for states to meet and discuss issues related to shipping, reduce emissions from shipping seems to be an issue well suited for IMO.

The opinion from sub-division uses the term "technical regulations", which traditionally points to IMO regulations concerning technical matters. MBM are economical regulations, as argued by the sub-division there is no clear obstacle against making a MBM convention apply universally.

Nevertheless, the opinion seems to focus on finding reasoning why MBM solutions should apply universally, rather than analyzing from all perspectives.

# 7 A Shipping ETS?

This chapter is written mostly with IMO in mind. Several features are the same if an ETS would be set by a single state or region.

## 7.1 Allocation?

Under the Kyoto Protocol emissions are allocated to states. The basic calculation is easy: emissions from sources within the state are referred to the state and the state has to cover the emissions with AAUs. In EU ETS the trading entities are private and the scheme could be said to work on three levels, regional (EU), national and private. The cap on each individual EU state is negotiated on the EU level, to make sure that EU makes a collective emission reduction. Each state can then allocate EUAs to private entities that are obligated to show allowances under the EU ETS. The private entities can then trade their EUAs on the EU market, and the state trade, if necessary, their AAUs within the Kyoto system.

### 7.1.1 Allocate to State?

Should shipping emissions be allocated to States or to Private entities?

If IMO does not come up with a solution to reduce CO<sub>2</sub> emissions from Shipping EU suggests that “international... maritime transport will be counted towards national totals under the Copenhagen agreement which will ensure comparable action by all developed countries”.<sup>97</sup>

UNFCCC gives several options to allocate the emissions from bunker fuel to different Parties, which then have to cover these emissions with AAUs.<sup>98</sup>

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<sup>97</sup> COM(2009) 39 Final, p. 7

<sup>98</sup> FCCC/SBSTA/1996/9/Add.2



First option is to maintain the *status quo*, there would be no allocation to states, international bunker fuel would be reported separately and annex-I states would still have the responsibility to try to mitigate ship emissions somehow, maybe by allocating the emissions to private entities.<sup>99</sup> Second option is in line with the international character of shipping, bunker emissions would be allocated to states in proportion to their national emissions. For example, if international bunker emissions would be 3 per cent globally, each state would add 3 per cent to its domestic emissions inventory, in order to cover all international emissions jointly. Since this option doesn't relate the emissions to any specific activity, e.g. bunker sales, the creation of control measures are open. This option may, however, distort the emissions inventories of some countries for example, land-locked countries or small countries with sizeable sea ports. And under this option emissions are allocated to states that have no influence over the emissions.<sup>100</sup>

An administratively easy way to allocate bunker emissions would be to allocate them to the state where the bunker fuel is sold. Data for this is available already to day, hence this option would not need big administrative changes to set up. On the other hand, this option provides little room for affecting emissions through national policies and measures. High taxes in one country could lead to ships bunkering in another country.<sup>101</sup> Fuel sale statistics doesn't accurately show the emissions from shipping. IMO's updated study on GHG emissions from Ships indicates that fuel statistics tend to be under-reported and that activity-based data as base for calculating emissions is more accurate.<sup>102</sup>

Other options are to allocate according to the nationality of the transporting company, or to the country where the vessel is registered, or to the country

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<sup>99</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 67

<sup>100</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 68-69, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 235

<sup>101</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 70-71

<sup>102</sup> MEPC 58/INF.6 *Updated Study on Greenhouse Gas Emissions from Ships Phase 1* report, p.44-46

of the operator. Under this option the ship operator report fuel consumption to the state and this requires new administration by operating/owner state. Register State is used to collect and administer data and this would not be a big change. Flag States are in the position to legislate, but is not always in a position to enforce. Flag States with many registered ships would be affected gravely, e.g. it is estimated that half of the Danish emissions are from shipping<sup>103</sup>. This option might also lead to more ships being registered in non-annex I states since annex-I states would have bigger incentive to legislate to reduce emissions. Also the domicile of the owner/operator can be changed since firms are free to register in another state.<sup>104</sup> Allocation by register state would not show the economic benefits from the vessel, e.g. big importing states with few registered ships would benefit from shipping but the emissions would be allocated to another state.<sup>105</sup>

An option that would better demonstrate the financial benefit from shipping would be to allocate the emissions between the country of departure and the country of arrival. Michaelowa and Krause point out that this is not as easy as it seems, after long over Seas voyages ships often call in a major port and then goes on to other ports in the area.<sup>106</sup> To make land locked states or states with smaller ports also share the emissions in a more wide extent, an option is to allocate the emissions either according to the country of departure or/share destination of passenger or cargo, or by the country of origin of the passenger or owner of the cargo.<sup>107</sup> Allocating based on origin of passenger or owner of the cargo would help to spread the costs of emissions over the transport chain and is in line with the polluter pays principles. This option requires the shipowner to keep track of origin of the passenger or cargo owner, distance and total emissions, to be able to report, to the competent authority, the data needed for the allocation.<sup>108</sup> Cargo

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<sup>103</sup> “Shipping responsible for half of Denmark’s CO2 emissions”, COP 15 news

<sup>104</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 237

<sup>105</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 72-75

<sup>106</sup> Michaelowa and Krause, p. 8, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 230

<sup>107</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 76-78

<sup>108</sup> Michaelowa and Krause, p 9-10

information is available on the transport document, e.g. Bill of Lading, and passengers are recorded in the passenger manifest.<sup>109</sup>

The last option discussed by the Subsidiary Body for Scientific and Technological Advice is not really an option, to allocate based on emissions generated in national space. This option doesn't reflect the global nature of shipping and it would require not just monitoring fuel consumption but also where the emissions take place.<sup>110</sup> If states choose to legislate regarding all emissions within their jurisdiction this might also violate the right to innocent passage.<sup>111</sup>

## 7.1.2 Trading Entity

When deciding which entity is best equipped to be obligated to surrender allowances one can look at who is in control of fuel consumption and who is in possession of information.<sup>112</sup>

### 7.1.2.1 Owner/ Operator

The ship owner/operator has direct control over fuel consumption by the age of the ship they use, engine, speed, fuel etc. However, it depends on the contract whether or not the operator has an incentive to reduce fuel consumption. There is a difference between a contract where the shipper pays for the fuel and prioritizes speed and a Contract of Affreightment where all costs are included in the price.<sup>113</sup> This option would give the largest quantity of allowance traders.<sup>114</sup>

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<sup>109</sup> FAL art 2.7

<sup>110</sup> FCCC/SBSTA/1996/9/Add.2 paragraph 79, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 229

<sup>111</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 229, MEPC 57/INF.3, p. 68 of report. Right to innocent passage see. UNCLOS section 3.

<sup>112</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 230

<sup>113</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, 198

<sup>114</sup> MEPC 57/INF.3, p 74

### **7.1.2.2 Cargo Owner**

Shipper or cargo owner pays for fuel somehow, either included in freight or separately. Thereby the cargo owner has an interest in reducing the fuel consumption, however, the possibility to do so are limited.<sup>115</sup> A cargo owner can look at fuel efficiency when deciding on ship while some shippers do that within their own climate policy.<sup>116</sup>

### **7.1.2.3 Port**

Port authorities have some influence over emissions in and around ports. For the purpose of reducing local air pollutants they may for example offer shore side electricity<sup>117</sup> or have differentiated harbour dues depending on emissions<sup>118</sup>. Ports also have the possibility to affect manoeuvring and waiting operations in port, and to impose speed limits.<sup>119</sup>

On the other hand, Port authorities have no influence over operational measures taken at sea and have no direct incentive to reduce fuel consumption. Neither are Port Authorities in a position to reap the benefits of a reduction in fuel consumption. To be able to have different port fees the Port Authorities must have access to vessel emissions, which must be provided by the ship.<sup>120</sup>

### **7.1.2.4 Bunker Supplier**

The bunker supplier has no direct control over fuel supply and no interest in keeping it low either. However, one could give them the responsibility to obtain emission allowances for the amount of fuel they sell. This way the

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<sup>115</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 198

<sup>116</sup> TD/B/C.I/MEM.1/2, p. 9

<sup>117</sup> Shore side electricity, see. Ecoports

<sup>118</sup> Differentiated Harbour Dues See. Port of Göteborg

<sup>119</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 199

<sup>120</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 199

cost for fuel would increase and give incentive for ship operators to reduce fuel consumption.<sup>121</sup>

The number of bunker suppliers are limited in comparison with the number of ship operators. This would mean lower administrations cost for administering the allowances.<sup>122</sup>

### **7.1.2.5 Others**

Other stakeholders that have influence on fuel consumption are shipbuilders and engine manufacturers, both of whom can, by design, influence fuel consumption. However, none of these entities have direct impact over fuel and emissions. Rather, they will adjust their manufacturing if there is demand for it. These entities are better influenced by technical standards, than allowances.<sup>123</sup>

### **7.1.3 Scope**

The principle of common but differentiated responsibilities gives developed and developing states different responsibilities to take action to reduce GHG emissions. With this in mind, it would be natural to make regulations regarding application that reflect this.

As mentioned before in this thesis, a system based on flag state could become ineffective if shipowners would change flag to avoid the requirements. To avoid this, but still honouring the CBDR principle, the scope could be geographical. If a scheme would be applicable in only annex I states there is a risk of “carbon leakage” as vessels would make calls in

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<sup>121</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 199

<sup>122</sup> MEPC 57/INF.3 annex, p. 73

<sup>123</sup> MEPC 57/INF.3 annex, p. 74, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 195-196

ports outside annex I states and the cargo would be transported with other modes to the final destination.<sup>124</sup>

## 7.1.4 Conclusions

The demand from EU to count ship emissions towards national quotas seems simple, but a closer look shows that there are several issues to consider.

Regardless of which premises are chosen, the state, especially an annex-I state, would have to make legislation to reduce emissions. Emissions allocated based on cargo or passengers would concern states that have no influence over the actual emissions. The state would be able to legislate to make cargo/passengers with high emissions cost more than those with low emissions, but not the actual emissions. This goes for all proposals were the state has no relation to the ship or fuel.

Concerning trading entity, owner/operator or bunker fuel supplier seems to be the most feasible options. The owner/operator has direct influence over the fuel consumption and is in the best position to collect information needed to calculate the base for allowances. Bunker fuel suppliers have no direct influence over fuel consumption, but a system where a supplier cannot sell more fuel then covered by allowances would set a cap on fuel used. This requires that Ships are only allowed to bunker at suppliers that are in the system, and a control mechanism ensuring that ships do not buy fuel from suppliers outside the allowance system. Hence legislation regarding the ship will be necessary even if the ship will not require allowances.

To not defeat aim, reduction of CO<sub>2</sub> emissions, it is important to draft the regulations with as big coverage, geographical, mode etc., as possible.

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<sup>124</sup> Compare with EU; *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive* p.250

## 7.2 How to distribute allowances

### 7.2.1 Closed

A closed trading scheme allows only trading within the sector, accordingly trading with emission allowances from marine bunker fuel only. Since the idea behind emission trade is that reductions are to be made where it can be done to the lowest cost, a trading scheme needs diverse entities to function well. If all trading entities have the same costs and the same need, everyone will have almost the same demand for emission allowances, making the trading rather slow. Due to the diverse shipping industry, there might be room for different solutions, resulting in some needing few allowances and others buying extra.

### 7.2.2 Open

An open system where different sectors trade with each other on an open market, gives, with a soundly functioning market, the largest reductions to the lowest cost. It is assumed that industry installations have lower abatement cost than the transport industry. With a trade between different sectors, the maritime sector could buy allowances while global reductions would be made in other sectors giving a total reduction.

An open system needs shipping allowances to be derived from Kyoto allowances, non-annex states cannot create AAUs.<sup>125</sup> Since this is the case for several IMO states, the allowances have to be based on something else than AAUs. If special allowances were created solely for international shipping these allowances linked to another market would create “extra” allowances in addition to the existing AAUs and thereby distorting the market.

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<sup>125</sup> See. FCCC/CP/2001/13/Add.2

## 7.2.3 Conclusions

To be most cost effective the carbon market should be open. For the total reductions to stay within the cap all allowances have to be derived from national totals. Shipping is a global business and several states derive economic benefit from shipping. To allocate emissions to one specific state can be unproportionate. Hence it might be easier to create allowances solely for the shipping sector and this requires shipping emission trade to be a market on its own. Allowances from other markets could be brought in to the shipping market, but allowances could not be traded out without distorting the global market.<sup>126</sup>

## 7.3 Administration

### 7.3.1 Localise allowances

Grandfathering is the best way to get acceptance from the industry, but to base allowances on former year can be misleading. Emissions might differ depending on how many voyages the ship has made with little or no cargo, how long voyages last etc.<sup>127</sup>

Benchmarking refers to allocation in relation to some pre-determined performance measures. This option is dependent on data of high quality to set up accurate benchmarks. However, the method favors early emission reduction actions.<sup>128</sup>

Auctioning would apply equally to all and no previous emission data would be needed. Every entity decides how much allowances they need. However, there will of course be a higher initial cost for the actors compared to

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<sup>126</sup> It might be possible to create special calculation rules regarding trade between the sectors.

<sup>127</sup> *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 215-216, 232

<sup>128</sup> MEPC 57/INF.3, p 75



grandfathering, and if other transport modes do not have the same extra burden it might distort the transport market.<sup>129</sup>

### **7.3.2 Control**

Regardless of which entity will be subjected to obtaining allowances and how the allowances will be localised, the system will need monitoring and control. Primarily this will be done by the Parties to the convention, but designed correctly, the control can also be made by port state. This ensures “no favorable treatment”.

### **7.3.3 Revenues**

If auctioning is chosen as a means to distribute the allowances revenue that will be generated, it is important that participating entities know what happens with the revenue for it to be legitimate. Should it be used for environmental projects in general, to the shipping industry, to encourage technical innovations, to support non-annex I states?

### **7.3.4 Conclusions**

Auctioning is the best way to make sure that early adopters benefit from their actions and it does not require special rules regarding entities wanting to start new businesses. However, this has to be made in understanding with other transport modes to make sure that the shipping industry does not get an extra burden. If the entity is shipowner there will be many small players, which might seem unfair, but regardless of how the allowances are localized, these small owners will face administration costs.

If the allowances are tied to documents required to be on board failure to comply could be detected by port state control.

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<sup>129</sup> MEPC 57/INF.3, p 75, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, p. 232-233

## 8 Levy

A levy is another way to make emissions cost. A levy on bunker fuel would be a way to increase the price on fuel, thereby giving shipowners and operators an incentive to reduce fuel consumption. A levy can be seen as a tax and most parties are not keen on an international tax.<sup>130</sup>

Below two different proposals on a levy to reduce emissions from international marine bunker will be accounted for.

### 8.1 International Fund

At MEPC 57 Denmark proposed a GHG Fund (under IMO). Ships must bunker fuel at a registered bunker fuel supplier, where a GHG contribution is to be paid. Already today ships are required to keep a bunker delivery note on board all the time, new under the fund is that the bunker delivery note must show that the fuel is from a certified supplier and that GHG contribution has been paid.<sup>131</sup>

Parties to the fund shall require bunker fuel suppliers within its territory to become registered fuel suppliers. The registered supplier will be required to collect information on all fuel sold on a ship specific basis and to collect and transfer GHG contributions to the International GHG Fund Administrator. The International GHG Fund Administrator will maintain a global registry of registered bunker fuel suppliers and of GHG contributions received, where each ship has its own account.<sup>132</sup>

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<sup>130</sup> MEPC 58/4, Report of the outcome of the first Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships, Note by the Secretariat, 5.5

<sup>131</sup> MEPC 59/4/5 paragraph 29-30, Bunker Delivery Note; MARPOL annex VI 18 (4)

<sup>132</sup> MEPC 59/4/5 paragraph 20, 25

Without the requirement that all ships are entitled to fly their flags to buy fuel only from a registered supplier, ships could buy cheaper fuel at a supplier located in a non-party state. This requirement will nevertheless lead to less demand for fuel from non-registered suppliers. As a response, the system allows suppliers in non-party states to become registered suppliers. If it would be the ship owner/operator who was responsible for contributing the levy there would be no need for rules, control and enforcement, regarding suppliers in non-party states.<sup>133</sup>

Ships flagged by a non-party State will have to pay an enter-into-the-scheme contribution corresponding to the amount of bunker fuel consumed during the last 90 days directly to the International GHG Fund. A ship flagged with a party shall be required to notify the International GHG Fund Administrator and the competent authority of the relevant port of destination if the ship cannot purchase bunker fuel oil from a registered bunker fuel supplier.<sup>134</sup>

The revenues from the Fund should be used with the common but differentiated responsibilities and capabilities in mind. Part of the revenues should be allocated for specific mitigation and adaptation purposes, preferably for activities in the most vulnerable developing countries. Part of the revenues should be used for fuel efficiency and GHG emission reduction R&D projects to accelerate the maritime industry's efforts in this respect and for technical cooperation within the existing IMO framework.<sup>135</sup>

## **8.2 The International Maritime Emission Reduction Scheme**

The International Maritime Emission Reduction Scheme, IMERS, aims to create funds for climate adoption in developing states, while reducing

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<sup>133</sup> MEPC 59/4/5 paragraph 22,23,25,29

<sup>134</sup> MEPC 59/4/5 paragraph 31, 34

<sup>135</sup> MEPC 59/4/5 paragraph 61

carbon dioxide emissions from shipping. It is based on a Norwegian proposal at MEPC 56, and further developed by IMERS, a non-profitable organization whose front figure is Dr Stochniol.<sup>136</sup> The Norwegian proposal seems more to be an effort to get the discussion started, while later MEPC documents in Denmark seems to be dominating the levy discussion. IMERS is mentioned by WWF and Norway is developing emission trade.<sup>137</sup> Dr Stochniol on the other hand is promoting the proposal outside IMO.<sup>138</sup>

To differentiate responsibilities between developed and developing countries, the idea is to put an “emission cap for all destinations with emission reduction commitments”. A carbon levy on ship fuel is derived from the amount of emissions above the cap and the prevailing market price for carbon. The levy is collected centrally based on ship fuel use and a ratio of delivered cargo to A1 states; annex I states.<sup>139</sup>

The emission reduction, 20% below the 2005 level by 2020, will primarily not be in the shipping industry, the reductions will be made to the lowest cost by buying emission reductions in different forms.<sup>140</sup> The revenue will create an international fund which will be used for climate change action, comprising mitigation of emissions in excess of the cap, climate adaptation and maritime technology transfer and transformation. This would be in the form of CDMs, JIs and other projects. According to the proposal how the funds would be used is to be decided by the parties to UNFCCC.<sup>141</sup>

The levy would be paid periodically by the fuel payers, typically charterers. However, the liability stays with the ship and is enforced by A1 ports.<sup>142</sup> The levy would be based on Bunker Delivery Notes.<sup>143</sup>

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<sup>136</sup> MEPC 56/4/9, See. IMERS homepage [www.imers.org](http://www.imers.org)

<sup>137</sup> MEPC 58/4/39, MEPC 58/4/25

<sup>138</sup> [www.imers.org](http://www.imers.org)

<sup>139</sup> Stochniol, p. 1

<sup>140</sup> Stochniol, p. 2, 3

<sup>141</sup> Stochniol, p. 4

<sup>142</sup> Stochniol, p. 1

<sup>143</sup> Stochniol, p. 6

## 8.3 Example of International Fund

Under the Civil Liability Convention, CLC, shipowners have strict liability for pollution damage caused by oil spilled as a result of an incident and in return, the shipowner has limited liability. When those who suffered from oil pollution damage (in a state party) do not get fully compensated the 1992 Fund sets in.<sup>144</sup>

Every person that receives more than 150 000 ton of crude oil and heavy fuel oil in a state party to the 1992 Fund Convention contributes to the 1992 Fund. The annual contributions are levied by the 1992 Fund to meet the anticipated compensation and administrative expenses during the coming year. The contributions are paid by the individual contributors directly to the 1992 Fund, the state is only responsible if it voluntarily accepted such duty.<sup>145</sup>

## 8.4 Conclusions

Due to expected growth in shipping fuel consumption will increase, making it difficult to reach an absolute reduction. The main focus in both proposals is not major emission reductions within the shipping industry, but overall global reductions. Particularly the Danish Fund proposal points to the fact that the levy is to be seen as a package together with technical and operational regulations to reduce emissions from shipping.<sup>146</sup> To be able to control that the ship actually has paid its levy it will be necessary with a routine to compare the ship route with fuel bunkered. If offshore bunkering is one of the reasons for bunker fuel statistics not being accurate, it might be a problem also when monitoring fuel levy payments.

One of the major dividers in IMO is CBDR, both the proposals try to consider the principle. The Fund through how the revenues are used and the

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<sup>144</sup> Jacobsson, p. 2-3

<sup>145</sup> Jacobsson, p. 4-5

<sup>146</sup> MEPC 59/4/5 paragraph 57-58

IMERS through only enforce it in A1 states and to calculate on the ratio of delivered cargo to A1 states.<sup>147</sup> This can create a situation where some try to avoid the levy by avoiding A1 ports. To mitigate this, the levy has to be coordinated with market based instruments within other transport modes, thus losing some of its simplicity.

The Fund proposal uses an upstream approach where it is the bunker fuel supplier that is to pay the levy to the Fund. IMERS have a downstream approach and both systems have negative and positive sides. Bunker fuel suppliers are not as many as ships, hence it is more manageable to control and enforce. On the other side there has to be rules regarding suppliers in non-party states and ships with fuel from non-registered suppliers.

To monitor compliance, data concerning both fuel and contributed payments to the fund would be available to the flag state. It would involve much administrative work to compare this to the distance the ship has travelled to make sure that the ship has paid. Under IMERS, it is the ship operator that pays the levy, but the liability stays with the ship. A system where the levy is included in the fuel price is, for obvious reasons, preferable to the shipowner.

Both proposals involve an international Fund that needs to be able to act on its own. No such administration exists under IMO today, however, there is an example of an international fund that works, the IOPC Funds. IOPC Funds has a very clear mandate. The fund compensates those suffering from oil pollution from accidents involving ships. This is liabilities that, without the CLC and IOPC Funds, under most jurisdictions, would have been paid by the shipowner. The proposed GHG Fund would administrate money in the hope of making reductions, reductions not purely regarding shipping. The trade with different MBMs is just starting and therefore to give a fund mandate to collect money to trade on this market seems a bit uncertain. Regarding technical innovations and other support within the shipping

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<sup>147</sup> MEPC 59/4/5 paragraph 61, Stochniol paragraph 2.

industry targeting developing states the relation is clearer and easier to adapt in the future.

# 9 Discussion

## 9.1 Is there a need for Market Based Measures?

Shipping is a good transport mode from the environmental point of view and has a place in a sustainable future. Climate Change is a real threat, especially to some small island states, and when other sectors reduce their emissions the global share from shipping will grow. This will demand action, if not for any other reason than to stay competitive.

Reducing fuel consumption is in every shipowner's interest even without any regulation, as long as it cuts costs. If soundly functioning voluntary measures like EEOI and EEDI can help to reduce fuel consumption. However emission reduction through technical regulations might become very limited, because the regulations only apply to new ships. Besides, as pointed out by Fischer, cutting cost is one thing, being concerned by carbon content is another. To achieve an emission reduction of a certain substance, one tool is to make those emissions cost economically.<sup>148</sup>

## 9.2 Common but Differentiated Responsibilities

UNFCCC and the Kyoto protocol recognize the need for different requirements on developed and developing states, historically developed states have emitted considerable amounts of green house gas, while emissions from developing states have been low. Developed states have the economic resources to take action and develop strategies to mitigate climate change while many developing states are still in the process of building industries and infrastructure.

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<sup>148</sup> Fischer, p 39



Flag hopping has been a reason for shipping regulations to apply to all ships regardless of flag. Two ships at the same place cannot have different rules depending on a flag state, which might be on the other side of the world. CO<sub>2</sub> emissions pollute the atmosphere wherever the emissions take place. A factory in China contributes to the climate change to the same extent as a factory in France that emits the same amount of CO<sub>2</sub>. This is also true regarding vessels. The emissions from a ship are not more dangerous outside La Ciotat than Shanghai. Why should the ship outside Shanghai be treated differently from the factory on land?

The opinion from sub-division uses the term "technical regulations", which traditionally points to IMO regulations concerning technical matters. Market based measures is different, the whole idea behind MBMs is flexibility, that some can make technical improvements that lead to reductions, others keep emitting and pay. The idea behind CBDR is that developed states pay a bit more in the transition to a sustainable future. It is not self evident that market based measures should apply universally. UNFCCC makes a difference between responsibilities between developed and developing states concerning land-based pollution, there is no reason why a solution regarding emissions from marine bunker fuel should not be guided by common but differentiated responsibilities. With a solution based on port state, CBDR inspired options could be available.

### **9.3 Best option?**

Emission trade or levy, which is the best option? Emission trade has the advantage to be a tool used in other sectors, with a Shipping ETS connected to other ETSs, shipping could buy allowances from other sectors and reduce emissions cost effectively. Nevertheless there are many details that have to function to make this option work. Allowances derived from states' Kyoto units, must be allocated to a specific state. The clear state with jurisdiction regarding shipping would be the flag state, but most big flag states have no reduction targets under Kyoto and therefore have not the same incentive or

possibilities to regulate. One option could be not to allocate shipping emissions to a state but instead have a separate scheme for shipping emissions, with states or an international organization responsible for the overseeing and administration of the scheme. The trading entity can be chosen through two approaches; an upstream approach would have the same affect on emissions as a fuel tax, or even maybe less if the traded price would be low. As chosen for other areas a downstream approach might be more efficient as the ship operator has most control and information over the fuel consumption and the emissions. This way the responsibility to acquire shipping allowances would be on all shipowners, independent of state.

Making an independent international authority of some kind responsible for the Shipping Emission Scheme would make sure that the rules were interpreted unilaterally and it would be a relief to states with small resources and ability to monitor the new scheme. A way to make emissions trade comply with CBDR would be to only require ships in annex I ports obliged to have allowances. Then there has to be a requirement on what distance/time the allowances are to cover. One significant risk is “carbon leakage” where ships call a port in a nearby non-annex I port and switch the cargo to other transport modes.

An international tax on marine bunker fuel does not seem feasible, and a similar option is to have a levy. A levy alone on marine fuel is not guaranteed to have an impact. As fuel is a big cost already today, increased cost are not destined to lead to big reductions. Hence the idea behind a levy is instead to use the revenues to reduce CO<sub>2</sub> emissions in other sectors, by these achieving total emission reductions. The levy could be drafted to comply with all principles set up by IMO but the big question is if it is a good idea to base a system on a trade that has not been evaluated? Some of the revenues will be used for technical and fuel efficiency, in other words possible reductions of maritime emissions. Nevertheless the basis for reduction with the levy proposal is to use the revenues in emissions

reducing projects, projects that no one knows will continue to exist in the future or if they even will be efficient on reducing total global emissions.

## 9.4 New Convention or amend existing?

The average IMO Convention takes five years from adoption until it is in force. Amendments to conventions are made with “tacit acceptance”. The amendment enters in to force on a particular time unless before that date, objections to the amendment are received from a specified number of Parties.<sup>149</sup>

MARPOL, which deals with vessel source pollution, is a technical convention. It contains regulations about sulphur content, about storage of oil residue, emissions of ozone depleting substances etc. Regardless of choosing a levy or emission trade both this options have different characteristics from MARPOL. Although the purpose of introducing market based measures are in line with the purpose of MARPOL, market based measures are not characteristic of the rest of MARPOL. Different states are parties to different conventions and amendments made must be applicable together with all of them.

The emissions from international shipping are less than Japan’s land emissions. At the moment we are in an economic recession but when the economy improves shipping will grow and emissions increase. To make sure that the shipping industry takes its share of the burden to reduce global emissions it is important to have functioning legislation for the future. Making a whole new independent convention it will be easier to make a frame work that can be amended with new substances in the future. A new convention which each state can make an independent decision to join, although one could argue that annex I states has an obligation under Kyoto art 2.2 to ratify an convention regarding mitigation of shipping emissions.

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<sup>149</sup> “Conventions” at IMO homepage

## 9.5 Copenhagen

All transport modes are worried that emissions costs within their sector will lead to distortion of competition concerning other transport modes. Big nations have stated that they want to see reduction of CO<sub>2</sub> from all transport modes.<sup>150</sup> EU is demanding action from IMO and has already taken action regarding emissions from aviation. Copenhagen should be the perfect place to try to start discussions regarding the whole transport sector.

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<sup>150</sup> Reuters 16 Jan 2009

# 10 Conclusions

Shipping has, due the global nature and possibility to flag out, applied international conventions in line with the “no more favourable treatment”. This principle collides with the “common but differentiated responsibilities”. Regarding emission trade, shipping should try to find a solution in line with the latter principle. When states are ready to take larger responsibility for land-based emissions, they will be ready to take the same responsibility regarding shipping emissions. Thus, there is no need for shipping to have requirements that are more stringent.

“...Maritime transport will be counted towards national totals...”<sup>151</sup> At first glance, it seems problem free, but a deeper look indicates otherwise. Shipping emissions are not within any state’s territory and it is not always clear which state benefits from the ship. A system that focuses on the ship instead of state could be a way to honour the global element of shipping. To secure uniformity and circumvent the need to allocate emissions to a state an international authority could be set up to monitor the allowance distributed and possible trade. This authority could also distribute the revenues. A trade with each individual ship as one allowance holder would be a big scheme and would besides register over the allowances, require access to registrations, fuel sale and allowances. An ETS connected to other ETS would however provide the most cost effective solution for shipping to reduce global emissions.

All states within IMO would benefit from working towards a common solution. As shipping is a future business, it is better to find a well thought out solution now instead of a hastily put together one in the future. This is especially true since the average IMO Convention takes five years from adoption to the point where it comes into force.

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<sup>151</sup> COM (2009)39 Final, p.7

If putting a price on emissions from bunker fuel would create increased cost on freight transportation, some goods might change transport mode. To avoid this it is important that a solution is sought together with other transport modes. Copenhagen could be the perfect platform for this discussion. If reductions within shipping are made by cargo being transported on other modes, the result would probably be higher total emissions. COP 15 could be a start to an overall solution for the emissions from international transport as a whole.

# Supplement A

Table 1. Some estimates of fuel consumption, CO<sub>2</sub> emissions and projected growth

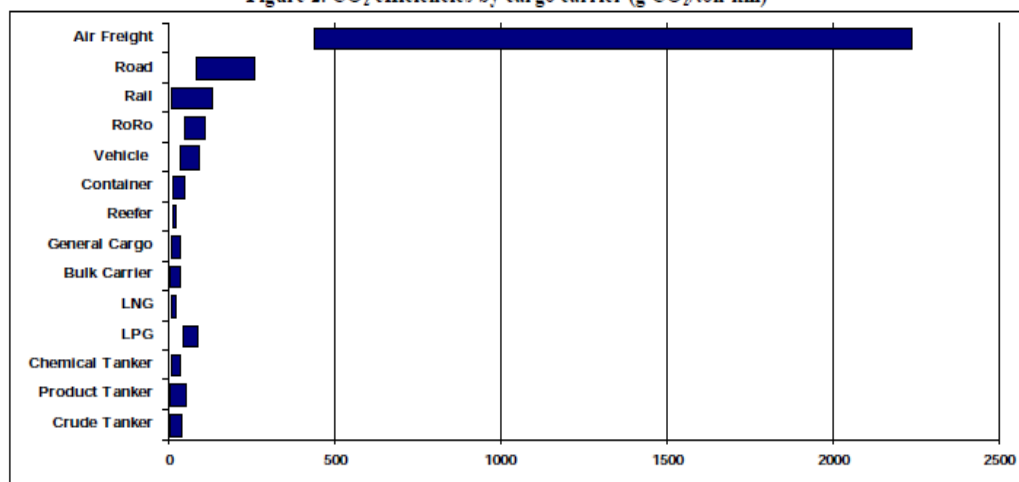
	Base year	CO <sub>2</sub> million tons	Fuel million tons	% of world fuel combustion <sup>a</sup>	Projected growth
IMO Updated Study (2008)	2007	843	277	3.1	By a factor of 1.1–1.3 by 2020 & 2.4–3 by 2050.
IMO/Group of Experts (2007)	2007	1,120	369	4.1	+ 30% by 2020
IMO GHG Study (2000)	1996	419.3	138	1.6	--
IEA (2005)	2005	543	214	2.0	--
TRT Transport e Territorio	2006	1,003	NA	3.7	--
Endressen et al., 2007 <sup>b</sup>	2002	634	200	2.3	+ 100–200% by 2050
Eide et al., 2007 <sup>b</sup>	2004	704	220	2.6	+ 100–200% by 2050
Eide et al., 2007 <sup>b</sup>	2006	800	350	2.9	+ 100–200% by 2050
Corbett et al., 2003 <sup>b</sup>	2001	912	289	3.1	--

<sup>a</sup> World CO<sub>2</sub> emissions from fuel combustion, 2005 IEA data.

<sup>b</sup> From secondary sources including IMO Updated Study on GHG, 2008.

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Figure 2. CO<sub>2</sub> efficiencies by cargo carrier (g CO<sub>2</sub>/ton-km)



Source: UNCTAD, based on IMO (2008).

# Bibliography

**Archer**, Mary D., **Barber**, James ed., *Molecular to global photosynthesis, Series on Photoconversion of Solar Energy – Vol. 2*, 2004, Imperial Collage Press

**Falowski**, Paul G., **Geider**, Richard, **Raven**, John A., *The Role of Aquatic Photosynthesis in Solar Energy Conversion: A Geovolutery Perspective.*

**Baumert**, Kevin, *Carbon Taxes vs. Emissions Trading: What's the Difference, and Which is Better?* Globalpolicy, 1998  
[http://www.globalpolicy.org/socecon/glotax/carbon/ct\\_et.htm](http://www.globalpolicy.org/socecon/glotax/carbon/ct_et.htm) accessed 2009-05-08

**Bellefontaine**, Niel ed., *Impacts of Climate Change on the Maritime Industry - The Proceedings of the Conference on Impacts of Climate Change on the Maritime Industry, 2–4 June 2008, Malmö Börshus, Sweden, 2009*, WMU Publications, Lund

**Mukherjee**, Proshanto K., and **Xu**, Jingjing, *The Legal Framework of Exhaust Emissions from Ships: A Selective Examination from a Law and Economics Perspective*, pp. 69-101

**Birnie**, Patricia, **Boyle**, Alan, *International Law & the Environment*, 2<sup>nd</sup> ed., 2002, Oxford University Press, (Printed in Great Britain)

**Buhr**, Katarina, *Bringing aviation into the EU Emisions Trading Scheme: Institutional Entrepreneurship at Windows of Opportunity*, Doctoral Thesis No. 140/ Department of Business Studies, Uppsala University, 2008, Uppsala

**Van Dokkum**, Klaas, *Ship Knowledge, Ship Design, Construction and Operation*, 4<sup>th</sup> ed, 2007, Dokmar, Meppel, Neatherlands

**Dorfman**, Robert & **Dorfman** Nancy S Ed., *Economics of the Environment*, 3<sup>rd</sup> ed., W.W. Norton & Company, 1993, New York

**Hardin**, Garett, *The Tragedy of the Commons*, first published in Science, v. 162, 1968, pp. 1243-48

**Douma**, W.Th, **Massai**, L, **Montini**, M ed. *The Kyoto Protocol and Beyond – Legal and Policy Challanges of Climate Change*, 1<sup>st</sup> ed. 2007, T M C Asser Press, Hauge

**Gao**, Feng, *The International Climate Regime: Where do we stand?*



**Gupta, Joyeeta**, *Developing Countries and the Post Kyoto Regime*

**Freestone, David, Streck, Charlotte** ed. *Legal Aspects of Implementing the Kyoto Protocol Mechanisms – Making Kyoto Work*, 1<sup>st</sup> ed., 2008, Oxford University Press

**Freestone, David**, *The UN Framework Convention on Climate Change, the Kyoto Protocol, and the Kyoto Mechanisms*

**De Witt Wijnen, Rutger**, *Emission Trading under Article 17 of the Kyoto Protocol*

**Fuglestad, Jan, Berntsen, Terje, Myhre, Gunnar, Rypdal, Kristin, Bieltvedt Skeie, Ragnhild**, *Climate forcing from the transport sectors*, Published: PNAS January 15, 2008, vol. 105, no. 2, p 454-458.  
<http://www.pnas.org/content/105/2/454.full.pdf+html> accessed 2009-05-12

**Guruswamy, Lakshman**, *International Environmental Law*, 3<sup>rd</sup> ed, 2007, Thomson West, US

Ed. **Hansjürgens, Bernd**, *Emissions Trading for Climate Policy: US and European Perspectives*, 1<sup>st</sup> ed, 2005, Cambridge University Press, Cambridge

**Ellerman, A Denny**, *US Experience with emissions trading: lessons for CO<sub>2</sub> emissions trading*.

**Fischer, Carolyn**, *Technical innovation and design choices for emission trading and other climate policies*.

**Sternner, Thomas & Hammar, Henrik**, *Designing instruments for climate policy*.

**Jacobsson, Måns**, *The International Oil Pollution Compensation Funds and the International Regime of Compensation for Oil Pollution Damage*, Handout World Maritime University, Malmö Sweden 21<sup>st</sup> August 2006

**Kågeson, Perm**, *Tools for Cutting European Transport Emissions – CO<sub>2</sub> Emissions Trading or Fuel Taxation?* 2008, SNS Förlag, Stockholm

**McConnel, Moira L**, *Business as usual: An Evaluation of the 1986 United Nations Convention on Conditions for Registration of Ships*, Journal of Maritime Law and Commerce, vol. 18, No 3, July 1987

**Michaelowa, Axel, Krause, Karsten**, *International Maritime Transport and Climate Policy*, Intereconomics, 35, 2000, pp. 127-136

**Mukherjee, P. K.**, *Flagging Options: Legal and Other Considerations*, Mariner Jan/Mars 1993

**Parkin, Michael, Powell, Melanie, Matthews, Kent**, *Economics*, 7<sup>th</sup> ed. 2003, Addison Wesley, printed in Italy

**Rodi, Michael** ed. *Between Theory and Practice, Putting Climate Policy to Work* – Vol. 1 of the Proceedings of the Summer Academy “Energy and the Environment” Greifswald, 16-29 July, 2006, 2008, Lexxion Verlagsgesellschaft mbH, Berlin

**Von Asselt, Harro, Gupta, Joyeeta**, *The Role of Flexibility Mechanisms Beyond 2012 and Developing Country Concerns; Lessons Learnd?*

**Rogers, Peter P, Jalal, Kazi F, Boyd John A**, *An Introduction to Sustainable Development*, 1<sup>st</sup> ed, 2008, Earthscan, Trowbridge UK

**Woerdman, Edwin**, *Hot art Trading under the Kyoto Protocol: An Environmental Problem or Not?*, *European Environmental Law Review*, 14 (3), March 2005, Kluwer Law International

### **Article**

*Acid Seas – is it goodbye to coral reefs?*, *Marine Scientist* no. 22 2008

### **Reports**

*Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive*, CE Delft, Germanischer Lloyd, MARINTEK, Det Norske Veritas, 2006

IPCC 4<sup>th</sup> assessment report

Report 2006-045; *The use of emissions trading in relation to other means of reducing emissions – a Nordic Study*, ECON analysis, 2006

*Review of Maritime Transport 2008* - Report by the UNCTAD secretariat [http://www.unctad.org/en/docs/rmt2008\\_en.pdf](http://www.unctad.org/en/docs/rmt2008_en.pdf) accessed 2009-05-26

Zetterberg, Lars, IVL Report B1703; *Greenhouse Gas Emissions Trading for the Transport Sector*, Swedish Environmental Research Institute, 2006

### **Documents**

BLG 12/INF10  
GHG-WG 2/WP.1  
MEPC 56/4/9  
MEPC 57/21  
MEPC 57/INF.3  
MEPC 58/4

MEPC 58/4/20  
MEPC 58/4/39  
MEPC 58/4/25  
MEPC 58/INF.6  
MEPC 59/4/5  
MEPC 59/4/7

MEPC 59/4/15

FCCC/CP/2001/13/Add.2

TD/B/C.I/MEM.1/2

IMO resolution A.963(23),

UN General Assembly Resolution  
45/212

FCCC/SBSTA/1996/9/Add.2

### **Internet Sources**

CICERO

<http://www.cicero.uio.no/fulltext/index.aspx?id=6860&lang=no> accessed  
2009-05-26

Climate Brief

<http://mydocs.epri.com/docs/public/000000000001007762.pdf> accessed  
2009-05-26

EcoPorts

<http://www.ecoport.com/ContentFiles/Shoreside%20electricity%20for%20ships.pdf> accessed 2009-05-26

IMO homepage

Conventions and amendments

[http://www.imo.org/TCD/mainframe.asp?topic\\_id=148#amend](http://www.imo.org/TCD/mainframe.asp?topic_id=148#amend) accessed  
2009-05-26

Port State Control

[http://www.imo.org/TCD/mainframe.asp?topic\\_id=159](http://www.imo.org/TCD/mainframe.asp?topic_id=159) accessed 2009-05-  
26

Pressrelease UNFCCC

[http://unfccc.int/files/press/news\\_room/press\\_releases\\_and\\_advisories/application/pdf/20060526\\_final\\_26\\_may\\_press\\_release-english.pdf](http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20060526_final_26_may_press_release-english.pdf) accessed  
2009-05-26

Port Of Göteborg

[http://www.portgot.se/prod/hamnen/ghab/dalis2b.nsf/vyFilArkiv/hamntaxa\\_GB\\_090121\\_web.pdf/\\$file/hamntaxa\\_GB\\_090121\\_web.pdf](http://www.portgot.se/prod/hamnen/ghab/dalis2b.nsf/vyFilArkiv/hamntaxa_GB_090121_web.pdf/$file/hamntaxa_GB_090121_web.pdf) accessed 2009-  
05-26

Reuters

<http://www.reuters.com/article/GCABusinessofGreen/idUSTRE50E3CW20090116>

Purely for “Fun”

Homepage where one can calculate shipping emissions from different vessels

<http://www.martrans.org/emis/> visited 2009-05-26