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**PROPOSAL FROM THE COMMISSION TO
THE EUROPEAN PARLIAMENT AND COUNCIL**

**for the inclusion of GHG emissions from maritime transport in the EU's reduction
commitments**

Impact Assessment

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Disclaimer:

This report commits only the Commission's services involved in its preparation and does not prejudge the final form of any decision to be taken by the Commission.

GLOSSARY

CDM	Clean Development Mechanism
CER	Certified Emissions Reductions
EEA	European Environment Agency
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Index
EIB	European Investment Bank
EMSA	European Maritime Safety Agency
EUA	European Union Allowances
GT	Gross tonnage
GHG	Greenhouse gas
HFO	Heavy Fuel Oil
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
MARPOL	International Convention on MARitime POLLution
MEPC	Maritime Environmental Protection Committee
MDO	Marine Diesel Oil
MGO	Marine Gasoil
MRV	Monitoring, reporting and verification of emissions
NGO	Non-governmental organisation
SEEMP	Ship Energy Efficiency Management Plan
SOLAS	International convention for Safety Of Life At Seas
toe	Tons of oil equivalents
UNCLOS	Untied Nation Convention on Law Of the Seas

TABLE OF CONTENT

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES	7
1.1. IMPACT ASSESSMENT STEERING GROUP (IASG)	7
1.2. CONSULTATION OF THE IAB.....	7
1.3. CONSULTATION AND EXPERTISE	7
1.3.1. <i>External support.....</i>	7
1.3.2. <i>Consultation of maritime experts and Member States.....</i>	8
1.3.3. <i>Public on-line consultation.....</i>	8
2. PROBLEM DEFINITION.....	9
2.1. EU RELATED CO2 EMISSIONS FROM MARITIME TRANSPORT ARE SIGNIFICANT, LEADING TO NEGATIVE IMPACTS ON CLIMATE CHANGE.....	9
2.2. WHAT ARE THE DRIVERS OF THE PROBLEM?	11
2.2.1. <i>EU sea transport is experiencing growth , leading to an increase of its CO2 emissions</i>	11
2.2.2. <i>Market failures prevent the uptake of low carbon technologies.....</i>	12
2.3. WHO IS AFFECTED, IN WHAT WAYS AND TO WHAT EXTEND?	13
2.3.1. <i>The EU and its EU Member States</i>	13
2.3.2. <i>EU ship-owners and ship-operators.....</i>	14
2.3.3. <i>Third countries</i>	14
2.4. HOW THE PROBLEM WOULD EVOLVE, ALL THINGS BEING EQUAL? (BASELINE SCENARIO).....	15
2.5. INTERNATIONAL AND EU POLICY APPROACHES	16
2.5.1. <i>International negotiations</i>	16
2.5.2. <i>EU approach.....</i>	17
2.6. INDUSTRY APPROACHES.....	18
2.7. THE RIGHT OF THE EU TO ACT.....	20
2.7.1. <i>Legal basis.....</i>	20
2.7.2. <i>Analysis of subsidiarity.....</i>	20
2.7.3. <i>Analysis of proportionality.....</i>	21
3. OBJECTIVES.....	22
4. POLICY OPTIONS	25
4.1. CHOICE OF POLICY OPTIONS	25
4.2. CONSIDERATION OF THE BASELINE AND CREDIT OPTION	26
4.3. ENFORCEMENT OF THE POLICY OPTIONS ASSESSED	26
4.4. DESCRIPTION OF THE POLICY OPTIONS ASSESSED	27
4.4.1. <i>Option 1: Baseline scenario.....</i>	27
4.4.2. <i>Option 2: Monitoring, reporting and verification (MRV) of emissions based on fuel consumption</i> <i>28</i>	
4.4.3. <i>Option 3: Levy on emissions.....</i>	29
4.4.3.1. <i>Sub-option 3a: Levy on bunker fuel sales</i>	29
4.4.3.2. <i>Sub-option 3b: Tax on emissions from fuel consumed.....</i>	31
4.4.3.3. <i>Sub-option 3c: Contribution-based compensation fund.....</i>	32
4.4.4. <i>Option 4: Maritime emission trading scheme.....</i>	35
4.4.5. <i>Option 5: Target based compensation fund</i>	37
5. ASSESSMENT OF IMPACTS.....	39
5.1. GENERAL ELEMENTS ON THE MODEL USED	39
5.2. GENERAL CONSIDERATIONS.....	40
5.2.1. <i>Impacts on consumers and households</i>	40
5.2.1. <i>Transport modal split.....</i>	42
5.3. OPTION 1: BASELINE SCENARIO	43

5.3.1. <i>Environmental impacts</i>	43
5.3.2. <i>Economic impacts</i>	45
5.3.3. <i>Social impacts</i>	45
5.4. OPTION 2: MONITORING, REPORTING AND VERIFICATION (MRV) OF EMISSIONS BASED ON FUEL CONSUMPTION	45
5.4.1. <i>Environmental impacts</i>	46
5.4.2. <i>Economic impacts</i>	46
5.4.3. <i>Social impacts</i>	49
5.4.4. <i>Administrative burden for public authorities</i>	49
5.4.5. <i>Specific impacts outside the EU</i>	51
5.5. OPTION 3A: LEVY ON BUNKER FUEL SALES	51
5.5.1. <i>Environmental impacts</i>	51
5.5.2. <i>Economic impacts</i>	52
5.5.3. <i>Social impacts</i>	54
5.6. OPTION 3B: TAX ON EMISSIONS FROM FUEL CONSUMED	54
5.6.1. <i>Environmental impacts</i>	54
5.6.2. <i>Economic impacts</i>	55
5.6.3. <i>Social impacts</i>	58
5.7. OPTION 3C: CONTRIBUTION BASED COMPENSATION FUND.....	59
5.8. OPTION 4: MARITIME EMISSION TRADING SCHEME (ETS).....	59
5.8.1. <i>Environmental impacts</i>	59
5.8.2. <i>Economic impacts</i>	61
5.8.3. <i>Social impacts</i>	66
5.9. OPTION 5: TARGET BASED COMPENSATION FUND	66
6. COMPARISON OF OPTIONS	67
6.1. INTRODUCTION	67
6.2. EFFECTIVENESS.....	68
6.2.1. <i>Removal of market barriers</i>	68
6.2.2. <i>Environmental effectiveness</i>	69
6.2.3. <i>Vulnerability</i>	70
6.2.4. <i>Enforceability</i>	71
6.3. EFFICIENCY.....	72
6.3.1. <i>Shipping competitiveness</i>	72
6.3.2. <i>Maintaining and enhancing competitiveness</i>	73
6.4. CONSISTENCY.....	73
6.4.1. <i>Stimulating actions by others, including through the IMO</i>	73
6.4.2. <i>Consistency with EU related policies</i>	73
6.5. CONCLUDING REMARKS	74
7. MONITORING AND EVALUATION.....	75
ANNEX I - OVERVIEW OF THE SHIPPING SECTOR	77
ANNEX II - SMEs IN THE SHIPPING SECTOR	84
ANNEX III - SUMMARY OF RESULTS OF THE ON-LINE CONSULTATION.....	86
1. INTRODUCTION.....	88
2. STRUCTURE OF THE QUESTIONNAIRE	88
3. CHARACTERISATION OF THE RESPONDENTS	88
4. RESULTS OF THE ON-LINE CONSULTATION	90
4.1. GENERAL CONTEXT	90
4.1.1. <i>Equal treatment of all sectors of the European economy</i>	90
4.1.2. <i>Use of revenues</i>	91
4.2. SCOPE OF A POSSIBLE PROPOSAL.....	92

4.2.1. <i>Route coverage</i>	92
4.2.2. <i>Ships covered</i>	93
4.3. RELIANCE ON SHIPPING AT A LOCAL OR REGIONAL LEVEL.....	93
4.4. EVASION.....	94
4.5. POLICY OPTIONS.....	94
4.5.1. <i>Compensation fund</i>	94
4.5.2. <i>Mandatory emission reduction per ship</i>	97
4.5.3. <i>ETS</i>	98
4.5.4. <i>Tax</i>	101
4.6. CHOICE OF POLICY OPTIONS	102
4.7. GENERAL COMMENTS.....	105
5. GENERAL CONCLUSIONS.....	105
ANNEX IV - MINUTES OF THE ECCP MEETINGS	107
ANNEX V - PARTICIPANTS AND CONCLUSIONS FROM THE TECHNICAL WORKSHOP HOLD BY AEA TECHNOLOGY IN LONDON ON 9 MARCH 2012	134
ANNEX VI - METHODOLOGY FOR MODELLING	140
ANNEX VII - IDENTIFIED REGIONS RELIANT ON SHIPPING.....	154
ANNEX VIII - ANALYSIS OF POSSIBLE TECHNICAL SCOPE OF AN EU MEASURE	157
ANNEX IX - LIST OF IMO PROPOSALS (24 MAY 2011).....	163
ANNEX X - DESCRIPTION OF MARKET BARRIERS	164
ANNEX XI - GRAPHICAL REPRESENTATION OF THE COMPARISON OF THE POLICY OPTIONS	167
ANNEX XII - ANNUAL COMPLIANCE CYCLE FOR MONITORING, REPORTING AND VERIFICATION OF EMISSIONS	169
ANNEX XIII - ADMINISTRATIVE COSTS AND ADMINISTRATIVE BURDEN	171
ANNEX XIV – SPECIFIC ELEMENTS OF OPTION 2 – MONITORING AND REPORTING BASED ON FUEL CONSUMED	181
ANNEX XV – SPECIFIC ELEMENTS OF OPTION 4 – EMISSIONS TRADING SCHEMES	182

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

Lead DG: DG CLIMA in close cooperation with DG MOVE being in agreement with this impact assessment.

Agenda planning /WP reference: 2012/CLIMA/005

1.1. Impact assessment steering group (IASG)

Work on the impact assessment was carried out by a European Commission Inter-Service Steering Group (ISG) set up by DG CLIMA which met six times. The following Directorates-General (DGs) of the European Commission participated in the work of the group: DG ENV, DG ENTR, Secretariat-General (SG), Legal Service (SJ), DG TAXUD, DG MARKT, DG COMP, DG JRC, DG RTD, DG MOVE, DG TRADE, DG MARE, the European Maritime Safety Agency (EMSA) and the European Environment Agency (EEA).

1.2. Consultation of the IAB

Following the IAB's first opinion and its recommendations, the draft impact assessment has been substantially revised. These changes concern the section on problem definition which has been re-arranged describing the policy context, market failures as well as expected market dynamics until 2020 (e.g. ship overcapacity, the need to generate fuel savings, new technologies, slow steaming) more in detail. Furthermore, within the limits of a reasonable page volume for the Impact Assessment, the intervention logic has been re-enforced, the objectives more streamlined and the policy options have been described more in detail. Regarding the assessment and comparison of options, more elements have been added (e.g. a dedicated section on modelling, cost figures for all actors involved, administrative costs for Member States, a dedicated annex on SMEs and a dedicated annex describing costs for each individual option according to size of ships, type of competent authorities and type of recycling of revenues where relevant). Future monitoring and evaluation arrangements have been further clarified. Furthermore, more references to stakeholder views have been introduced all over the document including a dedicated section on "industry approaches" (section 2.6). The balance in the distribution of relevant information between the different annexes and the main text has only been partly modified as the draft Impact Assessment's main text already exceeded the recommended number of pages by around 50%.

In its second option, the IAB suggested providing more robust evidences on the magnitudes of the underlying market failures. Additional evidence based on the studies analysing these aspects has been added. Moreover, following the recommendation of the board, the results of the public consultation, instead of a synthesis of these results, have been added to the annex of the impact assessment to substantiate stakeholder views and to present them in a more differentiated way. Finally, following the IAB recommendation, the impact assessment also better explains the two stage approach. In particular, the fact that additional discussions are required once the MRV will be in place is now explicit.

1.3. Consultation and expertise

1.3.1. External support

The underlying econometric modelling and analysis was carried out by a consortium led by AEA Technology. The consortium consisted of senior experts consultants in the maritime sector: IHS Fairplay, AMEC and Marintek. The data on environmental, economic and social impacts used in this impact assessment have been provided by this study if not stated differently. A study on market barriers for the uptake of cost-efficient mitigation technologies carried out by Maddox consulting (particularly as regards the Monitoring, Reporting and Verification - MRV option) and a study carried out by IHS Fairplay on ships visiting EU ports, as well as industry expert consultations were also used to complement the analysis.

AEA Technology report, Maddox Consulting study and IHS Fairplay study are available on the Commission website¹.

1.3.2. Consultation of maritime experts and Member States

In order to review the policy options mentioned in the second International Maritime Organisation (IMO) greenhouse gas study 2009² and in the 2009 CE Delft study³, a working group (WG6) was established under the European Climate Change Program II (ECCP). This group has also allowed for a formal technical stakeholder consultation and provided input for the external support, especially by narrowing down the policy options, by addressing the issue on regions heavily dependent on shipping and by understanding the positive and negative aspects of an EU proposal for delivering an IMO action.

A one-day and three two-day meetings were organized on 31 August 2010, 8-9 February, 22-23 June and 15-16 November 2011. They brought together more than 100 participants from national administrations, from the EU shipping organizations and associations, from international shipping organizations and from other associations and NGOs. Representatives from the European Maritime Safety Agency (EMSA), the European Environment Agency (EEA) and the European Parliament also attended. The minutes, the background papers and the presentations of these meetings are available on the Commission website for public information⁴.

Furthermore, Commissioner Hedegaard and Vice-President Kallas met with high level experts in the maritime transport sector. These meetings took place on the 3 February 2011, 28 June 2011 and 7 November 2011.

¹ http://ec.europa.eu/clima/policies/transport/shipping/studies_en.htm

² The Second IMO Greenhouse gases study 2009 constitutes a significant scientific work undertaken at the global scale under the auspices of IMO. The Study identifies a significant potential for reduction of GHG emissions through technical and operational measures. The Study estimates that, if implemented, these measures could increase efficiency and reduce the emissions rate by 25% to 75% below the current level.

³ In 2009, CE Delft provides the European Commission with Technical support for European action to reducing Greenhouse Gas Emissions from international maritime transport.

⁴ http://ec.europa.eu/clima/policies/eccp/second/stakeholder/documentation_en.htm

1.3.3. Public on-line consultation

An online public consultation was held from 19 January to 12 April 2012, i.e. 12 weeks. A press release announced the launch of this public consultation. The public consultation was carried out using the “General principles and minimum standards for consultation of interested parties by the Commission”. Results from the consultation are given in Annex III.

The results of the consultation confirm that a global agreement in the IMO is perceived as the best long term option to achieve GHG emissions reduction of the shipping sector. The results show agreement that, in absence of a global measure, any European measure should be a level playing field for all ships using ports in the EU. It is also a generally shared view that any market-based measure, whether adopted at EU or IMO level, needs to be accompanied by transparent and robust monitoring of emissions. This monitoring should be established with the view of avoiding undue administrative burdens and ensure accurate reporting results.

In parallel to this internet public consultation, a technical workshop was organised on 6 March 2012 with relevant stakeholders in order to discuss in concrete terms how the possible EU measures could be implemented. The list of parties consulted and the main conclusions are given in Annex V.

In addition, a one-day broad consultation meeting with more than 120 participants was held on 5 December 2012 to discuss in more detail the monitoring and reporting of CO₂ emissions in the shipping sector.

2. PROBLEM DEFINITION

2.1. EU related CO₂ emissions from maritime transport are significant, leading to negative impacts on climate change

Emissions of the shipping sector have been recognised as a fast growing environmental problem as they affect climate, have direct impacts on human health, and they contribute to ocean acidification and eutrophication⁵. Background information on the shipping sector, especially regarding the various shipping segments and their energy efficiency, is given in Annex I.

EU related CO₂ emissions from maritime transport reached 179.6Mt in 2010⁶. By a way of comparison these EU related maritime sector emissions are higher than the total 2009 emissions of 20 Member States, taken individually⁷.

⁵ Corbett, J. 2003. New Directions: Designing ship emissions and impacts research to inform both science and policy. *Atmospheric Environment*, Vol 37 Issue 33: 4719–4721

⁶ AEA Technology and others 2012

⁷ Austria (82MtCO₂), Belgium (152MtCO₂), Bulgaria (61MtCO₂), Czech Republic (134MtCO₂), Denmark (64MtCO₂), Estonia (18MtCO₂), Ireland (65MtCO₂), Greece (134 MtCO₂), Cyprus (10MtCO₂), Latvia (12MtCO₂), Lithuania (22MtCO₂), Luxembourg (13MtCO₂), Hungary (67MtCO₂), Malta (6MtCO₂), Portugal (79MtCO₂), Romania (132MtCO₂), Slovenia (20MtCO₂), Slovakia (44MtCO₂), Finland (69MtCO₂) and Sweden (69MtCO₂)

Greenhouse gas emissions from shipping, which are closely linked to the development of the world economy, have increased strongly in the past few years. Although, the EU has reduced its greenhouse gas (GHG) emissions by 379,8MtCO₂eq between 1990 and 2007⁸, during the same period, the CO₂ emissions from international shipping related to the EU, i.e. emissions related to intra-EU routes, incoming and outgoing voyages, have increased by 66MtCO₂⁹, undermining the EU efforts to tackle climate change.

International shipping is the only sector and transport mode not covered at the EU level by emission reduction target. All other transport modes, including domestic shipping¹⁰, are covered by emission reduction targets in result of the revised directive 2003/87/EC which set the European emission trading scheme (EU-ETS) and the Decision (EC) n°406/2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. Moreover, some specific measures are used to help the internalisation of the carbon cost, such as the regulation (EC) n°443/2009 and 510/2011 setting CO₂ emissions standards for cars and vans, but none of them apply to international shipping.

Although the EU continues to consider global approaches central in developing its policy, in view of the significance of the problem it was agreed between the European Parliament and the Council of the EU in 2008 that in the absence of an international agreement, the Commission should make a proposal to include international maritime emissions into the Community reduction commitment¹¹.

The EU related maritime emissions have two distinct dimensions. Firstly, the emissions relating to intra-EU traffic by EU operators which are not expected to increase significantly by 2050, and secondly, those emissions relating to sea transport into and out of EU where significant growth is projected. Accordingly an appropriate regulatory measure should – in addition to addressing how EU does maritime business – contribute to how business is done in Europe and promote further action internationally.

Considering the importance of international progress on developing a global measure, this impact analysis covers a measure aimed at increasing availability of comparable and transparent emissions data through Monitoring, Reporting and Verification (MRV – option 2), which would allow for better informed decision making within sector, as well as a range of so called Market Based Measures (MBMs – options 3-5). For the purposes of this analysis it has been considered that although a robust MRV scheme is the foundation of most MBMs, it can in certain circumstances deliver significant results as an interim stand-alone measure.

Trade activity was the basis of the calculation of the projected CO₂ emissions in the shipping sector used for this impact assessment. More precisely, variations of seaborne trade of more than 80 commodities between two EU regions (Northern EU and Southern EU) and 13 extra-

⁸ Eurostat, April 2012

⁹ AEA Technology and others, 2012

¹⁰ Domestic shipping means shipping within the territorial waters of a Member State. Intra-EU shipping is considered as international shipping. CO₂ emissions from domestic shipping represent 22.3MtCO₂ in 2010.

¹¹ Recital 2 of the decision n°406/2009/EC and recital 3 of the directive n°2009/29/EC

EU regions¹² defined the maritime transport activity up to 2050. Such variations were calculated using the IHS Global Redesign Scenario¹³. It was therefore possible to estimate the future CO2 emissions on EU related routes considering a frozen technology scenario.

Based on this frozen technology scenario and using IMO data and Marintek and IHS Fairplay expertise, emissions reductions, due to economies of scale related to the increase of ship size (which is a significant trend in the shipping sector), fuel switch (in particular due to low sulphur requirement) and mandatory improvement of the implementation of the EEDI¹⁴, were integrated. This led to the projected EU related CO2 emissions under the baseline scenario.

The EU is strongly committed to achieve the climate objective of limiting global average temperature increase to less than 2 degrees Celsius above pre-industrial levels. To this end, the Europe 2020 Strategy for smart, sustainable and inclusive growth¹⁵ includes five headline targets. One of the headline targets is to reduce GHG emissions by at least 20% compared to 1990 levels or by 30%, if the conditions are right¹⁶. In the view of contributing to the EU 2020 Strategy, the 2011 Commission White Paper on Transport¹⁷ states that EU CO2 emissions from maritime transport should be reduced by 40% (if feasible 50%) from 2005 levels by 2050. Therefore, the projected increase of CO2 emissions from shipping is not in line with the EU objectives, leading to negative impacts on climate change.

2.2. What are the drivers of the problem?

2.2.1. EU sea transport is experiencing growth , leading to an increase of its CO2 emissions

CO2 emissions in maritime transport are related to shipping activity, which is closely related to the growth of the word trade. It can be assumed that the relative weight of major economies outside the EU, such as China, India or Brazil in the global GDP will increase¹⁸ resulting in an increase in the trade activity of the EU with these countries. More than 90% of EU trade is seaborne¹⁹ and this share is expected to increase²⁰. Although in absolute terms emissions from intra EU maritime transport are not expected to increase significantly and may even decrease from 78.5MtCO2 in 2005 to 70MtCO2 in 2030 (-11%)²¹, EU related maritime transport activity is expected to increase as a result of increase in trade with third countries leading to an increase of CO2 emissions on EU related routes. Under a frozen

¹² Mediterranean non EU, Northern non EU, Middle East, North Africa, North America, Central America/Caribbean, South America East Coast, South America West Coast, Australia/Oceania, North East Asia, South East Asia, India, Southern Africa

¹³ IHS Global Redesign Scenario is one out of a total of three scenarios that have been developed by IHS over the past two years.

¹⁴ Energy Efficiency Design Index, see section 2.3.1

¹⁵ COM(2011) 21, see: <http://ec.europa.eu/resource-efficient-europe>

¹⁶ COM(2010)2020, 3.3.2010

¹⁷ COM(2011) 144 final

¹⁸ IHS Fairplay, Global Redesign Scenario 2012

¹⁹ http://ec.europa.eu/transport/modes/maritime/index_en.htm

²⁰ The Commission's White Paper on Transport mentions that "30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors."

²¹ AEA Technology and others, 2012

technology scenario, the EU related CO₂ emissions could reach 280MtCO₂ by 2030 (+43% compared to 2005). The intra EU emissions from maritime transport will therefore drop from 40% of the total EU related CO₂ emissions in 2005 to 26.6% in 2050.

These projections have been estimated according to a trade model, the IHS Global Redesign Scenario, integrating strong underlying assumptions related to interalia geopolitics, monetary issues, environmental issues or economical policies. However, projected CO₂ emissions are sensitive to the variation of these assumptions. For example, a higher/lower GDP growth in major economies outside the EU may lead to higher/lower CO₂ emissions on EU related routes. A quantification of the projected CO₂ emissions different than the one used in this impact assessment would have required the use of another trade model. Further details, especially on the trade flows considered by the model, can be found in annex VI.

2.2.2. Market failures prevent the uptake of low carbon technologies

Greenhouse gas emissions (GHG) of maritime transport are directly related to fossil fuel consumption and fuel can be considered up to 33 to 63% of ship's operational costs. In theory, the increase of fuel prices (particularly due to global low-sulphur requirements²²) should trigger the adoption of technological means to increase of the energy efficiency of ships and ultimately to a decrease of GHG emissions compared to a business as usual scenario.

However, recent research by the International Maritime Organisation (IMO), CE Delft, Det Norske Veritas (DNV) and others has identified CO₂ reduction measures in the maritime transport sector that are not being implemented on large scale, such as slow steaming, weather routing, contra-rotating propellers, propulsion efficiency devices, etc. The total cost of many of these measures is negative – i.e. they deliver more fuel savings than the investment required. These measures could deliver substantial reductions in fuel consumption and emissions. However, they are not implemented in part due to market barriers which have to be considered as a major problem driver. Three main market barriers can be underlined²³:

1. lack of information: Ship-owners, ship operators and charterers may not be aware of the energy efficiency of a ship, may not be able to compare this energy efficiency amongst other ships or may not be aware of technologies delivering cost-effective emissions reductions;
2. split of incentives: Several entities are involved in the operation of ships. As a result of this, a coherent long-term strategy to improve of the energy efficiency is difficult to implement as neither owner nor operator or charter can expect full pay-back of their investments.
3. access to finance: Ship-owners or ship operators do not have adequate access to private finance to invest in low carbon technologies.

A detailed description of the market barriers is given in Annex X.

²² In 2008, the IMO requested the use of low-sulphur fuel in specific regions (North Sea, the Channel and the Baltic for the EU) from 2015 onwards. These requirements were introduced in the EU legislation through the review of Directive 1999/32/EC. The switch from heavy fuel oil (HFO) to marine diesel oil (MDO) will lead to an increase of fuel costs for the maritime sector.

²³ Maddox Consulting 2012

If all market barriers were removed, the EU related CO₂ emissions from maritime transport could be stabilized 5% below 2005 levels up to 2030²⁴. This means that, with the current fuel prices projection²⁵, the uptake of low carbon technology with negative costs could fully compensate the growth of the transport activity. Such results have been confirmed by recent study of Det Norske Veritas (DNV), which demonstrates that global maritime emissions can be stabilised at today's level up to 2050²⁶.

It can be stressed that the lack of information has to be solved before removing the other market barriers. For example, in order to ensure that a long-term strategy to improve the energy efficiency of a ship is set up, ship-owners or ship operators have to be aware of the energy efficiency of their ship. Moreover, providing reliable information on the economic and environmental effectiveness of technologies improving energy efficiency will reduce the risk taken by banks to finance such technologies.

Consequently, even if fuel price could in principle be a key driver to encourage emission reductions, it cannot deliver the full potential of emissions reductions in the shipping sector due to the above mentioned market barriers.

2.3. Who is affected, in what ways and to what extend?

2.3.1. The EU and its EU Member States

As mentioned in section 2.1, international maritime transport is the only mode of transport currently not covered by an EU or international regulation (see also section 2.5 on EU and international regulations). In the absence of a policy measure there is a risk of distortion of competition between modes of transport.

Aviation is included in the EU-ETS under a law agreed in 2008²⁷. The introduction of non-discriminatory carbon pricing for incoming and outgoing flights via the EU ETS has raised at times misinformed but nevertheless strong objections by key international partners. These partners have called for prioritising a global agreement on a market based measures at the 2013 International Civil Aviation Organisation (ICAO) Assembly. In response to the progress made at the latest ICAO Council meeting (9 November) and the commitment to deliver tangible results to address international aviation emissions by the 2013 Assembly, the Commission has proposed a temporary, one year derogation of the EU ETS as regards air traffic into and out of Europe. This gesture is expected to provide momentum for the ICAO discussions in the run up to the 2013 Assembly.

Other modes of transports, such as road, rail and inland waterways, are covered by the Decision (EC) n°406/2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. However, technical measures, such as regulation (EC) n°443/2009 setting emission performance standards for new passenger cars, have also been adopted to fit with the nature

²⁴ AEA Technology and others, 2012

²⁵ See table VI.2 under annex VI for the fuel price projections.

²⁶ Pathways to Low Carbon Shipping - Abatement Potential Towards 2050, DNV, 2012

²⁷ http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm

of the sector (e.g. the short life time of car, compared to other mode of transport, increases the accuracy of setting standards for new vehicles). Moreover, electric propulsion for railways and, increasingly, for cars, is also covered by the EU ETS.

There are also several international developments that will affect the level of emissions even in the absence of an EU measure. The work started in 2000 by the IMO led to finalising a report which represented, at the time, the most comprehensive overview and estimate of ships' emissions. On 15 July 2011 a new chapter was added on Regulations on energy efficiency for ships to make mandatory the Energy Efficiency Design Index (EEDI), for new ships and existing ships which have undergone a major conversion, progressively from 1st January 2013.

At the time of the adoption of the EEDI a further agreement was reached on all ships covered by the relevant IMO convention should carry a Ship Energy Efficiency Management Plan (SEEMP) on board. This SEEMP aims to record the operational measures taken to enhance the energy efficiency of the ship. However, the measures described in the SEEMP are not mandatory. Therefore, the impact of SEEMP remains uncertain.

Against this backdrop, and to maintain the consistency and positive impact of our environment and climate policy, a gradual approach which will still maintain maximum leverage on the international discussions on maritime emissions, will be in the interest of Europe.

2.3.2. EU ship-owners and ship-operators

In the shipping sector, the external cost of CO₂ emissions has not been yet internalised. As a consequence, shipping competitiveness will not be affected in the absence of regulation on CO₂ emissions from maritime transport. However, the penetration of low carbon technologies in the shipping sector, which would have reduced the shipping's dependency to fossil fuel, is currently low²⁸. This leads to a strong exposure of the shipping sector to fuel price increase.

In parallel however, there is a growing demand from the shippers to improve the environmental footprint of their supply chain. For example, the Clean Cargo Working Group was established in 2003, brings together major shippers (such as IKEA, NIKE, Marks and Spencer, etc.) and major ship-operators, representing today 60% of the global container fleet by volume, to improve the environmental performance of marine container transport²⁹. Despite the fact that maritime transport is still considered as the most efficient mode of transport, willingness to take action in this area is increasing among ship-operators to the extent that non-climate conscious ship-operators may face the risk of losing business opportunity.

2.3.3. Third countries

²⁸ Maddox Consulting, 2012

²⁹ <http://www.bsr.org/en/our-work/working-groups/clean-cargo>

In absence of regulation of GHG emissions of shipping, the third countries will face similar negative impacts of climate change as the EU. Ship-owners and ship-operators from third countries will also continue to be exposed to fuel price increase, if no regulation at regional or international level unlocks the uptake of low carbon technologies. Consultation with third country partners shows increasing level of awareness as well as gradual but broad based willingness to eventually agree on a global measure. An appropriate EU level measure compatible with the maturity of the international discussions could contribute significantly to the analysis aimed at identifying a single global MBM.

2.4. How the problem would evolve, all things being equal? (baseline scenario)

The total CO₂ emissions related to European maritime transport activities (including intra EU routes, incoming journeys to the EU and outgoing journeys from the EU) are expected to reach 210 Mt CO₂ in 2020 (+8% compared to 2005), 223 Mt CO₂ in 2030 (+15% compared to 2005) and 271 Mt CO₂ in 2050 (+39% compared to 2005)³⁰.

These figures have been extrapolated according to the most reliable 2010 data³¹. However, it has to be stressed that there is a lack of accurate and consolidated monitoring, reporting and verification of CO₂ emissions in the maritime transport sector. To this end, it can be recalled that the market failures will not be removed by the market.

The evolution of the problem remains also highly dependent on action taken by foreign countries. The intra-EU emissions are indeed expected to be stable at around 72 Mt CO₂ up to 2050, i.e. -9% compared to 2005, although minor variations may occur (e.g. intra-EU emissions were 15% below 2005 levels in 2010 due to the economic crisis). On the contrary, the emissions from incoming (i.e. coming from ports outside the EU) and outgoing (i.e. going to ports outside the EU) journeys are expected to increase significantly (respectively +91% and +51% by 2050 compared to 2005).

The EEDI sets technical standards for improving the energy efficiency of certain categories of ships which will, in turn, lead to less CO₂ emissions – approximately 23% reductions by 2030 compared to Business as Usual increase which would be 54% to 84% above 2007 levels on a global scale³². However, CO₂ Emissions will increase globally at least by 235Mt above the 2007 levels by 2030 in the average scenario despite the implementation of the EEDI. The EEDI applies only to the new ships and there are no specific measures in place for existing ships.

Moreover, according to the impact assessment of the proposal for a directive of the European Parliament and of the Council amending Directive 1999/32/EC as regards the sulphur content of marine fuels³³, fuel prices will increase due to IMO regulation on sulphur emissions. In particular, the EMSA analysis concludes that under normal circumstances the price for Marine Gas Oil (MGO) will be in the range of €450 to €680 per tonne. Compared to Heavy

³⁰ AEA Technology and others, 2012

³¹ Based on real time vessel tracking system in correlation with the IMO register of ship recording all ships technical specifications

³² Second GHG IMO Study 2009

³³ SEC(2011) 918 final

Fuel Oil with a sulphur content of 1.5% (sulphur standard before MARPOL Annex VI was revised) it is predicted that MGO with a maximum sulphur content of 0.1% would on average become 65% more expensive under a fuel-based-only compliance scenario (i.e. whereby the less costly technology-based compliance is not used).

Finally, according to the stakeholders, the shipping sector is facing an overcapacity for at least a decade. It is not possible to have precise quantification of this overcapacity for each shipping segment. However, some estimates are given in annex I figure 1. In the short term, this overcapacity leads to operational responses, such as slow steaming³⁴, which can deliver emissions reductions. However, in the long term, due to the expected growth of the shipping sector, this overcapacity should no longer exist.

The CO2 emissions projections used in this impact assessment integrate all the elements mentioned above in the baseline. Further information on the baseline scenario can be found in annex VI, especially on the trade figures (section 2 of annex VI), fuel prices (table VI.2 of annex VI)

2.5. International and EU policy approaches

2.5.1. International negotiations

In December 1997, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol. According to its article 2, paragraph 2, Parties included in Annex I of the Kyoto Protocol³⁵ shall pursue limitation or reduction of emissions of greenhouse gas emissions not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO), respectively.

The IMO started working on the reduction of greenhouse gases in 1997 when the Conference of the Parties to the International Convention for the Prevention of Pollution from ships (MARPOL convention) agreed in its Resolution 8 that the IMO, in cooperation with the United Nations Framework Convention on Climate Change (UNFCCC), undertake a study on CO2 emissions from ships and therefore that the matter is on the agenda of the Marine Environment Protection Committee (MEPC). The progress made on the industry standard (EEDI) described above and the deliberations on technical measures to improve sector energy efficiency has been significant, however IMO recognises that further mechanisms are required to achieve the reductions of emissions from shipping sector at a meaningful scale.

Additional measures are under discussion at the IMO, but the progress in the discussion of such measures has been relatively unimpressive after a working group provided its initial report on market-based measures in July 2011. An EU level measure and an analysis of the impacts of MBMs could significantly contribute to the on-going reflections in this context.

³⁴ Regulated Slow Steaming in Maritime Transport: An Assessment of Options, Costs and Benefits, CE Delft, 2012

³⁵ Annex I Parties include the industrialized countries that were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States

2.5.2. EU approach

According to the Article 5 of decision n°1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme, the Commission was committed to "*identify and undertake specific actions to reduce greenhouse gas emissions from marine shipping if no such action is agreed within the International Maritime Organisation by 2003*".

On 5 December 2003, the IMO Assembly adopted Resolution A963(23) which urged the Marine Environment Protection Committee (MEPC) to identify and develop mechanism(s) needed to achieve limitation or reduction of GHG emissions from international shipping. The Commission postponed action.

The Council and the Parliament recalled this commitment in the Climate and Energy Package adopted on 23 April 2009 : "*in the event that no international agreement which includes international maritime emissions in its reduction targets through the International Maritime Organisation has been approved by Member States or no such agreement through the UNFCCC has been approved by the Community by 31 December 2011, the Commission should make a proposal to include international maritime emissions in the Community reduction commitment, with the aim of the proposed act entering into force by 2013. Such a proposal should minimise any negative impact on the Community's competitiveness while taking into account the potential environmental benefits.*"³⁶

In July 2011, the IMO decided on measures setting efficiency targets for certain category of new ships (see section 2.3.1 above). These measures, while expected to reduce global GHG emissions from international shipping from business as usual scenario, are not sufficient to ensure an appropriate contribution from this sector to global efforts to maintain global temperature growth below 2°C. Consequently, there is a clear mandate given to the Commission to act now.

The Climate change and energy package of 2008 and the EU ETS are considered major achievements of the EU. EU ETS remains a flagship policy has served as an example for actions by our third country partners (China, Korea, Australia, etc.). Since its launch in 2005 the EU ETS has delivered significant CO2 reductions. By generating a uniform carbon price across countries and sectors, it has created a level playing field and guaranteed a cost-effective approach. The EU ETS has functioned as foreseen but, due in large part to the wider economic situation, emissions have reduced to such an extent that many stakeholders consider that a stronger signal is needed to generate low-carbon investments. In the 2012 Carbon Market Report³⁷, the Commission analyses this issue in more detail. On the short term, the Commission has recently proposed the 'backloading' of 900 million allowances³⁸, i.e. the delay of planned auctions, in order to reduce surpluses on the market. It has also identified six structural measures which could tackle the structural supply-demand imbalance,

³⁶ Recital 2 of the decision n°406/2009/EC and recital 3 of the directive n°2009/29/EC

³⁷ Report from the Commission to the European Parliament and the Council, The state of the European carbon market in 2012, COM(2012) 652 final

³⁸ http://ec.europa.eu/clima/policies/ets/auctioning/third/docs/20121112_com_en.pdf

and sought stakeholder feedback on these options. While monitoring aviation emissions in 2010 has taken place, the actual pricing of emissions from incoming and outgoing flights in ETS has been opposed by a number of third countries.

The Commission remains firmly committed to support the progress towards a global agreement in the IMO. Accordingly, although this analysis looks at a range of measures including MBMs, the Commission announced on 1st October 2012 a step-by-step approach. As mentioned in section 2.2.2, the removal of the market barriers related to lack of information is a prerequisite for the removal of any other market barrier. Therefore, the Commission will consider, in the interim, setting a strong monitoring, reporting and verification system first. Such monitoring and reporting system will be aligned with forthcoming international monitoring and reporting system, if available, and will be closely coordinated with the on-going discussion on the proposal for a regulation of the Council and the Parliament on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change³⁹ (called Monitoring Mechanism Regulation). Therefore, it is expected that this approach will accelerate and support international process.

2.6. Industry approaches

Several existing initiatives seek to classify ships according to their environmental performance and other indicators, such as the Clean Shipping Index (CSI)⁴⁰, the Environmental Shipping Index (ESI)⁴¹, Shippingefficiency⁴², Rightship⁴³ or Green Award⁴⁴. However, the variety of indicators might become an obstacle for their wider application.

Voluntary offsetting schemes have also been developed, such as Carbon Positive⁴⁵ or Yacht Carbon Offset⁴⁶, and an important number of major companies have taken action. For example, Maersk Line, the world leader in container transport, committed itself to reduce its GHG emissions per tonne nautical mile by 25% by 2020 compared to 2007. More precisely, the stakeholder consultations showed that the container vessel operators are at the forefront of tackling climate change. This can be explained by the fact that this shipping segment is significantly concentrated: the world top 10 containers operators represent approximately 60% of the global vessel capacity⁴⁷. But containers represent only 31% of the 2010 EU related GHG emissions⁴⁸.

Some other liners (e.g. ferries, Ro/Ro) are also taking action. For example, Wallenius Wilhelmsen Logistics commits itself to be carbon neutral by 2050. Finally, in tramp shipping (i.e. bulk carriers, tankers, general cargo, etc.), Norden, a Danish company, commits itself to

³⁹ COM(2011)0789 final

⁴⁰ <http://www.cleanshippingproject.se/>

⁴¹ <http://esi.wPCI.nl/Public/Home>

⁴² <http://shippingefficiency.org/>

⁴³ <http://site.rightship.com/>

⁴⁴ <http://www.greenaward.org/>

⁴⁵ <http://www.carbonpositive.net/>

⁴⁶ <http://www.yachtcarbonoffset.com/>

⁴⁷ <http://www.bsr.org/en/our-work/working-groups/clean-cargo>

⁴⁸ AEA Technology and others, 2012

reduce its CO₂ emissions by 25% by 2020 compared to 2005, or Star Bulk, a Greek company, have joined a voluntary offsetting scheme.

These examples show that numerous EU ship operators have already taken actions. However, except in the container vessel segment, the sector is heavily fragmented (see annex II) and no general assumption on how shipping companies are reducing greenhouse gas emissions can be drawn regarding the size of operators or the type of ships operated. Therefore, the impacts of such action is difficult to quantify, in absence of common monitoring and reporting standards.

2.7. The right of the EU to act

2.7.1. Legal basis

The legal basis for acting at the EU level is the environmental legal basis enshrined in Article 192 of the Treaty on the Functioning of the European Union, as the principal objective of the measure is the protection of the environment through the reduction of GHGs; this legal basis has already previously served as the legal basis to regulate GHG emissions.

2.7.2. Analysis of subsidiarity

The maritime sector is operated globally and a regulation at the international level remains the best way to address the reduction of CO₂ emissions of this sector. As previously mentioned, the IMO adopted technical and operational measures, which will only partially contribute to the necessary emission reduction of GHG from international shipping. Additional measures, such as MBMs, are under consideration in the IMO on the basis of a specific working group report on MBMs in July 2011.

Action at the EU level could significantly reduce CO₂ emissions from global maritime transport. CO₂ emissions related to journeys from and to EU ports represented 180 Mt CO₂ in 2010⁴⁹, i.e. around 1/5th of global maritime emissions⁵⁰. This covers intra-EU journeys (including domestic traffic⁵¹), journeys from EU ports to the first port of call outside the EU and journeys from the last port of call outside the EU to the first EU-port. The total emissions of ships calling into EU ports are estimated to be significantly higher when taking into account the entire journey (e.g. a route from Melbourne to Rotterdam via Singapore) as the scope only covers the last leg of routes related to EU (e.g. only the route between Singapore and Rotterdam).

Acting at the EU level will be more efficient than acting at the Member State level. Indeed, the single market in maritime transport is a key goal for the EU, even though there is still some on-going work for its full achievement. On average, 90% of calls in EU Member State ports are from ships coming from or going to a port located in another EU Member State. Moreover, the hinterland of EU ports goes far beyond national borders. Furthermore, acting at the EU level could avoid competitive distortion in the internal market by ensuring equal environmental constraints on ships calling into EU ports.

Finally, acting at the EU level will ensure that the information provided on greenhouse gas emissions is harmonised at the EU level, contributing to the removal of the market barrier on lack of information.

⁴⁹ AEA Technology and others, 2012

⁵⁰ Based on 2007 figures.

⁵¹ i.e. emissions within a Member State. Emissions between Member States are considered as international shipping.

2.7.3. Analysis of proportionality

According to the EU's climate and energy legislation⁵², all sectors of the economy should contribute to achieving these emission reductions, including international maritime shipping. International shipping is the only sector and transport mode so far not covered at the EU level by the emission reduction target.

Article 191 of the UN Convention of the law of the seas (UNCLOS) encourages cooperating, as appropriate, at a regional basis, directly or through competent international organisations in the interests of protecting and preserving the marine environment by way of international rules, standards and recommended practices. GHG emissions from ships qualify as pollution of the marine environment⁵³. No other international regulation prohibits regional action to address GHG emissions from ships, as long as any measure introduced respects international law, including IMO, WTO and UNFCCC rules.

As there is a clear mandate given to the Commission to act and as there exists no international rules prohibiting such action, an EU proposal is fully legitimate to take action on GHG emissions of the maritime transport sector.

The proportionality of a specific measure is also highly dependent on the categories and the size of ships concerned by the measures. About 19000 vessels above 300 Gross Tons (GT) have called in EU ports in 2010⁵⁴. There is a significant diversity of types (at least 18 categories and size of ships. Therefore, the same measure may not be proportionate for small fishing vessels, whereas it will be for very large crude carriers. In order to reduce the administrative burden while ensuring a high environmental impact, the measure should aim at high coverage of emissions with a minimum number of ships covered. At least small ships below 400 GT should be excluded to ensure consistency with international regulation⁵⁵. However, the threshold for small ships could also be set at a higher level and/or certain ship types may be excluded. For example, setting a size threshold at 5000GT would reduce the number of ships covered by 44% while covering 90% of the EU related CO2 emissions (see Annex VIII). Such threshold could also exclude around 99% of maritime transport SMEs from the scope of the regulation (see annex II). Therefore, the administrative analysis was done for both thresholds 400GT and 5000GT.

Finally, CO2 emissions due to fuel combustion represent about 98% of the GHG emissions of the shipping sector⁵⁶. The possible measure should therefore focus on CO2 emissions from fuel combustion, noting that a regulation on CO2 emissions from fuel combustion may in any case trigger emission reduction of other climate forcers, such as black carbon^{57 58}.

⁵² Recital 2 of the decision n°406/2009/EC and recital 3 of the directive n°2009/29/EC

⁵³ as recalled with amendment of Annex VI of MARPOL to include the EEDI.

⁵⁴ IHS Fairplay, 2011

⁵⁵ For example MARPOL Annex VI

⁵⁶ Excluding black carbon, as the global warming potential (GWP) of black carbon is highly uncertain.

⁵⁷ Black carbon is a climate forcing agent formed through the incomplete combustion of fossil fuels, biofuel, and biomass, and is emitted in both anthropogenic and naturally occurring soot. Black carbon warms the Earth by absorbing heat in the atmosphere and by reducing albedo, the ability to reflect sunlight, when deposited on snow

3. OBJECTIVES

EU action against climate change has been translated into a GHG reduction target as adopted in the Climate and Energy Package, and included in the headline target of the EU 2020 Strategy. The target set in the EU 2020 Strategy is to reduce GHG emissions by at least 20% by 2020 compared to 1990 levels, or by 30% in the context of a global deal⁵⁹.

Moreover, in order to keep climate change below 2°C, the European Council reaffirmed in February 2011 the EU objective of reducing GHG emissions by 80-95% by 2050 compared to 1990, in the context of necessary reductions according to the Intergovernmental Panel on Climate Change by developed countries as a group⁶⁰.

Therefore, the general objective is:

General objective:

1. To contribute to reaching the relevant climate change and energy objective outlined in the EU 2020 Strategy and the 2020 flagship initiatives by taking action on international maritime emissions, as part of the ultimate goal of limiting global average temperature increase to less than 2 degrees Celsius above pre-industrial levels;
2. To contribute to the EU objective of reducing GHG emissions by 80-95% by 2050 compared to 1990.

In the context of the EU 2020 Strategy and its flagship initiatives, the Commission's Transport White Paper introduced a specific target of a reduction in EU CO₂ emissions from maritime bunker fuels by 40% (if feasible 50%) by 2050 compared to 2005 levels.

Under the EU 2020 objectives, the European Council⁶¹ has identified that action against climate change will bring opportunities for growth and employment through building expertise in eco-efficient technologies. Currently, European shipbuilders are technology leaders in the passenger ship segment, for special purpose ships (e.g. dredgers) and in large parts of the equipment industry. Shipyards and equipment suppliers will play a vital role in providing the technical solutions to meet GHG reduction targets. It is important that Europe retains its expertise in this area. The policy objectives therefore promote technological development by supporting continued innovation in the EU maritime-related industries.

and ice. Black carbon stays in the atmosphere for only several days to weeks, whereas CO₂ has an atmospheric lifetime of more than 100 years.

⁵⁸ AEA Technology and others, 2012

⁵⁹ COM(2010)2020, 3.3.2010

⁶⁰Taking into account necessary efforts from developing countries, this will allow a global reduction of 50% in emissions by 2050 compared to 1990.

⁶¹ Conclusion of the European Council (17 June 2010), EU CO 13/10

Furthermore, due to the global nature of the maritime sector, international regulation is always preferred. Therefore, another important specific objective for the EU is to develop regional policies that can support the IMO process and that can take forward action to reduce maritime emissions within the EU and globally.

Specific objectives:

1. To reduce impact of EU shipping emissions on the climate by achieving reduction in CO₂ emissions from maritime transport by 40% (if feasible 50%) by 2050 compared to 2005 levels⁶²;
2. To promote technological improvement of ships, with respect of the flag neutrality⁶³ principle, and to improve the competitiveness of maritime supply chains of the EU, by supporting continued innovation of the European shipbuilders, equipment manufacturers and service providers of the shipping sector
3. To stimulate actions by others, including by States in the IMO,

The above objectives can only be assessed through a precise understanding of the GHG emissions from the shipping sector. However, these emissions are not currently monitored. Therefore, introducing requirements for monitoring, reporting and verification of GHG emissions from the shipping sector is an operational objective that must be achieved by the policy options under consideration.

Furthermore, in order to give a clear signal and a clear incentive to achieve emission reductions in the maritime sector, internalising the external costs of climate change in the maritime sector is required. However, internalising the external costs of climate change may not be sufficient to remove all market barriers, but it could generate revenues that could also be used to contribute to the removal of market barriers.

Thus, the operational objectives of a proposal are:

Operational objectives:

1. To monitor, report and verify CO₂ emissions of the maritime sector related to the EU, thereby contributing to more informed decision making and climate consciousness by sector operators
2. To set a carbon constraint on ships for their CO₂ emissions to achieve emission reductions from maritime transport of 40% (if feasible 50%) by 2050 compared to 2005 levels.
3. To ensure adequate access to finance for the implementation of low carbon

⁶² For the purpose of this impact assessment, an internal reduction scenario has been modelled with all impacts assessed according to this internal reduction scenario by 2030, due to the uncertainties of technological improvements of the maritime transport sector and of global economy on longer term.

⁶³ The flag of a vessel reflects the country of registration and thus the vessel's "nationality". The principle of flag neutrality calls for the equal treatment of all vessels, regardless to the vessel's nationality.

technologies.

4. POLICY OPTIONS

4.1. Choice of policy options

For any EU measure that aims to support the development of an international regulation, it is important to build on policy options developed at international level⁶⁴. However, as they have been designed from a global perspective, some may not be suitable for a regional measure. Therefore, the number of options proposed in the IMO has been narrowed down firstly by consulting the interested parties during the ECCP and the on-line public consultation mentioned earlier and secondly by refining them as described hereafter, based on the studies carried out by AEA Technology and others⁶⁵.

The policy options should not be prescriptive with respect to technological and operational solutions to be applied in the sector in order to maintain flexibility for the sector. In July 2009, IMO recognized that technical and operational measures would not be sufficient to satisfactorily reduce the amount of GHG emissions from international shipping in view of the growth projections of world trade⁶⁶. It was therefore agreed by overwhelming majority that a Market-Based Measure (MBM) was needed as part of a comprehensive package of measure for the effective regulation of GHG emissions from international shipping. To this extent, the policy options assessed do not include technical and operational measures (such as hull coating or weather routing) that reduce GHG emissions. An emission reduction goal-based approach was preferred, as it will trigger the implementation of technical and operational measures which reduce emissions in a cost-efficient way.

A proposal which aims to set a fixed emission reduction target per ship was not considered to be a suitable policy option (although one of the option for public consultation). This proposal, submitted by the Bahamas⁶⁷, presented an interesting approach to a GHG reduction scheme at global level. However, if implemented at a regional level, there is a high risk of avoidance of the scheme by increasing the number of ships operating in the EU.

In this context, taking into account the work done in the IMO, the following MBMs are assessed: a levy on bunker fuel sales, a tax on emissions, a contribution based compensation fund, an ETS and a target based compensation fund. Aside from the MBM options, a measure that would provide a robust MRV regime for the maritime sector was also analysed.

In light of international developments and although this analysis looks at a range of measures including MBMs, Vice-President Kallas and Commissioner Hedegaard announced on 1st October 2012 a stepwise approach for the implementation of EU measures. This first step will be the monitoring and reporting of CO2 emissions from international maritime transport.

⁶⁴ The Second IMO greenhouse gas study 2009, adopted and agreed by all parties, presented several policy options to ensure GHG emissions reduction in the maritime sector. Moreover, 10 proposals had been submitted by Parties. An overview of these policy options is given in Annex IX

⁶⁵ AEA Technology and others, 2012

⁶⁶ 59th session of the Marine Environmental Protection Committee – Agenda item 24

⁶⁷ The Bahamas submitted this proposal for the 63rd IMO's Marine Environment Protection Committee (MEPC 63) in March 2012. It has been withdrawn by the Bahamas in April 2012.

Accordingly, the impact of the monitoring and reporting of CO₂ emissions has been considered as an independent policy measure in this analysis. As robust MRV is a prerequisite for any MBM policy, MRV elements are included as an integral part of the impact analyses of the other options, with the exception of the levy on bunker fuel sales option where the quantities sold are the basis of the measure.

4.2. Consideration of the baseline and credit option

A baseline and credit scheme is a MBM, where ships that are more efficient than a benchmark can sell credits to ships that are less efficient than the benchmark. The benchmark expresses an amount of CO₂ per transport work (tCO₂ per tkm). It is an energy efficiency standard set per ship or per ship category and size. The benchmark and its evolution over time are set by the legislator, based on its policy objectives.

One option of designing such a system is to design the benchmark so as to ensure that the CO₂ emissions do not fluctuate with the transport work (i.e. CO₂ emissions are capped). In this case, the baseline and credit option is similar to a closed cap and trade system with free allocations of credits. A closed cap and trade system (also called closed ETS) is assessed hereafter. Therefore, for the purpose of this impact assessment, a baseline and credit option leading to a cap on emissions was not considered as a distinct option and, as a consequence, not further assessed.

By contrast, under a baseline and crediting system of the types currently in discussion at the IMO⁶⁸, no cap is established and therefore the overall CO₂ emissions will fluctuate according to the transport work coming under scope of the future measure. This means that, while such baseline and crediting system is no doubt an appropriate measure for increasing the efficiency of the fleet, it is not an appropriate tool for meeting specific objective 1, outlined in section 3. Therefore, such a system represents a sub-optimal policy option in a European context, and has been disregarded from the in-depth assessment in this impact assessment.

The Commission notes, however, that the approach described in the preceding paragraph, if applied globally⁶⁹, would nevertheless deliver significant CO₂ emission reductions beyond those achieved through a regional measure, primarily due to the sheer size of the fleet covered.

4.3. Enforcement of the policy options assessed

For all options, except the baseline scenario and the levy on bunker fuel sales, the enforcement of an EU measure will focus on actions taken by ships, even if the ship itself cannot perform the required activities for compliance due to the fact that the ship is not a legal entity. This approach is already used in other EU regulations.

⁶⁸ The 63rd Marine Environment Protection Committee of the IMO in 2012 stressed that the EEDI cannot be used for existing ships and the use of Energy Efficiency Operational Index (EEOI) is currently not mandatory. Furthermore, ship types with high relevance in Europe such as cruise ships and ferries are not yet covered by the EEDI. Therefore, developing such a measure in an European context would require the EU to replace or supplement existing efficiency standards adopted at global level.

⁶⁹ such an approach is currently being discussed in the IMO context

The maritime sector is highly fluid and involves a range of ownership and commercial arrangements that can make it difficult to identify the party ultimately responsible for the shipping activities covered by an emissions reduction scheme. For this reason, the enforcement of IMO regulations is based on actions taken by ships. Ships can be identified through their IMO number, a permanent number that every ship has and is used for registration purposes⁷⁰. Therefore, the enforcement of an EU measure should also focus on actions taken by ships.

So, ships will be considered as the compliance entity, even if for legal purposes the regulation will define the registered owner of a ship as the entity that will perform the required activities for compliance. This registered owner can in any case delegate this responsibility (e.g. to ship operators).

EU regulations in the maritime field already consider the issue of compliance of ships with EU and international standards. Inspections, compliance checks, expulsion from ports and denial of access to ports are done in accordance with the Flag State and Port State control rules. Existing databases (e.g. vessel tracking systems, such as Safe Sea Net⁷¹ and Thetis⁷² for Port State control regime, etc.) allow to tracking and targeting of individual ships. Provided that appropriate legal provisions are set, they could be used to check whether a ship has indeed reported its emissions and is thus in compliance with EU rules. Consequently, a list of non-compliant ships could be provided to the Member States for enforcement.

4.4. Description of the policy options assessed

4.4.1. Option 1: Baseline scenario

The baseline scenario does not address the market barriers mentioned in section 2.2.

A business as usual option is developed as a reference for the determination of impacts and the comparison of policy options. It only considers existing policies and legal instruments:

- CO₂ emissions from bunker fuel sales are monitored based on information provided by bunker fuel suppliers, in accordance with Decision 280/2004/EC⁷³. All ships purchasing fuel in the EU are covered by the regulation.
- The verification of the emissions is done by the Member States and by the European Environment Agency.
- No internalisation of climate change externalities.
- The instruments adopted by the IMO in 2011 (EEDI, SEEMP), as well as the impact of the review of Directive 1999/32/EC on low-sulphur maritime fuel⁷⁴, are included in the baseline. No additional measures under discussion in the IMO have been considered due to the high uncertainties related to their adoption.

⁷⁰ IMO resolution A.600(15); SOLAS Chapter XI

⁷¹ SafeSeaNet is a vessel traffic monitoring and information system

⁷² Thetis is an information system, which aims to assist Member States with harmonization of Port State Control procedures and execution through centralized storage and distribution of reports

⁷³ Currently under revision

⁷⁴ See footnote 22

- The baseline also takes into account the improvement of the carbon footprint of ships, especially due to fuel switch and economy of scale⁷⁵.
- No policy to remove market barriers.

All stakeholders consulted during the ECCP and the on-line consultation considered that further action to address greenhouse gases of ships was needed. However, there are different views on the level of action. All stakeholders indicated their preference for a global scheme, but many Member States, industry associations and non-governmental associations considered that the EU action would help the IMO to move forward faster, especially by providing a strong base for a global action.

This option does not take into account the current possibility for the Member States to include activities or installations into the EU-ETS, according to Article 24 of Directive 2003/87/EC. To this end, Member States may decide to include ships or ports into the EU-ETS. However, so far, none of Member States decided to do so.

Table 1 - Summary of the main parameters of option 1

Compliance entity	Bunker fuel suppliers
Scope of emissions covered	Any CO2 emissions from maritime bunker fuel purchased in the EU
Requirements	Bunker fuel suppliers communicate to the Member States the amount of bunker fuel sold within a year for the calculation of the associated CO2 emission.
Enforcement	Decision 280/2004/EC
Market barriers addressed	None

4.4.2. Option 2: Monitoring, reporting and verification (MRV) of emissions based on fuel consumption

MRV of emissions based on fuel consumption will ensure accurate information of the CO2 emissions performance of a ship. Therefore, it will address the market barrier related to lack of information. However, it will not address the market failures associated with the split of incentives and the access to finance.

During the stakeholder meeting on 6 December 2012, most of industry representative have supported a strong MRV of emissions based on fuel consumed. Moreover, this approach is also foreseen by IMO submissions of our international partners. However, some industry representatives want to have a better clarity on the use of the data collected before having position of the monitoring scheme.

Under this option, the MRV of emissions is done by ships, based on their fuel consumption. The CO₂ emissions are made publicly available to incentivise the improvement of energy efficiency.

⁷⁵ Increasing fuel prices (particularly due to global low-sulphur requirements) will make alternative fuels such as LNG or biofuels more attractive and therefore some level of fuel switching can be expected. Moreover, there is already evidence of an industry-wide trend towards larger ships and additional economies of scale on transoceanic routes will be permitted by the opening of the new Panama Canal in 2015.

CO₂ emissions from ships relate to the emission factor associated (in CO₂ per tonnes of fuel) with the type of fuel consumed and the volume of fuel consumed (in tonnes). Specific elements on the determination of fuel consumption are given in annex XIV.

Verification of processes and standard compliance is also a common practice in the maritime transport sector. The verification of emissions reports can be done in principle by current existing independent verifiers, such as Recognised Organisations⁷⁶.

The annual compliance cycle for MRV and the tasks of authorities involved are further described in Annex XII.

Table 2 - Summary of the main parameters of option 2

Compliance entity	All ships above 400GT (or 5000GT)
Scope of emissions covered	Any CO ₂ emissions from the last port of call outside the EU to an EU port, between EU ports and from an EU port to its next port of call outside the EU.
Requirements	Ships communicate to the relevant Competent authority the amount and the type of fuel consumed on routes within the scope for the calculation of the associated CO ₂ emissions.
Enforcement	Existing Flag State and Port State control rules
Market barriers addressed	Lack of information

4.4.3. Option 3: Levy on emissions

This option is based on the payment of a contribution in euros per tonne of CO₂ emitted. Three sub-options were developed. The subjected compliance entity and the scope are different between the sub-options.

Under option 3a (levy on bunker fuel sales), the subjected compliance entity is the bunker fuel supplier and the scope is based on emissions from bunker fuel sold in the EU, whereas under option 3b (tax on emissions from fuel consumed) and 3c (contribution based compensation fund), the subjected compliance entity is the ship and the scope is based on emissions from fuel consumed on EU related routes. The difference between option 3b and 3c comes from the legal possibility to earmark revenues, which is subjected to national laws under option 3b, but not under 3c.

4.4.3.1. Sub-option 3a: Levy on bunker fuel sales

The levy is based on the existing MRV of emissions (i.e. based on the information on bunker fuel sales reported for taxation purpose by bunker fuel suppliers to the Member States and the European Environment Agency). The level of the levy depends on the contribution of the maritime transport sector as part of the transition to a low carbon economy. The carbon constraint is set through the payment of a contribution to a fund (in €/tCO₂). However, it

⁷⁶ Recognised organisations are organisations recognised in accordance with Regulation (EC) No 391/2009 of the European Parliament and of the Council on common rules and standards for ship inspection and survey organisations

could be suggested to recycle these revenues in an international fund, as proposed by Cyprus, Denmark, the Marshall Islands, Nigeria and IPTA in the IMO.

Any recycling of revenues would be under the responsibility of the Member States collecting the levy. If revenues are recycled, these revenues could in theory be used to remove the market barrier related to access to finance, for example by providing financial incentives reducing the risk of investment (e.g. financial guarantee) or reducing the return on investment (e.g. low-interest loans or grants). Such instruments would be especially useful to apply to SME's, which would face greater difficulties in accessing finance. SME's could further profit from technical support for the implementation of new technologies or processes. This support could therefore be used for technological improvement of ships, with respect of the flag neutrality principle. It is however important to stress that, if the recycling of revenues takes place at Member States' level, it would be in the interest of overall consistency, if Member States apply the same principles as those applicable to state aid⁷⁷ for such spending. If Member States disagree on revenue recycling, it would therefore be desirable that this option is complemented with other instruments/interventions in order to remove the market barriers, especially where access to finance is concerned. Complementary instruments would in any case be useful: for instance, information campaigns could increase the speed at which mitigation technologies are taken up by the market.

Revenues could also be used for international climate finance.

During the on-line consultation, 71% of the respondents considered that the evasion risk regarding the implementation of a tax on fuel at a regional level cannot be avoided. The respondents in favour of a tax on fuel considered that it could be applied as a measure directed to the smallest ships, as a supplementary policy instrument of an ETS or a compensation fund.

For the purposes of this Impact Assessment, the level of the levy was set in line with the European Commission's proposal of 13 April 2011 to revise the Energy Taxation Directive (ETD)⁷⁸, which set energy taxation rules in the EU. This equates to a tax of €145.9 per tonne CO₂ (i.e. €456 per tonne of fuel sold) for bunker fuels (HFO and MDO) and €189.2 per tonne CO₂ (i.e. €536 per tonne of fuel sold) for LNG⁷⁹.

Any maritime bunker fuel purchased in the EU will be subjected to the levy. Fuel sold for export and offshore bunkering would not be covered by the regulation, as it is only possible to charge fuel for direct consumption⁸⁰. As ships are able to undertake long voyages on a single bunkering and can carry additional fuel without significantly sacrificing their carrying capacity, it can be considered that the regulation will only address CO₂ emissions from ships performing exclusively intra-EU routes (i.e. mainly ferries).

As the bunker fuel suppliers are fixed installations, the Member States would be in charge of ensuring the enforcement of the regulation, in line with their internal rules.

⁷⁷ OJ C 82,01.04.2008, p.1.

⁷⁸ COM(2011) 169 final.

⁷⁹ The tax rates are based on the rates in the ETD proposal of EUR 20 per tonne of CO₂ and EUR 9.6 per GJ.

⁸⁰ Article 4 of Directive 2003/96/EC

Table 3 - Summary of the main parameter of option 3a

Compliance entity	Bunker fuel suppliers
Scope of emissions covered	Any CO2 emissions from maritime bunker fuel purchased and released for consumption in the EU
Requirements	Bunker fuel suppliers communicate to the Member States the amount of bunker fuel sold within a year for the calculation of the associated CO2 emission.
Enforcement	National enforcement rules
Market barriers addressed	(Access to finance could be addressed, if Member States agree on revenue recycling)

4.4.3.2. Sub-option 3b: Tax on emissions from fuel consumed

Under this option, the MRV of emissions is done by ships, based on its fuel consumption (as for option 2). The carbon constraint is set through the payment of a tax due for every tonne of CO2 emitted to incentivise emissions reductions.

MRV of emissions based on fuel consumption, which is a prerequisite for this option, will ensure accurate information of the CO2 emissions performance of a ship. Therefore, it will address the market barrier related to lack of information.

The payment of the contribution by the ship-owners will ensure that the entity in charge of implementing technical measures on board of a ship is fully responsible for the CO2 performance of this ship and therefore remove the market barrier related to the split of incentive.

The collection of the contribution will be a Member States' responsibility. For this reason, even if revenues can be generated to tackle market barriers, any eventual earmarking may be decided by national laws. If this is the case, these revenues could in theory be used to remove the market barrier related to access to finance, for example by providing financial incentives reducing the risk of investment (e.g. financial guarantee) or reducing the return on investment (e.g. low-interest loans or grants). Such instruments would be especially useful to apply to SME's, which would face greater difficulties in accessing finance. SME's could further profit from technical support for the implementation of new technologies or processes. This support could therefore be used for technological improvement of ships, with respect of the flag neutrality principle. It is however important to stress that, if the recycling of revenues takes place at Member States' level, it would be in the interest of overall consistency, if Member States apply the same principles as those applicable to state aid⁸¹ for such spending. If Member States disagree on revenue recycling, it would therefore be desirable that this option is complemented with other instruments/interventions in order to remove the market barriers, especially where access to finance is concerned. Complementary instruments would in any case be useful: for instance, information campaigns could increase the speed at which mitigation technologies are taken up by the market.

⁸¹ OJ C 82,01.04.2008, p.1.

Revenues could also be used for international climate finance.

During the on-line consultation, the tax on emission option was considered by only 10% of the respondents as being able to promote progress at the IMO. Moreover, 44% of the respondents indicated that a tax on emissions could not achieve the emission reduction required effectively and efficiently.

For the purpose of this impact assessment, the level of the tax has been assumed to be set at the following level:

Table 4: Level of the tax used for the impact assessment, 2010 prices

	2020	2025	2030
Level of the tax (€/t CO ₂)	9.13	21.37	35.55

This level corresponds to the carbon price with no additional action on climate change in the EU beyond policies already implemented and constitutes therefore the lower bound of the possible tax level. It is not a projection of the spot price of emission allowances under the EU ETS. A higher level may be set to deliver higher environmental output⁸². Detail on the methodology used for the assessment of impacts, especially the model used by AEA Technology, is explained in Annex VI.

Table 5 - Summary of the main parameter of option 3b

Compliance entity	All ships above 400GT (or 5000GT)
Scope of emissions covered	Any CO ₂ emissions from the last port of call outside the EU to an EU port, between EU ports and from an EU port to its next port of call outside the EU.
Requirements	<p>Ships will communicate to the relevant Competent authority the amount of and the type of fuel consumed on routes within the scope for the calculation of the associated CO₂ emissions.</p> <p>Ships will pay the tax on their CO₂ emissions according to the CO₂ emissions declared</p>
Enforcement	Existing Flag State and Port State control rules
Market barriers addressed	<p>Lack of information</p> <p>Split of incentives</p> <p>(Access to finance could be addressed, if Member States agree on revenue recycling)</p>

4.4.3.3. Sub-option 3c: Contribution-based compensation fund⁸³

Under this option, the MRV of emissions is done by ships, based on their fuel consumption (as for option 2). The carbon constraint is set through the payment of a fixed voluntary contribution (in €/tCO₂) to incentivise emissions reductions. A prerequisite is the setting up

⁸² For the purpose of this Impact Assessment, analyses have also been carried out using different tax levels, e.g. close to the expected price of EU allowances under a decarbonisation scenario with values of € 25.0 in 2020, € 34.2 in 2025 and € 50.9 in 2030. However, this does not significantly affect the results.

⁸³ The term "compensation fund" is associated with the idea that the growth of emissions in the maritime transport is compensated by the funding of in-sector or out-of-sector emissions reductions.

of a complementary instrument (e.g. speed limits, ETS, etc.) to ensure the participation in the contribution-based compensation fund as the more attractive instrument for ships⁸⁴. Detail on the methodology used for the assessment of impacts, especially the model used by AEA Technology, is explained in Annex VI.

MRV of emissions based on fuel consumption will ensure accurate information of the CO2 emissions performance of a ship. Therefore, it will address the market barrier related to lack of information.

The payment of the contribution by the ship-owners will ensure that the entity in charge of implementing technical measures on board of a ship is fully responsible for the CO2 performance of this ship and therefore remove the market barrier related to the split of incentive.

The revenues collected by the fund could in theory be used to address the market barrier related to access to finance, for example by providing financial incentives reducing the risk of investment (e.g. financial guarantee) or reducing the return on investment (e.g. low-interest loans or grants). Such instruments would be especially useful to apply to SME's, which would face greater difficulties in accessing finance. SME's could further profit from technical support for the implementation of new technologies or processes. This support could be used for technological improvement of ships, with respect of the flag neutrality principle. It is also important to stress that, even if the recycling of revenues may not entail state aid elements, it would be in the interest of overall consistency, if Member States apply the same principles as those applicable to state aid⁸⁵ for such spending.

Revenues could also be used for international climate finance.

During the on-line consultation, the compensation fund option was considered by 53% of the respondents as the best to promote progress at the IMO. 68% of the respondents considered that any compensation fund should be managed by a public entity. Several respondents recommended the IMO or an EU public body. Many respondents also recommended management by the industry, but this option raised oppositions from the NGOs.

The level of the contribution is assumed to be similar as the level of the tax used for sub-option 3b (tax on emissions from fuel consumed).

The collection of the contribution and the recycling of revenues in the sector could be done by an EU wide fund. It is a practice in the maritime sector to set up funds to tackle environmental problems (e.g. International Oil Compensation Funds, Norwegian NOx Fund....). Similarly, such a pan-EU fund could be set up and be in charge of the collection of contributions and revenue recycling. This fund could be privately managed or publicly

⁸⁴ This mechanism should be designed in such way that the contribution based compensation fund remains in practise the primary instrument. The Norwegian NOx fund is an example where a tax serves as such complementary instrument. The tax rate is higher than the contributions to the fund. So, it can be assumed that the use of alternative mechanisms will be marginal. For this reason, possible impacts of alternative mechanisms are not assessed.

⁸⁵ OJ C 82,01.04.2008, p.1.

managed. If publicly managed, an existing body or a European Agency could serve as fund manager.

A fund should be managed in accordance with the full cost principle (non-profit), i.e. all the financial means which the fund receives will be utilised in accordance with its purpose of reducing emissions in a cost-effective manner with the exception of necessary administrative costs. Under the supervision of the fund's board, the fund management would decide which measures shall receive support from the fund, and how (e.g. through inverse bidding processes).

Table 6 - Summary of the main parameter of option 3c

Compliance entity	All ships above 400GT (or 5000GT)
Scope of emissions covered	Any CO2 emissions from the last port of call outside the EU to an EU port, between EU ports and from an EU port to its next port of call outside the EU.
Requirements	<p>Ships will communicate to the relevant Competent authority the amount and the type of fuel consumed on routes within the scope for the calculation of the associated CO2 emissions.</p> <p>Ships will pay the contribution to the fund according to the CO2 emissions declared, unless they opt to comply with a complementary instrument (e.g. speed limits, ETS, etc.)</p>
Enforcement	Existing Flag State and Port State control rules
Market barriers addressed	<p>Lack of information</p> <p>Split of incentives</p> <p>Access to finance</p>

4.4.4. Option 4: Maritime emission trading scheme

Under this option, the monitoring, MRV of emissions is done by ships, based on its fuel consumption (as for options 2, and 3 b) and c)). The carbon constraint is set through the setting of a CO2 emission reduction target.

MRV of emissions based on fuel consumption will ensure accurate information of the CO2 emissions performance of a ship. Therefore, it will address the market barrier related to lack of information.

The surrendering of allowances by the ship-owners will ensure that the entity in charge of implementing technical measures on board of a ship is fully responsible for the CO2 performance of this ship and therefore remove the market barrier related to the split of incentive.

Of the ETS options analysed, sub-option 4c generates revenues due to the auctioning of allowances. These revenues could in theory be used to remove market barriers relating to availability of adequate finance. This support could be used for technological improvement of ships, with respect of the flag neutrality principle. It is also important to stress that, if the recycling of revenues takes place at Member States' level it would be in the interest of overall consistency, if Member States apply the same principles as those applicable to state aid⁸⁶ for such spending. If Member States disagree on revenue recycling, it would therefore be desirable that this option is complemented with other instruments/interventions in order to remove the market barriers, especially where access to finance is concerned. When the recycling of revenues may not entail state aid elements, it should still comply with the same principles as those applicable to state aid for environmental protection.

⁸⁶ OJ C 82,01.04.2008, p.1.

Revenues could also be used for international climate finance.

During the ECCP meetings, some industry associations considered the administrative burden as an issue for the ETS, whereas some Member States considered that it is mainly an issue for public authorities. The risk of evasion was raised by industry associations. The openness of an ETS was also discussed without firm conclusions. Industry associations and Member States considered that a closed ETS would be problematic in the shipping sector. However, several Member States and some non-governmental organizations supported an ETS. UK indicated that they preferred an ETS with 100% auctioning and no earmarking. One Member State expressed its opposition to an ETS.

For the purpose of this impact assessment, an internal target has been assumed to be set up at the following level based on an internal reduction scenario to achieve the reduction target for 2050 (-40%/-50% if feasible) provided by the Commission's Transport White Paper:

Table 7: Estimated emissions reductions compared to 2005 to reach -40% by 2050 compared to 2005

	2020	2025	2030
CO ₂ emissions reductions compared to 2005	0%	-6%	-10%

Source: AEA Technology and others, 2012

Detail on the methodology used for the assessment of impacts, especially the model used by AEA Technology, is explained in Annex VI.

Compliance is ensured by an obligation for each ship to surrender allowances to a competent authority according to its emissions reported for the previous year. If a ship-owner or a ship operator owns less allowances than the quantity it has to surrender, it will have to purchase allowances from other actors involved in the scheme.

The allowances surrendered can be existing units (EU allowances, Certified Emissions Reduction....) or new allowances created for the maritime sector. When the allowances authorized to be surrendered are only new allowances created for the maritime sector, the system is called a closed system. Otherwise, it is considered as an open system.

For the purpose of this impact assessment, three sub-options are considered, even if the final design of a maritime ETS will probably combine some elements of these sub-options (e.g. partial linking with other trading system, partial auctioning):

- Sub-option 4a: closed ETS (emission trading system without link to external carbon markets; free allocation of allowances to ships owners/operators),
- Sub-option 4b: open ETS with free allocation (emission trading system with link to external carbon markets; free allocation of allowances to ships owners/operators),
- Sub-option 4c: open ETS with full auctioning (emission trading system with link to external carbon markets; allowances are auctioned).

Details of this policy option are given in annex XV.

Table 8 - Summary of the main parameter of option 4

Compliance entity	All ships above 400GT (or 5000GT)
Scope of emissions covered	Any CO2 emissions from the last port of call outside the EU to an EU port, between EU ports and from an EU port to its next port of call outside the EU.
Requirements	<p>Ships will communicate to the relevant Competent authority the amount of and the type of fuel consumed on routes within the scope for the calculation of the associated CO2 emissions.</p> <p>Ships will surrender to the Competent authority the number of allowances corresponding to the CO2 emissions declared</p>
Enforcement	Existing Flag State and Port State control rules
Market barriers addressed	<p>Lack of information</p> <p>Split of incentives</p> <p>(Access to finance could be addressed by sub-option 4c if Member States agree)</p>

4.4.5. Option 5: Target based compensation fund⁸⁷

Based on an emission reduction target defined by the legislator, a "target-based compensation fund" would be an entity which takes the responsibility for the emissions of all ships calling into EU ports. Each ship calling into an EU port would have to be member of this fund. Compliance of the fund is ensured by an obligation for the "compensation fund" to surrender offsets (for instance EU allowances or CER credits) to a competent authority in case the emissions of the maritime transport sector reported for the previous year exceed to emission target. For the emissions up to the target, it could also be required to surrender offsets. Detail on the methodology used for the assessment of impacts, especially the model used by AEA Technology, is explained in Annex VI.

The membership is defined by the payment of a membership fee. This membership fee is set per tonne of CO2 emitted in the previous year and is set in accordance with internal rules of the fund, but it has to be sufficiently high to cover the management costs, the implementation of in-sector measures to reduce CO2 emissions in line with the emission reduction target and the purchase of out-of sector allowances to be surrendered by the fund. The fee would be expected to depend on the achievement of in-sector emission reductions compared to the reduction target.

Under this option, the MRV of emissions is done by ships, based on its fuel consumption (as for option 2, 3 b) and c), and all sub-options 4). Therefore, it will address the market barrier related to lack of information.

The payment of the membership fee by the ship-owners will ensure that the entity in charge of implementing technical measures on board of a ship is fully responsible for the CO2

⁸⁷ The term "compensation fund" is associated with the idea that the growth of emissions in the maritime transport is compensated by the funding of in-sector or out-of-sector emissions reductions

performance of this ship and therefore remove the market barrier related to the split of incentive.

The revenues collected by the fund could in theory be used to remove the market barrier related to access to finance, for example by providing financial incentives reducing the risk of investment (e.g. financial guarantee) or reducing the return on investment (e.g. low-interest loans or grants). Such instruments would be especially useful to apply to SME's, which would face greater difficulties in accessing finance. SME's could further profit from technical support for the implementation of new technologies or processes. This support could be used for technological improvement of ships, with respect of the flag neutrality principle. It is also important to stress that, even if the recycling of revenues may not entail state aid elements, it would be in the interest of overall consistency, if Member States apply the same principles as those applicable to state aid⁸⁸ for such spending.

Revenues could also be used for international climate finance.

During the on-line consultation, the compensation fund option was considered by 53% of the respondents as the best option to promote progress at the IMO. 68% of the respondents considered that any compensation fund should be managed by a public entity. Several respondents recommended the IMO or an EU public body. Many respondents also recommended management by the industry, but this option raised oppositions from the NGOs. Moreover, the target based compensation fund was considered as more efficient and effective than a contribution based compensation fund to achieve the emission reductions required.

The carbon constraint is set through the setting of a CO₂ emissions target for the fund. For the purpose of this impact assessment, the target has been assumed to be set up at the same level of a maritime emission trading system (option 4).

The offsets surrendered are existing allowances (EU allowances, CER, etc.). The fund can be privately or publicly managed (by an existing body or a European Agency), in accordance with the same principles of full cost coverage and non-interference of Member States as in sub-option 3c.

Table 9 - Summary of the main parameter of option 5

Compliance entity	All ships above 400GT (or 5000GT)
Scope of emissions covered	Any CO ₂ emissions from the last port of call outside the EU to an EU port, between EU ports and from an EU port to its next port of call outside the EU.
Requirements	<p>Ships will communicate to the relevant Competent authority the amount of and the type of fuel consumed on routes within the scope for the calculation of the associated CO₂ emissions.</p> <p>Ships will have to pay a membership fee to the Fund corresponding to the CO₂ emissions declared</p>

⁸⁸ OJ C 82,01.04.2008, p.1.

	The fund will have to provide finance to the sector for the implementation of low carbon technologies and to purchase of out-of sector allowances to compensate the CO2 emissions of the sector (the part which will not be achieved by in-sector reductions)
Enforcement	Existing Flag State and Port State control rules
Market barriers addressed	Lack of information Split of incentives Access to finance

5. ASSESSMENT OF IMPACTS

In preamble, it can be recalled that the environmental, economic and social impacts of the emission reduction target set in the Commission's White Paper on transport (i.e. -40%, if feasible -50% by 2050 compared to 2005) was done in the impact assessment accompanying the Commission's White Paper⁸⁹, in particular regarding the general impacts on economic growth, household and transport-related sector.

For the purpose of this Impact Assessment, the economic, environmental and social assessment has been done up to 2030 due to the uncertainties of the global economy on longer term.

All impacts, except the administrative burden, have been estimated assuming that all ships above 400GT were covered by the regulation (see section 2.7.3). However, the administrative burden was calculated for both size threshold (400GT and 5000GT). Details of these calculations are given in annex XIII.

5.1. General elements on the model used

From a model perspective, the key points of interest relate to the costs of policy options, the emissions abatement profile over time, and the cost effectiveness (Euro per tonne CO₂ abated) of taking action in this area. Additional areas of interest include the extent to which shipping routes may change in response to policy action, the potential for modal shift as a policy response, and the extent of in-sector abatement versus out-of-sector abatement. AEA Technology, who provided support for the impact assessment, developed a model based on the TIMES model architecture. This model is built on three building blocks: (i) a representation of shipping activity, (ii) a representation of vessels and (iii) cost assumptions.

Regarding the representation of shipping activity, the model integrates the available routes into/out of Europe and available technological and logistical choices to 2050 for 313 commodities. For each origin/destination pair (e.g. "Demand of North African crude oil in EU South"), one or two types of movements are defined. One of them is direct movement, e.g. from supply to demand region. The other type of movement defined is one that assumes a stopover on the way to/from Europe. In this case, a ship is assumed to stop in Port Said or

⁸⁹ SEC(2011) 358

Casablanca on its way to/from Europe. The CO₂ emissions are split to represent the two journey legs. Only one movement type is defined for shorter routes, such as Intra-European trade. The TIMES model can allow for modal shift of cargo on intra-EU journeys. The costs are sourced from the DG Environment-funded project from 2010 entitled COMPetitiveness of EuropeAn Short-sea Shipping (COMPASS) report.

Six vessel categories and up to 5 sub-categories according to vessel type and size were defined. For each of these categories and sub-categories of ships, several parameters, such as daily financial costs, daily operational costs, fuel consumption, CO₂ emissions per tnm, etc. were defined.

Finally, a range of possible emissions abatement options (technological and operational) have been identified and included in the modelling framework. The investment costs, operational costs and CO₂ reduction potentials of the abatement technologies were sourced from MEPC 61 INF. 18⁹⁰, an IMO-funded study on the reduction of GHG emissions from ships.

Detail on the methodology used for the assessment of impacts, especially the model used by AEA Technology, the underlying assumptions on fuel prices and a sensitivity analysis on the results provided by the model, is explained in Annex VI.

5.2. General considerations

5.2.1. Impacts on consumers and households

In general, due to its central role in enabling economic activity, a change in the cost of shipping may have effects on the whole spectrum of economic agents: raw material suppliers, manufacturers and service providers, the shipping industry, retailers and consumers. However, it was not possible to assess in detail the impact on all commodities traded by sea.

Therefore, for the analyses of such economic impacts as well as of possible modal shift, the impact of policy options on the costs of transport for eleven key commodities has been assessed. The results are summarised in table 10.

The commodities have been selected according to their relevance in terms of their importance for EU competitiveness (e.g. share of exports and imports, profit margins, transport costs) and according to the technical feasibility of the analysis, in terms of readily available data on historical and predicted trade flows, freight rates, freight rate elasticities, own price elasticities, costs pass-through rates, quantities sold and market shares of domestic and overseas producers. They were chosen as a representative sample on the basis of EU's collective trading profile and the inputs of experts. Competitiveness is understood at the EU-27 level, considering all Member States as a trading bloc vs. the rest of the world. These commodities represent 58% in value of EU imports and 26% in value of EU exports in 2010.

The analysis of the 11 representative commodities is presented below. Following the public consultation and specific feedback from the pulp and paper industry, it was decided to carry

⁹⁰ http://www.rina.org.uk/hres/mepc%2061_inf_18.pdf

out a complementary assessment on the pulp and paper sector. Due to sequencing constraints, it was not possible to include this sector in the scope of the main impact assessment. However, the preliminary findings of the specific assessment carried out by AEA Technology show similarly low impacts on cost of transport. The analysis will be available in full on the Commission's website early 2013.

Table 10: Additional variation of transport costs for key commodities by 2030 for all options, except 2 and 3a⁹¹, in %

	3b Tax on emissions	3c Contribution based fund	4a Closed ETS	4b open ETS – free allocation	4c open ETS – auctioning	5 Target based fund
Crude oil	-0.8 to 7	-0.8 to 7	-0.8 to -0.2	-7 to -1	-0.4 to 8	-0.4 to 8
Refined petroleum products	-0.8 to 5.6	-0.8 to 5.6	-2.4 to -0.8	-7 to -2	-0.4 to 6	-0.4 to 6
Natural gas	6	6	-2 to -1.4	-1.5 to -1.4	6	6
Iron ores	2 to 11	2 to 11	-4.6 to 3.3	-5.3 to 2.8	2.6 to 12	2.6 to 12
Iron and steel	2 to 14	2 to 14	-5.5 to 5.5	-5.4 to 4.5	2 to 14	2 to 14
Steel products	4 to 14	4 to 14	-11 to 5.5	-11 to 4.5	-4 to 14	-4 to 14
Wearing apparels	-26 to -3	-26 to -3	-31 to 15	-33 to -11	-26 to -2	-26 to -2
Grain	-29 to -15	-29 to -15	-33 to -17	-34 to -22	-28 to -15	-28 to -15
Office and IT equipment	-2.9	-2.9	-15	-11	-2.3	-2.3
Motor vehicles	-13 to -3	-13 to -3	-15 to -6	-20 to -11	-12 to -2	-12 to -2
Organic chemicals	5 to 6	5 to 6	-2.6 to -1.2	-2.1 to -1.2	5 to 6	5 to 6

Source: AEA Technology and others, 2012

Freight rates to be paid by freight customers are in principle not expected to change in reaction to the changed transport costs with very limited exceptions. For the purpose of the analyses of economic impacts, it has been assumed that the few and limited transport cost increases of policy options (see table 10) are passed on by the ship operators to their customers whereas net cost savings are not passed-on due to the price building mechanism within the shipping sector.

Based on these considerations on the pass-through of costs and savings in maritime transport and on the price building mechanisms in different sectors (see Figure 1), measurable increases of commodity prices (with transport costs being only an insignificant element of the commodities' prices) are only expected for natural gas (only for policy options 3b, 3c, 4c and 5) of up to 0.1-0.5% and for iron ore (only for policy options 3b, 3c, 4c and 5) of up to 0.1-0.3%. Such price impacts are far below the usual price fluctuation for these products. In conclusion, no impacts deriving from possible increases of commodity prices are expected on the functioning of the internal market, on competitiveness and trade, on small and medium enterprises, consumers and households as well as third countries.

5.2.1. Transport modal split

⁹¹ Under option 2 (monitoring of fuel consumed), transport costs for all commodities are slightly decreasing. Under option 3a (levy on bunker fuel sales), very limited changes can be expected as only intra-EU routes are impacted but the transport costs related to these routes are increasing for all commodities.

Impacts on transport costs for shipping might have impacts on the modal split in case shipping is in competition with other transport modes. If shipping costs decrease under a policy option, shipping might attract new freight customers provided that shipping costs fall below the cost level of the other modes. Even if this can be expected to happen for several commodities, a quantification of this modal shift from road and rail to shipping is not feasible as the competition between transport modes is linked to specific routes. Furthermore, increased shipping costs for a commodity under a certain policy option could in principle lead to a modal shift from shipping to road and rail if shipping costs increase above the cost level of the other modes⁹². Again, route-specific assessments would be required to get reliable estimates. In the context of this impact assessment, the impact on changing maritime transport costs of the modal split cannot be quantified, even if the change in shipping costs could be used as proxy for a qualitative estimate of possible impacts of the modal split.

5.3. Option 1: Baseline scenario

5.3.1. Environmental impacts

For the baseline scenario, a further increase of CO₂ emissions is expected despite the effects of the EEDI introducing minimum efficiency standards for certain types of new ships as from 2015 (see table 11). The drivers behind this increase are described in section 2.2.

Table 11: Projected EU related CO₂ emissions

	Mt CO ₂	Compared to 1990	Compared to 2005
2020	210	+45%	+8%
2030	223	+54%	+15%

Source: AEA Technology and others, 2012

The warming effect of CO₂ dominates the global warming impacts of shipping. However, black carbon⁹³ can have significant regional warming impacts. Atmospheric black carbon and surface deposition is considered to produce a warming effect due to accelerated melting of ice and snow. Even quantification of the impacts in terms of black carbon emissions or climate change impacts is not exact, evidence suggests that heavy fuel oil consumption is closely linked to the amount of black carbon emitted.

As there is a direct link between the fuel consumption and CO₂ emissions, the increase of CO₂ emissions of the maritime sector will lead to an increase of the negative effects of fuel combustion, especially on local air quality (see table 12). The main air pollutants from shipping include sulphur dioxide (SO_x), nitrogen oxides (NO_x) and particulate matter (PM). However, both NO_x and SO_x are controlled by international and European standards that will become significantly more stringent in the future leading to substantially lower emission levels in 2020. Sulphur regulations have an indirect impact on PM emissions. For 2030, emissions increases could be expected compared to 2020 due the likely increase of fuel consumption and unchanged emission standards.

⁹² Less than 0.12% of the volume traded by ships is expected to shift to road or rail (which are covered by EU regulations on climate change), according to AEA Technology and others, 2012

⁹³ see footnote 55

Table 12: Emissions of NO_x, SO_x and PM in 2030, kt,

	2030 (kt)	Compared to 2010	Compared to 2020
NO _x	4224	-5.4%	-1.7%
SO _x	539	-79%	+12%
PM	75	-76%	+10%

Source: AEA Technology and others, 2012

The impacts of ship emissions on ecosystems and biodiversity are highly site-specific, but can cause damage through acidification and eutrophication. Increased acidification may affect certain organisms, particularly those with calcium carbonate skeletons and shells and the ecosystems that rely on them. Eutrophication is caused by high nutrient concentrations that stimulate the growth of algae and leads to several problems including: production of excess organic matter; increase in oxygen consumption; oxygen depletion and death of benthic organisms⁹⁴. It has been suggested in studies of the impacts of emissions in Europe that including ecological impacts would make little difference given the magnitude of health effects. However, any increase in emissions of NO_x, SO_x and CO₂ could be expected to have negative impacts on ecosystems and biodiversity.

With continuing monitoring and reporting by Member States based on fuel sales, increased shipping activities will lead to an increase in fuel consumption (77.1Mtoe by 2030 for the EU scope, i.e. +30% compared to 2010). Beside the use of HFO and MGO⁹⁵, it can be expected that a number of ships switch to LNG (liquefied natural gas), mainly in response of the strengthened standards for sulphur emissions (LNG can be considered almost sulphur-free). In the baseline scenario, LNG is expected to represent about 9% of energy consumption in 2030. It can be noted that this expected fuel switch will also have a positive impact on CO₂ emissions (with LNG being less carbon-intensive than HFO and MGO), but this is outweighed by the growth of maritime transport.

Voluntary MRV already done today, e.g. by container vessels through the Clean Cargo Working Group, would continue to deliver emission reductions. However, due to its voluntary nature, it is not possible to estimate with sufficient accuracy the future benefits of such voluntary schemes.

Impacts on other environmental resources could be caused by an increase in dredging and infrastructure construction to accommodate larger vessels, leading to habitat fragmentation and disturbance. Construction of LNG infrastructure could also cause land use changes. It is not possible to get an accurate estimate of these impacts, although they are expected to be rather small. Moreover, if no policy is in place to require the contribution of the maritime sector to achieve the climate objective of limiting global average temperature increase to less than 2 degrees Celsius above pre-industrial levels, other sectors will have to compensate the growth of emissions in the international maritime transport. This contribution is estimated at up to 78MtCO₂ by 2030, i.e. almost the 2010 emissions of Austria. Consequently, impacts on other sectors may be significant. However, the nature of these impacts will depend on the way international maritime sector is included into the EU commitments.

⁹⁴ Helsinki Commission, 2010

⁹⁵ Heavy Fuel Oil and Marine Gas Oil

5.3.2. Economic impacts

The costs of the operation of ships within the EU scope related to the baseline scenario are given in the table below. The cost increase can be explained by the expected growth in maritime transport.

Table 13: Costs in the maritime sector in 2030, €bn, 2010 prices, undiscounted

	2030 (€bn)	Compared to 2010
Investment costs	49.4	+42%
Operational costs ⁹⁶	22.9	+23%
Fuel costs	60.0	+162%

Source: AEA Technology and others 2012

The increase of fuel costs will increase the costs per tonne of goods traded by 20% by 2030, which will either be passed through to the customers by increasing freight rates and/or be absorbed by the maritime sector reducing their profit margin. As this would impact all sectors and regions inside and outside the EU⁹⁷, no specific impacts are expected on average for the competitiveness of the EU economy, even if some specific regions or sectors particularly dependent on shipping are likely to face specific difficulties. Prices for end consumers on certain commodities will be affected.

Increasing freight rates in the shipping sector could in principle lead to modal shift from shipping to other modes of transport (such as rail or road). However, the expected increase in fuel price would also affect the other transport modes and therefore not undermine the competitiveness of shipping, in particular as in most cases, transport by ship is more energy efficient than by other modes.

5.3.3. Social impacts

The shipping sector also employs a significant number of people in various sub-sectors. Total maritime employment in the EU is approximately 250,000 people. In addition to seafarers, there are a number of sectors that are directly linked to the shipping industry, such as shipping services, port services, maritime works, shipbuilding, ship management and gas and wind energy industries. Banking and financial services, research and development, education and marine equipment are sectors that are indirectly linked to the maritime sector.

There might be some increase in employment in European ports and distribution hubs due to the expected growth in trade and shipping activities.

5.4. Option 2: Monitoring, reporting and verification (MRV) of emissions based on fuel consumption

It should be noted that an impact assessment on monitoring mechanisms for maritime emissions have already been carried out within the framework of the proposal for a regulation

⁹⁶ Excluding fuel cost

⁹⁷ Assuming that no action is taken outside the EU.

on mechanism for monitoring and reporting greenhouse gas emissions for reporting other information at national and Union level relevant to climate change⁹⁸. A supporting study was also carried out in this context⁹⁹. However, the impact assessment or the supporting study did not quantify the specific impact of a monitoring mechanism on shipping. The quantification is therefore provided hereafter.

5.4.1. Environmental impacts

Under this policy option, the EU CO₂ emissions are expected to be 2% lower than the baseline¹⁰⁰ (reaching 218.5 MtCO₂ by 2030), and deliver a cumulative emission reduction of 55.9 MtCO₂ up to 2030¹⁰¹. Lack of access to accurate and comparable information about fuel consumption in the maritime transport sector is one of the market barriers to cost effective GHG emission reductions in the maritime sector¹⁰². The 2% emission reduction has been confirmed during bilateral discussion with stakeholders. Some leading stakeholders, such as Maersk Maritime Technology for example, consider that this figure could even be higher.

More precisely, simply making fuel consumption information available can trigger an improvement of the fuel efficiency of ships. Ship operators that are directly responsible for fuel payments (i.e. they cannot pass the cost on) would already carefully monitor their fuel consumption and take adequate measures for the improvement of the energy efficiency in order to reduce fuel costs. However, other ship operators that are not responsible for fuel payments (i.e. they pass the cost on, for example via contract arrangements) would improve the energy efficiency of their ships only if the energy efficiency of the ship is taken into account in the charterer contracts.

This reduction in fuel consumption could also result in a reduction of other pollutants, such as sulphur dioxide (SO_x), nitrogen oxides (NO_x) and particulate matter (PM), as well as other climate forcing agents such as black carbon.

Additional environmental benefits may be triggered by the removal of this market barrier (e.g. the availability of information on fuel consumed at berth may increase the pressure for port electrification). However, these additional environmental benefits cannot be quantified, as they depend on other market barriers, such as split incentives (e.g. in case of port electrification, most of the investment is paid by ports, whereas the benefits are taken by the ship operators).

The improvement of ship efficiency may lead to the scrapping of less efficient vessels. However, limited impacts are expected on ship dismantling.

5.4.2. Economic impacts

⁹⁸ COM(2011)0789

⁹⁹ http://ec.europa.eu/clima/policies/g-gas/docs/monitoring_2011_en.pdf

¹⁰⁰ Maddox Consulting, 2012

¹⁰¹ AEA Technology and others, 2012

¹⁰² Maddox Consulting, 2012

As mentioned previously, the lack of accurate, comparable and standardised information about fuel consumption is one of the market barriers to cost effective GHG emission reductions in the maritime sector and therefore to a reduction of fuel cost. Removing this market barrier can trigger an improvement in energy efficiency of the ships and therefore enhance innovation and research due to a better understanding of the fuel consumption.

Assuming that the improvement of the energy efficiency leads to a decrease of the fuel consumption of 2% compared to the baseline¹⁰³, the reduction of fuel cost can be estimated at up to €9.4 billion up to 2030. However, the operational costs will slightly increase due to the administrative requirements related to the monitoring of emissions.

In cases where ship-owners and ship operators do not yet apply fuel monitoring of their emissions, the total administrative burden for ships down to the level of 400GT may be estimated at €52.5 million per year¹⁰⁴, i.e. around €2900 per ship¹⁰⁵. This represents 0.28% of the average 2010 operational costs (excluding fuel costs). However many ship-owners have already adopted highly sophisticated MRV standards and will have no difficulty complying. In addition evidence of consumption is already provided in fuel consumption log books on board for all ships. Log books contain data on fuel purchased and consumed, ports visited, cargo loaded and distances sailed. Accordingly, most of the additional costs are related to the familiarization of the obligation, the collection and formatting of existing data, verification and submission to the appropriate competent authority. If the EU monitoring scheme requires electronic reporting, the uptake of electronic data collection tools on board of ships may increase which could reduce the time spent by the crew on data collection and reporting and save money for the ship operator (according to some stakeholders, such as Norden, this would outweigh the initial investment). As a consequence, the administrative burden calculated for the impact assessment is probably a high estimate.

This total administrative burden is calculated for all ships above 400GT holding an IMO number. Using a higher threshold significantly reduces the total administrative burden for ships without significantly undermining the environmental effectiveness. The total administrative burden for all ships above 5000GT¹⁰⁶ are estimated at €26.1 million per year, leading to a reduction of 50% of the administrative burden while still capturing 90% of the emissions (and, as a consequence, to large proportion of the fuel savings previously mentioned, i.e. €11.6 billion up to 2030). Furthermore, the introduction of simplifications (see annex VIII) could further reduce the administrative burden although this has not been quantitatively assessed within this impact assessment. To conclude, the administrative burden for the monitoring and reporting requirements will be fully compensated by the fuel savings.

Further details of the calculation of the administrative burden are given in annex XIII.

¹⁰³ Maddox Consulting, 2012

¹⁰⁴ For 18400 vessels, this figures includes annual costs (e.g. for annual emission reports) as well as one-off costs (e.g. for monitoring plans) which are equally distributed over 10 years

¹⁰⁵ €4500 would be added if the private sector verification of the data reported as well as the processes is required.

¹⁰⁶ This threshold is used in SOLAS regulations

Table 14: Additional costs of policy option 2 compared to the baseline, up to 2030, private discount rate (10%)¹⁰⁷,

Additional costs compared to the baseline up to 2030	Investment costs	Operational costs (excluding fuel costs)	Fuel costs	Carbon costs	Total costs
Value (€bn)	-	+0.6	-9.4	-	-8.8
Percentage	-	+0.28%	-2%	-	-0.58%

Source: AEA Technology and others 2012

The pass through of these savings to the final consumers will rely on the elastic demand of maritime transport and on the elastic demand of commodities using maritime transport. If the demand of maritime transport is inelastic, ship operators should keep the savings, whereas, if the demand is elastic, the ship-operators should pass-through the savings to the shippers. If the savings are passed-through the shippers and if the demand of commodities using maritime transport is elastic, the savings should be passed through the final consumer. If the savings are passed-through the shippers and if the demand of commodities using maritime transport is inelastic, the savings should be kept by the shippers. Such mechanisms are explained in the figure below.

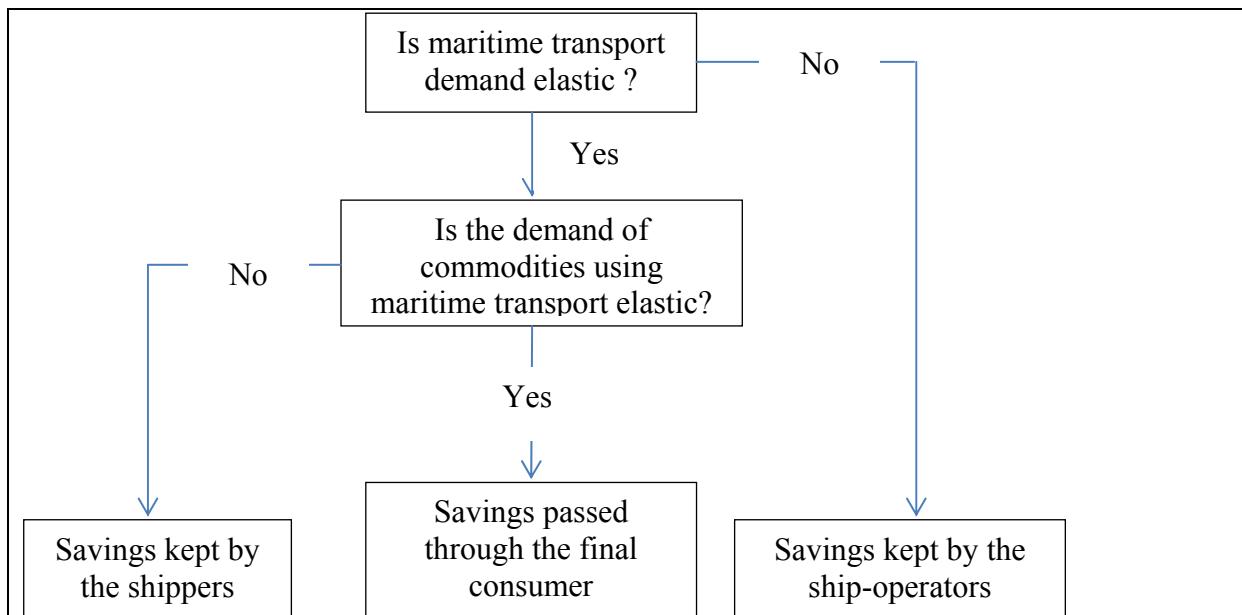


Figure 1 – Pass-through of savings in the shipping sector

The analysis shows that the impact of the measure on final consumer will be limited to commodities where the savings are passed through to the final consumers. However, freight costs represent only a share of the cost of a commodity (for example, up to 20% for natural gas, but only 0.03% for IT equipment). So, the pass-through of the savings to final consumers

¹⁰⁷ As market barriers are key in the maritime transport sector, a private discount rate of 10% was used in this impact assessment (expect for the health benefits) instead a social discount rate of 4% recommended by the Impact Assessment guidelines.

will have a limited impact (for example, -0.1% on natural gas prices up to 2030 and -0.0002% on IT equipment prices up to 2030). So, even for the commodities where the savings are passed through the final consumer, the impact should be marginal.

No specific administrative burden on small and medium enterprises¹⁰⁸ has been identified. However, as mentioned in annex II, small and medium enterprises in maritime transport may be more sensitive on getting accurate information on the abatement potential of low technology and their operational impacts. Such information should secure their uptake by companies that are operating only a few numbers of ships and which cannot afford to test technologies on board of their ships.

5.4.3. Social impacts

No significant impact on employment can be expected.

Setting requirements on monitoring will also trigger an increase of qualification of the crew. However, this increase is not considered as significant, as most of the tasks requested are already performed.

Moreover, the reduction of fuel consumption will lead to a decrease of emissions of sulphur dioxide (SOx), nitrogen oxides (NOx) and particulate matter (PM) and therefore have benefits for human health. These benefits are estimated between €1.0 to 2.9 billion up to 2030¹⁰⁹.

5.4.4. Administrative burden for public authorities

Detail calculation of the administrative burden for public authorities is given in annex XIII.

For the public authorities, the total administrative burden will be limited to the supervision of monitoring and reporting, and enforcement. The annual administrative burden can be estimated at around €4 million in case of national competent authorities and around €3 million in case of a central EU competent authority. This difference can be explained by aggregation of resources and economies of scale. These costs may be reduced by 40% if only ships above 5000GT are included. Furthermore, the introduction of simplifications (see annex VIII) could further reduce the administrative burden for public authorities. As a consequence, taking into account these simplifications, the minimal annual costs for a central EU competent authority could be estimated at € 0.6 million¹¹⁰.

For a ship, there is no difference between reporting the emissions to a Member State competent authority or to a central EU competent authority, even if using a single EU competent authority may be simpler for non EU flagged ships. Moreover, using national or EU competent authorities makes no difference to the environmental, social or economic

¹⁰⁸ Pending on the scope, at least 99% of EU maritime transport SMEs could not be subjected to the regulation. See annex II

¹⁰⁹ AEA Technology and others, 2012

¹¹⁰ Estimate based on a minimum number of posts required, excluding one-off costs for setting up IT systems and excluding enforcement costs

impacts of the policies. The main difference between national competent authorities and a central EU competent authority is the cost for public authorities.

5.4.5. Specific impacts outside the EU

The monitoring of fuel consumption can trigger environmental, social and economic benefits also outside the EU. There is little administrative burden to monitor the total emissions of a ship on all routes instead of only the ones related to EU routes. Therefore, the monitoring of emissions could become attractive also on non-EU routes, especially if the monitoring of emissions on EU routes delivers fuel savings, and progress should be made through the IMO on this respect.

As a consequence, the environmental, social and economic benefits mentioned previously for the MRV of the emissions of fuel consumed related to EU routes can also apply outside of the EU. However, it cannot be quantified with absolute accuracy, especially as the expansion of transparent monitoring depends on the willingness of the ship operators.

Moreover, it can be stressed that any market based measure adopted through the IMO would require robust monitoring and reporting of emissions. Strong monitoring and reporting requirements that can be used outside EU routes should therefore help the IMO to progress on this issue.

5.5. Option 3a: Levy on bunker fuel sales

5.5.1. Environmental impacts

The EU CO₂ emissions are expected to be 3% lower than the baseline (reaching 217.0 MtCO₂ by 2030), and deliver a cumulative emission reduction of 40.1MtCO₂ up to 2030. However, the environmental effectiveness may be less pronounced, if market barriers are not sufficiently addressed and reduced.

Emissions of black carbon are expected to decrease in the same order of magnitude as both, black carbon and CO₂ are closely linked to the fuel consumption.

Due to the link between CO₂ emissions, fuel consumption and emission of other pollutants, it is expected that the emissions of NO_x, SO_x and PM decrease. However, this decrease is not considered as significant. As results of the slightly decreased emissions of NO_x, SO_x and CO₂, limited positive impacts on ecosystems and biodiversity are expected.

Limited reduction of fuel consumption is expected: the cumulative reduction up to 2030 is expected to be 2.1 Mtoe. No major uptake of biofuels is expected by 2030.

Imposing a non-global levy on bunker fuel sales would trigger specific negative economic and environmental impacts due to an expected high level of avoidance. Most ships travelling on intra-EU routes could avoid taxation using offshore bunkering. This offshore bunker supply (i.e. beyond a 12 nautical mile zone) is already common practice to avoid paying port fees, agency fees or being constrained by loading limits in ports. However, offshore bunker supply has negative environmental effects as it increases the risk of oil spills.

5.5.2. Economic impacts

The tax of bunker fuel sales will only have an impact on ships performing exclusively intra-EU routes as others will purchase the fuel outside the Union. Large ships in particular are able to undertake long voyages on a single bunkering and can carry additional fuel without significantly sacrificing their carrying capacity (a process known as “tankering”). Therefore, if the purchase of fuel in the EU requires additional costs not required in third countries, the ships will purchase their fuel outside of the EU. As consequence, the EU maritime bunker fuel sales would drop by 55% to 90%, without significantly reducing the GHG emissions of ships. The range of this estimate is based on two assumptions: Only fuels for intra-EU shipping (related emissions account for 43% of the total GHG emissions of the maritime sector based on fuel sales) would be purchased within the EU or only fuels for intra-State shipping (representing 11% of the total) would be purchased within the EU.¹¹¹.

Table 15 presents the total and additional direct costs and savings for the operation of ships generated by this policy option up to 2030 compared to the baseline in terms of investment, operational, carbon and fuel costs as well as the net aggregated total.

Table 15: Additional costs of policy option 3a compared to the baseline, up to 2030, private discount rate (10%)¹¹²,

Additional costs compared to the baseline up to 2030	Investment costs	Operational costs (excluding fuel costs)	Fuel costs	Carbon costs	Total costs
Value (€bn)	+2.5	+1.6	-4.8	+66.7	+66.0
Percentage	+0.4%	+0.5%	-0.8%	-	+4.5%

Source: AEA Technology and others 2012

A tax on bunker fuel would likely be passed on by suppliers to their customers i.e. ship operators, in turn creating an incentive for them to improve fuel efficiency. As a result, this policy option would incur additional investment costs as ship owners and ship operators operating on intra-EU routes would invest in new vessels and / or abatement technologies¹¹³ to retrofit existing ships. A small rise in overall operational cost (excluding fuel cost) may also occur as a result of implementing these abatement measures. However, both these impacts would be small amounting to an increase of 0.4% in investment costs and 0.54% in operation costs compared to the baseline.

Total costs under this policy options are expected to be high, at € 66 billion compared with the baseline out of which the cost of the tax would be of approximately €67 billion.

¹¹¹ AEA Technology and others 2012, CE Delft and others 2009.

¹¹² As market barriers are key in the maritime transport sector, a private discount rate of 10% was used in this impact assessment (expect for the health benefits) instead a social discount rate of 4% recommended by the Impact Assessment guidelines.

¹¹³ For example, hull coating (reduction of frictional resistance of a hull), waste heat recovery (using the heat of the engine for electricity production), wind engines (rotors placed on deck of a ship can generate thrust, taking advantage of the Magnus effect), solar energy, speed reduction, propeller upgrade, engine upgrade, weather routing (optimisation of routes according to current and weather conditions), etc.

Administrative burden is expected to be negligible for this policy option as the cost for monitoring the emissions from bunker fuel purchased is estimated at €0.6 per ton of fuel sold¹¹⁴ and can be considered as small¹¹⁵. Detail calculation of the administrative burden is given in annex XIII.

The free movement of goods is unlikely to be affected as no change in volume of goods traded within and outside the EU has been identified. Moreover, no impacts are expected on extra-EU trade (as ships will bunker outside the EU to avoid the tax), as the costs will only be supported by ships performing intra-EU routes. As a consequence, no impacts on the general economy are expected on third countries, a part from an increase of fuel sales.

Regarding ships performing exclusively intra-EU routes, cargo ships may have the possibility to change their route to bunker outside EU territorial waters. Alteration of routes and/or modal shift could be expected, with specific concerns with regions heavily dependent on shipping. Ferries will not change their route. So, the impact will be limited to certain type of ships. These ships are mostly performing land-bridge routes, which are particularly sensitive for isolated regions and may face strong competition with other modes of transports.

The introduction of a levy on bunker fuel sales would not have any negative impacts on the competitiveness of the EU shipping operators compared to non EU shipping operators as any policy option will be flag-neutral. A competition distortion may be triggered between ships performing exclusively intra-EU routes and others, as ships performing exclusively intra-EU routes will have limited possibility to purchase their fuel outside the EU.

Small and medium enterprises will be affected in a similar manner as large enterprises. More precisely, a levy on bunker fuel sales does not allow distinguishing the impact regarding ship size. However, as mentioned in annex II, for small enterprises, the size of enterprises is related to the size of ships this enterprise is operating. As a consequence, the levy on bunker fuel sales prohibits possible implementations of SMEs related provisions.

The impacts on public authorities remain very limited for this policy option as for monitoring and reporting of emission, internalization of costs of emissions and enforcement, existing structure could in principle be used. The total administrative burden for public authorities are estimated around € 100 000 per year. Detail calculation of the administrative burden is given in annex XIII.

The major economic impact is related to the distortion of competition between ships performing exclusively intra-EU routes and others that can avoid the scheme. It appears that there are no options to reduce avoidance. This was demonstrated by California's 1991 decision to lift the fuel tax exemption and to tax interstate bunker fuel sales. Within a year, Californian bunker sales had collapsed as ships bunkered elsewhere especially in Panama.

¹¹⁴ Assuming that the total administrative burden is €34 million per year and the fuel consumption is around 56Mtoe

¹¹⁵ Fuel prices are expected to reach €745 per ton of fuel by 2030

5.5.3. Social impacts

A levy on bunker fuel sales in the EU would lead to increased expenditure on energy efficiency measures, new ships and/or engines and would contribute to the growth of the global market for these products with positive impacts on employment in Europe. Compared to the baseline, the expected additional investment in technical energy efficiency measures is expected to contribute to the creation of additional jobs.

Shipping activities are projected to remain constant for this policy option compared to baseline. The additional operating cost of €100 million due to speed reduction is expected to create a limited number of additional jobs on ships relative to the baseline.

The expected drop of bunker fuel sales under this policy option would lead to the loss of jobs in bunker facilities in ports. Other job loss may be expected in refineries in the EU. However, as this job loss is highly dependent on the strategies of the petroleum companies (producing bunker fuels in the EU and then exporting or producing directly outside the EU), it is not possible to get an accurate estimate on this potential job loss.

The impacts of the tax on bunker fuel sales option on emissions of SO₂, NO_x and PM emissions are estimated to be small. This translates to a small (but not negligible) benefit for human health and crop damage impacts. The total estimated cost to human health and crops due to decreases in SO₂, NO_x and PM emissions following the methodology set out for the other policy options is €0.1 to 0.4 billion.

5.6. Option 3b: Tax on emissions from fuel consumed

5.6.1. Environmental impacts

Under this policy option, EU CO₂ emissions are expected to be 16% lower than the baseline (reaching 186.8MtCO₂ by 2030) and deliver a cumulative emission reduction of 335.4MtCO₂ up to 2030. However, the environmental effectiveness may be less pronounced, if market barriers, especially related to access to finance, are not sufficiently addressed and reduced.

Emissions of black carbon are expected to decrease in the same order of magnitude as both, black carbon and CO₂ are closely linked to the fuel consumption. Due to the link between CO₂ emissions, fuel consumption and emission of other pollutants, it is expected that the emissions of SO_x and PM decrease by 3% and of NO_x by 8% up to 2030 compared to baseline¹¹⁶. As results of the slightly decreased emissions of NO_x, SO_x and CO₂, limited positive impacts on ecosystems and biodiversity are expected.

Fuel consumption is expected to be less than the baseline: the cumulative reduction up to 2030 is expected to be 113.8 Mtoe. More precisely, the consumption of fossil fuel (heavy fuel oil – HFO –, marine diesel oil – MDO – and liquefied natural gas - LNG) is expected to be less than the baseline, even if the share of LNG within these fossil fuels will be greater. This

¹¹⁶ AEA Technology and others, 2012, based on TIMES model output on fuel consumption

can be explained by the fact that up to 2030, it is less costly to reduce the fuel consumption than to switch to low carbon fuel. There remains no commercial basis for major uptake of biofuels by 2030.

5.6.2. Economic impacts

5.6.2.1. Direct impacts on the ship owners and ship operators

The table below presents the total and additional direct costs and savings for the operation of ships generated by this policy option up to 2030 compared to the baseline in terms of investment, operational and fuel expenditure as well as the net aggregated total.

Table 16: Additional costs of policy option 3b compared to the baseline, up to 2030, private discount rate (10%),

Additional costs compared to the baseline up to 2030	Investment costs	Operational costs (excluding fuel costs)	Fuel costs	Carbon costs	Total costs
Value (€bn)	+2.9	+0.03	-55.9	+26.1	-26.9
Percentage	+0.5%	+0.01%	-9.6%	-	-1.8%

Source: AEA Technology and others 2012

Most of operational measures, such as slow steaming or weather routing, can be implemented immediately after the entry into force of the measure. The implementation of new technologies, such as engine or propeller upgrade, may require being in dry dock. Therefore, ship-owners and ship-operators will probably anticipate the entry into force of the measure by investing in low carbon technologies when they have planned dry dock repairs¹¹⁷. Finally, it can be assumed that technical and operational measures with negative abatement costs will be implemented first.

As a consequence, considering that the implementation of low carbon technology start 3 years before the entry into force of the tax on emissions, the carbon costs paid during the first year after the entry into force of the tax, i.e. 269M€, will be fully compensated by the fuel savings, i.e. 1473M€. Moreover, annual investment costs will increase progressively from 11M€ in 2016 to 297M€ in 2030.

The implementation of a tax on emissions from fuel consumed would encourage additional investment costs as, in order to reduce tax contribution, ship owners and ship operators would invest in new vessels and / or abatement technologies to retrofit existing ships. Furthermore, a small increase of the overall operational cost (excluding fuel cost) is expected. Indeed, some specific abatement measures may trigger additional operational costs (e.g. hull cleaning), whereas others can lead to a decrease of the operational costs (e.g. slowing down reduce engine maintenance costs) or are neutral (e.g. weather routing). Therefore, even if there is a limited increase of the costs for the entire fleet, a more significant increase of costs may be

¹¹⁷ For example, many ships are already retrofitted to comply with the IMO regulation on sulphur which will enter into force in 2015.

possible, especially for less efficient ship level, depending on the abatement strategy followed individually.

The most important decrease of costs comes from the fuel savings. In addition to the fuel savings directly related to ship journeys from and to EU ports, it can be expected that the policy options also trigger fuel cost savings outside this scope as ships becoming more efficient in reaction to the EU measure (spill-over effect). However, it has not been feasible to quantify these additional costs savings and the related emission reductions.

Overall, the additional costs are compensated by reduced fuel costs leading to significant net savings of around €27 billion until 2030 for the sector.

The total administrative burden for ship-owners and ship operators is estimated at €140 million per year, if all ships above 400GT are included in the scope. This means €7600 per ship per year and represents annually 0.75% of the average 2010 operational costs (excluding fuel costs). Detail calculation of the administrative burden is given in annex XIII.

5.6.2.2. Functioning of the internal market and competition

Free movement of goods is unlikely to be affected. Indeed, this policy option would not lead to a decrease of the volume of goods traded within and outside the EU as the assessment of key commodities shows that their prices are not affected by a tax on emissions (see preamble of section 5).

The issue of competition between the maritime sector and other transport modes may be raised in the event of changing shipping costs. Even if a detailed assessment of possible model shift is not feasible within the context of this impact assessment, some modal shift from road and rail to shipping cannot also be excluded due the significant cost reduction for shipping (see section 5.2.1).

5.6.2.3. Competitiveness and trade investment flows

This option is not expected to have negative impacts on the competitiveness of the EU shipping operators compared to non EU shipping operators. As any policy option will be flag-neutral, the policy will apply equally to all ships calling into EU ports. Ships calling more often into EU ports may have the advantage of shorter pay-back periods for investments into their efficiency leading to high fuel cost savings.

Regarding the competitiveness of the EU economy, the detailed analysis of eleven representative commodities shows that the prices of the commodities are not affected by the possible change of freight rates with the exceptions of natural gas (increase of up to 0.5%) and iron ore (up to +0.3%). Therefore, no significant impacts are expected on the EU economy.

5.6.2.4. Impacts on Small and Medium Enterprises

No specific administrative burden on small and medium enterprises¹¹⁸ has been identified. However, as mentioned in annex II, small and medium enterprises in maritime transport may be more sensitive on getting accurate information on the abatement potential of low technology and their operational impacts. Such information should secure their uptake by companies that are operating only a few numbers of ships and which cannot afford to test technologies on board of their ships.

Large companies account for half of the turnover in Water Transport, but for 1% only of number of companies. This suggests that large firms undertake higher added value tasks and have higher productivity than SMEs. This is likely to be the result of economies of scale which apply strongly in shipping with research showing that firm capacity and net profit are positively related. Therefore, facilitating access to finance is also a key issue to ensure that SMEs will be able to invest and take the benefits of cost savings. To this end, it has to be underlined that, under a tax option, the recycling of revenues would need to be decided by Member States.

5.6.2.5. Public authorities

Public authorities will be affected by the control of compliance (i.e. reporting of emissions, payment of the contribution, etc.) and the enforcement. Detail calculation of the administrative burden is given in annex XIII.

Enforcement is already carried out by Flag State and Port State control. So, the administrative burden related to the enforcement should be low. The total additional burden for the national public authorities in charge of enforcement are estimated around €100 000 per year.

The costs borne by the competent authority in charge of controlling the compliance will depend on the scope considered. The table below shows the total additional administrative burden according to the different options and according to the size of ships concerned.

Table 17: Annual additional administrative burden, in € million

	National Competent Authority		EU competent authority	
	All ships above 400GT	All ships above 5000GT	All ships above 400GT	All ships above 5000GT
Tax	5.4	3.5	4.6	3.0

Source: AEA Technology and others, 2012

5.6.2.6. Consumers and households

Consumers and households are most sensitive to 5 of the 11 commodities assessed: natural gas, refined petroleum products, wearing apparels, office and IT equipment and motor vehicles¹¹⁹. The introduction of a tax on emissions from fuel consumed would not lead to price changes for these commodities, except natural gas, and therefore, should have no negative impacts on consumers and households. The increase of prices of natural gas, up to

¹¹⁸ Pending on the scope, at least 99% of EU maritime transport SMEs could not be subjected to the regulation. See annex II

¹¹⁹ AEA Technology and others 2012

0.5% by 2030 cannot be regarded as significant impacts on households. The other commodities are not directly consumed by households and even in the event of an increase in their price, the low level of increase should not be sufficient to result in impacts on the final consumers.

5.6.2.7. Specific regions heavily dependent on shipping

As the introduction of a tax on emissions from fuel consumed would in general lead to net benefits for the shipping sector, in principle, more intensive impacts in terms of job creation and cost savings impact could be expected for regions dependent on shipping. No general economic impacts on these regions can be expected (see preamble of section 5).

5.6.2.8. Third countries

As mentioned previously, this policy option is not expected to lead to significant changes of freight rates. As a consequence, major international partners should not be economically affected by an EU regulation.

5.6.2.9. Risk of avoidance

If there were no barriers to the addition of port calls, then for certain types of ships, the effect of the alteration of routes could be significant. The CO₂ emissions could be up to 6% higher than the expected emission reduction by 2030. However, there are significant additional costs related to the addition of a port call (e.g. financial interests related to longer journeys, additional charter, logistic and administrative costs, etc.). Moreover, the impacts of route shifting due to the addition of a port call (which are higher than the risk of modal shift) could be significantly less pronounced if the regulation provides for an adequate definition of a port call. Indeed, such definition could ensure that additional port calls are not calls of convenience. The risk of avoidance could therefore be significantly mitigated.

5.6.3. Social impacts

The tax on emissions from fuel consumed would lead to increased expenditure on energy efficiency measures, new ships and/or engines and would contribute to the growth of the global market for these products with positive impacts on employment in Europe. The expected additional investment in technical energy efficiency measures which could lead to the creation of new jobs in shipyards and equipment manufacturers globally. The additional operating cost of €300 million due to speed reduction is expected to create a limited number of additional jobs on ships relative to the baseline.

Due to reduced emissions of NO_x, SO₂ and PM, monetised benefits for public health for the period until 2030 in the order of magnitude of €6 – 18 billion can be expected for this policy option¹²⁰.

¹²⁰ These estimates are based on the damage cost function developed under the Clean Air For Europe (CAFE) program.

5.7. Option 3c: Contribution based compensation fund

The impacts of this policy option are in principle similar to the ones for the tax on emissions from fuel consumed (option 3b) (see section 5.6) as a membership fee based on emissions could be assimilated as a tax on emissions, except for the administrative burden and the impacts of the recycling of revenues. However, the reduction of emissions and fuel costs are higher for option 3c, if the recycling of revenues would be done in an efficient manner and would succeed in removing the market barriers, given that it is an integral part of the compensation fund approach.

Detail calculation of the administrative burden is given in annex XIII.

In the event of a privately managed fund, the total administrative burden for ship-owners and ship operators is estimated at €149.5 million per year, if all ships above 400GT are included in the scope. This means €8100 per ship per year and represents annually 0.80% of the average 2010 operational costs (excluding fuel costs). For the public authorities, the administrative burden will be limited to the control of monitoring and reporting and the enforcement (see table 18).

Table 18: Annual additional administrative burden for the public authorities in the event of a privately managed fund, in € million

	National Competent Authority		EU competent authority	
	All ships above 400GT	All ships above 5000GT	All ships above 400GT	All ships above 5000GT
	5.4	3.5	4.6	3.0

Source: AEA Technology and others 2012

In the event of a publicly managed fund, the administrative burden for ship owners and ship operators will be similar to the tax on emissions from fuel consumed (option 3b) (see section 5.6), but the administrative burden for the public authority will differ due to the setting of a fund (see table 19).

Table 19: Annual additional administrative burden for the public authorities in the event of a publicly managed fund, in € million

National Competent Authority		EU competent authority	
All ships above 400GT	All ships above 5000GT	All ships above 400GT	All ships above 5000GT
19.1	11.9	18.1	11.3

Source: AEA Technology and others 2012

A contribution based compensation fund would allow the generation of €26.1 billion up to 2030. So, this option generates sufficient revenues to incentivise the removal of market barriers, especially considering that the additional investment costs requested to improve the energy efficiency of ships is estimated at around €3 billion up to 2030.

5.8. Option 4: Maritime emission trading scheme (ETS)

5.8.1. Environmental impacts

Under this policy option, the in-sector emissions reduction will depend principally on the linking of the system and on the use of free allowances. Under open ETS options, ship-owners and ship operators could purchase out-of sector emissions reductions (offsets) to comply with the target. If these offsets are supplied from an emission trading system where the emissions are capped, the environmental effectiveness can be considered as similar to an in-sector contribution.

Table 20: In-sector emissions by 2030 and cumulative emissions, MtCO₂.

	Emissions by 2030 (MtCO ₂)	Compared to the baseline	Cumulative emissions reductions up to 2030
Closed ETS ¹²¹	175.7	-21% ¹²²	377.1
Open ETS with free allocation	186.7	-16%	333.8
Open ETS with full auctioning	186.8	-16%	336.3

Source: AEA Technology and others 2012

Emissions of black carbon are expected to decrease in the same order of magnitude as both, black carbon and CO₂, are closely linked to the fuel consumption. Due to the link between CO₂ emissions, fuel consumption and emission of other pollutants, emissions of SO_x and PM decrease by about 3% and of NO_x by 8% up to 2030 compared to baseline. As results of the slightly decreased emissions of NO_x, SO_x and CO₂, limited positive impacts on ecosystems and biodiversity are expected.

For all ETS options, the fuel consumption is expected to be smaller than the baseline: the cumulative reduction up to 2030 is expected to be 116.13 Mtoe under the closed ETS, 113.51 Mtoe under the open ETS with free allocation and 113.97 Mtoe under the open ETS with auctioning. More precisely, the consumption of fossil fuel (heavy fuel oil – HFO –, marine diesel oil – MDO – and liquefied natural gas - LNG) is expected to be smaller than the baseline, even if the share of LNG within these fossil fuels will be greater (up to 11.1% in 2030 under the closed ETS versus 9.4% in 2030 under the baseline). This can be explained by the fact that up to 2030, it is less costly to reduce the fuel consumption than switching to low carbon fuel. There is no commercial basis for major uptake of biofuels by 2030.

5.8.2. Economic impacts

5.8.2.1. Direct impacts on the ship owners and ship operators

The table below presents the total and additional direct costs and savings for the operation of ships generated by this policy option up to 2030 compared to the baseline in terms of investment, operational and fuel expenditure as well as the net aggregated total.

Table 21: Additional costs of a maritime ETS compared to the baseline, up to 2030 (€bn), private discount rate (10%),

		Closed ETS	Open ETS with free allocation	Open ETS with full auctioning
Investment costs	€bn	+8.4	+2.8	+3.0
	%	+1.4%	+0.4%	+0.5%
Operational costs (excluding fuel costs)	€bn	+0.07	+0.12	+0.01
	%	+0.02%	+0.04%	+0.003%
Fuel costs	€bn	-55.8	-55.6	-56.0

¹²¹ Closed ETS with full auctioning is not assessed

¹²² This is equivalent to -10% compared to 2005 in accordance with the internal reduction scenario for the 2050 target modeled for the purpose of this impact assessment.

	%	-9.6%	-9.5%	-9.6%
Carbon costs	€bn	0.0	+0.7	+30.4
Total costs	€bn	-47.3	-52.0	-22.6
	%	-3.3%	-3.6%	-1.5%

Source: AEA Technology and others 2012

For the reasons explained in section 5.6.2.1, for all ETS options, any annual increase of investment, operational or carbon costs will be compensated by fuel savings. More precisely, considering that the implementation of low carbon technology start 3 years before the entry into force of the ETS, the carbon costs paid during the first year after the entry into force of an open ETS with full auctioning, i.e. 486M€, will be fully compensated by the fuel savings, i.e. 1491M€. Moreover, annual investment costs under an ETS with full auctioning will increase progressively from 17M€ in 2016 to 295M€ in 2030.

The implementation of a maritime ETS would encourage additional investment costs and operational cost (excluding fuel cost). If these increases are moderate at the sector level, a significant increase at the ship level may be possible, especially for less efficient ships, depending on the abatement strategy followed individually.

The most important decrease of costs is coming from the fuel savings. In addition to the fuel savings directly related to ship journeys from and to EU ports, it can be expected that the policy options also trigger fuel cost savings outside this scope as ships become more efficient in reaction to the EU measure (spill-over effect, see section 5.6.2.1).

Overall, significant net savings of up to €52 billion until 2030 for the sector are expected as additional costs are more than compensated by the reduced fuel costs. The savings correspond to average annual savings of €1.57 billion (for a closed ETS), €1.73 billion (for an open ETS with free allocations) and €0.75 billion (for an open ETS with full auctioning).

If all ships above 400GT are included in the scope, the total administrative burden for ship-owners and ship operators is estimated at €149.0 million per year for ETS with full auctioning and at €178.6 million per year for open or closed ETS with free allocations. This means between €8100 and €9700 per ship per year and represents annually between 0.80% and 0.96% of the average 2010 operational costs (excluding fuel costs). Detail calculation of the administrative burden is given in annex XIII.

5.8.2.2. Functioning of the internal market and competition

Free movement of goods is unlikely to be affected. This policy option would not lead to a decrease of the volume of goods traded within and outside the EU as the assessment of key commodities shows that the prices of the commodities are not affected by the surrendering of allowances (see preamble of section 5).

The issue of competition between the maritime sector and the other transport modes may be raised in the event of changing shipping costs. Even if a detailed assessment of possible model shift is not feasible within the context of this Impact Assessment, due to the significant cost reduction for shipping, some modal shift from road and rail to shipping may occur.

5.8.2.3. Competitiveness and trade investment flows

The maritime ETS is not expected to have negative impacts on the competitiveness of EU shipping operators compared to non EU shipping operators. Indeed, as any policy option will be flag-neutral, the policy will apply equally to all ships calling into EU ports. However, ships calling more often into EU ports may have the advantage of shorter pay-back periods for investments into their efficiency leading to high fuel cost savings.

Regarding the competitiveness of the EU economy, the detailed analysis of eleven representative commodities shows that the prices of the commodities are not affected by the possible increase of freight rates with the exceptions of natural gas (increase of up to 0.5% under the open ETS with full auctioning) and iron ore (up to +0.3% under the open ETS with full auctioning). Therefore, no significant impacts are expected on the EU economy¹²³.

5.8.2.4. Impacts on Small and Medium Enterprises

No specific administrative burden on small and medium enterprises¹²⁴ has been identified. However, as mentioned in annex II, small and medium enterprises in maritime transport may be more sensitive on getting accurate information on the abatement potential of low technology and their operational impacts. Such information should secure their uptake by companies that are operating only a few numbers of ships and which cannot afford to test technologies on board of their ships.

Large companies account for half of the turnover in Water Transport, but for 1% only of number of companies. This suggests that large firms undertake higher added value tasks and have higher productivity than SMEs. This is likely to be the result of economies of scale which apply strongly in shipping with research showing that firm capacity and net profit are positively related. Therefore, facilitating access to finance is also a key issue to ensure that SMEs will be able to invest and take the benefits of cost savings. To this end, it is noted that revenues are generated under the ETS options with auctioning (see section 5.8.2.10).

5.8.2.5. Public authorities

Public authorities will be affected by the control of compliance (i.e. reporting of emissions, control of the surrendering, etc.) and the enforcement. Detail calculation of the administrative burden is given in annex XIII.

Enforcement is already carried out by Flag State and Port State control. So, the administrative burden related to the enforcement should be very low. The total additional costs for the national public authorities in charge of enforcement are estimated around € 100 000 per year.

¹²³ Bearing in mind that these commodities are mostly looked at in isolation and are a small sample of the whole economy, the cumulative impacts of the option may be important.

¹²⁴ Pending on the scope, at least 99% of EU maritime transport SMEs could not be subjected to the regulation. See annex II

The costs borne by the competent authority in charge of controlling the compliance will depend on the option considered. The table below shows the total additional administrative burden according to the different policy options and according to the size of ships concerned

Table 22: Annual additional administrative burden, in € million

	National Competent Authority	EU competent authority		
	All ships above 400GT	All ships above 5000GT	All ships above 400GT	All ships above 5000GT
Closed / Open ETS with free allocation	4.7	3.0	2.9	1.9
Open ETS with full auctioning	5.7	4.3	3.2	2.5

Source: AEA Technology and others 2012

5.8.2.6. Consumers and households

Consumers and households are most sensitive to 5 of 11 commodities assessed: natural gas, refined petroleum products, wearing apparels, office and IT equipment and motor vehicles¹²⁵. The introduction of a maritime ETS would lead to a decrease of the freight rates of these commodities, except natural gas, and therefore, should have no negative impacts on consumers and household. The increase of prices of natural gas, up to 0.5% by 2030 is not sufficient to trigger significant impacts on households. The other commodities are not directly consumed by households. In the event of an increase in their price, the low level of increase should not be sufficient to result in impacts on the final consumers.

5.8.2.7. Specific regions heavily dependent on shipping

As the introduction of a maritime ETS would in general lead to net benefits for the shipping sector, in principle, more intensive impacts in terms of job creation and cost savings could be expected for regions dependent on shipping. No general economic impacts on these regions can be expected (see preamble of section 5 and annex VII).

5.8.2.8. Third countries

As mentioned previously, this policy option is not expected to lead to significant changes of freight rates. As a consequence, major international partners should not be economically affected by an EU regulation.

5.8.2.9. Risk of avoidance

The risk of avoidance for this policy option is similar to the one for option 3b (see section 5.6.2.9).

5.8.2.10. Recycling of revenues

A maritime ETS with auctioning would generate important financial flows, some of which could be recycled back into the sector. Similar mechanism is already foreseen under the

¹²⁵ AEA Technology and others 2012

current EU-ETS at the EU level under the NER 300¹²⁶. A maritime ETS with full auctioning would generate around €30 billion up to 2030. So, this option could generate sufficient revenues to incentivise the potential removal of market barriers, especially considering that the additional investment costs requested to improve the energy efficiency of ships is estimated at €3 billion up to 2030.

5.8.3. Social impacts

A maritime ETS would lead to increased expenditure on energy efficiency measures, new ships and/or engines and would contribute to the growth of the global market for these products with positive impacts on employment in Europe. The expected additional investment in technical energy efficiency measures could lead to the creation of up to 21 600 new jobs (for a closed ETS) and 5800 (for an open ETS) in shipyards and equipment manufacturers globally¹²⁷. The additional operating cost of €300 to €400 million due to speed reduction is expected to create a limited number of additional jobs on ships relative to the baseline.

As shown in the table below, the emission reductions of NOx, SO2 and PM due to the reduction of the fuel consumption will lead to substantial benefits for public health¹²⁸.

Table 23: Total estimated benefits (health and crop damage) due to reductions in emissions of NOx, SO2 and PM (€ billion) under each scenario for the period 2010-2030, 2010 prices, discounted using a discount rate of 4%

	Benefits: low – high (mean) (€bn)
Closed ETS	6.5 - 18.3 (11.3)
Open ETS – free allocation	6.2 - 17.6 (10.9)
Open ETS – auctioning	6.4 - 18.0 (11.1)

Source: AEA Technology and others 2012

5.9. Option 5: Target based compensation fund

The purpose of a target based compensation is to mutualise the achievement of the target set for the sector. The achievement of the target can be done through in-sector investments or through the purchase of offsets. These actions (in-sector investments or purchasing of offsets) are similar as the one a ship has to perform under an ETS. Therefore, from a modelling point of view, a target based compensation fund can be seen as a single entity under an ETS.

¹²⁶ The NER 300 – so-called because it is funded from the sale of 300 million emission allowances held in the New Entrants Reserve (NER) of the EU Emissions Trading System (ETS) - aims to contribute to investments in demonstration and deployment of innovative technologies, including 34 types of renewables.

¹²⁷ AEA Technology and others, 2012

¹²⁸ These estimates are based on the damage cost function developed under the Clean Air For Europe (CAFE) program.

Assuming that the compensation fund functions as intended, ship-owners and ship-operators will not pay a membership fee to a target based compensation higher than the price of allowances they would have paid if they were directly involved in an ETS.

A target based compensation fund can require a membership fee covering all CO₂ emissions in the shipping sector or only CO₂ emissions above the target.

If the membership fee is set to cover all CO₂ emissions, considering that the level of membership fee will not be higher than the price of allowances ships would have paid if they were directly involved in an ETS, the impact of a target based compensation fund can be considered as similar as an open ETS with full auctioning (see section 5.8).

If the membership fee is set to cover only CO₂ emissions above the target, considering that the level of membership fee will not be higher than the price of allowances ships would have paid if they were directly involved in an ETS, the impact of a target based compensation fund can be considered as similar as an open ETS with free allocation (see section 5.8).

The only difference with an open ETS with full auctioning or with free allocation is related to the administrative burden, as investments are required to setup and manage the fund. The administrative burden are in principle similar to option 3c (contribution based compensation fund). Detail calculation of the administrative burden is given in annex XIII.

6. COMPARISON OF OPTIONS

6.1. Introduction

A set of specific criteria to select the most suitable policy option was developed based upon the general criteria set in the IA guidelines. They aim to assess the achievement of the specific objective of the policy option, while considering the 9 IMO principles for the design of market-based measures¹²⁹

These criteria were submitted to stakeholders during the online consultation carried out from January until April 2012 (see section 1.3.3). The consultation results showed that the environmental effectiveness of a possible EU measure is considered most relevant by 65% of the respondents. Other criteria to determine the choice of the policy option considered to be most relevant or relevant by a majority of respondents are the vulnerability of the legislation, its enforceability and the competitiveness of the EU. The other proposed criteria (timeliness, competitiveness of the EU maritime sector and consistency with the related EU measures) are regarded as less important for the choice of the policy option. However, the consistency with EU related policies and shipping competitiveness are nevertheless regarded as relevant for the

¹²⁹ 1 / Effective in contributing to the reduction of global GHG emissions; 2/ Binding and equally applicable to all flag States in order to avoid evasion; 3 /Cost-effective; 4/Able to limit – or at least – effectively minimize competitive distortion; 5/ Based on sustainable environmental development without restricting global trade and growth; 6 /Goal-based approach that is not prescriptive in nature; 7/ Supportive of promoting and facilitating technical innovation and R&D in the entire shipping sector; 8/ Facilitates new technologies in the field of energy efficiency; 9/ Practical, transparent, fraud free, and easy to administer

evaluation and should be maintained as criteria. The timeliness was not considered as relevant for the evaluation, as any policy option can be adopted in consistency with its interaction with policy progress in international fora.

General criteria	Specific criteria for this Impact Assessment
Effectiveness	Environmental effectiveness (To reduce impact of EU shipping emissions on the climate by achieving reduction in CO ₂ emissions from maritime transport by 40% (if feasible 50%) by 2050 compared to 2005 levels – Specific objective 1)
	Vulnerability: Exposure to/Risk of evasion
	Enforceability (Ensure appropriate monitoring, reporting and verification while keeping administrative burden to the minimum)
Efficiency	Shipping competitiveness (Promote technological improvement of ships, with respect of flag neutrality principle, and improve the competitiveness of maritime supply chains of the EU, by supporting continued innovation of the European shipbuilders, equipment manufacturers and service providers of the shipping sector – Specific objective 2)
	Maintaining and enhancing competitiveness of the EU
Consistency	Stimulating actions by others, including the IMO (Specific objective 3)
	Consistency with the related EU policies
	<i>Timeliness (Consistency with timing of application of measures and interaction with policy progress in international fora)</i>

In addition to these criteria, the policy options were also assessed considering their ability to remove market barriers, which are the key driver of the increase of CO₂ emissions in the shipping sector, as mentioned in section 2.

Using these criteria, the comparison of options is based on the results of the quantitative and qualitative assessments of the economic, environmental and social impacts (see section 5).

6.2. Effectiveness

6.2.1. Removal of market barriers

All market barriers are addressed by just two of the options analysed: the contribution based compensation fund (option 3c) and the target based compensation fund (option 5).

In theory two further options could address all market barriers, including the market barrier relating to access to financing, notably the tax on emissions (option 3b) and an open ETS with full auctioning (option 4c). However, this would only be the case if Member States would agree on the recycling of national revenues or if alternative instruments/interventions are setup.

Other ETS options (4a – closed ETS) and (4b – open ETS with free allocation) are not generating revenues and therefore no revenues can be recycled in the sector to address the market barriers related to access to finance. However, these options do not prevent the implementation of alternative instruments/interventions to address the market barrier related

to access to finance. These alternative instruments will be in any case independent of the policy options and cannot therefore be considered as part of the evaluation of these options.

The monitoring based on fuel consumed (option 2) will only address the market barriers related to the lack of information. At the same time robust MRV regime should contribute to increasing awareness of the environmental consequences and economic opportunities of efficiency measures within the sector thereby stimulating early action and investment.

The levy on bunker fuel sales (option 3a) could only address the market barrier related to access to finance if Member States agree on the recycling of national revenues or if alternative instruments/interventions are setup to address this market barrier.

Finally, the baseline (option 1) is not expecting to address any market barrier.

Table 24: Key market barriers addressed,

Options	Key market barriers		
	Lack of information	Split incentives	Access to finance
Option 1 – Baseline			
Option 2 – Monitoring based on fuel consumed	✓		
Option 3 – Levy on emissions			
3a - Levy on bunker fuel sales			✓*
3b - Tax on emissions from fuel consumed	✓	✓	✓*
3c - Contribution based compensation fund	✓	✓	✓
Option 4 – Maritime ETS			
4a - Closed ETS	✓	✓	
4b - Open ETS with free allocation	✓	✓	
4c - Open ETS with full auctioning	✓	✓	✓*
Option 5 – Target based compensation fund	✓	✓	✓

*if Member States agree or if other instruments/interventions are established

6.2.2. Environmental effectiveness

A closed ETS (option 4a) delivers the highest in-sector emission reductions followed by the tax on emissions from fuel consumed (option 3b), the contribution based compensation fund (option 3c), the open ETS with free allocation (option 4b), the open ETS with full auctioning (option 4c) and the target based compensation fund (option 5) which have similar positive results. However, for options the contribution based compensation fund (option 3c), the open ETS with full auctioning (option 4c) and the target based compensation fund (option 5), the in-sector CO₂ reduction is more certain than for the tax on emissions from fuel consumed (option 3b) and the open ETS with free allocation (option 4b) as revenues could be used to remove market barriers. The monitoring based on fuel consumed (option 2) and the levy on bunker fuel sales (option 3a) deliver the lowest in-sector emission reduction compared to the baseline, both with a rather high level of uncertainty.

Table 25: In-sector emission reduction by 2030,

	In-sector emissions by 2030 (MtCO ₂)	Compared to the baseline	Cumulative in-sector emissions reductions up to 2030 (Mt CO ₂)
Option 1 – Baseline	223	-	-
Option 2 – Monitoring based on fuel consumed	218.5	-2%	55.9
Option 3 – Levy on emissions			
3a - Levy on bunker fuel sales	217.0	-3%	40.1
3b - Tax on emissions from fuel consumed	186.8	-16%	335.4
3c - Contribution based compensation fund	186.8	-16%	335.4
Option 4 – Maritime ETS			
4a - Closed ETS	175.7	-21%	377.1
4b - Open ETS with free allocation	186.7	-16%	333.8
4c - Open ETS with full auctioning	186.8	-16%	336.3
Option 5 – Target based compensation fund	186.8	-16%	336.3

Source: AEA Technology and others, 2012

The emission reduction delivered by the closed ETS (option 4a) is in line with the Commission's White Paper on Transport target, i.e. to reduce impact of EU shipping emissions on the climate by achieving reduction in CO₂ emissions from maritime transport by 40% (if feasible 50%) by 2050 compared to 2005 levels, as the reduction achieved by 2030 is in accordance with the internal reduction scenario for the 2050 target (-40%/-50% if feasible compared to 2005) modeled for the purpose of this impact assessment.

The emission reductions delivered by the contribution based compensation fund (option 3b), open ETS options (4b and 4c) and the target based compensation fund (option 5) could also be in line with Commission's White Paper on Transport target, if ship-owners and ship operators are purchasing out-of sector emission reductions that are supplied from an emission trading system where the emissions are capped in addition to the in-sector emissions reductions of -16% compared to the baseline.

All other options – baseline (option 1), monitoring based on fuel consumed (option 2) and levy on bunker fuel sales (option 3a) – fall short of delivering emissions reductions in line with Commission's White Paper on Transport target.

The other environmental impacts are proportional to the reduction of CO₂ emissions, especially air quality.

6.2.3. Vulnerability

Except for the levy on bunker fuel sales (option 3a), where the risk of avoidance is estimated around 55% to 90% of the scope, no policy option is expected to trigger significant risk of avoidance or evasion. The alteration of routes and a switching of ship size or type are very unlikely. Furthermore, no modal shift to road or rail can be expected as the net savings for the shipping sector are more likely to trigger a shift towards shipping.

6.2.4. Enforceability

All policy options consider appropriate and robust MRV of emissions is ensured as an integral part of the measure with the exception of the levy on bunker fuel sales (option 3a) which is based on fuel sales not delivering complete emission figures of shipping activities related to the EU¹³⁰.

Table 26: Annual administrative burden for ship owners and ship operators, € million

	Total annual administrative burden	
	All ships above 400GT	All ships above 5000GT
Option 1 – Baseline	0	0
Option 2 – Monitoring based on fuel consumed	52.5	26.1
Option 3 – Levy on emissions		
3a – Levy on bunker fuel sales	Negligible	Negligible
3b - Tax on emissions from fuel consumed	139.9	80.2
3c - Contribution based compensation fund	149.5 ¹³¹ / 139.0 ¹³³	86.2 ¹³² / 80.2 ¹³³
Option 4 – Maritime ETS		
4a - Closed ETS	178.6	105.2
4b - Open ETS with free allocation	178.6	105.2
4c - Open ETS with full auctioning	149.0	87.4
Option 5 – Target based compensation fund	149.5 ¹³² / 139.0 ¹³²	86.2 ¹³² / 80.2 ¹³³

Source: AEA Technology and others 2012

The administrative burden is very low for all policy options compared to the net savings for the sector of around € 25 -50 billion up to 2030 for most policy options (see section 6.3.1). Apart the baseline scenario (option 1), the administrative burden is lower for the levy on emissions (option 3) and the monitoring based on fuel consumed (option 2) than other options. For the other options, the administrative burden for ships and ship operators is in the same order of magnitude.

Administrative burden for public authorities for all policy options are very low, in particular compared to other costs and benefits related to the policy options.

Overall, the enforceability considering appropriate monitoring, reporting and verification while keeping the administrative burden to a minimum can be considered best for monitoring based on fuel consumed (option 2) as MRV is ensured at lowest cost. The costs of setting benchmarks for an ETS with free allocation (options 4a and 4b) would make administrative burden the highest. The baseline (option 1) and to a lesser extent the levy on bunker fuel sales (option 3a) cannot be considered as effective regarding the criterion enforceability.

¹³⁰ Under this policy option, to large extent, fuel is expected to be purchased outside the EU. Therefore, fuel sales could not be used as basis to determine the total CO₂ emissions of voyages from and to EU ports.

¹³¹ In case of a privately managed fund

¹³² In case of a publicly managed fund

6.3. Efficiency

6.3.1. Shipping competitiveness

All policy options except the baseline (option 1), monitoring based on fuel consumed (option 2) and the levy on bunker fuel sales (option 3a) would deliver substantial net savings to the shipping sector serving the EU. ETS types with free allocation (4a and 4b) are expected to deliver the highest absolute benefits for the maritime sector (around €50 billion up to 2030) followed by the contribution based compensation fund (option 3c), the open ETS with full auctioning (option 4c) and the target based compensation fund (option 5), each of them delivering around € 23 to 27 billion up to 2030. The tax on emissions from fuel consumed (option 3b) could in principle deliver similar reduction, but no revenues might be available to incentivise the removal of market barriers as they go to the general budgets of Member States. The monitoring based on fuel consumed (option 2) leads to significantly less savings whereas the levy on bunker fuel sales (option 3a) is the only policy options leading to net costs for the sector.

Table 27: Cost and savings up to 2030, € billion, private discount rate (10%),

	Additional investment, operational and carbon costs (€ bn)	Fuel savings (€ bn)	Net costs (€ bn)	Ratio savings/ costs
Option 1 – Baseline	0	0	0	-
Option 2 – Monitoring based on fuel consumed	0.6	9.4	-8.8	15.6
Option 3 – Levy on emissions				
3a - Levy on bunker fuel sales	70.8	4.8	66.0	0.07
3b - Tax on emissions from fuel consumed	29.0	55.9	-26.9	1.9
3c - Contribution based compensation fund	29.0	55.9	-26.9	1.9
Option 4 – Maritime ETS				
4a - Closed ETS	8.5	55.8	-47.3	6.5
4b - Open ETS with free allocation	3.5	55.6	-52.0	15.8
4c - Open ETS with full auctioning	33.5	56.0	-22.6	1.7
Option 5 – Target based compensation fund	33.5	56.0	-22.6	1.7¹³³

Source: AEA Technology 2012

In relative terms, the open ETS with free allocation (option 4b) delivers the highest savings/costs ratio for the maritime sector. However, it has to be stressed that an open ETS with entirely free allocation does not bring revenues that could be used *inter alia* to remove

¹³³ If the target based compensation fund is assimilated as an open ETS with free allocation, this ratio should be equivalent to option 4b.

market barriers. So, this ratio would be lower in case of partial free allocation. The monitoring based on fuel consumed (option 2) is also an option that delivers absolute savings compared to the additional costs requested.

Moreover, the contribution based compensation fund (option 3c) and the target based compensation fund (option 5) generate revenues that can be rechanneled in the maritime sector to improve the competitiveness of the EU maritime supply chain. For the open ETS with full auctioning (option 4c), revenues could be rechanneled as well whereas for the levy on bunker fuel sales (option 3a) and the tax on emissions from fuel consumed (option 3b), such use in the maritime sector would be subjected to the initiative of the Member States.

Overall, shipping competitiveness could be best ensured by the closed ETS (option 4a) and the open ETS with free allocation (option 4b) with the highest net savings for the sector. In this context, the monitoring based on fuel consumed (option 2 with very good savings/costs ratio, but limited absolute savings) as well as the tax on emissions from fuel consumed (option 3b), the contribution based compensation fund (option 3c), the open ETS with full auctioning (option 4c) and the target based compensation fund (option 5) could be regarded as positive with – for the four latter policy options – substantial net savings in the order of magnitude of € 22-26 billion up to 2030 and a good savings/costs ratio. The baseline (option 1 with no savings) and the levy on bunker fuel sales (option 3a with high additional costs) are not expected to be able to contribute to shipping competitiveness.

6.3.2. Maintaining and enhancing competitiveness

The policy options are not expected to generate major general economic and social impacts, except the levy on bunker fuel sales (option 3a) which could lead to a closure of some bunker fuel suppliers in Europe. Furthermore, no significant negative impacts on SMEs have been identified.

6.4. Consistency

6.4.1. Stimulating actions by others, including through the IMO

Any IMO agreement will require a strong monitoring and reporting of emissions. Therefore, the monitoring of emissions from fuel consumed (option 2) could serve as a catalyst for global measure without prejudging what kind of market based measure will be implemented. All options that generate revenues (contribution based compensation fund (option 3c), target based compensation fund (option 5), open ETS with full auctioning (option 4c)) could also be used to pool financing in support of international climate action (e.g. Green Climate Fund) or to facilitate technical assistance and cooperation in view of efficient shipping.

6.4.2. Consistency with EU related policies

As under the baseline (option 1), maritime transport would remain the only transport mode or industrial sector not covered by the EU's GHG reduction commitment, this option cannot be regarded as consistent with EU related policy. All other options could in principle be used to set a carbon constraint on CO₂ emissions from maritime transport (although the monitoring of emissions from fuel consumed (option 2) is only the first step in this direction that does not

set a carbon constraint by itself), in line with the respective operational objective defined in section 3.

6.5. Concluding remarks

Table 28 summarises the comparison of policy options based on the explanations given in the previous sections 6.2 – 6.4.

Table 28: Overview of assessment of policy options

General criteria	Specific criteria	Options									
		1	2	3a	3b	3c	4a	4b	4c	5	
		Baseline	Monitoring fuel	Levy fuel sales	Tax emissions	Contribution-based fund	Closed ETS	Open ETS allocation	Open ETS auctioning	Target-based fund	
Effectiveness	Market barriers addressed	o	(+)	(+)	+	++	+	+	++	++	
	Environmental effectiveness	o	(+)	(+)	+	+	++	+	+	+	
	Vulnerability	o	o	--	o	o	o	o	o	o	
	Enforceability	o	++	o	+	+	(+)	(+)	+	+	
Efficiency	Shipping competitiveness	o	+	--	+	+	++	++	+	+	
	Maintaining and enhancing competitiveness	o	+	--	+	+	+	+	+	+	
Consistency	Stimulating actions by others, including the IMO	o	++	+	o	+	+	+	+	+	
	Consistency with the related EU policies	o	+	+	+	+	+	+	+	+	

++: very positive +: positive (+): slightly positive o: neutral -: negative --: very negative

A graphical representation of this table is given in Annex XI.

Considering the market barriers addressed, the contribution based compensation fund (option 3c), the open ETS with full auctioning (option 4c) and the target based compensation fund (option 5) could be regarded as the best options as they could address all three main barriers (lack of information, split incentive and lack of access to finance). However, as discussed earlier the open ETS with full auctioning could be considered to address the lack of access to finance, only if there is an agreement on revenue spending. The tax on emissions (option 3b) could also address all market barriers, if Member States would set up instruments removing the market barrier related to access to finance.

Concerning environmental effectiveness, the closed ETS (option 4a), followed by the tax on emissions from fuel consumed (option 3b), the contribution based compensation fund (option 3c), the open ETS with free allocation (option 4b), the open ETS with full auctioning (option

4c) and the target based compensation fund (option 5) could be regarded as the best. However, for the tax on emissions (option 3b) no out-of sector emission reductions can be expected.

Regarding efficiency, the monitoring of fuel consumed (option 2) the open ETS with free allocation (option 4b) deliver the highest benefit/cost ratio for the sector, but the contribution based compensation fund (option 3c), the open ETS with full auctioning (option 4c) and the target based compensation (option 5) generate revenues that could be used for removing market barriers. However, all the highly environmental effective policy options deliver similar benefit/cost ratio for society.

A non-global levy on bunker fuel sales (option 3a) is not suitable, as it will trigger evasion that will undermine the environmental effectiveness of the measure. Moreover, this option brings very high additional costs, without providing significant savings. The baseline option is not a suitable option, as any action will trigger environmental, social and economic benefits for the maritime sector.

It is also clear that all policy options based on fuel consumed will require a strong monitoring and reporting of CO₂ emissions from fuel consumed. So, even if the contribution based compensation fund (option 3c), all three ETS types (options 4a, 4b, 4c) and the target based compensation fund (option 5) can be considered as the most suitable options, the implementation of the monitoring of fuel consumed (option 2) will be a prerequisite for all policy options.

Finally, reducing the scope of the measure to ships above 5000 GT will have significant impacts on the administrative burden of all policy options based on CO₂ emissions from fuel consumed, while not significantly undermining the environmental benefits of these measures. It could also limit the impacts on SMEs. For these reason, only ships above 5000 GT should be included in a measure for a first step. This would reduce the administrative burden by around 40% under all options while still capturing 90% of the emissions.

As a conclusion and in accordance with the stepwise approach proposed by Vice-President Kallas and Commissioner Hedegaard, the monitoring of fuel consumed (option 2) should be considered as the option that would be the necessary first step for other policy options leading to more substantial benefits in terms of economic, environmental and social impacts. It would also trigger some emission reductions and other benefits.

For the next steps following the implementation of the monitoring and reporting, it is clear that the levy on bunker fuel sales (option 3a) is not suitable for a regional measure. The other policy options address problem drivers and achieve the environmental objective (although to different degree) with economic and social impact discussed above. Any eventual decision regarding market based measures should be aligned with the option emerging from the relevant deliberations at the IMO.

7. MONITORING AND EVALUATION

In order to monitor and evaluate the progress made towards the reduction of GHG emissions from maritime transport in view of a possible Commission proposal to include maritime GHG emissions into the EU's reduction commitment, the following indicators are proposed:

1. Annual CO₂ emissions from maritime transport within the EU scope measures on ship and fuel consumption basis
2. Annual CO₂ emissions from maritime transport compared to the annual maritime transport activity of the EU (in tonnes-nautical miles);
3. Annual turnover of European shipbuilders, equipment manufacturers and services providers of the shipping sector;
4. Achievement of milestones in IMO process: IMO expert group on monitoring and reporting established, IMO expert group on market based measures pursued, IMO impact assessment on global market based measures launched and measures in place in third countries
5. Number and percentage of ships that are monitoring and reporting their emissions in line with the regulation compared to the number of ships calling into EU ports;

These indicators should be calculated on an annual basis from relevant European Agencies based on data provided by the Competent Authorities. The functioning of measures for monitoring and reporting of emissions as well as for internalisation of climate externalities and any potential revenue recycling should be reviewed periodically.

The first and second indicators are data collected as part of the monitoring and reporting requirements necessary for any policy options, except the tax on bunker fuel sales (option 3a), which was discarded by the impact assessment. They aim to ensure that the first specific objective mentioned in section 3 is fulfilled.

The third indicator is already collected by Eurostat. It aims to ensure that the second specific objective mentioned in section 3 is fulfilled.

The fourth indicator aims to assess the progress made by the IMO and by others to address GHG emissions in the shipping sector. It therefore ensures that the third specific objective mentioned in section 3 is fulfilled.

Regarding the fifth indicator, the number of ships that are monitoring and reporting their emissions will be part of the monitoring and reporting requirements necessary for any viable policy options. The number of ships calling into EU ports can be provided by EMSA using their existing database mentioned in section 4.3. This indicator aims to address the acceptance of the EU regulation by the shipping sector.

ANNEX I - OVERVIEW OF THE SHIPPING SECTOR

In 2010, the Commission set up a contract with IHS Fairplay to have an overview of ships calling into EU ports. The full study can be found on Commission's website¹³⁴. However, this annex aims to provide an overview of the results of this study.

1. ORGANISATION OF THE SUPPLY CHAIN OF THE SHIPPING SECTOR

The supply chain of the shipping sector is organised around the follow main actors:

- the ship-owner who owns the vessels
- the ship operator who operates the vessel
- the charterer who rents the vessels (with or without the crew)
- the shipper who provides the cargo

Other actors may also take part of this supply chain, such as the ship-broker who negotiates the use of a ship between ship-owners and charterer or the ship-manager who performs the technical operation of the ship but not its commercial management. These actors may not be distinct. For example, a ship operator can own its ships or a ship-operator can charter a ship.

Different type of chartering contract exists¹³⁵:

- A voyage charter is the hiring of a vessel and crew for a voyage between a load port and a discharge port. The charterer pays the vessel owner on a per-ton or lump-sum basis. The owner pays the port costs (excluding stevedoring), fuel costs and crew costs. The payment for the use of the vessel is known as freight. A voyage charter specifies a period, known as laytime, for unloading the cargo. If laytime is exceeded, the charterer must pay demurrage. If laytime is saved, the charter party may require the shipowner to pay despatch to the charterer.
- A contract of affreightment is a contract similar to a voyage charter, but ship-owner undertakes to carry a number of cargoes within a specified period of time on a specified route. Agreed frequency of cargoes may require more than one ship.
- A time charter is the hiring of a vessel for a specific period of time; the owner still manages the vessel but the charterer selects the ports and directs the vessel where to go. The charterer pays for all fuel the vessel consumes, port charges, and a daily hire to the owner of the vessel.

¹³⁴ http://ec.europa.eu/clima/policies/transport/shipping/docs/ships_visiting_en.pdf

¹³⁵ <http://maritimeknowhow.com/>

- A trip time charter is a comparatively short time charter agreed for a specified route only (as opposed to the standard time charter where charterer is free to employ the vessel within agreed trading areas).
- A bareboat charter or demise charter is an arrangement for the hiring of a vessel whereby no administration or technical maintenance is included as part of the agreement. The charterer obtains possession and full control of the vessel along with the legal and financial responsibility for it. The charterer pays for all operating expenses, including fuel, crew, port expenses or hull insurance.

2. SHIPPING SEGMENTS¹³⁶

a. General data

Table I.1: Ship types in the world fleet in 2010

Ship type	Number of ships	Ship type	Number of ships
Oil tankers	7.568	Container	4.928
Chemical tankers	5.071	Vehicle	5.784
LPG	1.199	Roro	1.793
LNG	364	Ferry	6.354
Other tanker	399	Cruise	5.525
Bulker	9.100	Yacht	1.523
General cargo	16.486	Offshore	8.027
Other dry	2.326	Service	18.406
TOTAL			83.863

Table I.2: World fleet, percentage of ships for different flags, 2010

¹³⁶ Source: IHS Fairplay, 2010 and 2012

World fleet, percentage of ships, by vessel type and flag																		
GROUP	Oil	Chem	Other			General		Other										Total
	tanker	tanker	LPG	LNG	tanker	Bulker	Cargo	dry	Container	Vehicle	Roro	Ferry	Cruise	Yacht	Offshore	Service		
AUSTRIA	0%	1%	1%	2%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
BELGIUM	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BULGARIA	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CYPRUS	1%	1%	1%	1%	1%	3%	1%	0%	4%	1%	1%	1%	1%	0%	1%	1%	1%	1%
DENMARK	1%	2%	0%	1%	1%	0%	0%	0%	2%	0%	1%	1%	0%	0%	1%	1%	1%	1%
ESTONIA	0%	0%															0%	0%
FINLAND	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	1%	1%	0%	0%	1%	0%	0%	0%
FRANCE	0%	1%	1%	1%		0%	0%	1%	0%	2%	2%	1%	0%	1%	1%	1%	1%	1%
GERMANY	0%	1%	1%	0%	0%	0%	0%	0%	6%	0%	1%	2%	0%	0%	0%	1%	1%	1%
GREECE	5%	2%	1%	2%	3%	3%	1%	0%	1%	2%	5%	2%	3%	0%	1%	2%	1%	2%
IRELAND	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ITALY	1%	3%	2%	1%	6%	1%	0%	0%	0%	4%	4%	6%	4%	3%	1%	2%	2%	2%
LATVIA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
LITHUANIA	0%						0%	0%	0%						0%	0%	0%	0%
LUXEMBOURG	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	5%	0%	0%	0%	0%	0%
MALTA	2%	6%	3%	1%	1%	6%	2%	0%	2%	2%	3%	1%	9%	4%	0%	0%	2%	2%
NETHERLANDS	0%	5%	2%	0%	1%	0%	3%	1%	1%	0%	2%	0%	5%	2%	0%	1%	1%	1%
POLAND	0%	0%					0%					1%			0%	0%	1%	0%
PORTUGAL	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	3%	2%	0%	0%	0%	0%
ROMANIA	0%	0%					0%			0%	0%	0%	0%	0%	0%	0%	0%	0%
SLOVAKIA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SLOVENIA																		
SPAIN	0%	0%	0%	2%	1%	0%	0%	0%	0%	1%	1%	1%	0%	1%	0%	2%	1%	1%
SWEDEN	0%	0%			1%	0%	0%	0%	3%	4%	2%	0%	0%	0%	1%	1%	1%	1%
UNITED KINGDOM	1%	1%	1%	0%	1%	0%	1%	0%	4%	3%	3%	2%	1%	14%	3%	2%	2%	2%
ICELAND	0%					0%	0%					0%			0%	0%	0%	0%
NORWAY	1%	3%	3%	3%	1%	1%	1%	1%	0%	6%	1%	6%	0%	0%	4%	1%	2%	2%
EEA TOTAL	13%	28%	15%	15%	18%	15%	11%	6%	22%	21%	33%	33%	28%	34%	12%	17%	17%	17%
RUSSIA	4%	1%			3%	1%	5%	4%	0%	2%	1%	2%	0%	1%	3%	3%		
OTHER EUROPE	2%	3%	3%	2%	1%	1%	3%	1%	1%	1%	2%	2%	1%	9%	2%	1%	2%	2%
NORTH AFRICA	1%	0%	1%	2%	5%	0%	0%	0%	0%	3%	1%	1%	0%	1%	2%	1%	1%	1%
MEDITERRANEAN	2%	2%	1%	0%	3%	1%	3%	1%	1%	1%	5%	4%	0%	1%	0%	1%	2%	2%
BL.SEA	1%	0%	0%		2%	0%	2%	1%	0%	0%	1%	2%	1%	0%	2%	2%	1%	1%
CANADA	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	2%	0%	1%	0%	1%	1%	1%
USA	1%	1%			0%	1%	0%	1%	2%	3%	1%	3%	5%	3%	15%	9%	4%	4%
BAHAMAS	3%	2%	2%	14%	1%	3%	1%	5%	1%	8%	2%	1%	18%	1%	2%	0%	2%	2%
BERMUDA	0%	0%	0%	10%		0%	0%	0%	0%	0%	0%	0%	5%	2%	0%	0%	0%	0%
PANAMA	8%	12%	13%	10%	9%	27%	8%	12%	15%	37%	14%	2%	8%	1%	9%	3%	9%	9%
OTHER AMERICA	6%	3%	5%		5%	4%	11%	9%	10%	1%	10%	4%	17%	37%	12%	7%	8%	
CHINA	8%	5%	8%	1%	8%	15%	7%	6%	10%	4%	2%	7%	0%	0%	3%	4%	7%	
JAPAN	8%	9%	11%	9%	7%	5%	8%	0%	0%	7%	7%	8%	1%	0%	0%	7%	6%	
SOUTH KOREA	3%	4%	5%	1%	3%	3%	2%	1%	1%	1%	1%	3%	0%	0%	0%	3%	2%	
OTHER ASIA	23%	13%	25%	14%	21%	9%	22%	34%	13%	11%	8%	19%	3%	2%	20%	28%	21%	
REST OF WORLD	14%	14%	10%	22%	8%	12%	9%	16%	22%	5%	7%	5%	6%	7%	16%	6%	11%	
Unknown	5%	2%	2%		6%	2%	7%	4%	1%	1%	3%	5%	2%	2%	4%	6%	4%	
TOTAL	100%																	

Table I. 3: Percentage of calls in an EEA port by flag and ship type, all ships, 2010

COUNTRY	Share of port calls in the EEA, by vessel type and flag																
	Oil tanker	Chem tanker	LPG	LNG	Other tanker	Bulker	General Cargo	Other dry	Container	Vehicle	Roro	Ferry	Cruise	Yacht	Offshore	Service	Total
AUSTRIA																	0%
BELGIUM	2%	1%	1%	1%		0%	1%		0%		8%	0%	0%	0%	2%	1%	
BULGARIA	1%	0%	0%		0%	1%	0%		0%	0%	0%	0%	0%	0%	0%	0%	
CYPRUS	2%	3%	3%		0%	6%	3%	1%	11%	5%	3%	3%	1%	2%	1%	4%	
DENMARK	3%	8%	0%	1%	9%	0%	2%	1%	3%		4%	9%		6%	8%	6%	
ESTONIA	2%	0%					0%				2%				1%	1%	
FINLAND	1%	1%	0%			1%	2%	1%	1%	4%	9%	2%	1%	1%	3%	2%	
FRANCE	2%	3%	0%	8%		0%	0%		1%		1%	5%	1%		0%	3%	
GERMANY	4%	2%	2%			1%	3%	1%	10%		2%	5%	0%	2%	9%	4%	
GREECE	15%	5%	2%	2%	4%	4%	1%	1%	1%		3%	5%	1%	1%	0%	3%	
IRELAND	0%						1%		0%		0%	0%		0%	1%	0%	
ITALY	2%	10%	9%	11%	22%	3%	1%	4%	0%	15%	8%	15%	16%	2%	3%	4%	
LATVIA	0%	0%					0%				0%	0%			0%	0%	
LITHUANIA							1%	0%	0%		2%	0%			0%	0%	
LUXEMBOURG	1%						0%		1%		8%		0%	1%	1%	0%	
MALTA	8%	13%	5%		2%	11%	6%	1%	4%	5%	4%	2%	16%	4%	2%	4%	
NETHERLANDS	1%	8%	11%	6%	20%	0%	16%	8%	7%		8%	1%	5%	8%	5%	16%	
POLAND	2%	0%					0%				0%	0%	1%	0%	2%	0%	
PORTUGAL	0%	2%	2%		2%	2%	1%	1%	0%	7%	1%	0%	6%	0%	0%	1%	
ROMANIA	0%	0%					1%					0%		0%	0%	0%	
SLOVAKIA							0%	0%						0%	0%	0%	
SLOVENIA							0%	0%						0%	0%	0%	
SPAIN	1%	1%	1%	7%	4%	3%	1%	0%	0%	5%	2%	5%	1%	1%	6%	4%	
SWEDEN	6%	3%		8%	3%	1%	0%		3%	11%	9%	0%	4%	0%	5%	6%	
UNITED KINGDOM	8%	2%	1%		2%	3%	0%	8%	2%	7%	18%	2%	11%	20%	18%	13%	
ICELAND	0%					0%					0%			0%	0%	0%	
NORWAY	3%	6%	4%	4%	20%	2%	4%	3%		4%	2%	10%	0%	0%	32%	5%	
EEA TOTAL	63%	71%	41%	41%	91%	39%	46%	22%	46%	50%	81%	94%	50%	37%	73%	92%	77%
RUSSIA	0%	1%			0%	2%	3%	1%	0%		0%	0%	0%	0%	0%	0%	0%
OTHER EUROPE	9%	9%	10%	1%		2%	9%	4%	3%	7%	2%	0%		11%	7%	2%	3%
NORTH AFRICA	0%	0%	1%	2%		0%	0%		0%		2%	1%			0%	0%	1%
MEDITERRANEAN	0%	1%	0%		0%	2%	2%	0%	2%	0%	2%	0%	0%	0%	0%	0%	1%
BL SEA	0%	0%			0%	1%	1%	1%	0%		0%	0%		0%	0%	0%	0%
CANADA	0%					0%	0%				0%			0%	0%	0%	
USA	0%	0%				0%	0%	0%	1%	1%	0%		0%	0%	0%	0%	
BAHAMAS	7%	2%	4%	16%	0%	7%	3%	16%	0%	2%	2%	27%	1%	6%	1%	3%	
BERMUDA	0%	0%		14%		0%		3%	1%		0%	1%	8%	3%	0%	1%	
PANAMA	2%	3%	7%	1%	4%	16%	2%	13%	11%	21%	2%	0%	10%	1%	3%	1%	
OTHER AMERICAS	3%	3%	9%		1%	8%	28%	18%	18%	1%	6%	1%	1%	42%	4%	2%	
CHINA	1%	1%	2%		0%	5%	0%	0%	3%	0%	0%			0%	0%	0%	
JAPAN	0%					0%	0%		0%	2%		0%	0%		0%	0%	
SOUTH KOREA	0%	0%				0%	0%		0%			0%			0%	0%	
OTHER ASIA	2%	2%	15%	2%	1%	3%	0%	2%	2%	8%	1%	0%		1%	3%	0%	
REST OF WORLD	9%	8%	11%	21%	3%	15%	5%	19%	14%	2%	2%	0%	4%	4%	3%	1%	
Unknown	0%	0%				0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

b. CO2 emissions and efficiency

Table I.4: CO2 emissions on EU related routes in 2010 (tCO2)

	from EU27	to EU27	intra EU27	Domestic	TOTAL
01 Oil tanker	5.608.190	6.011.682	2.743.508	1.411.465	15.774.845
02 Chemical tanker	4.286.408	4.515.222	5.067.885	2.014.793	15.884.307
03 LPG	614.856	565.809	668.851	419.477	2.268.994
04 LNG	2.227.206	2.242.901	285.072	473.119	5.228.299
05 Other tanker	165.863	148.205	67.283	49.631	430.982
06 Bulker	8.853.597	9.793.108	2.693.337	941.744	22.281.786
07 General cargo	3.666.037	3.664.151	5.036.541	1.187.354	13.554.083
08 Other dry	1.409.449	1.435.208	1.264.408	517.024	4.626.089
09 Container	20.797.067	22.765.949	10.052.641	1.546.880	55.162.536
10 Vehicle	1.638.468	1.930.954	1.888.082	193.478	5.650.981
11 Roro	840.470	908.774	3.199.086	1.307.121	6.255.451
12 Ferry	1.473.840	1.472.736	8.461.109	8.452.329	19.860.014
13 Cruise	1.549.139	1.427.755	3.025.106	1.055.131	7.057.131
14 Yacht	229.548	274.957	172.867	177.735	855.107
15 Offshore	392.762	414.958	225.212	857.630	1.890.562
16 Service	253.733	224.546	299.617	1.477.012	2.254.908
17 Fishing	81.085	93.499	59.044	180.574	414.202
18 Miscellaneous	35.245	41.404	26.239	73.748	176.636
TOTAL	54.122.962	57.931.819	45.235.888	22.336.244	179.626.912

Table I.5 : Projection of CO2 emissions per type of ship on EU related routes

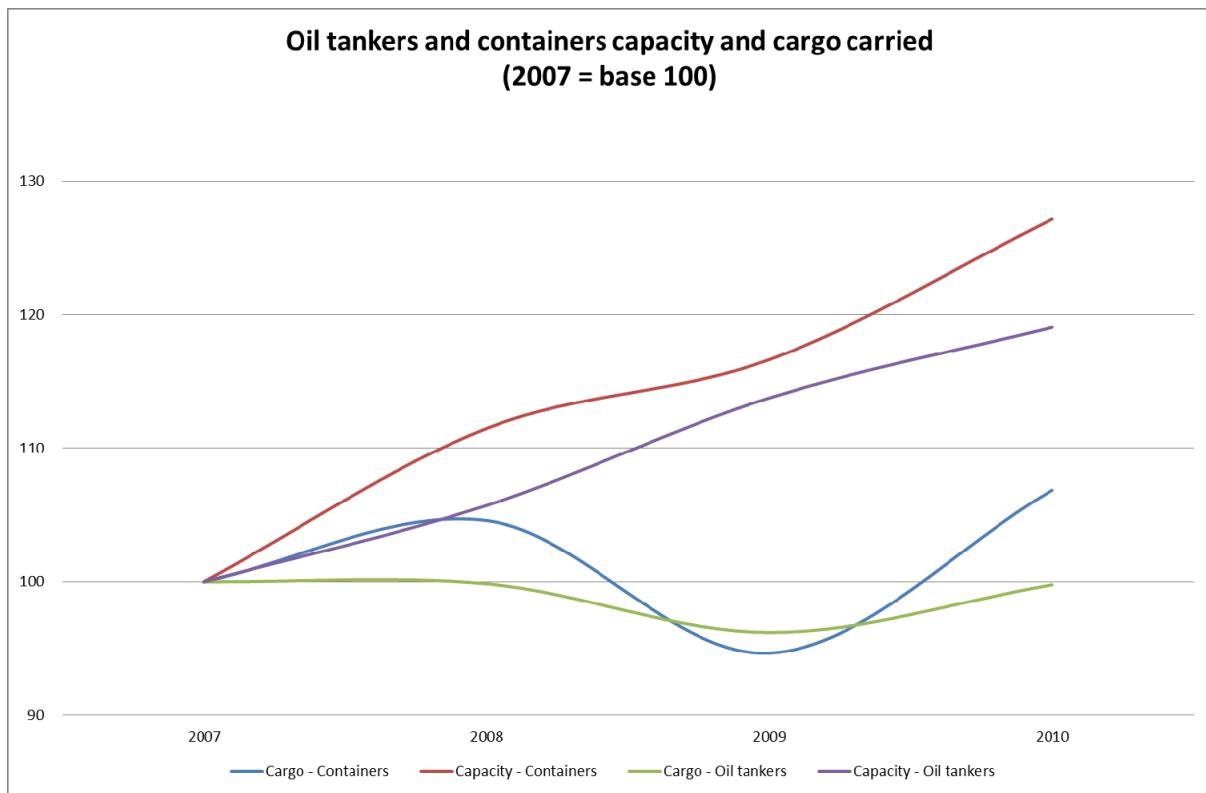
	2005	2010	2020		2030		2050	
	MtCO2	MtCO2	MtCO2	% / 2005	MtCO2	% / 2005	MtCO2	% / 2005
Liquid bulk	44.926.957	39.587.426	40.557.367	-10%	39.669.218	-12%	38.619.315	-14%
Dry bulk	26.276.027	22.281.786	26.948.113	3%	29.354.200	12%	35.922.703	37%
General cargo	23.612.709	18.180.172	22.630.302	-4%	25.093.387	6%	29.812.802	26%
Container	55.391.337	55.162.536	67.662.971	22%	72.897.514	32%	94.763.227	71%
Roro & Vehicle roro	14.121.212	11.906.432	13.832.126	-2%	14.847.546	5%	20.256.208	43%
Ferry	22.694.635	19.860.014	23.862.420	5%	26.237.304	16%	32.056.787	41%
Non-cargo	8.367.176	12.648.546	14.283.027	71%	15.311.497	83%	19.197.403	129%
TOTAL	195.390.053	179.626.912	209.776.325	7%	223.410.666	14%	270.628.444	39%

Table I.6: Projected fuel efficiency (Mtoe/Mtonnes carried) under the baseline scenario

	2010	2015	2020	2025	2030
Fuel consumption	Mtoe	59,44	63,30	66,12	70,92
Seaborne trade	Mt	2234,31	2515,14	2737,18	2972,34
Fuel efficiency	Mtoe/Mt	0,027	0,025	0,024	0,024
Improvement compared to 2010		-	-5%	-9%	-10%

c. Overcapacity

Figure I.1: Overcapacity in oil tankers and containerships



ANNEX II - SMEs IN THE SHIPPING SECTOR

According to EU recommendation n°2003/361, an SME can be defined according to the following criteria:

Company category	Employees	Turnover	or	Balance sheet total
Medium-sized	< 250	$\leq \text{€} 50 \text{ m}$		$\leq \text{€} 43 \text{ m}$
Small	< 50	$\leq \text{€} 10 \text{ m}$		$\leq \text{€} 10 \text{ m}$
Micro	< 10	$\leq \text{€} 2 \text{ m}$		$\leq \text{€} 2 \text{ m}$

These ceilings apply to the figures for individual firms only. A firm which is part of larger grouping may need to include employee/turnover/balance sheet data from that grouping too.

According to the table below and considering the threshold mentioned above, 97% of maritime transport enterprises can be considered as SMEs¹³⁷.

Table II.1: turnover, number of enterprises and turnover per enterprise per size of enterprises

Nb of employees	Total	>250	50-249	20-49	10-19	2-9	1
Turnover (M€)							
Sea and coastal passenger transport	c	11962,78	2329	1312,11	c	630,77	707,77
Sea and coastal freight transport	c	47329,89	17161,24	5416,93	c	4833,92	7163,22
Nb of enterprises							
Sea and coastal passenger transport	5481	51	92	141	222	1990	2985
Sea and coastal freight transport	5672	53	216	414	589	2000	2400
turnover / enterprises							
Sea and coastal passenger transport	n/a	235	25	9	n/a	0	0
Sea and coastal freight transport	n/a	893	79	13	n/a	2,4	3,0
SME threshold (turnover/enterprise)			50	10	10	2	2

Source: Eurostat, 2010; (c): confidential data

These statistics include all companies operating ships, including for example a company operating a single route to a small island close to the coast. However, the size of a company is linked to the size of ships operated by the company and a ship of more than 400 GT requires more than 9 people to be operated. This means that, as the regulation intends to apply to ships above 400GT at the lowest, 87% of SMEs in the shipping sector will not be concerned by the regulation. If the size threshold is set at 5000GT¹³⁸, at least 99% of SMEs in the shipping sector will not be concerned by the regulation.

¹³⁷ According to the turnover threshold, only maritime freight transport enterprises with less than 50 employees can be considered as SMEs

¹³⁸ As a ship above 5000GT will require more than 50 people to be operated.

Example of ferry of around 4000GT



Example of ferry around 400GT



Having said that, the thresholds used to define SMEs may not be relevant to define a small enterprise in maritime transport. The number of ships is a more relevant indicator to consider the size of the company. In 2010, around 8000 ships above 400GT¹³⁹¹⁴⁰ were operated by 1778 EU enterprises. This means that on average, each enterprise operates 4 to 5 ships. However, the top 5 container vessels operators operated together more than 1756 ships in 2010. So, without considering these enterprises, the number of ship per EU operator is between 3 to 4 ships.

Operating 3 to 4 ships only does not mean that the ship operator comply with the SME definition mentioned above. For example, SeaFrance, a former ferry company, had 4 ships, but 1850 employees due to the size of its ships (mainly above 30,000GT).

For that reason, the administrative burden mentioned in annex XIII have been calculated on a ship basis, having in mind that, if a company operates several ships, it can benefit from economies of scale.

The fuel savings and the increase of investment and capital costs mentioned in section 5 of the impact assessment are not related to the size of the companies. The abatement technologies considered are related to the type of ships and not to the size of ship operators. Having said that, the fewer the number of ships is operated by an enterprise, the more reluctant this enterprise will be to implement innovative low carbon technology. Indeed, a company operating a small number of ships cannot afford to test technologies on one of its ships, facing the risk to jeopardize the operation of this ship and the overall profitability of the company. In this context, getting accurate information on the abatement potential of low technology and the operational impacts of each of these technologies are key to ensure their uptake.

¹³⁹ IHS Fairplay 2010

¹⁴⁰ Note that, in 2010, 18400 ships above 400GT have called in EU ports.

ANNEX III - SUMMARY OF RESULTS OF THE ON-LINE CONSULTATION

**Public consultation on
"Including maritime transport emissions in the EU's greenhouse
gas reduction commitment"**

Summary of the contributions received

11 February 2013

Please note that this summary of the consultation does not express the position of the Commission.

Table of Contents

1	Introduction.....	92
2	Structure of the questionnaire	92
3	Characterisation of the respondents	92
4	Results of the on-line consultation.....	93
4.1	General context	93
4.2	Scope of a possible proposal	95
4.3	Reliance on shipping at a local or regional level	97
4.4	Evasion.....	97
4.5	Policy options.....	97
4.6	Choice of policy options	104
4.7	General comments.....	106
5	General conclusions	107

1. INTRODUCTION

As part of the preparation of the impact assessment of a possible Commission proposal to address GHG emissions of the maritime sector¹⁴¹, the Commission ran an internet public consultation for 12 weeks from 19 January until 12 April 2012.

This consultation sought opinions from stakeholders and experts in the field of shipping and climate change with a view to getting additional information on the shape of a possible Commission proposal. All European citizens, organised stakeholders, industries, institutions, NGOs and public authorities of EU countries were invited to contribute to this consultation.

This consultation supplements several stakeholders meetings held throughout 2011, including 3 two-day meetings in the context of a working group (WG6) established under the European Climate Change Program II (ECCPII)¹⁴² and 3 meetings in the context of a High Level Platform co-chaired by Vice President Kallas and Commissioner Hedegaard. The outcome of these stakeholder meetings was used as input for the on-line consultation. All documents from the ECCP meetings are available on the Commission's website¹⁴³.

2. STRUCTURE OF THE QUESTIONNAIRE

The questionnaire used open questions or multiple choice questions. With the exception of certain selected questions, answers were not mandatory. The questionnaire reflected the discussion with stakeholders at the time of its preparation. Emphasis on specific issues may have happened after the publication of the questionnaire.

3. CHARACTERISATION OF THE RESPONDENTS

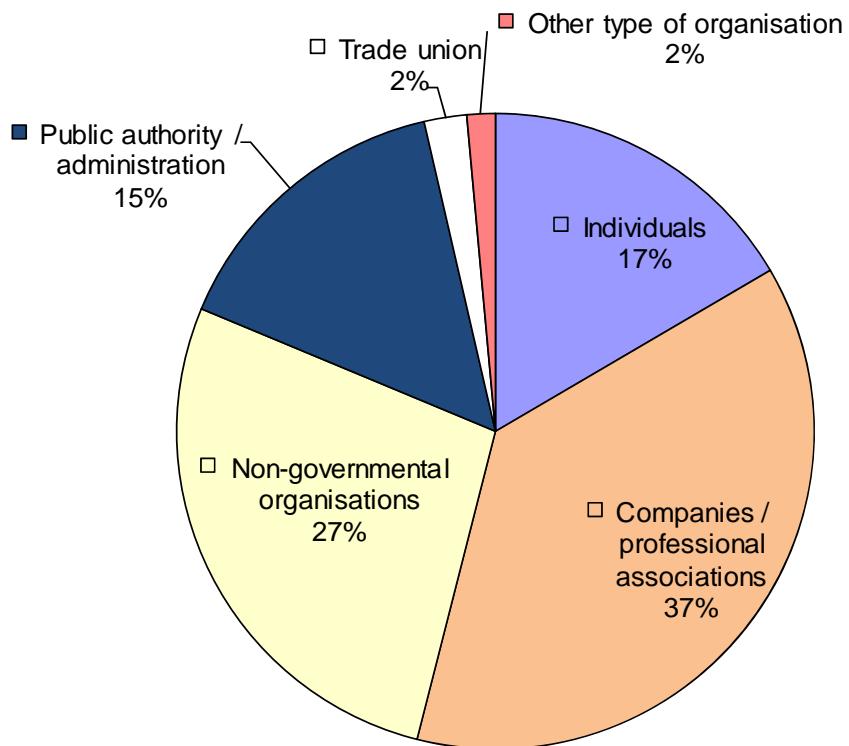
All in all, 139 contributions were received either directly online or through the support mail address (CLIMA-ECCP-SHIPS@EC.EUROPA.EU). Some contributors sent multiple submissions. The most represented contributors were companies or professional associations (37%), followed by non-governmental organisations (28%), individuals (17%) and public authorities or public administrations (14%).

¹⁴¹ http://ec.europa.eu/atwork/programmes/index_en.htm

¹⁴² http://ec.europa.eu/clima/policies/eccp/second/stakeholder/index_en.htm

¹⁴³ http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm

Respondent profile



It is noted that some ship-owners or ship-operators associations were registered as non-governmental associations and some ports were registered as public authorities. The table below gives an overview of the contributors, grouped in accordance to their field of competency:

	Number	% of total
Ship-owners*	36	26%
Charterers/ Ship operators*	13	9%
Shippers	12	9%
Service providers/ Equipment manufacturers	9	7%
Ports	6	4%
Trade Unions	3	2%
EU Regional public authority	4	3%
EU National public authority	9	6%
Non-EU National public authority	4	3%
Environmental and social NGO	29	21%
Individuals	23	17%
Others	1	1%

* 10 entities considered as ship-owners can also be considered as ship-operators.

15 respondents requested confidentiality for their responses, i.e. no publication on the Commission's website, while 24 respondents authorised publication on the Commission's website in an anonymous format.

4. RESULTS OF THE ON-LINE CONSULTATION

4.1. GENERAL CONTEXT

4.1.1. Equal treatment of all sectors of the European economy

54% of respondents consider that the maritime sector should contribute to the European emission reduction efforts as other sectors, whereas 39% felt sector contributions not necessary. 7% of the respondent had no opinion on the matter. The arguments developed under this question by the respondents demonstrate a full range of opinion from a strong support to an equal treatment of all sectors of the European economy to a strong opposition to an inclusion of the maritime sector into the EU commitments.

All respondents considered that the maritime sector should take actions to reduce its greenhouse gas emissions. All respondents also felt that an agreement should be reached at the IMO level. There were however some differences of opinions on the timing and on the added value of EU action.

More precisely, 21 respondents considered that the IMO is moving forward at a sufficient pace, especially as result of the adoption of the Energy efficiency design index for new ships (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP). Accordingly this group considered that EU action may interfere with the IMO work. Another larger group (24 respondents) considered that the IMO had not delivered sufficient measures (i.e. no market-based measure nor inclusion of shipping emission in reduction commitments) and that EU action would help the IMO move forward faster, especially by providing a strong base for a global action.

There were also different views on the urgency of regulating the GHG emissions on shipping. On the one hand, most ship-owners and ship-operators considered that shipping is a minor source of emissions and felt that as the most efficient mode of transport maritime sector should not be the immediate focus of policy action and priority should rather be on other sectors. Most NGO contributions considered that shipping is one of the fastest growing sources of emissions and therefore emissions from shipping should be addressed urgently.

Regarding competitiveness, all respondents agree that the key issue is to ensure a level playing field. However, the responses to this question reflected the different understanding of the associated dimensions. All NGOs and a majority of individuals (38 respondents in total), underlined that the maritime sector is the only sector of the European economy not included in the EU commitments, emphasising the intra-European perspective. According to them, this creates a market distortion compared to other sectors of the EU economy. 13 other participants, especially from ship-owners and ship-operators, claimed that the maritime sector is global and therefore EU action could risk triggering a market distortion in the maritime sector with other regions in the world.

Equal treatment of all sectors of the European economy was also felt to have the potential to provide a clear signal for technology improvement in the maritime sector. Almost 20 participants stressed that there is potential in the maritime sector to reduce its GHG emissions. The up-taking of this potential could result social benefits by stimulating growth and job creation due to the retrofitting of ships and the development of new equipment. However, one equipment manufacturer said that, even if the potential is there, the question of affordability of such emission reduction should be assessed carefully. On the technological improvement of ships, a ship-owner mentioned the difficulties of reselling a vessel outside the EU, as the improvement of energy efficiency required by the EU may not be considered of value by stakeholders outside the EU.

While all NGOs supported equal treatment of all sector of the European economy, 15 NGOs stressed the need to avoid negative effects on the poorest countries, especially on least developed countries. All NGOs requested a contribution of the maritime sector to global climate action.

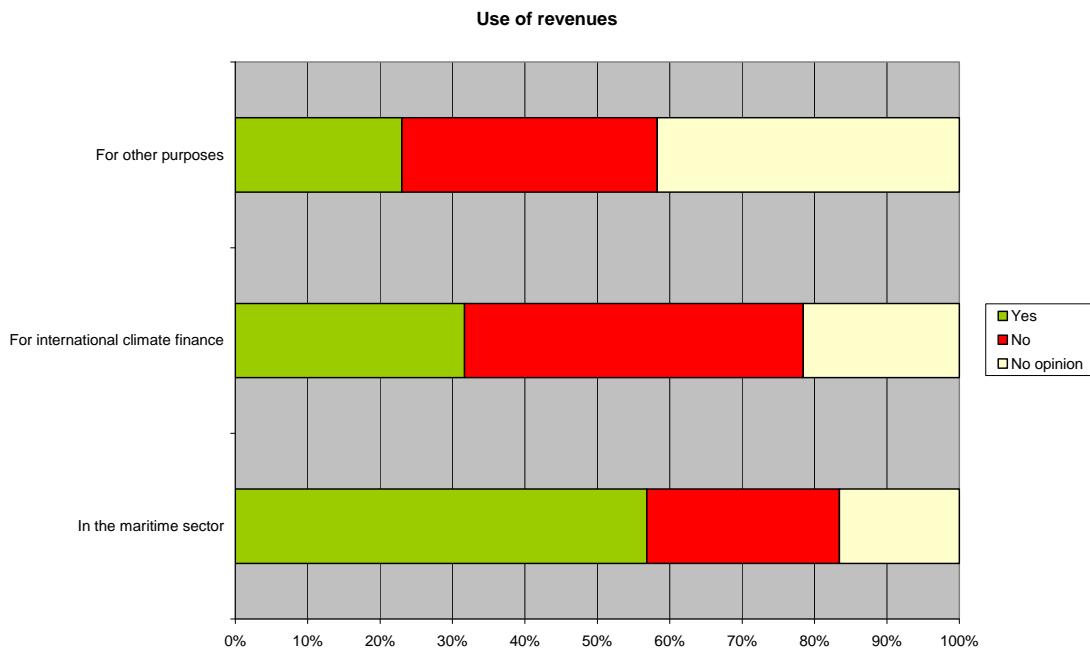
10 respondents, especially ship-operators, also stressed the issue of modal shift, especially for short sea shipping, and evasion.

4.1.2. Use of revenues

A majority of respondents (57%) considered that revenues generated by a market-based measure should be used to tackle climate change and support investments to reduce emissions in the maritime sector, e.g. by improving energy efficiency of the fleet, especially through research and development or by removing market barriers in the maritime sector, especially due to split incentives. One service provider stressed that recycling of revenues in the maritime sector may weaken the polluter pays principle if the revenues are going back to the polluters.

Regarding the use of revenues primarily for international climate change finance, there is no clear prevailing view. The responses varied between 37% in favour and 47% against. However, all NGOs are in favour and they proposed to use at least 50% of the revenues for this purpose, especially for the poorest countries. Moreover, even those respondents which are against primary use for international climate finance recognise the need to use revenues for developing countries in the event of there being a global scheme. The use of revenues from a global scheme for international climate change finance was also seen by 13 respondents as a way to help the IMO to move forward.

Furthermore, the use of revenues for other purposes than tackling climate change and supporting investments to reduce emissions in the maritime sector or financing the international climate change funds, was only supported by 23% of respondents. The respondents in favour argued that the revenues could be used to lower labour taxes or to use for the poorest households who are dealing with increase of energy prices.



More generally, it was stressed that the revenues should be used in accordance with the IMO principle of "no more favourable treatment". 29 respondents considered that the revenues generated from either a regional or global system should be centralised to a single entity (collection point) in charge of its use. Furthermore, even if it is not directly related to an EU measure, 5 respondents underlined that a 'double charge' (i.e. a contribution to the IMO and one to the UNFCCC) should be avoided.

4.2. SCOPE OF A POSSIBLE PROPOSAL

4.2.1. Route coverage

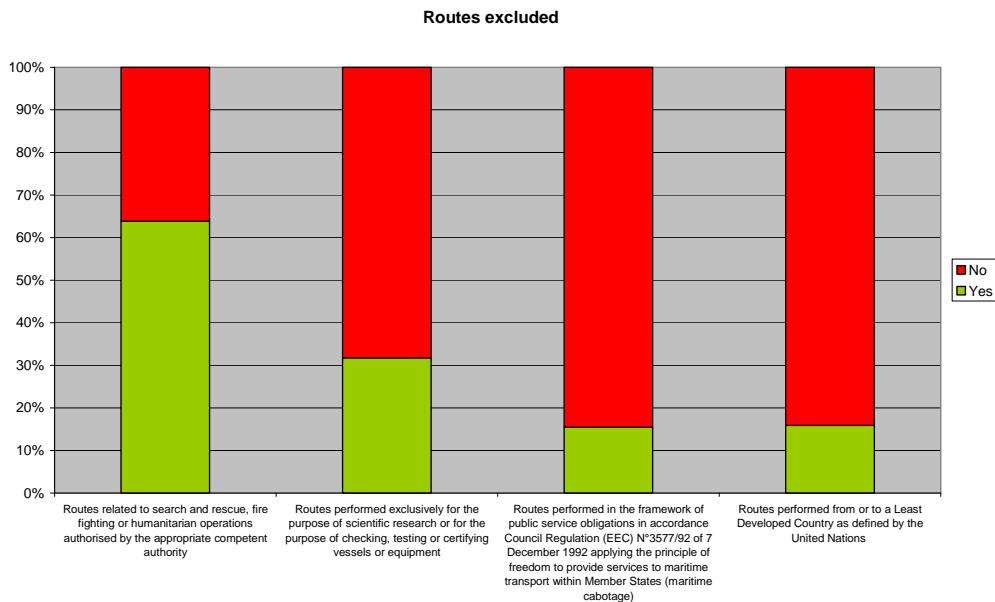
More than 70% of respondents considered that no route to or from European ports should be excluded from the scope, except routes related to search and rescue, fire fighting or humanitarian operations authorised by the appropriate competent authority. Indeed, 37 respondents consider that the exclusion of routes may potentially create market distortions and encourage activity seeking avoidance of the scheme.

3 respondents concerned with short sea shipping urged consideration of either exemption of routes performing public services obligations or exemption of routes in competition with land based transport to avoid modal shift. Respondents from short sea shipping also highlighted that, at present, some routes cannot be performed in the most efficient way regarding GHG emissions as the infrastructure on ports is not yet available, especially as regards LNG, or as the weather conditions are not optimal (e.g. need for ice-breakers).

12 respondents, especially NGOs, also indicated their view that the exclusion of routes from least developed countries makes no sense as some goods coming from least developed

countries may transit by other countries. Therefore, the impact on trade of goods should be assessed.

11 respondents took the view that only routes within the EU should be covered by an EU scheme.



4.2.2. Ships covered

The responses to the questionnaire indicated that European policy action for regulating CO₂ emissions from maritime transport should be applied to all types of vessels or some main types of vessels, such as general cargo, tankers, containers, bulk carriers, refrigerated ships, passenger ships, ferries, fishing ships and military, customs or police ships.

75% of respondents to this question considered that no other categories should be added. 54% of respondents to this question considered that no categories should be excluded. 18 respondents indicated a preference for small emitters to be excluded. The threshold for exclusion suggested was 400 GT (to fit MARPOL requirements), 500 GT or 5000 GT. 5 respondents, especially ship-owners and ship-operators, indicated that the size threshold should be carefully assessed to avoid potential distortion of competition within the categories.

The 46% of respondents considered that some categories of ships should be excluded, and all agreed that fishing ships and military, customs and police ships should be excluded. The exclusion of service vessels and yachts (and more generally all private vessels) was also proposed. Finland mentioned that the specificity of ice-breakers should be taken into consideration.

4.3. RELIANCE ON SHIPPING AT A LOCAL OR REGIONAL LEVEL

The consideration of the reliance on shipping at local or regional level gave balanced results: 52% were in favour of taking the reliance into account, whereas 48% were opposed to the idea. Quite markedly, all local, regional and national public authorities were in favour of taking into consideration the reliance on shipping at local or regional level.

One third of respondents in favour stated that the reliance on shipping of isolated regions, like islands, overseas territories and EU peripheral regions should be considered. 7 respondents, especially NGOs, considered that the level of development of the region should be taken into account, especially for least developed countries and small island developing states. It was also proposed to define the regions according to the risk of modal shift of their trade. One respondent proposed to solve the issue of reliance on shipping by providing grants and loans to local actors.

4.4. EVASION

53% of respondents provided comments on the question of evasion. 39% of respondents considered that there is an important risk of evasion especially in the Baltic sea, in the Mediterranean Sea (and especially around the Strait of Gibraltar) and in the Black sea. 19% of respondents contested the link between the implementation of a regional environmental policy and the loss of competitiveness for maritime actors, which would trigger evasion. One ship-operator stressed that the risk of evasion is pending on the level of the carbon cost, the extra fuel burnt and, eventually on the level of additional port dues and on the cost of transhipment. Two NGOs indicated that evasion would not occur if the charge of the carbon constraint was put on ports, which is an option that has been proposed by Jamaica in the IMO.

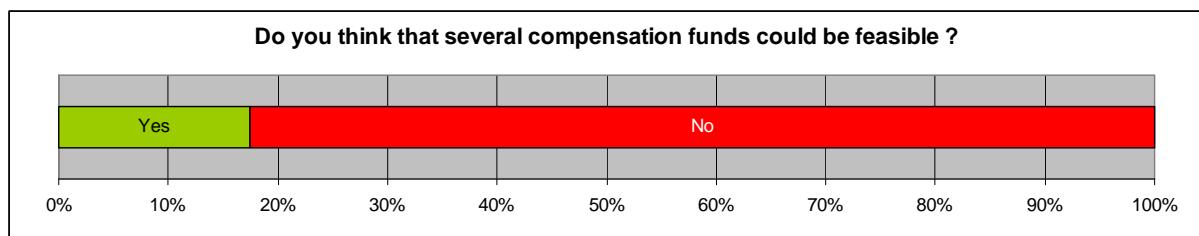
4.5. POLICY OPTIONS

4.5.1. Compensation fund

Management of a compensation fund

68% of respondents considered that any compensation fund should be managed by a public entity. 42% of respondents recommended the IMO or an EU public body. 5% of respondents also recommended management by the industry, but this option raised opposition from the NGOs. The management by national authorities, by the UNFCCC, by a group of stakeholders (industry, EU and Members States) were also mentioned. 16% of respondents underlined the general principle that the fund should be managed by an independent entity. 22% of respondents stressed that the management of the fund should be transparent and independent from political interest. 3 respondents indicated that the management of a fund should depend on the purpose of the fund, in term of revenue recycling. .

Implementation of several compensation funds

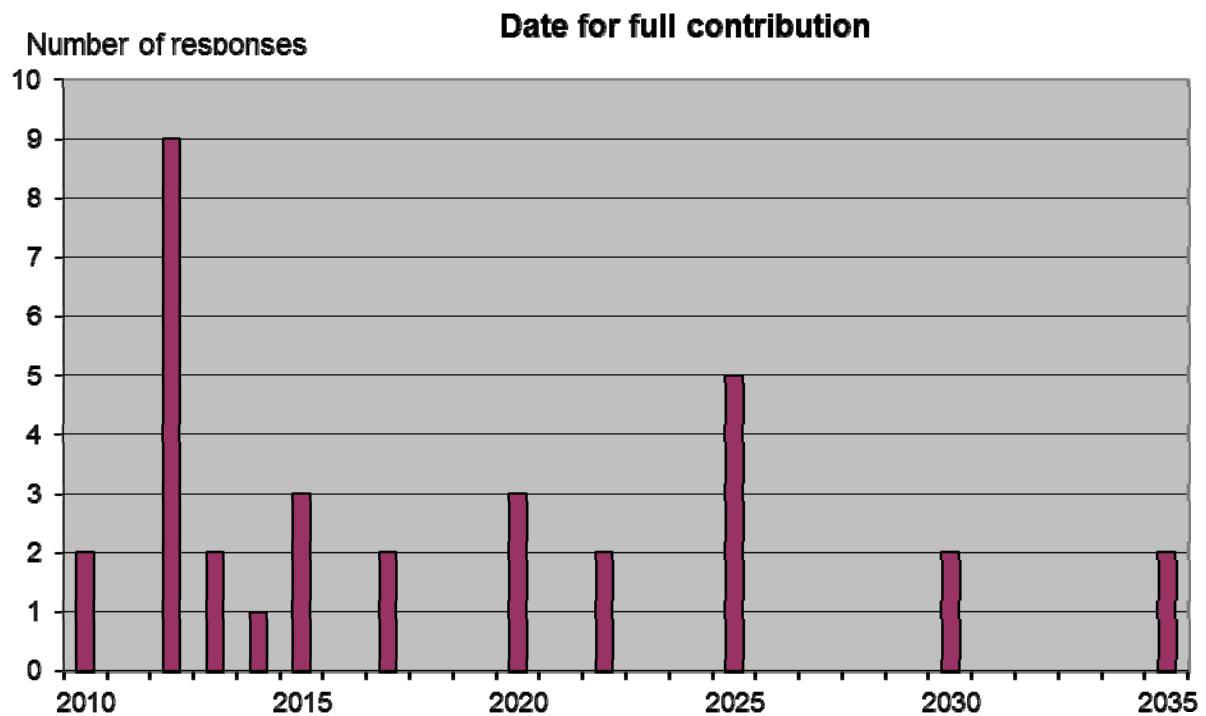


Around 82% of respondents took the view that the existence of several compensation funds would not be feasible. The rationale they mentioned was built from the notion that several compensation funds may create an important administrative burden and market distortions. It was also stated that this could increase the risk of fraud and carbon leakage. The respondents in favour of several compensation funds felt that such a set up could give flexibility to the sector. This group of respondents also recommended to set different funds according to ship types.

Option 1: Contribution-based approach

Under option 1, a contribution has to be paid for each ton of CO₂ emitted falling under the responsibility of the compensation fund. The level of the contribution is driving the level of reduction.

There was no strong majority in favour or against a rebate of the contribution to a compensation fund, in the initial years. 22% are in favour, 33% are against and 45% of the respondents did not answer. Among the respondents in favour of a rebate, there was no strong differences between those preferring a reduction to be based on a percentage of a certain carbon price (75% in favour) or by pre-set levels of contribution in financial terms (60% in favour). Regarding the end of the rebate, there was no clear preference for a particular precise date for reaching a full contribution, and timings between 2010 and 2035 were proposed.



Option 2: Target-based approach

13 respondents considered that penalties should be paid for emissions above the target to ensure compliance. 11 respondents proposed also to use offsets or financial guarantee.

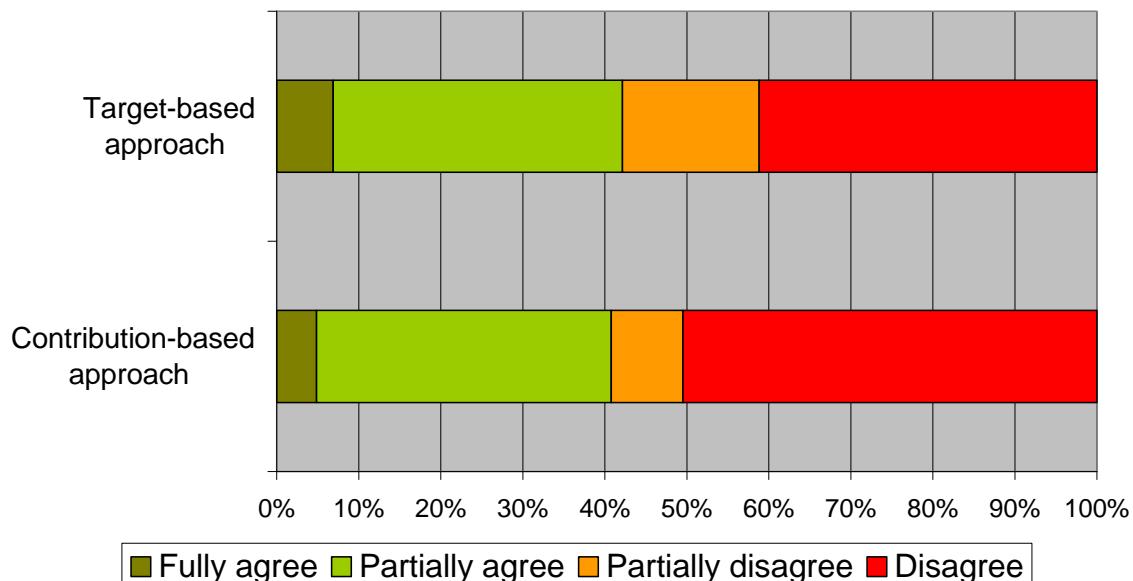
2 respondents indicated that setting a target according to historical emissions is not suitable, as this does not take into account the variability of the shipping emissions due to the variation of trade or due to the weather conditions.

All NGOs stressed that the compliance mechanism has to be robust and ensure environmental integrity. They proposed that a third party controls the achievement of the target. Some shippers mentioned that any such system should foresee benefits for being in compliance. Regarding monitoring, one NGO proposed to use fuel tank monitoring and another participant proposed fuel sellers as the monitoring entity. The Norwegian NOx Fund was mentioned as an example to use for a possible EU measure.

Comparison of option 1 and 2

As shown in the graph below, majority of respondents considered that neither a contribution based compensation fund, nor a target based compensation fund could achieve the emission reduction effectively or efficiently.

Do you consider these options could achieve the emission reduction required effectively and efficiently?



4.5.2. Mandatory emission reduction per ship

The replies to the questionnaire indicated that a target corresponding to a mandatory emission reduction compared to historical transport performance or emissions could be set for each ship calling into in-scope ports. The mandatory emission reduction target could be set as percentage of historical baseline (option 1) or in comparison with an index, such as the Energy Efficiency Design Index (EEDI, option 2).

More than 60% of respondents considered that neither a mandatory emission reduction target set as percentage of an historical baseline (option 1), nor a mandatory emission reduction target set in comparison with an index such as the EEDI (option 2) could achieve the emission reduction effectively or efficiently.

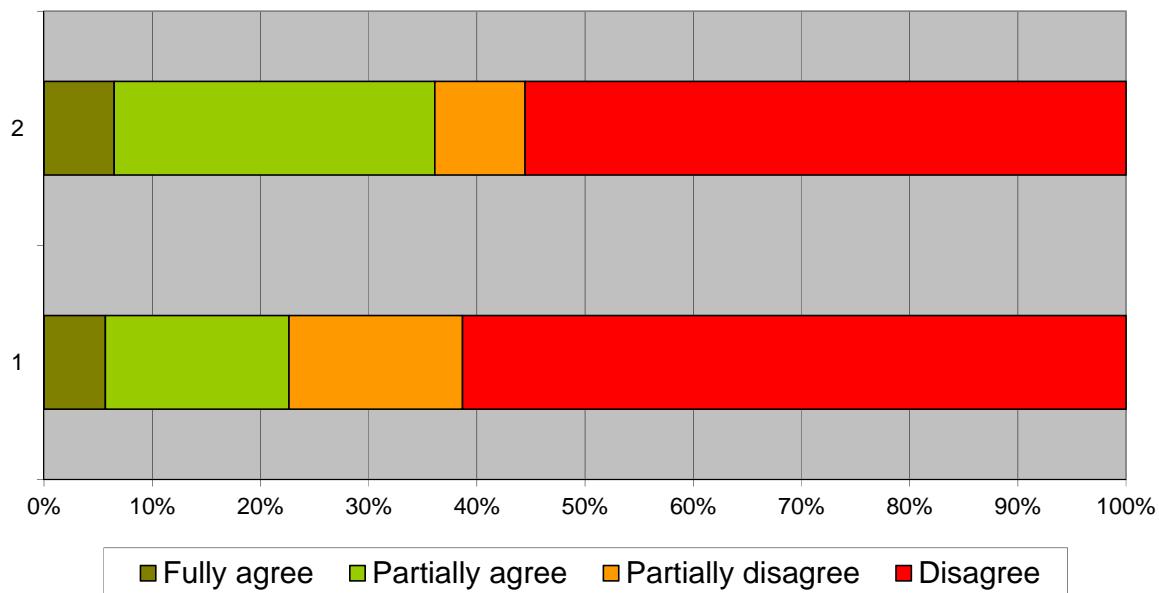
The rational is that a baseline is considered very hard or costly to define. Indeed, most of the respondents are against the use of the EEDI¹⁴⁴ or the Energy Efficiency Operational Indicator (EEOI). Moreover, the administrative burden of setting a baseline is considered as very high due to the number of ships and the multiple parameters, like loading conditions, weather conditions, etc. to be considered.

Some concerns were also raised about the environmental effectiveness of such an option, as no absolute target is set and as the environmental integrity could be challenged by the increase of ships in case of a baseline based on historical emissions.

¹⁴⁴ After the publication of the on-line consultation, the MEPC 63 agreed that the EEDI should not be applied to existing vessels.

16 respondents, especially NGOs, also raised the issue that mandatory emission reductions per ship do not generate revenues.

Do you consider that these options could achieve the emission reduction required effectively or efficiently ?



62% of the respondents considered that the baseline cannot be set on another basis than the two options suggested in the questionnaire, even if some respondents proposed to use speed as a baseline or to consider the Environmental Ship Index.

65% of respondents agreed that a mechanism to reward early movers should be foreseen. It was proposed to consider a differentiation to the pricing of emissions for early movers or some financial incentives (e.g. tax reductions, special grants, etc.). 6 respondents suggest using ETS as a compliance mechanism to trigger benefits for early movers. It was also proposed to differentiate the target according to speed.

Furthermore, 73% of respondents consider that a mechanism that creates incentives to go beyond the mandatory emission reduction should be explored. 16 respondents proposed to develop a baseline and credit emission trading scheme for this purpose. 35 respondents proposed to set the baseline according to speed. 10 respondents proposed to introduce financial incentives, either through reductions in the pricing of emissions or of ports dues, or through special grants, while 16 respondents proposed to introduce energy efficiency labelling.

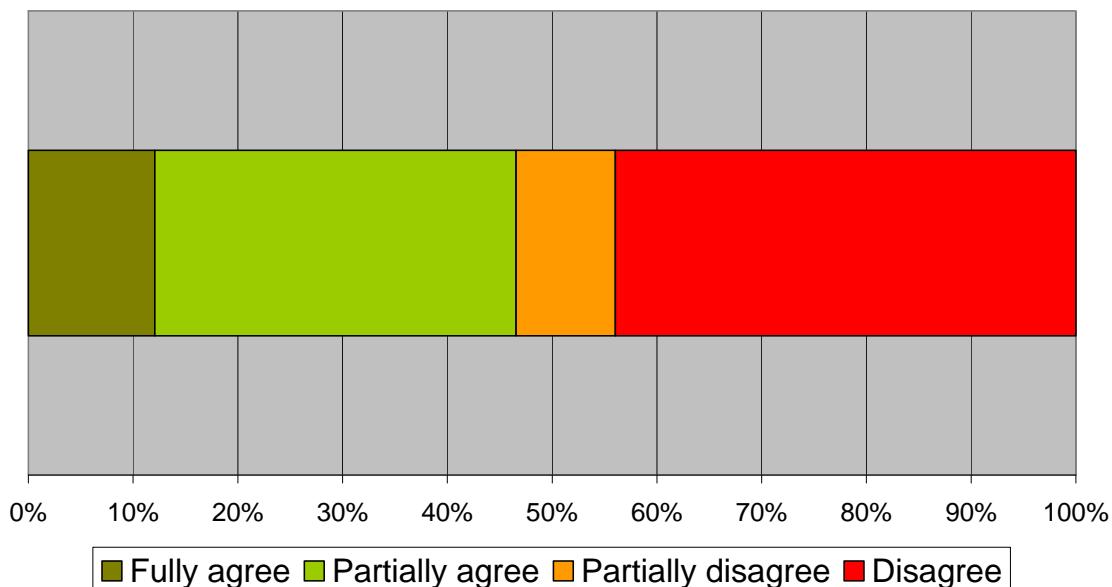
4.5.3. ETS

Regarding the effectiveness and the efficiency of an ETS to achieve the emission reduction required, the opinion of respondents is balanced. 46% of respondents considered that an ETS

can provide the right signal to reduce GHG emissions from shipping if using an absolute cap. Those respondents also stressed that ETS gives flexibility to achieve the emission reduction. 44% of respondents, especially from ship-operators and ship-owners, were concerned at the perceived administrative burden of an ETS. The same group of respondents also mentioned that a regional ETS may not be internationally well-received. Regarding the cost of an ETS, shippers expected pass-through of costs even in a case there were free allocations given. 27% of respondents from various categories considered that the ETS is the least costly mechanism if emission reductions need to be made.

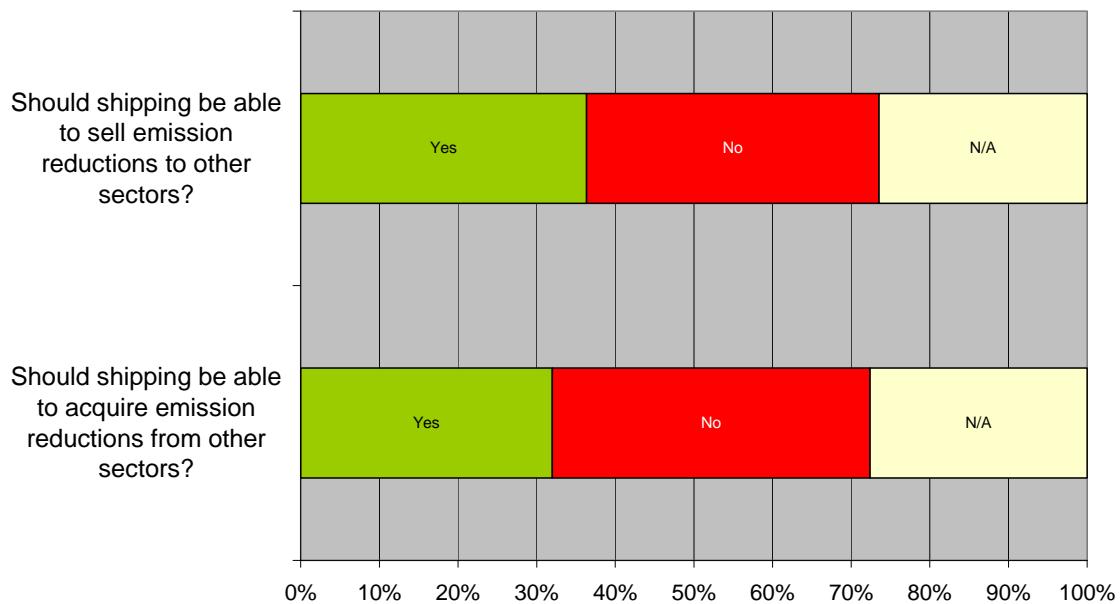
15 respondents, especially NGOs and individuals, noted that the environmental outcome of an ETS depends on the level of the cap. It was stressed that a reliable monitoring and reporting scheme was needed, as well as a mechanism to ensure effective compliance.

Do you consider that an ETS could achieve the emission reduction required effectively and efficiently?

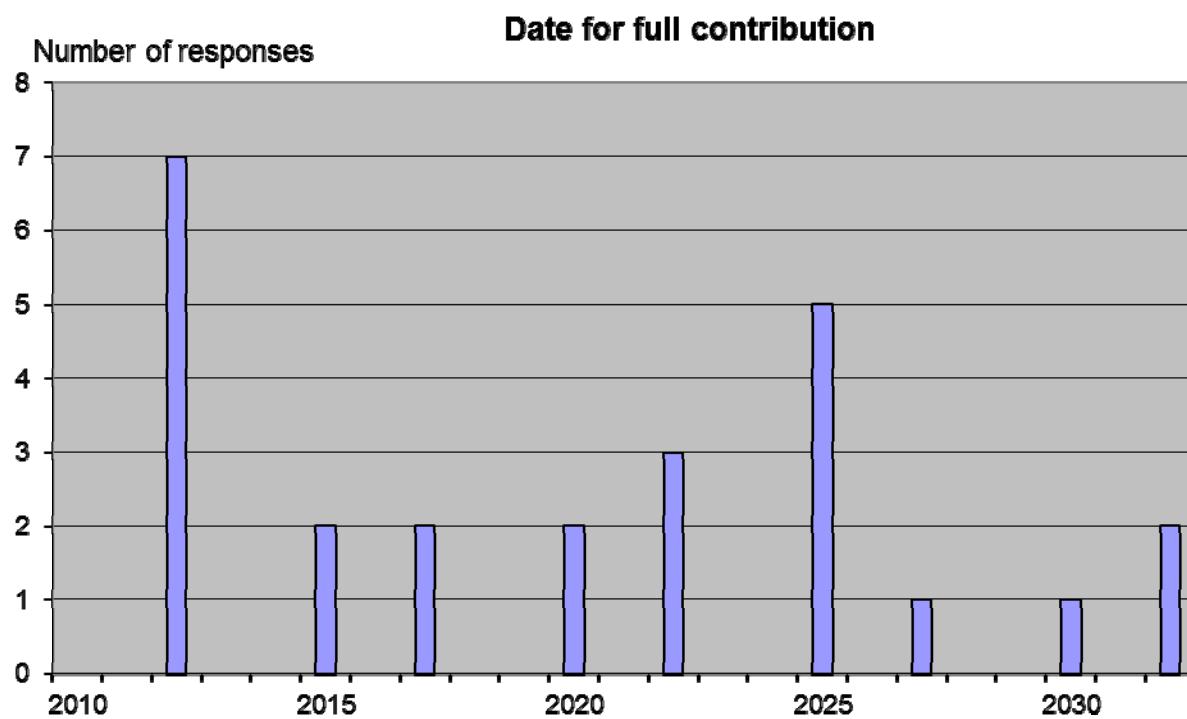


Regarding potential linking with other sectors, the responses were fairly evenly split. On the one hand, 43% of respondents, especially from ship-owners and ship-operators, supported the linking of a maritime ETS with other sectors, as it would enable access to cheaper emissions reductions, ensure equal contributions with other sectors and allowing shipping activity to grow even where this leads to an increase in absolute emissions (as reductions can be bought from other sectors). On the other hand, 45% of respondents, especially NGOs, considered that emission reduction should be done in-sector as the maritime sector can implement measures with negative abatement costs. Potential variation of carbon price worried 16 respondents. 2 respondents mentioned that the ETS should be designed to avoid windfall gains for specific categories of vessels. Some NGOs highlighted that the use of CDM should not be unrestricted.

Linking with other sectors



Regarding potential financial support to the shipping industry (either directly as free allowances or some of the revenue generated from allowances) by an emission trading system, the replies in favour or against were evenly split: 29% were in favour, 29% were against and 42% of the respondents did not answer. Regarding the end of potential financial support to the shipping industry, there was no clear preference on a precise date for full contribution, with dates for reaching a full contribution spanning between 2012 and 2032.



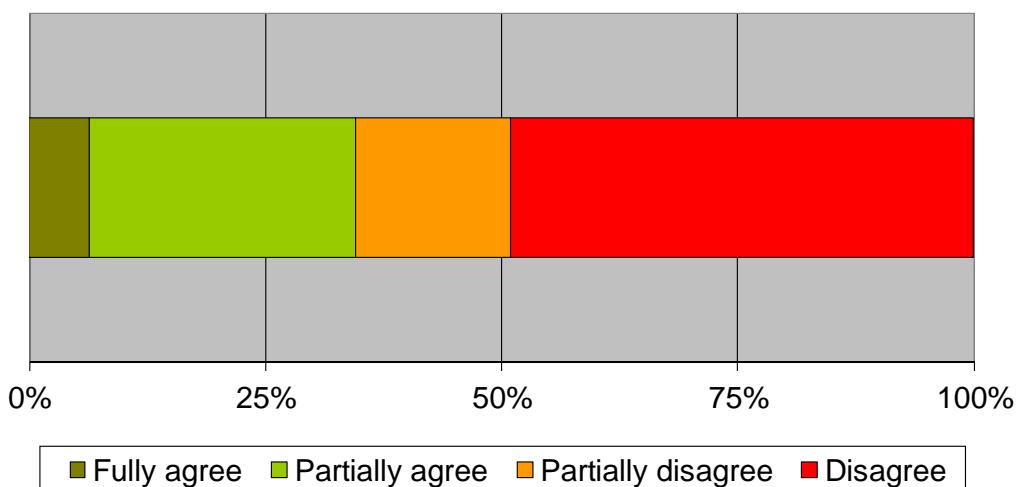
4.5.4. Tax

Tax on fuel

71% of respondents considered that the evasion risk regarding the implementation of a tax on fuel at a regional level cannot be avoided. 16 respondents in favour of a tax on fuel considered that it could be applied as a measure directed to the smallest ships, as a supplementary policy instrument of an ETS or a compensation fund. 4 respondents stressed that this option would be fully applicable if it were possible to be applied globally.

49% of respondents indicated that a tax on fuel could not achieve the emission reduction required effectively and efficiently. The main concern raised was related to the fact that no revenues of a taxation system would be earmarked for any purpose. Moreover, the environmental output is highly uncertain, especially regarding the risk of evasion, but also due to the fact that there is no cap on emissions. Furthermore, 12 respondents from various categories expressed their doubts regarding the economical effectiveness. In particular, it was mentioned that some competition distortion could be triggered if different levels of taxes are set by Member States or if the level of the tax triggers some modal shift. One service provider indicated that the effectiveness could be solved by the introduction of progressivity (the tax should be high when the fuel price are low and low when the fuel prices are high). One individual mentioned that if a tax on fuel was introduced the type of fuel should be considered (biofuel/fossil fuel/blended).

Do you consider that a tax on fuel could achieve the emission reduction required effectively and efficiently ?

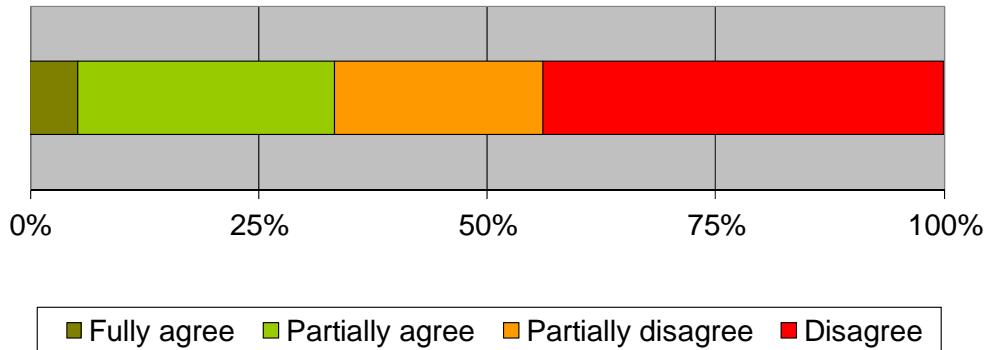


Tax on emissions

44% of respondents indicated that a tax on emissions could not achieve the emission reduction required effectively and efficiently. 31 respondents from various categories

considered that the risk of evasion is lower for a tax on emissions than for a tax on fuel. However, 15 respondents from various categories indicated that the administrative burden may be higher for the ships and the public authorities. Two NGOs indicated that a tax on emissions should avoid adverse effects on least developed countries. One individual mentioned that ships operating in specific weather conditions should be taken into account.

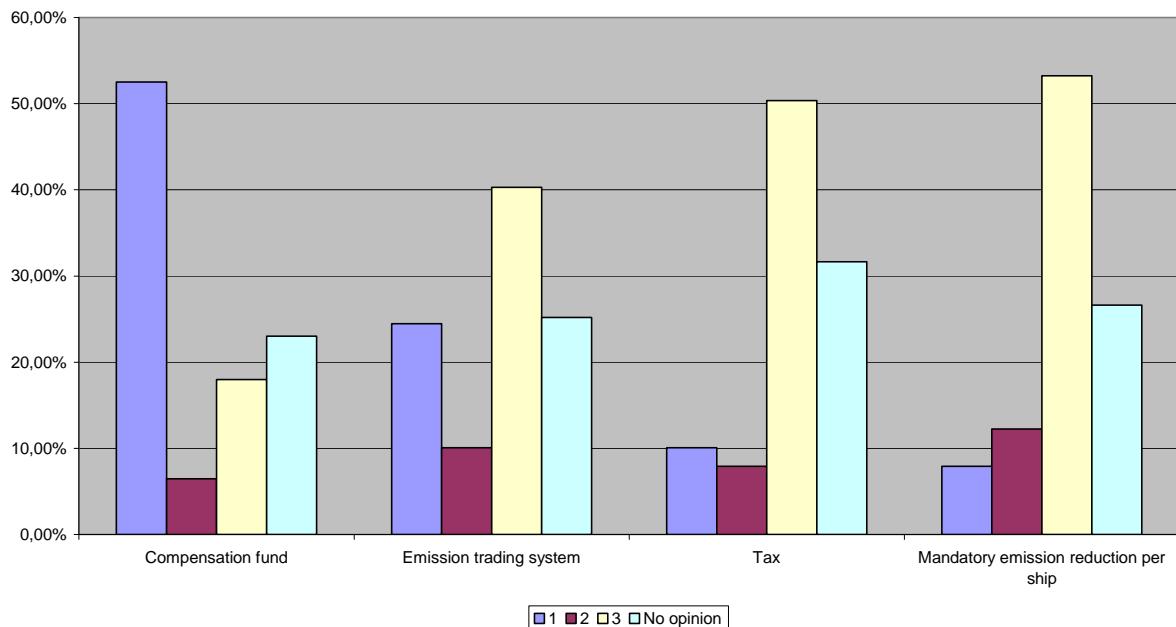
**Do you consider that a tax on emissions could achieve
the emission reduction required effectively and
efficiently?**



4.6. CHOICE OF POLICY OPTIONS

Regarding the promotion of progress at the IMO, a measure comprising a "compensation fund" received the highest support, with 53% of respondents ranking this option as the most preferred one. An ETS measure was considered as the most preferred option by 24% of respondents, while a tax was considered as the most preferred option by 10% and mandatory emission reduction per ship was considered as the most preferred option by only 8%. As a consequence, the tax option and the mandatory emission reduction per ship were considered as less preferred options by more than 50% of the respondents. The level of respondents with no opinion is almost the same for any option.

Which of these options for an EU proposal could be better to promote progress at the IMO (rank from 1 (preferred) to 3) ?

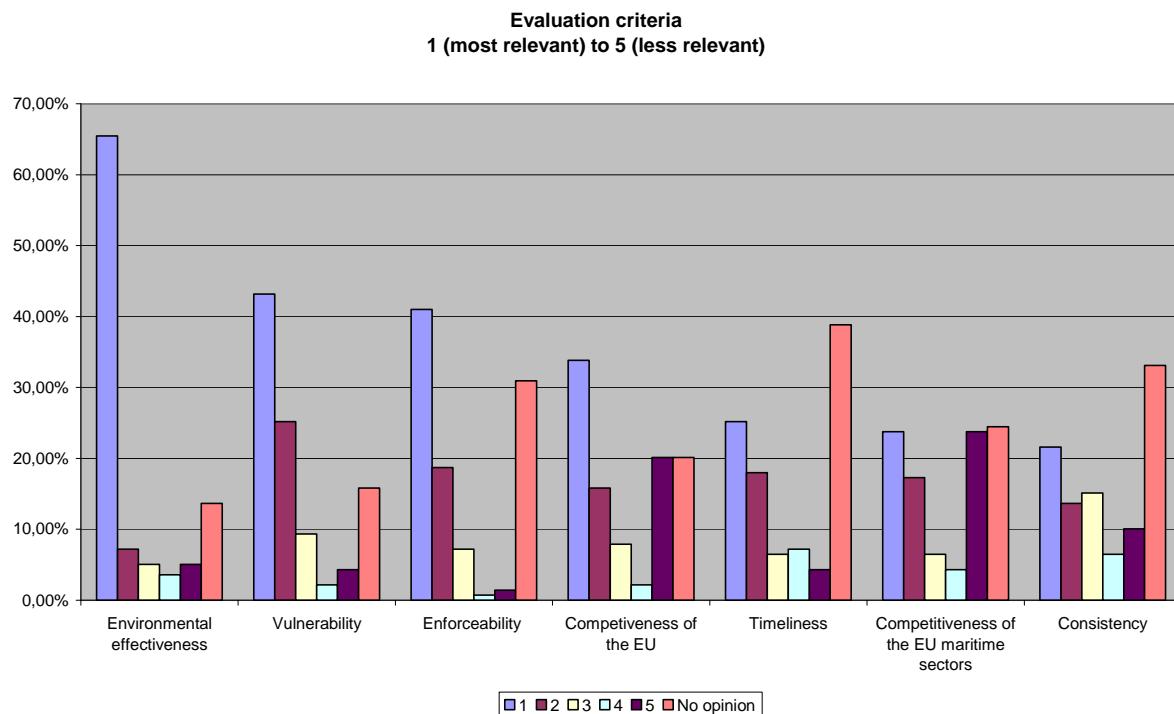


The questionnaire identified the following criteria that could be taken into account for the evaluation of possible EU measures:

- Environmental effectiveness (ensure effective emission reduction in line with the 2°C objective)
- Maintaining and enhancing competitiveness
- Maintain competitiveness of the EU maritime sectors through both first mover advantage and by providing incentives to increase fuel efficiency
- Enforceability (Ensure appropriate monitoring, reporting and verification while keeping administrative burden to the minimum)
- Consistency with the related EU policies
- Vulnerability: Exposure to/Risk of evasion
- Timeliness (Consistency with timing of application of measures and interaction with policy progress in international fora)

The environmental effectiveness of a possible EU measure was considered the most relevant criterion by 65% of the respondents. Other criteria to determine the choice of the policy option considered as most relevant or relevant by a majority of respondents were the vulnerability of the legislation, its enforceability and the impact on competitiveness of the EU economy.

The other proposed criteria (timeliness, competitiveness of the EU maritime sector and consistency with the related EU measures) were regarded as less important for the choice of the policy option.



46% of respondents considered that other criteria should be used to choose the policy option and 44% had no opinion on this. The additional criteria mentioned were the ability to generate revenues, the effects on least developed countries, the ability to provide a stepping stone to an effective global carbon pricing arrangement, the affordability to vessels operators/owners and the risk of modal shift. Regarding revenue generation, the contribution to the international climate finance is proposed to be between 2.7% and 50% or more of the revenues.

29 respondents, especially ship-owners and ship-operators, recalled the nine principles agreed by IMO to define a market based measures and indicated that an EU proposal should be assessed against these criteria. One respondent indicated that the criteria proposed in the questionnaire were sufficient as the nine principles of the IMO are included in.

Regarding the potential use of international credits (e.g. from the Clean Development Mechanism) for compliance, the opinions were split as 50% of respondents were in favour and 50% against. 22 respondents, especially from NGOs, indicated that they were not in favour of offsets, as some measures with negative abatement costs are available in the maritime sector. However, 13 others indicated that it could give flexibility for the maritime sector to achieve its target.

Regarding the same approach to use of the international credits as for other sectors, views were evenly split (49% of respondents for, 51% against). A key issue mentioned was related to the quality of international credits.

4.7. GENERAL COMMENTS

Under this section, many respondents reiterated their strong support or their strong opposition to regional EU action. As could be anticipated, many of the ship-owners and ship operators took the view that the IMO deliveries, i.e. the EEDI and the SEEMP, are sufficient or felt confident that the IMO would be able to deliver an MBM in the 'short term'. In such context, this group of respondents were of the opinion that the EU should not act. One ship-owner representative proposed that there should be a sunset provision under an EU regulation. On the contrary, many equipment manufacturers, the environmental NGOs and some ship-owners and ship-operators considered that an EU proposal would be a desirable stepping stone for further action at global level.

The importance of ensuring the same level playing field for all maritime actors was emphasised by the bulk of the respondents. 16 respondents further mentioned that any future scheme should be designed in a way that would provide predictability for planning future economic actions. The option of basing a future scheme on incentives and not on penalties was also put forward by 3 respondents in this section.

Many NGOs emphasised that revenues should be provided from shipping for international climate finance and especially for least developed countries. On the contrary, most ship-owners, ship-operators and equipment manufacturers took the view that the revenues raised should be used to finance research and development in the maritime sector and to implement new green technologies.

One port and one individual were of the opinion that the maritime sector was already struggling due to the implementation of the MARPOL Annex VI related to sulphur content of fuels.

Some international partners (US, Canada and Japan) indicated their strong desire to accelerate discussions in IMO, and to work together with the EU and preferred the EU postponing market-based measures and focussing efforts on a common global proposal.

5. GENERAL CONCLUSIONS

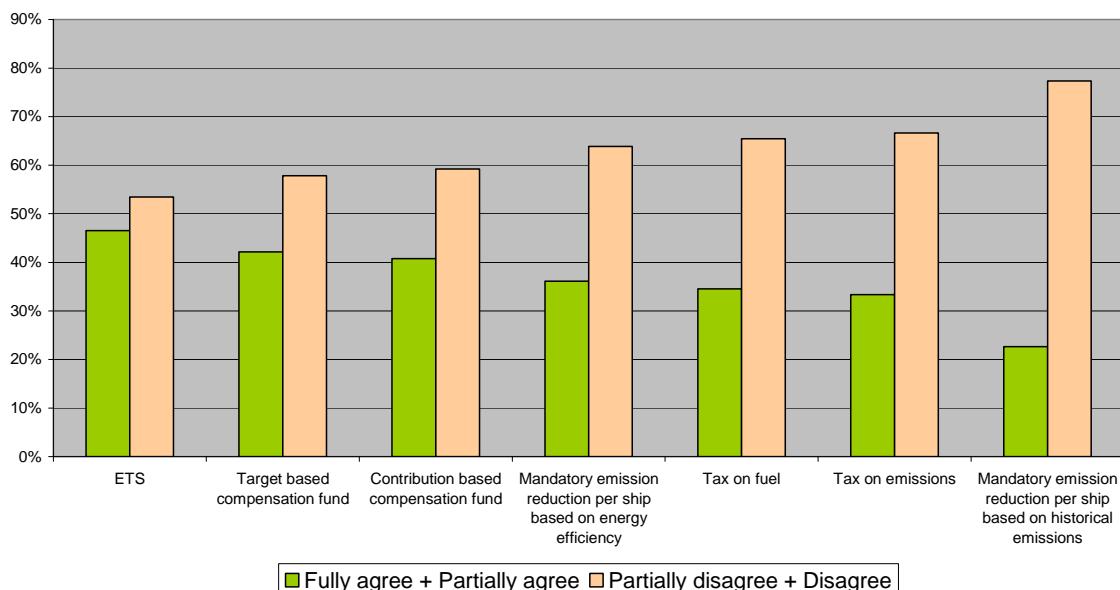
The responses to the consultations carried out clearly illustrate that respondents agree that a global agreement in the IMO remains the best long term option to achieve GHG emissions reduction of the shipping sector. The views on the contribution of an EU proposal to this process differ. In the event of a European measure, there appears to be general agreement that securing a level playing field for all ships using ports in the EU should be a central priority.

Views also converge in so far that any market-based measure, whether adopted at EU or IMO level and whether it is a tax, a compensation fund or an ETS, should have transparent and robust monitoring of emissions. It was further felt that the monitoring approach to be applied should avoid undue administrative burdens and ensure accurate reporting results.

In general, the position taken by the respondent groups reflected their expected interests. Shippers raised concerns about a possible pass-through of cost even if there were free allocations or other subsidy measures, which could lead to an increase of freight rates; representatives of the short sea shipping focused on the risk of modal shift; ship-owners and ship-operators stressed primarily the issue of affordability; the equipment manufacturers mentioned the benefits for the implementation of green technologies. Public authorities generally wish to limit administrative burden. NGOs indicated that the use of revenues from maritime was an important way to provide climate change funding to the least developed countries.

Regarding the different options proposed, respondents indicated that the two most preferred ones would be the compensation fund (with the target- and contributions-based sub-options) and the ETS. An ETS was considered as the most effective and efficient option to achieve the emission reduction required, with a compensation funds considered the second most effective and efficient policy measure in this context. Establishing a compensation fund was considered as being better to promote progress at the IMO, while the establishment of an ETS was considered as the second most effective option to promote progress at the IMO.

Do you consider that these options could achieve the emission reduction required effectively and efficiently?



The feedback on the effectiveness and efficiency of the policy options confirmed that a number of ship owners and operators, making up the majority of the respondents, are sceptical regarding all market-based measures.

This consultation provides an input to the Commission's impact assessment work.

ANNEX IV - MINUTES OF THE ECCP MEETINGS

1st Meeting

REDUCING GREENHOUSE GAS EMISSIONS FROM SHIPS

MINUTES OF THE FIRST MEETING OF THE SHIPS WORKING (WG Ships) GROUP 6

HELD ON 8 & 9 February 2011

at the Albert Borschette Building, BRUSSELS

These minutes summarise the discussions in the first meeting of the ECCP Working Group on ships. The group was set up to provide input to the Commission in its work to develop and assess options for the inclusion of international maritime transport in the EU's GHG reduction commitment should there be no sufficient international agreement addressing these emissions. The ECCP brings together all relevant stakeholders, to discuss and prepare the further developments of the EU and the modalities of reducing GHG emissions from ships.

This meeting is the first of a series of three meetings foreseen to consider a list of topics important to the maritime sector and focused on scope, monitoring and enforcement.

All presentations referred to below are available, as well as a list of organisations represented in the group at: http://ec.europa.eu/clima/documentation/eccp/second_stakeholder_en.htm

These minutes record the views expressed by representatives present in the Group.

For the next ECCP

It was requested that the background material be sent earlier (BE, DE, DK, NL, INTERTANKO) and that the dates of the second ECCP be changed to avoid overlap with IMO and UNFCCC meetings. FI suggested that the 3rd meeting be held after MEPC 62. WSC and others requested a set of scope scenarios to discuss. IETA also requested additional time to discuss reporting, verification and enforcement (before evasion). Commission Representatives agreed that a number of issues such as scope could be re-opened at a subsequent session.

Shipping GHG emissions and the IMO

The majority of participants stated that the priority should be to aim for a global agreement reached at the IMO level (FI, DE, NL, GR, INTERTANKO, ECSA, SE, T&E, WSC, CY, ESC, UK, ECC, Seas at risk, DK, MT, FR, IMO, CESA, NO, IR). The Commission also stated its strong preference for an effective global agreement and stated clearly that an IMO or UNFCCC measure should be adopted which includes maritime transport emissions in reduction commitments. The ECCP forum is a way for stakeholders to express their views at a level of detail that will help measures to make sense, whatever the fora for their implementation.

NGO T&E stressed the need to cover maritime emissions, as aviation emissions will soon be fully covered by the EU ETS. T&E also called upon the 5 EU MS that have not ratified MARPOL Annex

VI to do so ASAP (T &E, NO) and with regards the Energy Efficiency Design Index (EEDI), to strengthen the EU voice behind its adoption.

Views on regional action

Following an initial presentation, participants made the following points regarding the specificities of any potential regional measure:

- Consistent with 9 IMO principles (DK, ECC, NL)
- Based on existing IMO tools and documentation as this will facilitate expansion into a global scheme (ECC, NL, MT, CESA, BIMCO, NO, EMSA)
- Importance for 'expandability' into an IMO scheme. A replicable regional measure would mean that different measures adopted in various parts of the world could fit together. (SE, CY)
- Flag neutral & avoid distortion of competition (BIMCO, WSC, NL, DK, MT)
- Minimum administrative burden (ESC, NL)
- Favouring incentives rather than sticks (ESC)
- Be adopted fast (NL)
- Start with a phase-in approach (IMO, NL, NO, EMSA)
- Cover a large volume of emissions (SE, Sea at risk)
- Fair and equitable measures which will not impact negatively on competitiveness (FR, ESC) and will prevent evasion (DE, NL) as well as carbon leakage (FR)

Scope Discussion

After an opening presentation, stakeholders exchanged views on the different aspects of scope:

Type of GHG emissions - the IMO Secretariat, NL and FI proposed to cover CO₂ (initially – NL, FI). NGO T&E stressed the importance to cover black carbon, a potent GHG and NOx emissions as these cause major eutrophication problems. Even though extensive efforts have gone into targeting NOx emissions from land based sources, no efforts have gone into addressing those coming from shipping. On this point, Commission representatives explained the planned revision of the Sulphur Directive.

Geographical Scope - NGO Seas at Risk, as well as SE, argued for the largest coverage possible to avoid market distortion (DE). MT stressed the importance to study this topic more extensively.

The WSC, CY and NO, suggested that an EU measure should rely on a port entry based system, rather than a time or distance based one (CY, NO). The WSC explained that a time

based measure would be difficult to apply in practice and that more analysis on the workability of such an approach is needed (WSC, BE, UK). Similarly, the distance based scheme has difficulties but precedents are available (WSC).

IE suggested a hybrid scheme covering ships that bunker in the EU vs. all other ships. MT suggested different measures for different scope boundaries in a staggering manner. Similarly, Business Europe favoured various instruments for intra EU, inland and outside EU shipping.

Liable entity responsible for covering emissions – Different views were expressed as to who should be the liable entity. CY suggested the registered owner and for non EU flagged vessels the use of Internal Safety Management Code (ISM Code) manager; CY will provide written comments to all participants with explanations. IE suggested the registered operator rather than the owner. SE suggested a hybrid scheme, with an upstream and downstream approach for ships not buying emissions by covered suppliers. MT suggested considering a combination of measures applicable differently to intra-EU shipping and ships going/coming from third countries.

EUROPIA had a different opinion and expressed its preference for a downstream approach, stating that marine fuel suppliers should not be involved. EUROPIA suggested that the liable entity be the one responsible and/or having an influence on emissions reductions. This was also supported by FI and SE. ECSA suggested using the management company and the use of compliance documents showing the person in charge of safety.

Type of Ships – Different views were expressed with regards which type of ships should be covered.

NL suggested the coverage of as many ships as possible but stated the need for further information and analysis. Similarly, SE explained that smaller ships should not be exempted to protect intra-EU shipping competition, but also because relatively small ships are large emitters. A hybrid system was suggested (upstream for smaller ships, and downstream for larger one). EMSA also supported the hybrid approach suggested by SE.

A large group of participants was in favour of covering larger ships above a certain threshold.

The WSC, the IMO Secretariat and SI proposed to target large ships at first, as covering small ships could be extremely burdensome (WSC, IETA) and could lead to modal shift (IMO, ECSA). Also, by addressing larger ships first, it will be possible to assess the scheme's monitoring capabilities/difficulties (SI). A different measure could then be developed for smaller ships (BIMCO). The IMO Secretariat proposed the use of a high tonnage threshold and BIMCO suggested the IMO thresholds (thereby making the system expandable into a global measure). The UK added that the '*de minimis*' threshold should not compromise the environmental effectiveness of the scheme – for instance a 500Gt threshold could be used, as stated in the CE DELFT report, 97% of emissions in 2006 were produced by ships above 500Gt. Commission representatives noted that 80% of emissions come from ships above 5000gt. EMSA also suggested the use of IMO thresholds including MARPOL and SOLAS.

However, a threshold based system could incentivise shipbuilders to build ships below that threshold (WSC). Also, IACS expressed their concern about underpowered ships being produced: there is a need to be able to keep going in heavy weather.

Legal aspects – certain participants raised concerns regarding the legal aspects of a regional scheme, especially if based on port entry (UK, BIMCO, WSC, BE, CY). However, NGO Seas at Risk and CY stated that most legal issues could be overcome. They gave some example such as the US Oil Pollution Act (OPA). Commission representatives observed that partial coverage of industry was precedent. In a recent ECJ case (Arcelor case C-127/07), the Court ruled that provided the regulator extends coverage over time, a portion of the sector may be covered at first.

Speed Limit Approach – NGOS were very supportive of this approach versus the industry which raised many concerns.

NGO Seas at Risk suggested the need for a speed limit imposed as a mandatory requirement to port entry, and as a potential complementary measure to a MBM. Slow steaming would help ships meet their operational EEDI and lead to actual in-sector reductions. This view was supported by NGO T&E confirming that slow steaming leads to immediate emissions reductions. Even though more ships might be required, the CO₂ gain will remain significant. Seas at Risk is currently organizing a study looking at speed limits, regionally, globally, and at contract and chartering aspects.

IE and FI explained their heavy reliance on shipping for imports and exports (95% of trade to Ireland is via ships). In this context, they both expressed their dislike towards this approach. FI explained that the increase in ships needed to compensate for the slower steaming, in combination with the heavy winter conditions, would increase GHG emissions significantly. The ECC explained that in addition to the increase in emissions, the need for more ships would mean additional crew would be required; currently the market lacks maritime crew. BIMCO added that slow steaming impacts the logistics chain negatively and that it is already done during fuel price increases. ECSA's concern was that a speed limit would lead to modal shift to aviation. SE explained that a speed limit could not be applicable on RORO and passenger ships as these are designed to run on specific schedules that allow a specific amount of trips per day. The ESC expressed concerns over resulting lower lead times. ESC therefore proposed that slow steaming be applied on a voluntary basis only (ESC, BIMCO).

MBM, technical or operational measures - NGO T&E stated that shipping should explore every possible avenue for emissions reductions (technical, operational and MBM). They urged the Commission to keep considering all possibilities and that a technical measure could influence the IMO members to act prompter. T&E also suggested fuel taxation in Europe. For a regional scheme, the IMO Secretariat favoured an MBM stating that it would be more difficult to introduce operational and technical measures regionally. For example, the implementation of an operational measure requires a change of culture on board the ship – this is more difficult than to require ship operators to pay a fee. Similarly, it is more difficult to regulate the construction and design of ships regionally. The IMO Secretariat concluded

that technical conditions could be set but these would certainly be less straightforward than an MBM.

Many other participants also agreed that all technical regulatory aspects should be dealt with by the IMO (NO, INTEMANAGER, OCIMF, MT). The importance of technology was also stressed by CESA, stating that as shown by DNV and the IMO studies, technological and operational measures combined provide net benefits to the operator. IACS added that any technical measure should be solely technically based and not politically driven (i.e. double hull).

Need for additional data - Many participants stated the need for additional data and examination of data. Data is needed about the composition of ship size/fraction/thresholds within Europe and segregate who comes from trans-oceanic voyages (WSC). FI requested that COM provides more information at the next meeting on the distribution of emissions (intra-EU / domestic / third countries) and per type of shipping (FI, Business Europe). This will also help determine which types of ships should be covered (IETA). (NB. The COM is intending to provide such information to the second ECCP meeting)

Concluding comments by the Chair

Stakeholders

- Accept the urgent need to tackle climate change
- Strongly prefer a global solution
- Suggest building on existing scope/categories rather than reinventing the wheel
- Suggest focus on CO₂ initially
- Strongly support a flag neutral application
- Suggest port state control as a possible way of administering/enforcing
- Suggest a MBM is more appropriate for regional action than technical or operational measures

Monitoring

Following the EEA's presentation, Commission representatives made a brief presentation on monitoring and stressed its importance for ensuring successful implementation. FI supported this statement by quoting an IMO expert group report stating that "the integrity of an MBM depends on robust monitoring".

Two monitoring options were examined:

- Option 1 - Inventory control based on the log books or Bunker Delivery Notes (hereafter BDN). Use of emissions factors. 5% margin of error.
- Option 2: A direct measurement approach with a fuel consumption monitoring system.

The following points were then made by the stakeholders:

Data availability - NL stated that fuel consumption data is simple to gather as the crew normally measure and report fuel consumption on a daily basis. NL explained that the data may be inaccurate at times but that all technical issues preventing accurate data collection could be tackled. It was added that if the EEDI became adopted, ship operators would be very keen to have accurate information.

ECSA stated that there are many possible ways to monitor emissions but these are time consuming. From the technological/hardware side, CESA and INTERMANAGER confirmed that fuel consumption can be measured precisely. CESA explained that ship operators operating their own ship, are very keen in investing in monitoring equipment and that the uncertainties in the data originate from the lack of legal requirements and enforcement. In this context, SI expressed its contentment over the industry acknowledging full technical possibility to monitor its emissions and added that in combination with political will, progress could be made. For the dredging sector, fuel consumption depends on the activity and is straightforward to measure (what goes in, goes out). However, with the emissions, alterations are common depending on engine performance (EUDA).

The method to gather data - INTERMANAGER stated that from an operational point of view many indicators could be used for monitoring (data that gives indication on the tuning of the engines). This should be considered, as many factors (wind, waves etc) influence fuel consumption data and create uncertainties and inaccuracies. EMSA suggested the use of existing EU monitoring tools. Moreover that the EU Member States could as a condition to port entry, require data reporting.

IBIA explained that inaccuracies are common in fuel consumption data and therefore suggested emissions monitoring rather than fuel. Finally, the question of how precise we would want to be was raised (IBIA, IETA). The UK favoured the use of current available data and stated that a 5% margin for error sounds acceptable (Option 1). In the context of Option 1, BIMCO added that the IMO emissions factors should be used, as the industry is familiar with them and knows how they work. With the Fuel Quality Directive, upstream CO₂ emissions are known for the power sector. It is however complicated to track the emissions based on marine fuel supply distribution. EUROPIA therefore favoured emissions calculation based on factor emissions (Option 1).

The IMO Secretariat favoured Option 2 (direct measurement) and added that a ship calling regularly at an EU port, when subject to an emissions reduction measure, might choose to invest in a reliable emissions monitoring equipment. A ship that rarely calls at an EU port may prefer to pay a standard fee.

Entity responsible for reporting fuel consumption - SE stated that the shipowner should report fuel consumption by providing a declaration, i.e. like the Norwegian tax which has a declaration system and makes use of the BDNs and the log books; ships prove they emitted less than the benchmark (IMO). EMSA added that with such a system which looks at the level of the single ship, the declaration data could then be compared with the bunker fuel sale statistics.

Reporting of fuel consumption - The IMO Secretariat explained that there is no legal requirement for ships to report their emissions. A 2008 IMO Secretariat proposal to introduce mandatory reporting of fuel consumption was turned down by the IMO Member States at the time. While it was recognized that fuel consumption data could be seized on every ship, IMO Member States objected to data collection for two main reasons:

- the resulting burden for management companies and the large flag states
- commercial confidentiality issues.

There is no plan by the IMO to raise this proposal again in the foreseeable future (IMO).

ECSA mentioned a voluntary reporting exercise which was carried out in Hamburg. Help/info could be requested from them. To minimise administrative burden, SE proposed that ships which run frequently between two ports, only report their fuel consumption once a month. Moreover, incentives could be offered to enhance accurate reporting and compliance. For the other ships (whether the scheme be route based or time based) a default value/price could be set.

EUDA suggested looking at the work of DG Enterprise on technical aspects. Moreover, EUDA requested that any measure adopted, create durable modification of the maritime market which will require all maritime stakeholders to change. DG CLIMA asked how the data collected at ship level could be consolidated and accurately reported for verification.

Verification - IETA pointed out the difference between the term verification when used in relation to GHG inventories and when used in relation to technology. Technological verification is done differently.

Upstream or Downstream - SE favoured an upstream approach in which shipowners would declare if the emissions bought were bought from a covered company. T&E explained that 50% of EU shipping emissions come from intra EU shipping and suggested ships be divided between the 'blue ships' which would be subject to an upstream charge and the 'red ships' (travelling outside the EU).

The WSC stated that an upstream system would be ideal if the market were closed; being open, a downstream system is most appropriate. Nevertheless, the WSC stated that a downstream system would still be very complicated to monitor and would impact the level playing field. The following questions were raised: How would you minimise under-

reporting? Is it difficult to segregate how much fuel suppliers have supplied and to whom? How do you verify that data? This view was supported by the IMO secretariat.

Concluding Comments by the Chair

- There appears to be lots of monitoring already being done for commercial reasons – but no standard approach.
- Monitoring creates efficiencies and is beneficial for shipowners
- An adequate level of data accuracy is available
- The question is how much accuracy do we want
- Verification and reporting needs further discussing
- The definition of verification should be well defined when talked about

Enforcement

Following an initial presentation, EMSA mentioned the complementarities of the port State control and the flag State controls in enforcing measures applicable to ships. It highlighted the distinction should be made between controls in ports and Port State Controls which rely on the Paris Memorandum of Understanding (Paris MOU). The following points were made by the stakeholders:

Scope of enforcement - MT stressed the important link between scope and enforcement, and the need to have a clear understanding of who will fall within the scope of enforcement. Reference was made to the aviation sector, for which according to MT, the identification of whether an operator fell within the scope or not was a complex exercise. Also, MT does not favour exemptions as this makes the above mentioned exercise more complicated.

WSC stressed that the context of what we are enforcing matters greatly and that knowing the context of the scheme would make it easier for the stakeholders to give feedback on enforcement. The following questions were raised:

- Whether the Commission is envisaging enforcement through a single enforcement unit or whether the Member States will be responsible
- Whether the Commission is envisaging recording fuel consumption or making calculations based on specific fuel consumption over specific distance
- Whether it will be required for ships to account for emissions occurring outside the EU

CMIA asked whether it would be possible to have a different enforcement scopes for intra EU shipping vs. international shipping. Many recalled that intra-EU is also partly international (voyages between EU MS). CMIA also expressed preference for an open sector approach, in which shipping would be allowed to trade allowances with other sectors – there would otherwise be a risk that the carbon price suffers of spikes.

Enforcement mechanisms - MT and BIMCO suggested the use of existing documentation (threshold certificates – BIMCO), regimes and proceedings (MT). MT and the IMO Secretariat both favoured a prescriptive approach, with clearly defined roles of who should do what. MT also suggested the hybrid approach. The ECC stated that ships should not be delayed because of the enforcement checks. NL proposed a risk based enforcement system with checks on a random basis (IMO).

In this context, it was mentioned that an advantage of a MBM is that it places fewer burdens on the industry than a Command and Control measure. The UK requested a linkable enforcement system, consistent and compatible to other systems.

EUDA favoured strong compliance incentives rather than bans (IE). The ECC asked whether early adopters could receive rewards.

IE favoured a sophisticated enforcement regime and suggested the use of SafeSeaNet (Maritime platform for exchange of information between designated authorities). Similarly to EUDA, IE does not favour banning procedures. Ships could give a 24h notice before nearing the port and confirm whether they are in compliance or not. If not, entry will not be allowed. This type of enforcement will be simple and won't require any physical intervention.

Commission representatives explained with the current EU ETS registry system, compliance and enforcement are straightforward. Once a year operators have to report their emissions in the registry. Those then have to be verified by the verifier, who is also in the registry. In the case of shipping, the verifier could look at the BDN which wouldn't add an extra requirement in itself. The operator would then have to surrender allowances based on the emissions reported and verified.

This system makes it easy for the regulator to see who complies and who doesn't; this information is then also publicly available, which creates an extra incentive for compliance due to the naming and shaming effect.

The IMO Secretariat suggested that each participating ship have its own account and that checks be done on a random basis. EMSA referred to a 'virtual wallet' attached to the ship identification number (IMO number). Amendments of the BDNs will be necessary, before these could be used for enforcement purposes. New enforcement tools, documentation but also new skills will be needed, if the system will not be purely paper based. For verification purposes SafeSeaNet could be very useful (but it would depend on the design of the system). The option of establishing a new entity for enforcement should be considered in further detail. For the use of the Long Range Identification & Tracking System (LRITS), the SOLAS convention would need to be amended to make sure LRIT could be used in that way. However, it is more likely that it could be used in the context of a global scheme than in a regional scheme.

IETA explained that verifiers could look at all BDNs associated with a ship, the quality of the fuel going on board and the effectiveness of the equipment. It could also be feasible to ask for calibration certification for the bunker barge. Bunker notes should be the basis of monitoring.

The WSC stressed the need to have a MBM that will affect the price signal and push the industry to reduce emissions. The Norwegian NOx tax has elements of interest which could be used when designing an EU scheme (NO). FI mentioned the Sulphur Directive for which similar enforcement issues arise.

The IMO Secretariat made a closing comment and pressed Member States to ratify MARPOL Annex VI and vote for the adoption of the EEDI in July 2011. Finally, the IMO Secretariat asked DG CLIMA to strengthen its outreach policy and use its diplomacy, to push third countries with a view to adopting a global IMO led measure.

List of acronyms and abbreviations

BIMCO	Baltic and International Maritime Council
CEFIC	European Chemical Industry Council
CESA	Community of European Shipyards Association
CLECAT	European Association for Forwarding, Transport, Logistics and Customs Services
CMIA	Carbon Markets and Investors Association
DG ENTR	Directorate-General for Enterprise and Industry. European Commission.
DG MARE	Directorate-General for Maritime Affairs and Fisheries. European Commission.
DG MOVE	Directorate-General for Mobility and Transport. European Commission.
ECC	European Cruise Council
ECSA	European Community Shipowners' Associations
EMEC	European Maritime Equipment Council
EMSA	European Maritime Safety Agency
ESC	European Shippers Council
ESPO	European Sea Ports Organisation
EUDA	European Dredging Association
EUROCHAMBRES	European Association of Chambers of Commerce and Industry
EUROPIA	European Petroleum Industry Association
FEPORT	Federation of European Private Port Operators
IACS	International Association of Classification Societies
IBIA	International Bunker Industry Association
ICS	International Chamber of Shipping
IETA	International Emissions Trading Association
IMO	International Maritime Organization
INTERTANKO	International Association of Independent Tanker Owners
INTERMANAGER	International Ship Managers Association

MIF	Maritime Industries Forum
OCIMF	Oil Companies International Marine Forum
T & E	Transport and Environment
UNFCCC	United Nations Framework Convention on Climate Change

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2nd Meeting

REDUCING GREENHOUSE GAS EMISSIONS FROM SHIPS

**MINUTES OF THE SECOND MEETING OF THE SHIPS WORKING (WG Ships)
GROUP 6**

22 & 23 June 2011

at the Albert Borschette Building, BRUSSELS

These minutes summarise the discussions in the second meeting of the ECCP Working Group on ships. The ECCP WG was set up to provide input to the Commission in its work to develop and assess options for the inclusion of international maritime transport in the EU's GHG reduction commitment should there be no sufficient international agreement addressing these emissions. The ECCP brings together relevant stakeholders, to discuss and prepare the further developments of the EU and the modalities of reducing GHG emissions from ships. This meeting was the second in a series of three meetings foreseen to consider a list of topics important to the maritime sector and focused on available data, use of revenues and evasion. All presentations referred to below are available, as well as a list of organisations represented in the group at: http://ec.europa.eu/clima/documentation/eccp/second_stakeholder_en.htm

These minutes record the views expressed by representatives present in the Group.

Introduction

The European Commission (COM) introduced the meeting by providing an overview of the agenda on maritime emissions issues, especially regarding the next IMO meeting in July, which will be important for the adoption of an Energy Efficiency Design Index (EEDI). COM presented the objective set in the new Transport White Paper, i.e. a reduction of at least 40% of EU shipping CO₂ emissions (50% if feasible) in 2050 (from 2008 levels). As requested in the first ECCP meeting, data was provided regarding the number of port calls in Europe by COM and IHS Fairplay. COM pointed out that the terms of reference of the impact assessment are available on the Commission's website (request of FI and UK).

For the next ECCP meeting

FI, RO and DE underlined to need to analyze the legal issues and challenges that could arise when implementing a regional system, especially those linked to evasion. On this note NGO Climate Earth informed the stakeholders about their study on the legal aspects related to EU unilateral action which will be available. Finally, DE and FR requested the COM to clarify open legal questions especially as to the compatibility of a regional scheme with the international law of the sea and with WTO rules. DE further requested the Commission to

look in how far a policy measure could combine high environmental effectiveness with low evasion risks.

Regarding the Impact Assessment, T&E requested the Commission to look at all the regulatory options and assess them on the basis of their potential to create substantial emissions cuts and cuts quickly within the sector.

There was strong interest in the COM's selected Impact Assessment contractors presenting to the next ECCP meeting.

In the beginning of the meeting, many stakeholders underlined that a global measure is preferable over a regional scheme.

Slow steaming

After the presentations made by Seas at Risk and the National Technical University of Athens (NTUA), an intensive debate raised the following different issues.

Most of the stakeholders agreed that reducing speed can contribute to GHG emission reductions. Several stakeholders also considered that slow steaming is a part of the solution to reduce GHG emission, but it cannot be considered as a single option (Sea at Risks, BE, DE, Öko Institute) and it has to be considered at a global level (DE, FI, UK, FR).

Seas at Risk underlined that speed reduction is the most cost-effective way to reduce emissions and that the adoption of an EDDI is not the solution for short term action. Reducing speed is also considered by some stakeholders (Öko Institute, BE) as inefficient to ensure absolute emission reduction, contrary to an MBM. Seas at risk expressed the idea that an MBM and speed limits could be combined, for example by creating a system that forces actors to pay for going faster.

Several stakeholders (BIMCO, ESC, ICS, ESCA, WSC, FR, FI, ECC) are against a mandatory scheme and underlined the need to differentiate between ship types. If speed limits are introduced, flexibility is required for its implementation (SE, ESC, ECSA, FI, FR).

It was argued that there is no correlation between fuel prices and speed (WSC, Öko Institute, BIMCO). The WSC explained that the important increase in the price of fuel between 1990 and 2007 had a limited effect on the speed of ships and that a fuel levy, would have no stronger impact. A mechanism should be found which will drive improvements within the sector itself (WSC).

Others (Seas at Risk, NTUA) considered that increasing the fuel price will have a direct effect on speed but the NTUA and ESC recognized that the speed of ships is not only driven by fuel prices, but also by market requirements.

The safety issue was also pointed out by the UK and ICS. UK considered that traffic congestion in ports due to slow steaming would be a major safety concern. FI raised the 'land bridge' issue: countries highly dependent on shipping will be penalized by a reduction of speed. EL supported this view as well. Sea at risks recognized that this issue has to be discussed.

Several stakeholders (NW, SE, NL, Intermanager, DE, ESCA, FR) requested more analysis on this topic. The Seas at Risk study final report will be available in October 2011. Several stakeholders (FI, UK, BE, DE, ECSA, ICS) were of the opinion that a flexible measure, which gives incentives to a broad range of CO₂-reduction options, is preferable.

Regional tax/ Hybrid system

Two presentations were made by T&E, on the one hand, presenting a solution based on a regional tax and by the Center for Transport Studies, on the other hand, presenting a solution that combined a tax based on fuel consumption for small vessels and a cap and trade scheme

for large vessels. This hybrid system is designed to involve progressively all actors and non-EU/EEA countries.

T&E also underlined that the emissions reduction has to be done in the shipping sector. WSC shared the view that the reduction must be internal. However, he pointed out that the increase of fuel price in the 90's had a major effect on the fleet efficiency.

Seas at Risk considered that whatever the system will be, it have to provide absolute emission reduction.

Several delegations (UK, NW, WSC) considered that a regional tax could be very complex to implement, especially due to the administrative burden.

BE expressed their preference for an MBM, and others specified that an MBM should be seen as transitory measure (ECC). ECSA stated its preference for a global bunker levy but shared the view of the ECC, that an MBM would be necessary to achieve absolute reductions and achieve the 40% emissions reduction target set in the White Paper, to complement technical and operational measure.

It was questioned whether an MBM is able to create multiple accelerators to provide incentives to improve the efficiency of the sector (ECC). ECC explained that emissions reductions could not be achieved with zero cost, especially in the cruise industry. If this was the case, the cruise industry would have done so already. However, some stakeholders (CESA, T&E, Seas at Risks,) considered that some measures could cost nothing. CESA pointed out that 35% reductions without any cost are possible.

ESC considered that a tax would not bring any substantial emission reduction.

CY is against any regional system, including a system capped. EL does not support a regional measure. It called for the EU MS and IMO to achieve an international solution. It stated that in developing a regional measure, the EU should pay particular attention on how it will affect certain MS, in particular Greece, where it is essential to keep shipping services between islands. EL will submit their comments on this issue in writing.

Several stakeholders (ICS, BE, DE, FI, UK, FR, EMEC, CY) raised the risk of evasion by implementing a regional system. However, DE, UK and FI stressed the need to analyze any solution that can lead to a global system. ICS consider that if a regional system exists, it must be flag-neutral.

Öko Intitut underlined the need of equity between the modes of transport and therefore all sectors need to contribute to the GHG emission reduction.

Use of Revenues

The following views were expressed by the stakeholders after the two presentations (Use of Revenues by COM – the Norwegian NOx Fund by NO).

Some stakeholders reaffirmed the need to have a global solution as opposed to a regional one (ICS). ICS was positive about the ability of the IMO to come forward with a solution after the go ahead from the UNFCCC.

A question on how compliance is ensured in the context of the NOx Fund was raised, due to the fact that contributions are made on a voluntary basis by the industry. NO explained that compliance was ensured by the “participant agreement” between the government and the industry and penalty processes.

The benefits of LNG were raised by SE. LNG creates greater CO2 emission reductions compared to the traditional bunker fuels (SE, NO). It reduces CO2 emissions by 20% (ICS, SE), NOx emissions by 90% and sulphur emissions very close to zero (SE). According to ICS, LNG seems like an attractive solution but could create important damages in the case of

a leakage (even 1%) as LNG is predominantly comprised of methane, a potent global warming gas.

NO stated the need to look into all possible options so as to achieve the 2 degrees target and stated that all sectors would have to incur costs to reach that target. T&E encouraged COM to look into solutions to handle NOx emissions from ships, in conjunction with DG ENV.

Distribution of revenues to third countries

SE noted the interest of the EU to use revenues differently over time and keep those within the European Union in the short term. When expanding the regional system, the revenues could be distributed on a larger scale, thereby considering the Common but Differentiated Responsibility (CBDR) principle.

According to Oxfam international, any EU regional system should include financial obligations to set aside revenues to a green fund or channel funds directly to developing countries for climate action, especially on adaptation, in accordance with the pledge of Copenhagen made by the EU. ICS agreed in that part of the revenues should indeed be spent on mitigation and adaptation in developing countries. ECSA expressed its concern about the use of revenues that should not be hypothecated for mitigation.

When developing a global system within the UNFCCC and IMO the distribution of revenues to developing countries for climate action would be an absolute condition (T&E). However, according to T&E, in the context of a regional measure, it would be expected that the revenues would not all go back to the industry, as is the case for road transport. The Commission recognises that, if the EU is forced to take regional measure, the use of revenues can be useful to build a global system.

Distribution of revenues to the sector

Other stakeholders stated that the revenues should be kept within the sector (BIMO, ECC, CMIA, CESA) – and shared their concern about the shipping industry becoming a ‘cash cow’ (BIMCO).

Any regional MBM should be designed primarily to reduce emissions (ECC, UK, BIMCO), the shipping industry should not pay for a measure which does not reduce emissions. There should be a strong link between CO2 emission reductions and the raising of revenues (ECC). The revenues gained should be used for efficiency improvements (ICS). By keeping revenues within the sector, distortion of competition could be minimised (CESA): CESA reiterated that ‘cleaner’ shipping would be beneficial for the industry and that the expenses incurred to reach more efficient levels, should be seen as investments rather than costs. If non EEA flagged ships were to be covered as well, these should then also have access to the funds (BIMCO).

DE has no final position on the use of revenues. DE currently earmarks auction revenues from the EU-ETS in a fund for national and international energy and climate projects. As a preliminary view, it was stated that for any instrument, the shipping industry would have to have access to revenues generated and that a fair distribution of revenues for land locked countries would need to be ensured. DE stressed that it put forward a submission to the IMO in which it lay down three possible uses of revenues generated by a worldwide ETS: Compensation of economic impacts on developing states; R&D and technological support to promote mitigation and adaptation in the maritime sector and contribution to international climate finance.

DK mentioned the CO₂ tax which is recycled in process intensive companies as long as those have an energy management plan.

NO explained that in that in the case of the NOx Fund, the government introduces the tax but the earmarking is happening in the industry. CMIA stated that the revenues should not be given to the Member States and mentioned the NER 300¹⁴⁵, which constitutes a good example of money being set aside to help finance industry project developments. The UK was attracted by the example of the NOx Fund, particularly as it avoids the hypothecation of revenues.

FR does not have a final view on how the revenues should be used as of yet – part of the revenues should be used to prevent carbon leakage.

ECSA asked the Commission about its position regarding the States aids. The Commission mentioned that free allocation is not considered as State aids. However, this issue has to be further analysed depending on the use of revenues.

Avoiding Evasion

The following views and concerns were expressed after COMs introductory presentation. According to the IMO, an EU system would inevitably create more evasion risks than a global scheme.

The ECC requested the Commission to refer to the act of legally evading the applicability of a measure as avoidance, rather than evasion.

Several stakeholders considered that the risk of evasion is highly dependent on the geographical scope of the scheme (ESPO, SE, FI) and of the type of instrument (ESPO, ICS, Oko Institut). ESPO noted that as the scope would be reduced, a loss in terms of environmental effectiveness would inevitably occur. ESPO does not currently have a position on which scope would be the most suitable. DE considered that evasion could be avoided by setting the largest scope as possible.

According to IETA, long lasting port inspections and bill of lading confirmations could delay the whole supply chain – this should be looked at in further detail.

RO considered that the risk of avoiding the EU Port should be well analysed, especially in the Black Sea. FR raised the evasion possibilities in the North African ports.

RO, supported by BE, also considered that there is a risk of evasion of the industry, not only the logistics.

The infrastructure and the ability of states to quickly develop their infrastructure (esp. concerning ports and transport from and to ports) in the third country States is also an important issue to analyse when discussing on evasion (UK, DE, FR). A regional measure could serve as an incentive for further port developments and thus could increase the risk of evasion over time. This has to be taken into consideration when studying the impact of a regional scheme (DE).

¹⁴⁵ The NER 300 will be funded from the sale of 300 million emission allowances held in the New Entrants Reserve (NER) of the EU Emissions Trading System (ETS). It aims to encourage private sector investors and EU Member States to invest in commercial low-carbon demonstration projects.

For more information please refer to the following link

http://ec.europa.eu/clima/policies/lowcarbon/ner300_en.htm.

The avoidance of evasion is a priority for the UK: the environmental effectiveness of the system should be ensured and distortion of competition should be minimised. Credibility of the system should be preserved. The bill of lading could be useful to check compliance.

FR informed the stakeholder that she is carrying out a study on evasion that will be available at the end of year. FR underlined the need to take foreign countries on board of an EU instrument to avoid evasion. The Commission pointed out that regional partnerships, such as EuroMed, are helpful in this context.

SE requested further analysis on how much money would be lost because of evasion.

List of acronyms and abbreviations

BIMCO	Baltic and International Maritime Council
CEFIC	European Chemical Industry Council
CESA	Community of European Shipyards Association
CLECAT	European Association for Forwarding, Transport, Logistics and Customs Services
CMIA	Carbon Markets and Investors Association
COM	European Commission.
ECC	European Cruise Council
ECSA	European Community Shipowners' Associations
EMEC	European Maritime Equipment Council
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ESPO	European Sea Ports Organisation
EUDA	European Dredging Association
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EUROMOT	European Association of Internal Combustion Engine Manufacturers
EUROPIA	European Petroleum Industry Association
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IACS	International Association of Classification Societies
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INTERTANKO	International Association of Independent Tanker Owners
NTUA	National Technical University Athens
OCIMF	Oil Companies International Marine Forum
T & E	Transport and Environment
UNFCCC	United Nations Framework Convention on Climate Change
WSC	World Shipping Council

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38	ECSA	PLÖTZKE Matthias
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41	EMEC	LANCELLOTTI Paola
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3rd Meeting

REDUCING GREENHOUSE GAS EMISSIONS FROM SHIPS

Draft MINUTES OF THE THIRD MEETING OF THE SHIPS WORKING (WG Ships) GROUP 6

15 & 16 November 2011

at the Charlemagne Building and the Management Centre Europe, Brussels

These minutes summarise the discussions in the third meeting of the ECCP Working Group on ships. The ECCP WG was set up to provide input to the Commission in its work to develop and assess options for the inclusion of international maritime transport in the EU's GHG reduction commitment should there be no sufficient international agreement including these emissions in reduction commitments by the end of 2011. The ECCP brings together relevant stakeholders, to discuss and prepare the further developments of the EU and the modalities of reducing GHG emissions from ships.

This meeting was the last in a series of three two day meetings foreseen to consider a list of topics important to the maritime sector. At this meeting, the possible policy options and the Impact Assessment Study were presented. The meeting also considered the appropriate emission reduction level and the potential for emission reductions in shipping, the question of offsetting, as well as the relevant legal framework. The issue of short-lived climate forcers and the question of how regional action could serve as a platform for broader action were also addressed.

All presentations referred to below are available, as well as a list of organisations represented in the group at : http://ec.europa.eu/clima/events/0047/index_en.htm

These minutes record the views expressed by representatives present at the meeting.

Introduction and Review of ECCP I and II and IMO Developments at MEPC 62

The European Commission (COM) opened the meeting by providing an overview on the previous ECCP meetings and by outlining the main developments within IMO, in particular the adoption of the Energy Efficiency Design Index (EEDI) at IMO's Marine Environment Protection Committee (MEPC) meeting in July 2011. COM noted that the EEDI was adopted through a vote and that the EEDI in itself did not sufficiently address the GHG emissions from international maritime transport as it only applies to new ships. COM noted that although it considered the ideal solution to be a global solution and therefore would continue to support the progress within IMO on market-based measures (MBM), COM is investing time and effort into developing and assessing options for the inclusion of international maritime transport in the EU's GHG reduction commitment. It was also highlighted that a possible COM proposal tabled next year would have no effect on the ground before 2017/2018 allowing for more time for the development of a global solution. A COM proposal could serve as an accelerator in the IMO discussions.

Support Contract for EC Impact Assessment

AEA Technology introduced, as the leader of the consortium of the support contract for the EC impact assessment, their methodology and the planning of their work. The launch of the impact assessment process was welcomed by several delegations (DE, ESC, FI). DE stressed the importance of the impact assessment of measures and referred to the inclusion of aviation into the EU-ETS.

ICS, supported by ECSA, called for transparent assumptions. In this context, WSC noted that the MACC curves have to be taken into account carefully. Several precise concerns were raised such as the risk of modal split (ESC, ECSA), the need to take into account the diversified circumstances, such as winter conditions, within the EU (FI), the use of revenues to tackle climate change globally (DE, Oxfam) or to help the sector to reduce its emissions (WSC), the impact on fuel and commodities prices (WSC, IMO) and the consideration of existing regulation on sulphur, NOx and others (ECSA).

The effects of the EU measures globally was stressed by DE, Oxfam and the IMO. DE recommended starting the analysis with the intra-EU option. In addition it may be useful to analyse in depth only those options which are feasible. The IMO indicated that developing countries might be affected by a regional measure.

AEA Technology pointed out that the model used, TIMES, is a global model that integrate most of the concerns, especially the consideration of existing regulation, the recycling of revenues and the modal split. A methodology to select relevant commodities to be assessed will be set.

COM underlined its openness to discuss with stakeholders the assumptions made for the impact assessment. COM agreed to consider the possibility of involving experts in the impact assessment process.

Main Policy Options

COM introduced the possible policy options to be analysed in the impact assessment.

BIMCO, supported by NL, SAR, EDF, stressed that the key issue is the effectiveness to address climate change.

All stakeholders indicated their preference for a global scheme. However, all Members states who took the floor (DE, FI, NO, NL, DK, SE) indicated their openness to elaborate and/or discuss a regional measure in parallel with the IMO process with the goal to serve as a basis for or advance a global scheme. The IMO indicated that for some policy options, a regional measure cannot serve as precursor for a global scheme. NGOs (SAR, EDF, T&E) encouraged the EU to take action. ICS, ECSA and Intermanager are not in favour of an EU measure.

Regarding an ETS, some stakeholders (BIMCO) considered the administrative efforts as an issue, whereas NL considered that it is mainly an issue for public authorities. The risk of evasion (BIMCO) was raised. The openness of an ETS was also discussed. Stakeholders (BIMCO) and Member States (DE, EL) considered that a closed ETS would be problematic. DE, SE, NO, UK, IETA, Transport and Environment supported an ETS. UK indicated that they preferred an ETS with 100% auctioning and no earmarking. EL expressed its opposition to an ETS.

Regarding a compensation fund, the issue of setting carbon price was raised by FR. The possibility to raise revenues for global climate change finance was also mentioned (FR). Regarding an industry managed compensation fund, several Member States asked for clarity to identify who will manage the fund (FR, UK). FI, EL supported the compensation fund option.

Regarding mandatory emission reductions per ship, several stakeholders (BIMCO, WSC) considered that there is a risk of stopping trade if the emission of each ship is capped on historical performance. Taking into consideration the efficiency of the ship, such as the one set by the EEDI or the EEOI, is clearly preferred by several stakeholders and Member States (DE, WSC). Regarding the EEDI, CESA indicated that its opposition to apply this on existing ships. The feasibility at the EU level was also questioned (DE, WSC).

Regarding the tax, DE stressed the importance of the legal issues and in particular its compatibility with the energy tax directive. EUROPIA is opposed to any system applying to fuel suppliers.

Several Member States and stakeholders agreed that the responsible entity should be the ship (DE, FI, NO, IMO). However, CE Delft indicated that it is possible to leave this choice open.

Seas at Risks recalled the sensitivity to the maritime sector on the fuel price and called for a range of measures and not only one. They reiterated the preference for speed limits.

EDF, supported by IETA, indicated the need of a robust compliance mechanism.

The IMO stressed that the issue of ships calling once into EU ports should be addressed, such as the flexibility in the design of the scheme. Building a scheme on historical emissions seems to be challenging according to the IMO.

DK underlined the importance of flag neutrality.

COM reiterated its wish to achieve a global agreement in the IMO. In this context, the Commission underlined that, if a proposal is made next year, it will take several years to be implemented at the EU level and therefore the IMO has still time to deliver. Any EU measure will also be fully compatible with international laws.

Legal Issues

After presentations by the European Maritime Safety Agency (EMSA) and ClientEarth setting out the international legal framework of relevance to the inclusion of international maritime transport in the EU's GHG reduction commitment, no participant underlined a possible incompatibility of the considered policy options with international law. Some were of the view that all considered policy options could be designed in a manner that is compatible with international law (T&E, DE, CY, WSC). DE pointed out that DE had analysed possible legal issues as well as the opportunities and barriers created by international law to a global MBM before making an ETS proposal to IMO and that preference should be given to the option that is most environmentally effective whilst being legally compatible. DE also remarked that parts of the Advocate General Kokott's Opinion in case C-366/10 on the compatibility with international law of the inclusion of aviation in the EU ETS were of relevance for shipping. Finally, DE insisted that the role of bilateral agreements with third countries on shipping also had to be considered.

When questioned why they preferred a "port entry"-based measure, ClientEarth responded that in terms of scope, port-entry raised less legal issues than a system based on distance or time for reasons of proportionality, although the evasion risk was lower in a distance/time-based scheme. ClientEarth also clarified that outgoing ships could be covered by a "port entry"-based scheme if allowances had to be surrendered on an annual basis by the ship, as liability would arise the next time the ship would return to the port.

The Commission's Legal Service highlighted that under UNCLOS and WTO law, continuous international efforts to reach agreement should and are being undertaken. Moreover, the Legal Service recalled that a future EU measure should be compatible with a system adopted at international level. Any risk of double regulation could be more easily avoided in a "port entry"-based scheme than in a scheme based on distance or time.

Generating Offsets through a Sector Based MBM/Access to Reductions in Other Sectors – International Credits

Several Member States and stakeholders stressed the need to strike the right balance between in-sector and out of sector reductions/offsetting. DK, ICS and WSC highlighted a perceived need for offsetting to enable the shipping sector to achieve its reduction targets cost-effectively, as there might be technical and operational limits to the reductions that are possible in the shipping sector. Others emphasised the wish to limit offsetting to encourage in-sector reductions (DE, SE).

Level of Reductions

The EC introduced a synthesis of the studies made on MACC curves in perspective of the EU objectives, followed by a presentation of DNV on the possible level of reduction achievable in the maritime sector and a presentation by ECSA on what the sector can deliver.

ECSA indicated that the shipping sector is committed to reduce its GHG emissions. However, shipping is the servant of the world trade and is the most effective mode of transport. ECSA recognised that the work in the IMO has been slow due to its political background. A reduction of 50% by 2050 compared to 2005 is achievable, as well as a relative reduction of 20% by 2020 compared to business as usual. To this end, EEDI and

SEEMP are not sufficient. Regarding global climate change finance, the shipping sector will contribute, but it should not be the only one. ECSA also stressed the risk of modal split and evasion in case of regional measure. ECSA also indicated that the majority of ship owners is in favour of a global compensation fund.

The issue of market barriers was raised by several participants (CE Delft, DE).

Regarding the EU objectives, DE recalled that the Council objective was made in the context of Copenhagen and stated that for shipping a cap of – 50 % until 2050 compared to 2005 levels might be feasible.

Regarding the risk of modal split, SE considered that will not happen in most cases, as road and rail are facing similar pressure. SE, supported by ECSA, called for incentives to support the maritime industry to overcome market barriers.

The IMO stressed that the EU emissions reduction is linked to the delocalisation of its industry to other parts of the world and therefore the increase of emissions of the shipping sector may be linked to this development.

CESA, supported by EMEC, stressed that, even if shipping is the most effective mode of transport, the current fleet is not efficient and, taking a lifecycle approach, 97% of CO2 emissions of a ship is emitted during its operation.

EMEC noted that even though shipping is the most efficient way of global transport – emitting about 4 % of the global CO2 emissions, transporting in excess of 95% of global transport – there is room for improvement; the most effective driver is cost saving through energy/fuel saving.

WSC stressed that ship operator have a limited leverage over the ship design.

Short Lived Climate Forcers

Transport and Environment made a presentation on the work they have done on short lived climate forcers. The IMO informed that work has begun on this issue at the global level. Several participants recalled that existing regulation have an impact on black carbon, such as the EEDI (ICS) and the sulphur rules (SE). DE indicated that we already have a good enough knowledge of black carbon to know that it is a concern.

Market Barriers

COM highlighted that different studies undertaken by the IMO, DNV, CE Delft and IMarEST had revealed the great potential to reduce GHG emissions from shipping at low or negative abatement costs. Nevertheless, GHG reduction measures are not being taken up widely by the industry, possibly due to market barriers to the introduction of abatement solutions.

Following a presentation by Maddox Consulting outlining their intended workplan to conduct a COM-financed market barriers study, SE encouraged Maddox Consulting to also consider parallels in other sectors such as market barriers to eco-driving in long-distance truck freight/road voyage. BIMCO considered that market barriers related to the questions of who is the owner, who pays the fuel bill and who benefits from the measures, as well as the fact that retrofitting is expensive. CESA assumed that behavioural market barriers were of greater importance than technological market barriers and proposed the development of criteria to be taken into account by banks when deciding whether to finance ships.

EMEC asked the question as to how the maturity of the technologies to be studied by Maddox Consulting will be measured. This needs to be considered carefully as many of the longer term technology developments which have a large potential to reduce GHG emissions are relatively immature and may not be available for widespread use in the timescales assumed in many forecasts.

ICS expressed concerns about the study being too generic and preferred targets being imposed on the industry rather than measures/solutions.

ECSA emphasised that surveys undertaken by the Danish Shipowners' Association had revealed that measures to reduce GHG emissions in the maritime transport sector are being taken up and said that the relevant data was publicly available on the website of the Danish Shipowners' Association.

IMO said that in an ideal MBM, part of the revenues generated through the measure should go back to the industry as in the MBM proposal by Japan to IMO since this would lead to the fastest emission reductions. Making part of the revenues available for R&D and for improving port and sea infrastructure in developing countries could also lead to reductions, while a general compensation scheme for developing countries might not result in (fast) reductions from the shipping sector. CESA stated that it would only be possible under a regional and not an international scheme to return all revenues to industry and that the most important emission reductions were possible in a system in which 100% of the revenues would go back to the industry.

Regional Action as a Platform for Broader Action

For a possible EU measure to be perceived as successful by COM, it would have to stimulate other states, regions and international organisations (IMO and UNFCCC) to adopt measures to reduce emissions from the shipping sector.

Several Member States and stakeholders insisted that for a possible EU measure to serve as a platform for broader action, it would have to be compatible with international law (NO) and promote IMO action (ES, FR, NL, NO). NL noted that the COM/EU would have to be active in the IMO debate to ensure compatibility with possible IMO action. Some participants argued that the EU system/systems would also have to allow for gradual linking with other compatible systems (FR) and that close cooperation, in particular with neighbouring states, was essential to avoid evasion (FR, SE). T&E considered the use of part of the revenues generated by the EU measures as crucial to promote broader action and FR suggested using some of the revenue to encourage linking and cooperation with neighbouring states. It was also highlighted that good communication was crucial to support broader action (NL, SE). ECSA noted that a COM proposal could help the EU to speak with one voice in future MBM debates within IMO and thus positively contribute to the IMO discussions by helping narrowing down the MBM proposals.

SE insisted that to facilitate expansion of the regional system to other states/regions it might be better to keep the shipping scheme separate from the existing ETS.

Summary and Close of ECCP Process

COM closed the ECCP process by thanking all Member States and stakeholders for their valuable contributions, which will be taken into consideration by COM in its future work on the inclusion of international maritime transport in the EU's GHG reduction commitment. Stakeholders can provide further input through written submissions or by participating in an online consultation on "Your Voice in Europe".

COM highlighted the consensual view that a global solution to tackle GHG emissions from maritime transport was the preferred option. It is COM's intention to continue being closely involved in the IMO process and to engage with neighbouring countries and other third states. COM stressed the existing obligations under EU legislation, requiring COM to act on maritime emissions. A proposal for including maritime transport emissions in the EU's GHG reduction commitment is foreseen in the Commission Work Programme for 2012. COM stressed that a proposal tabled next year would not be likely to have effects on the ground before 2017/2018, leaving considerable time for global action to be taken forward. A future COM proposal would address issues of distortion of competition and evasion, be compatible with international law and strike the right balance between in-sector reductions and offsetting. Any EU action should serve as a platform for broader action.

IMO invited COM to submit the outcome of relevant studies to pertinent IMO bodies as they could be useful also in the context of global regulations.

ANNEX V - PARTICIPANTS AND CONCLUSIONS FROM THE TECHNICAL WORKSHOP HOLD BY AEA TECHNOLOGY IN LONDON ON 9 MARCH 2012

➤ **Delegates:** 17 participants attended:

- Antoine Person, LDA (ferries)
- Didier Vandevelde, MSC (containers)
- Julien Topenot, CMA-CGM (containers)
- Paul Altena, Speilthoff (bulkers)
- John Rogan, Shell (tankers)
- Robert Ashdown, European Cruise Council, on the behalf of Tom Strang, Carnival (cruise)
- Eija Kanto, Finnish shipowner association
- Sara Skold, Clean Shipping Index
- Fabien Becquelin, ShortSea on the behalf of Jean-Louis Cambon, Michelin (shippers)
- Jorgen Clausen, DK Group (equipment manufacturer)
- Ernst Karchhasrt, Siemens (equipment manufacturers)

- Robert Derksen, Swiss Climate (service provider)
- Herman-Josef Mannes, Meyer Werft (shipyard)
- Jan Huebner, Germanisher Lloyds (verifier)
- Didier Chaleat, Bureau Veritas (verifier)
- Geir Hoybe, NOx Fund
- Andreas Arvanitakis, Point Carbon (ETS expert)
- Edmond Hughes, from the IMO

➤ **Summary of discussion on policy options**

Emissions trading

Enforcement Regarding enforcement measures, the escalation to detention of a ship was highlighted that this would incur a cost to Port Authorities, particularly if the owner chose to abandon the ship. Denial of entry is considered a strong measure. Delays to a ship would generate huge costs.

There is competition between ports and a need for a level playing field. In the case of an operator with a large fleet, it was asked whether it would be appropriate to detain any ship in that fleet.

Level of the penalty It was suggested that penalties should take several factors into account, including whether non-compliance was intentional, and the level of non-compliance. One suggestion was that port fees could be differentiated such that a discount is awarded to ships that are compliant.

Conclusions Maritime experts agreed that penalties should be scaled in proportion to the level of non-compliance. This could be enforced through differentiation of port fees. Additional consideration would need to be given to determine the level of underreporting that would trigger penalties.

Whatever the option, it was suggested that the compliance could be ensured thanks to a compliance certificate held on ships.

Mandatory compensation fund

Membership It was felt that the fund should have open membership. Given the dynamic nature of the industry, it would be helpful to have some flexibility over membership. It was questioned as to whether the membership should be owner-specific or ship-specific. The length of membership was also discussed – from the point of view of the industry, a period of 5-8 years is considered to be long, but it was also recognised that periods of this length would be needed to produce meaningful emission reduction targets.

Penalties In terms of appropriate penalties, the system used in the Norwegian NOx fund was offered as a possible solution. Companies are obliged to pay a form of tax if they miss their targets by a certain threshold (e.g. 10%). However, it was suggested that the system currently proposed by the project team (in the background document, i.e. the payment of a refundable deposit) for the CO₂ regulation could be easier to manage, given the much larger number of ships that would be involved.

It would be important for tax/port authorities to police the systems, so it is not up to the Fund to enforce measures. This allows the Fund to concentrate on emission reductions. The money would go to industry but they would have to report to an authority. However, there would need to be an EU regulation to confer this power; at which point, it could be argued that it would not be an industry-only scheme.

Payment into the Fund The idea of a returnable deposit received some support – if the deposit were set lower than the obligations imposed on those outside of the system. It was felt that the level of membership fee should be low, although this would reduce the size of the fund. Another suggestion was for a basic rate of membership, but with optional incentives that could be selected, or a form of bonus/malus

Conclusions The Norwegian NOx fund was felt to be a good model; however, careful considerations would be needed if expanding to an EU-level measure, as the number of ships would be much greater.

Industry managed compensation fund

Discussion of competent authority The idea of existing industry associations was suggested (e.g. BIMCO, INTERTANKO). However, these associations would not capture all vessels, so there would need to be a default fund for vessels that were not represented. Giving a mandate to EMSA to play the role of competent authority was also suggested.

The importance of good communication to stakeholders about the different options was highlighted.

It would be important to give Funds the right to evict members who are not complying.

Conclusions In general the idea of the industry-managed fund is considered to be the best option by many of the maritime experts.

The idea of funds by type of vessel was viewed positively by most experts. However, the way that targets would be set would have to be considered carefully.

Some calculations would be needed to work out the relative size of the Funds, and whether they would have large enough membership to generate significant revenues.

Mandatory emission reductions

Indicator Maritime experts pointed out that a good indicator would allow efficient ships to differentiate themselves and allow best practice sharing. This would only be possible through transparency.

A product called the “Eco toolbox” to manage all environmental aspects e.g. water ballast, cargo etc. was discussed. It has had positive effects on operational efficiency when used in the container sector. However, it could be very difficult for the existing world fleet to rely on these measures.

It was pointed out that the EEDI does not apply to all ships. The EEOI was not considered to be a feasible indicator as it would not work for tramp shipping because have no control over their EEOI. It was generally agreed that the EEOI cannot form a reliable indicator for the shipping sector.

Conclusions Maritime experts were of the opinion that there is no indicator that could be applicable to the shipping sector. They felt that this option would not be feasible.

➤ **Administrative aspects**

Fuel measurement technologies The only existing mandatory instrument to measure fuel supply is the bunker delivery note. Many schemes advocate the use of it, but over time other measures could be introduced. Even the bunker delivery note would be inaccurate as it wouldn't take into account measures onboard. Maritime experts pointed out that not every ship has a flow meter (even if, the largest the ship is, the most they have a flow meter), and they need to be calibrated accurately to the fuel type. This would impact the cost calculations. It would be possible to detect gross mis-reporting thought use of several different measures.

There would need to be some back-up system for all circumstances – for example, if a ship's flow meter broke.

Monitoring using a particular recommended technology could be voluntary for an introductory period, during which incentives would be offered to ships that fit this technology. However, there is a risk that ships will have to pay twice if a global system comes into force that was to require a different technology.

Uncertainties would be smaller for big companies (<2%), whereas smaller operators would have lower accuracy. Manual measurements are not reliable either. There are no international standards.

The IMO cited some data on ship thresholds: ships >5,000 GT = 22,000 vessels, and would account for 99% of vessels For ships >2,000 GT would account for 96%

Administrative burden It was suggested that it would be difficult to ask the crew to do additional tasks because they already have a high workload. In general, the view was that it was possible to monitor fuel consumption, and it would not place undue additional burdens on the crew. The regional scope would add some complexity. There was much discussion about sophisticated electronic monitoring that is currently in use of larger/modern ships. With respect to smaller ships, it could be possible to amend the oil record book to reflect how much fuel consumption occurred within the scope of the scheme. Every ship must have an oil record book and the data quality is very good. There are particular codes for different operations. Another line could be created with a new code that indicates when a ship enters the scope, and another line that records when it leaves. Based on this data it would be possible to calculate the amount of fuel consumed in the EU. However, there are still issues that would need further consideration, such as who would control its application and ensure correctness.

Some maritime experts felt that the public sector should pay for the verification, and the industry should not bear the cost of this.

Verification In terms of verification, it was felt that auditors should be able to certify the *processes* used to monitor fuel consumption, and that this could be done in the back offices. In some cases, it may be necessary to board the ship, but that would be possible as it is already done (e.g. low sulphur regulations). It was suggested that class societies would be able to approve monitoring plans. At a high level it would be possible to use AIS data to check consistency and plausibility of reported emissions.

Monitoring guidelines In terms of defining monitoring guidelines, it was recommended that a matrix should be created that identifies the pros and cons of each technology for each sector. It could be better to have a common methodology to ensure uniformity, otherwise ships would use the method that gives them the least emissions.

Conclusions The cost for larger vessels would be a much smaller percentage of overall costs. If the IMO figures are correct, then it makes sense to focus on larger ships, who would find compliance easier in any case.

Focussing on larger ships initially would also allow the rest of the sector to learn.

➤ **Other business**

- Freight rates are very sensitive to competition
- Stakeholders pointed out that the fuel prices presented by the project team are based on a very old source and that the figures for 2010 are not accurate.
- The prices of MDO/MGO will increase in the future.
- In general, it was felt that the fuel prices were rather low
- It is expected that the sulphur regulations are more likely to be realised in 2025, rather than 2020
- LNG as a retrofit was not considered to be a feasible option at present. If it does penetrate the fleet it would probably happen only gradually
- Prices of fuels are different in different regions of the world
- The elasticities also vary by region. It is very difficult to come up with reliable figures.

ANNEX VI - METHODOLOGY FOR MODELLING

1. GENERAL ASSUMPTIONS

If bunker fuel sold in the EU was considered, there would be a gap between the volume of bunker fuel sold in the EU and the volume of bunker fuel consumed on EU routes. As the purpose of the measure is to address EU GHG emissions of ships, the environmental, social and economic impact assessment is based on bunker fuel consumed. Considering the bunker fuel sold in the EU will not lead to an exhaustive assessment of the impacts of GHG emissions of ships in the EU (e.g. a ship calling into the EU ports will have an impact on EU local air quality, even if it purchased its fuel outside of the EU), but it can trigger impacts outside of the EU. However, the administrative burden and the risk of avoidance of an internalisation of climate externalities based on bunker fuel sold in the EU are nevertheless duly assessed.

The assessment of the impacts has been estimated considering the compliance entity is the ship. The measure intends to have a direct effect on CO₂ emissions from ships. However, other compliance entities may be chosen triggering an indirect effect on CO₂ emissions from ships, which may mitigate the impacts mentioned hereafter.

2. GENERAL ASSUMPTIONS OF THE BASELINE SCENARIO¹⁴⁶

The baseline scenario was established according to a trade model, the IHS Global Redesign Scenario, integrating strong underlying assumptions related to inter alia geopolitics, monetary issues, environmental issues or economical policies. In particular the global redesign scenario is considering:

- Strong, sustainable expansion in emerging markets.
- Monetary policy gradually adjusted in line with growth prospects. Asia starts tightening first, followed by the United States and Europe/Japan.
- Inflation is kept at bay.
- Large developed economies adopt measures to reduce budget deficits.
- After shrinking in 2009, US trade deficits widen again.
- As consumer demand expands in emerging markets a process of global rebalancing begins.
- Trade liberalization continues, but troubled by occasional disagreements and conflicts.
- US dollar depreciates mostly against emerging markets currencies, especially the renminbi.

¹⁴⁶ Source: IHS Fairplay, 2012

- By 2030 China's economy accounts for a significant share of global trade, including key commodities and manufactured goods.
- The relative change in real GDP per capita is much quicker in the emerging markets than in the developed countries.

Figure 1 illustrates the compound annual growth rate (CAGR) of the developed world (US, W Europe, Japan) in the 20 years leading up to the great recession. The CAGR was 2.3%. In the Global Redesign scenario the CAGR for the years following the recession up to 2030 is forecasted to be lower, 2.1%.

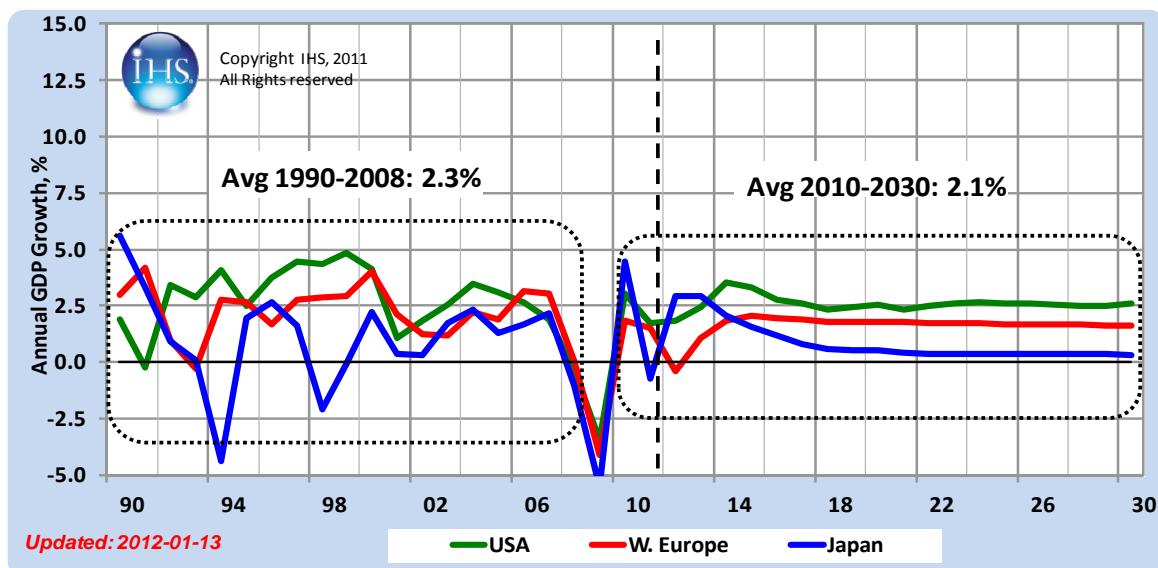


Figure 1: GDP growth in the developed regions

Figure 2 shows how the CAGR for three of the leading emerging market economies is expected to be lower in the forecast years compared to the two decades before the recession.

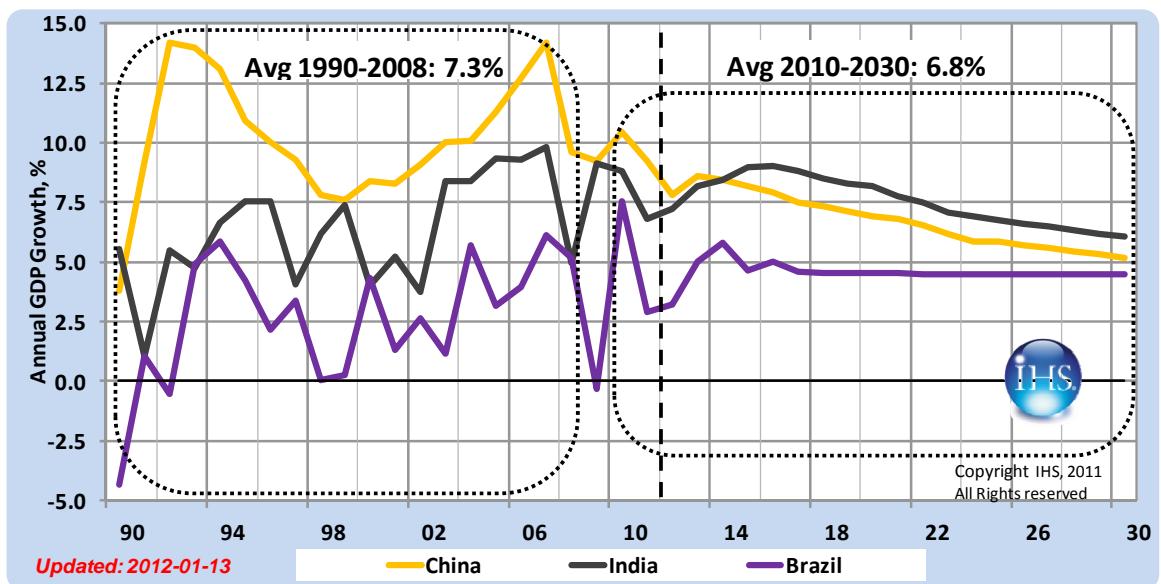


Figure 2: GDP growth in key emerging markets

As a result the world total CAGR for GDP increases as displayed in Figure 3. This is a consequence of the still higher growth in the emerging markets which gain market share each and every year and thereby lifts the world total. Figure 4 shows the absolute numbers behind the development, where the share of the world GDP of the Asian emerging markets continuously increases over the period on the expense of the developed regions' share.

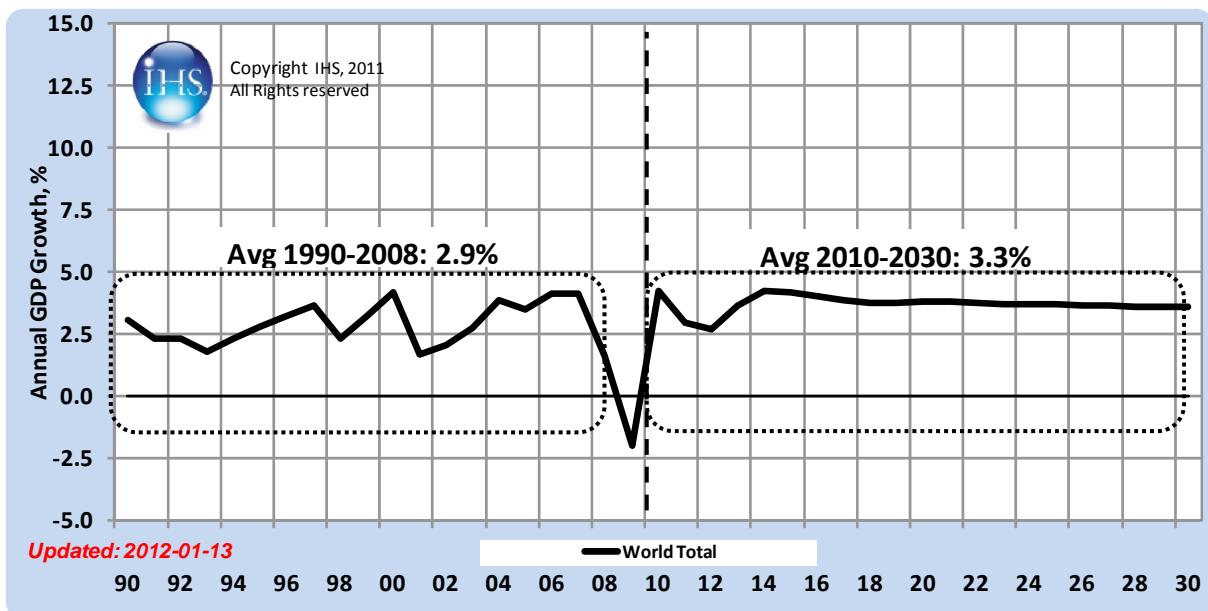


Figure 3: Global GDP growth

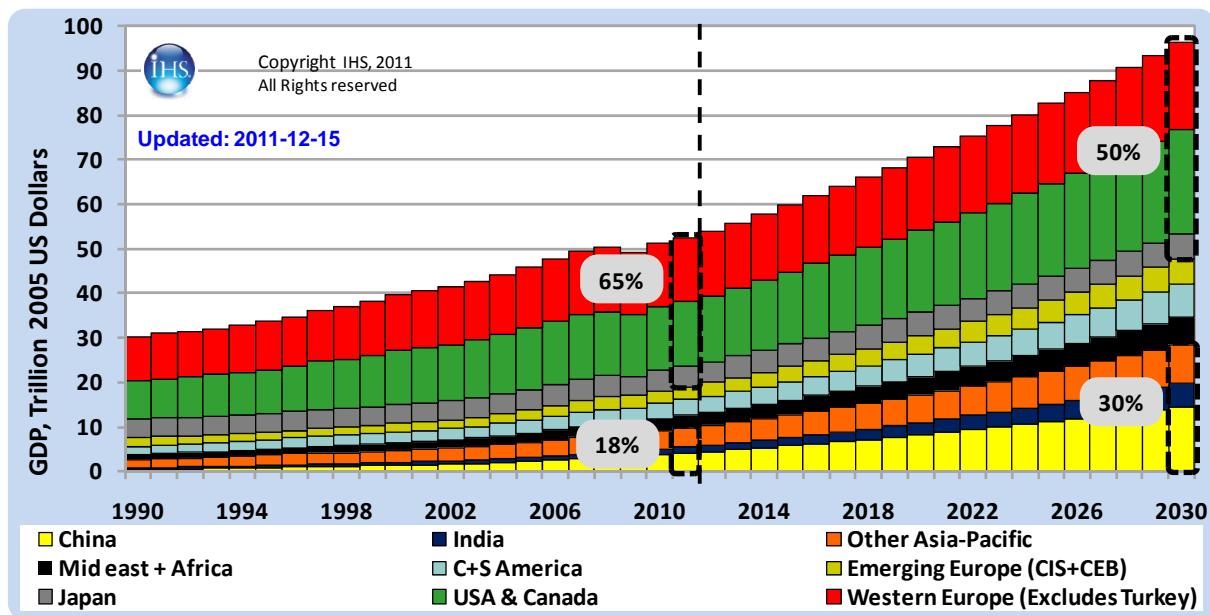


Figure 4: Global GDP, trillion 2005 US dollar

3. DESCRIPTION OF THE MODEL

1. Overview

From a model perspective, the key points of interest relate to the costs of policy options, the emissions abatement profile over time, and the cost effectiveness (Euro per tonne CO₂ abated) of taking action in this area. Additional areas of interest include the extent to which shipping routes may change in response to policy action, the potential for modal shift as a policy response, and the extent of in-sector abatement versus out-of-sector abatement. AEA Technology, who provided support for the impact assessment, developed a model based on the TIMES model architecture. This model is built on three building blocks: (i) a representation of shipping activity, (ii) a representation of vessels and (iii) cost assumptions.

2. Representation of shipping activity

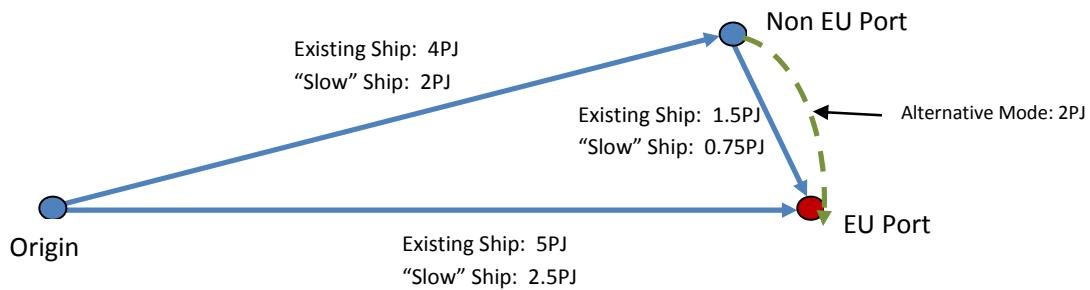
The model integrates the available routes into/out of Europe and available technological and logistical choices to 2050. Key amongst these are:

- the ability for ships to stop at a port just outside the EU,
- the ability to divert freight to alternative modes via a port just outside the EU, or for intra-EU trade,
- the possibility for technology change in the shipping fleet (i.e. new ships and/or efficiency measures).
- the option for ships to slow down and thus reduce emissions.

- the possibility for fuel switching in the shipping fleet.

Therefore, in addition to standard TIMES energy system model functionality, a network model is required depicting the various routes and modes for goods currently shipped into and out of Europe. The model includes the flexibility to switch between these routes and modes.

Figure VI.5: Hypothetical Network & Technology Model Showing Routes of Fuel Consumption¹⁴⁷



Trade data for cargo categories, including historical data and projections up to 2050 were provided by IHS World Trade Service. Extra-EU data was available by the region of trade and commodity type.

The regions within the TIMES model were defined according to those used by the IHS World Trade Service to report the trade data. There are two EU regions: EU Northern/Baltic and EU South/Mediterranean, and 13 extra-EU regions. Distances between regions were defined in order to calculate fuel consumption on each route. For this purpose, a representative port was defined in each extra-EU region, and two ports for each EU region. The distances in nautical miles were calculated between these representative ports using <http://www.portworld.com/map/>.

For each origin/destination pair (e.g. “Demand of North African crude oil in EU South”), one or two types of movements are defined. One of them is direct movement, e.g. from supply to demand region. The other type of movement defined is one that assumes a stopover on the way to/from Europe. In this case, a ship is assumed to stop in Port Said or Casablanca on its way to/from Europe. The CO₂ emissions are split to represent the two journey legs. Only one movement type is defined for shorter routes, such as Intra-European trade.

The TIMES model can allow for modal shift of cargo on intra-EU journeys. The costs are sourced from the DG Environment-funded project from 2010 entitled COMPetitiveness of EuropeAn Short-sea Shipping (COMPASS) report.

3. Representation of vessels

A summary of ship sizes/types is shown here. For each of these categories of ships, several parameters, such as daily financial costs, daily operational costs, fuel consumption, CO₂ emissions per tnm, etc. were defined

¹⁴⁷ Note: “Slow” ships require double the capacity of the existing fleet to serve an equivalent demand

Table VI.1: Summary of ship sizes and types

Type	Size
Dry Bulk	Dry bulk Capesize 120' +
	Large Dry Bulk carrier (80' +)
	Medium Dry bulk carrier (35' - 85')
	Small Dry Bulk carrier (<35')
General Cargo	General Cargo 15'++
	RoRo 35'-++
	GEN long avg of GEN 15'++ and RoRo 35' ++
	RoRo 15' - 35'
	GEN short avg of GEN 0-15' and Reefer 0-15'
Container ships	Container 8500 TEU +
	Container 5500 - 8500 TEU
	Container 2000-5500TEU
	Containers 1000-2000TEU
	Container 0 - 1000 TEU
Oil (and product) tankers	Crude oil tanker 120'++
	Crude oil tanker 120' + , Product tanker 75' +
	Crude oil tanker 75-120', products 15-75'
	Crude oil tanker 0-75'and Products 0-15'
Liquid bulk (Chemical, LNG, LPG tankers)	Chemical 40'-++, LNG 60'++
	Chemical tanker 40' ++ and LPG 45'++
	Chemical tanker and LPG 15-40'
	LNG tanker 0'-15' and Chemical 0 - 15'
Passenger vessels	Ships carrying up to 1000 passengers

Source: size thresholds based on categories used in data provided by Marintek, IHS and IMO sources

4. Cost assumptions

Abatement technologies

A range of possible emissions abatement options (technological and operational) have been identified and included in the modelling framework. The investment costs, operational costs and CO₂ reduction potentials of the abatement technologies were sourced from MEPC 61 INF. 18¹⁴⁸, an IMO-funded study on the reduction of GHG emissions from ships. These costs are variable depending on the ship size and type. Changes were made to the data sourced from MEPC 61 INF.18 in only three areas: speed reduction, optimisation of hull & superstructure (new ships), LNG costs (investment cost and operational cost), as updated data were available from Marintek.

Fuel types and costs

A generic maritime fuel was assumed to be used in existing cargo ships, rather than defining ships that run on residual fuel (HFO) and distillate marine fuel (MDO/MGO) separately. This assumption was used in order to keep the model compact and facilitate the interpretation of results. A new alternative technology is included in future years, i.e. ships that use liquefied natural gas (LNG) as fuel.

Wholesale fossil fuel price projections were sourced from the PRIMES model crude oil price and natural gas price projections developed for the Commission's 2011 Energy Roadmap (as obtained from the EC). There are three price scenarios: Reference, Current Policy Initiatives, and Decarbonisation. While the prices under the Reference Scenario and Current Policy Initiatives are similar in the years 2010 and 2015, the Decarbonisation Scenario projects significantly lower fossil fuel prices throughout the time horizon.

All three of the PRIMES crude oil price projections were used as the basis for developing price projections for maritime fuels. The impacts of sulphur regulations on prices were calculated using results from the Purvin & Gertz (2009) report to the Commission on the impacts of IMO fuel specification changes and included in the fuel price scenario.

Table VI.2: Maritime bunker fuel price projections (EUR/tonne)

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Reference (Central prices)	328	375	606	710	755	808	861	909	977
Current policy initiatives (CPI)	386	418	636	745	791	847	903	954	1024

¹⁴⁸ http://www.rina.org.uk/hres/mepc%2061_inf_18.pdf

Decarbonisation	328	373	548	575	539	539	533	520	512
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The CPI scenario was used as a reference for the impact assessment, as it reflects the current policy initiatives scenario.

Administrative costs

Additional administrative costs included in the model assume a minimum of five days investigation time (at €500 per day), with additional costs of 5% of the investment cost of the measure.

4. IN-SECTOR REDUCTION TRAJECTORY

It has been analysed how to achieve the objectives defined in the White Paper on Transport, namely a 40% reduction in GHG emissions by 2050 compared to 2005, through only action within the maritime sector. It has been assumed for this trajectory that the sector has no access to “flexibilities” such as the possibility to substitute in-sector emission reduction by purchasing offsets (carbon credits) or emission allowances (EUA). This trajectory could be achieved by setting up a closed ETS for the maritime sector only.

International fossil fuel price assumptions do not presuppose significant global climate action and thus follow global baseline projections, i.e. 791€/t by 2030 and 1024€/t by 2050.

The trajectory was set by trying to minimise cost subject to the constraint of the in-sector emission reduction of 40%. The results show emissions reduce from 2015 onwards, reaching -10% by 2030 compared to 2005.

Table VI.3: In-sector reduction trajectory

	2015	2020	2025	2030	2035	2040	2045	2050
Business as usual	199	210	217	223	233	244	255	271
Reference in-sector reduction trajectory for the Impact Assessment								
In-sector reduction trajectory	199	195	184	176	162	145	131	119
Reduction compared to 2005 emissions	2%	0%	-6%	-10%	-17%	-25%	-33%	-40%

Source: AEA Technology 2012

It is worth to recall that if the domestic GHG reduction milestones of the Roadmap for Moving to a Competitive Low Carbon Economy in 2050¹⁴⁹ are achieved, demand for fossil fuels in the EU may be reduced significantly, reducing also the need for shipping these fossil fuels. To illustrate the possible impact of reduced demand for shipping, a sensitivity analysis was carried out assuming that the same

in-sector reduction trajectory is applied. The reduction of transport activity due to decreasing shipping of fossil fuels necessarily leads to higher emissions reductions than the reference in-sector reduction scenario mentioned in table VI3.

Table VI.4: Sensitivity analysis assuming a decarbonisation of the EU economy

	2015	2020	2025	2030	2035	2040	2045	2050
In-sector reduction trajectory	199	190	176	167	152	134	119	109
Reduction compared to 2005 emissions	2%	-2%	-10%	-14%	-22%	-31%	-39%	-44%

Source: AEA Technology 2012

Moreover, a sensitivity analysis was carried out assuming that administrative costs related to the uptake of technology were higher than 5% of the investment cost of the measures. A threshold of 10% was chosen. However, this increase did not lead to a significant change in the uptake of technology: the CO2 emissions remain similar to the internal optimal reduction trajectories, even if the total costs increase by 0.04%.

A sensitivity analysis was also carried out assuming low bunker fuel prices, which is associated with a global decarbonisation scenario.

Table VI.5: Internal optimal reduction trajectories according to different fuel prices

		2015	2020	2025	2030	2035	2040	2045	2050
Emissions (MtCO2)	High fuel price	199	195	184	176	162	145	130	119
	Low fuel price	199	197	187	180	168	147	132	119
Reduction compared to 2005	High fuel price	2%	0%	-6%	-10%	-17%	-25%	-33%	-40%
	Low fuel price	2%	1%	-4%	-8%	-14%	-25%	-32%	-40%

Source: AEA Technology and others 2012

The in-sector reduction trajectory is not expected to vary significantly, even if the emission reduction may be delayed. Regarding the costs, even if there is a significant difference (around 7%) between the total costs of the in-sector reduction trajectory using high fuel prices and low fuel prices, this difference is mainly due to fuel costs. Indeed, other costs do not vary significantly (less than 1% difference for investment costs and even lower for operational costs). So, the impacts on policy options assessed should not significantly differ regarding fuel prices.

5. SCENARIO ASSESSED

The policy analysis only considers the time period up to 2030 to look at concrete policy proposals. Taking into account the in-sector reduction trajectory to achieve the long term goal of -40% by 2050, a reduction goal of -10% is set for 2030 to assess the different potential policy instruments to achieve such a goal.

The modelling simulates two types of policy instruments, i.e. a levy and an emission trading system (ETS). Any policy option assessed, except the option on monitoring and reporting based on fuel consumed (option 2), can be linked with these policy instruments. In particular, due to similar mechanisms, the contribution based compensation fund was assessed considering a levy with full recycling on revenues and the target based compensation fund was assessed based on an ETS with full auctioning and full recycling of revenues. The option on monitoring and reporting based on fuel consumed was assessed using academic studies, in particular the Maddox study, and stakeholder consultations.

The impacts associated with different levels of the levy are assessed. For the ETS the impact of a stand-alone system or a system linked to other trading systems is assessed, assuming different options for free allocation and auctioning.

The scenarios that look at impacts of different policy instruments up to 2030 apply a number of assumptions in order to allow results to be compared:

- The assessment of the impacts of the internalisation of climate externalities is based on the assumption of no evasion or avoidance of the system, as any regulation must be designed in such way to minimize avoidance.
- Private discount rates are applied and the model assumes efficient implementation of possible mitigation options, with no market barriers.
- Global oil prices are as listed in table VI.2
- Shipping of fossil fuels is not reduced due to climate action in the EU.

The model is a partial equilibrium model focused on the shipping sectors. Therefore macro-economic impacts, including potential double dividend benefits from raising revenue through auctioning or a levy are not estimated in this model.

The results focus on the impacts on the costs of shipping itself. For options that include a certain amount of free allocation, it is assumed that ship operators will not incorporate the opportunity costs of these free allowances in its price setting. This specific assumption therefore might underestimate the cost increasing impact on shipping prices and underestimate the windfall profits that might materialise for shipping operators if free allocation is applied.

5. Levy

Three scenarios were assessed based on the level of the levy:

- Internal reduction scenario: A level of levy that would ensure that emissions reduce by 10% by 2030 within the shipping sector

- Levy high ETS prices: A level of levy that corresponds to the carbon prices required to achieve the 2030 milestone from the 2050 Low Carbon Economy Roadmap¹⁵⁰.
- Levy low ETS prices: A level of levy that corresponds to the carbon prices with no additional action on climate change in the EU beyond policies already implemented¹⁵¹.

The table below shows the level of the levy marginal abatement costs of achieving an emission reduction of 10% by 2030 compared to 2005.

Table VI.6: Level of levy considered

(2010 prices)	2020	2025	2030
Internal reduction scenario ¹⁵²	19.73	137.62	470.61
Levy high ETS prices	25.0	34.2	50.9
Levy low ETS prices	9.13	21.37	35.55

If all emissions are reduced internally, carbon prices would need to increase considerably, to levels above € 400 by 2030. It does not appear economically efficient for the level of the levy to be set at such level, as the marginal abatement costs of other sectors is likely to be lower (e.g. 50.9€/tCO₂ considering the EU ETS prices in case of a step up of ambition in line with the 2050 Roadmap). In other words, this demonstrates that the in-sector reductions in line with the cost-effective reduction trajectory of the economy as a whole (as shown in the Low Carbon Economy Roadmap) would be lower: at around 5% by 2030, as opposed to the 10% in-sector reduction in line with the reference trajectory mentioned in table VI.3.

Table VI.7: Comparison between the level of the levy and the emissions

		2020	2025	2030
Emissions (MtCO ₂)	Levy low ETS prices	194,2	185,9	186,7
	Levy high ETS prices	193,9	185,7	186,4
	Internal reduction scenario	194,8	180,8	176,1

¹⁵⁰ The carbon prices used are those equivalent to the low carbon scenario in SEC(2011) 288 final (Table 31), achieving 80% reductions in the EU by 2050, using effective technologies with fragmented global action on climate and reference fossil fuel prices.

¹⁵¹ The carbon prices used are those equivalent to the reference scenario in SEC(2011) 288 final, assuming policies at EU and national level already implemented, with fragmented global action on climate and reference fossil fuel prices. These carbon prices would see emission only reduce by 40% by 2050, well short of the -80% as projected in the 2050 low carbon Roadmap scenarios.

¹⁵² AEA Technology and others, 2012

Reduction compared to the baseline	Levy low ETS prices	-7%	-14%	-16%
	Levy high ETS prices	-7%	-15%	-17%
	Internal reduction scenario	-7%	-17%	-21%
Reduction compared to 2005	Levy low ETS prices	-1%	-5%	-5%
	Levy high ETS prices	-1%	-5%	-5%
	Internal reduction scenario	0%	-8%	-10%

Source: AEA Technology and others, 2012

The assessment of costs also shows that a scenario using a levy set at low ETS prices (i.e. 35.55 €/tCO₂ in 2030) delivers significant net savings of 23.6 bn €. It should also be noted that applying a levy that corresponds to the carbon prices required to achieve the 2030 milestone from the 2050 Low Carbon Economy Roadmap (i.e. 50.9 €/tCO₂ in 2030) achieves similar emissions reduction as the Levy low ETS price still at negative total costs for the sector.

Table VI.8: Additional costs up to 2030 compared to the baseline, €bn

	Internal reduction scenario	Levy high ETS prices	Levy low ETS prices
Costs ¹⁵³ (excluding levy costs)	-47,6	-52,7	-52,7
Levy costs	203,5	47,8	29,1
Total costs	156,0	-1,8	-23,6

Source: AEA Technology and others, 2012

The level of a levy depends on the contribution requested from the maritime transport sector as part of the transition to the low carbon economy. As this contribution is not set yet for the short and medium term, only the impacts associated with a levy set at low ETS prices (i.e. 35.55 €/tCO₂ in 2030) is assessed further to analyse the environmental, economic and social impacts.

6. Free allocation and auctioning

For the assessment of impacts under the ETS options, all scenarios assume an allocation to the sector equal to the emission profile as projected in section 3 to achieve the long term in-sector reduction trajectory, resulting in a 2030 target equal to -10% compared to 2005.

Two scenarios have been assessed: a free allocation scenario (i.e. all allowances up to the cap are given for free) and an auctioning scenario (i.e. each allowance has to be purchased).

¹⁵³ Including additional investment costs, additional operational costs and fuel savings.

It should be noted that the scenarios are stylised. No sensitivity was performed on allocating to the sector a cap higher than the target of -10% compared to 2005. But a tighter cap, in a system that is linked to a large external trading system, would be similar from the point of view of the sector, to a scenario with more auctioning. As such the extreme scenarios of full auctioning and full free allocation give a range of potential impact on the sector, also for more ambitious targets.

The ETS scenarios assume that there is a link to external carbon market mechanisms, resulting in an equalisation of prices. In the scenario it is assumed prices equalise to a level equal to the low and the high ETS prices as used in the Levy example. As such this assessment gives a potential range of impacts that strongly will be determined by the available supply of allowances from for instance the ETS or credits from CDM, sectoral trading mechanisms or other carbon market mechanisms. The assessment does not look into potential sources of this supply and the impact of the potential demand from the maritime sector on these sources of supply.

No closed ETS scenario has been specifically assessed but the closed ETS with full auctioning would largely correspond to a levy that achieves the reductions fully internally.

Table VI.9: In-sector emissions under the open ETS option (MtCO₂), Sources: AEA Technology and others 2012

		2020	2025	2030
Emissions (MtCO ₂)	ETS link, high ETS prices	194.6	185.9	186.7
	ETS link, low ETS prices	194.6	185.7	186.4
Reduction compared to the baseline	ETS link, high ETS prices	-7%	-14%	-16%
	ETS link, low ETS prices	-7%	-15%	-17%
Reduction compared to 2005	ETS link, high ETS prices	-0,2%	-5%	-5%
	ETS link, low ETS prices	-0,2%	-5%	-5%

Table VI.10: Comparison between the level of the levy and the emissions by 2030(MtCO₂), Source: AEA Technology and others, 2012

	Internal reduction scenario	Levy high ETS prices	Levy low ETS prices
ETS link, high ETS prices	10.6	0.3	0
ETS link, low ETS prices	10.3	0	0.3

This table shows that the difference in terms of in sector CO₂ emissions is not significant up to 2030.

7. Impacts on the EU-ETS in case of a linking with the maritime ETS

In case of linking with the EU-ETS, the maritime sector would be expected to be a net buyer of up to 10 million of EUAs¹⁵⁴ by 2030. This represents less than 0.5% of the total EUAs by 2030 and therefore, it can be assumed that the linking of a maritime ETS with the EU-ETS will have no significant impacts on the EU-ETS.

However, as mentioned previously, the impact assessment has been carried out assuming that there is no comprehensive global agreement on climate change and therefore no significant decrease of the trade of fossil fuels. In the event that there is a global decarbonisation of the economy, the maritime sector could be a net seller of 14 million of allowances. This represents around 0.5% of the total EUAs by 2030 and therefore it can be assumed that there is no major risk of disturbance of the EU-ETS in case of linking with a maritime ETS.

¹⁵⁴ European Union Allowances

ANNEX VII - IDENTIFIED REGIONS RELIANT ON SHIPPING

1. SPECIFIC REGIONS HEAVILY DEPENDENT ON FREIGHT ACTIVITY

The Member States most reliant¹⁵⁵ on shipping are Ireland, the Netherlands, Malta, the UK, Sweden and Finland. These countries are expected to be the most sensitive to an EU regulation that places price on emissions. Austria, Czech Republic, Hungary, Poland, Slovakia and Slovenia do not have a significant seaborne trade activity and, therefore, are not expected to be as sensitive to any policy.

Apart from these two groups of countries, the following groups can be considered:

- more than 50% of the port calls (excluding port calls from passenger vessels) in Bulgaria, Estonia, Latvia, Lithuania, Denmark and Romania are done by bulk carriers (excluding tankers) and general cargo; these categories of ships are carrying low added value goods and, therefore, according to the different policy options considered, the greatest the savings will be, the greatest the benefits will be for these Members States;
- almost 50% of the port calls (excluding port calls from passenger vessels) in Germany, Belgium, Cyprus, Spain and the EU overseas territories are done by container vessels; this category of ship is the most sensitive to avoidance and, therefore, this issue is a key issue for these Member States;
- the port calls in France, Italy, Portugal and Greece are balanced and the sensitivity to the EU regulation should be close to the EU average. Luxembourg can be considered as part of this group too.

At NUTS¹⁵⁶2 level, the main regions reliant on shipping are heavily linked with the location of major EU ports. According to the share of freight activity by sea, these regions are: Zuid Holland (Rotterdam - NL), Antwerpen (BE), Hamburg (DE), Haute-Normandie (FR), Noord-Holland (NL), Andalucia (SP), Provence Alpes Cote d'Azur (FR), East Yorkshire and Northern Lincolnshire (UK), Liguria (IT), Sicily (IT), Västsverige (SE), Cataluna (SP), Comunidad Valenciana (SP), Etelä-Suomi (FI), Bremen (DE), Puglia (IT), Nord-Pas-de-Calais (FR) and Romania South East region (RO).

The impacts previously assessed should be more visible for these regions.

2. SPECIFIC REGIONS HEAVILY DEPENDENT ON PASSENGER ACTIVITY

¹⁵⁵ The reliance on shipping is define according to seven indicators: the export as % of GDP, the share of exports done by sea, the imports as % of GDP, the share of imports done by sea, the extra-EU exports as % of GDP, the share of extra-EU exports done by sea, the extra-EU imports as % of GDP, the share of extra-EU imports done by sea and the trade volume in tonnes per capita.

¹⁵⁶ Nomenclature of Territorial Units

In 2009, 403 million passengers embarked and disembarked in EU 27 ports from passenger vessels. Italy and Greece are the focus of this activity, together accounting for 44% of all passengers. This is followed, with significantly smaller numbers, by North Sea countries (Denmark, Sweden, Germany, UK and France).

Malta, Denmark, Greece, Estonia, Sweden, Finland and Italy have a share of passenger embarked/disembarked per inhabitant higher than the EU average. So, these countries, and especially Italy, Greece and Denmark, will be the most affected by any option addressing passenger ships.

At NUTS2 level, the most reliant regions are: Åland (FI), Ceuta (SP), Sjælland (DK), Sydsverige (SE), Notio Aigaio (GR), Malta, Nordjylland (DK), Sardinia (IT), Stockholm (SE), Calabria (IT), Hovedstaden (DK), Ionia Nisia (GR).

3. SPECIFIC ISSUE FOR REGIONS WITH SPECIAL WINTER CONDITIONS

It can also be stressed that regions with special winter conditions, especially in the Baltic Sea, will be more sensitive to a regulation that address GHG emissions from fuel consumed. Indeed, ice-strengthened ships use more fuel oil in ice conditions and also in open water, due to their special design and engine power compared to ships designed only for open water conditions.

Ice-strengthened ships have more expensive investment costs than ships designed only for open water conditions, because ice-strengthening increases the steel weight of the ship hull and also the weight of the propulsion machinery. In addition to the cost of ice-strengthening of the hull, also the additional engine power increases the investment costs of ice-going ships.

Therefore, even if most policy options intend to reduce GHG emissions from ships effectively at negative costs, the investment costs and the fuel savings may be lower for ice-strengthened ships and, as a consequence, regions dependent on routes performed by ice-strengthened ships may be affected. As a consequence, this concern has to be addressed when implementing the policy option.

4. SPECIFIC ISSUE FOR REGIONS DEPENDENT ON SHIPBUILDING

Although the EU's market share of shipbuilding in terms of volumes has declined over the years, the EU has succeeded in retaining a position by building more complex ships with a relatively higher value added, while the production of more standard mass production ships moved to other countries, especially in Asia. The EU also has a relatively strong position in the ship repair market and in the marine equipment sector which supplies ship construction. Indeed, it is a net exporter.

At the European level, while shipbuilding may be declining, it still remains an important source of jobs and economic activity in the regions where it does take place. The main concentrations of large ship yards are in Germany, Croatia and Romania, followed by Finland, the UK and Spain.

A measure to address GHG emissions of ships will lead to an increase of demand of retrofitting, as well as of high value marine equipment. Therefore, any policy option should lead to net benefits for regions dependent on shipbuilding. The highest net benefits would be provided by policy options with the highest in-sector emission reduction required.

ANNEX VIII - ANALYSIS OF POSSIBLE TECHNICAL SCOPE OF AN EU MEASURE

All existing technical regulations for ships define a threshold for the size of ships covered. Main criteria for the definition of such threshold should be maximising of the amount of emissions covered by the measure (to ensure its environmental effectiveness) and the proportionality of the measure, in particular the minimisation of the administrative burden mainly for industry.

For the purpose of this Impact Assessment, two possible thresholds have been analysed:

1. 400 GT: this size limit is commonly applied under MARPOL and has been used for proposals in the IMO
2. 5000 GT: SOLAS uses 5000 GT as a threshold for certain technical equipment requirements. In addition, the 1992 International Convention on Civil Liability for Oil Pollution Damage uses 5000 GT as the floor for Article V liability.

As the absolute administrative burden of a market-based measure (including monitoring, reporting and verification and internalisation of climate externalities) seems to be to a large extent independent of the size or type of ship (in the order of 7000 – 8000 € per ship and year, see Annex XIII and AEA study), this burden is expected to be insignificant for large ships, but relatively high for smaller vessels.

Overall, the total annual administrative costs for industry in case of a 5000 GT threshold have been estimated at 148 M€ and at 82 M€ for a 400 GT threshold (see Annex XIII for detailed results). Costs for public authorities are also lower in case of a 5000 GT threshold (see annex XIII for different scenarios).

Furthermore, the size threshold impacts on the coverage of the MRV system regarding SMEs in the shipping sector: A 400 GT threshold would exclude 87% of the SMEs whereas a 5000 GT threshold would exclude 99% of the SMEs (see Annex II for more information).

It can be concluded that a 5000 GT threshold has to be regarded as more proportional than a lower threshold as both the total administrative costs for the sector and the coverage of SMEs can be minimised.

To ensure the effectiveness of the measure, the effect of the exclusion of certain vessel types and smaller ship categories on the amount of emissions covered has been analysed. This analysis could support a decision on the technical scope of a measure addressing maritime GHG emissions.

For the analysis, 2010 emission data from the AEA study have been used. Overall, almost 20,000 vessels equipped with Automatic Identification System (AIS) transponders and with EU port calls in 2010 are covered.

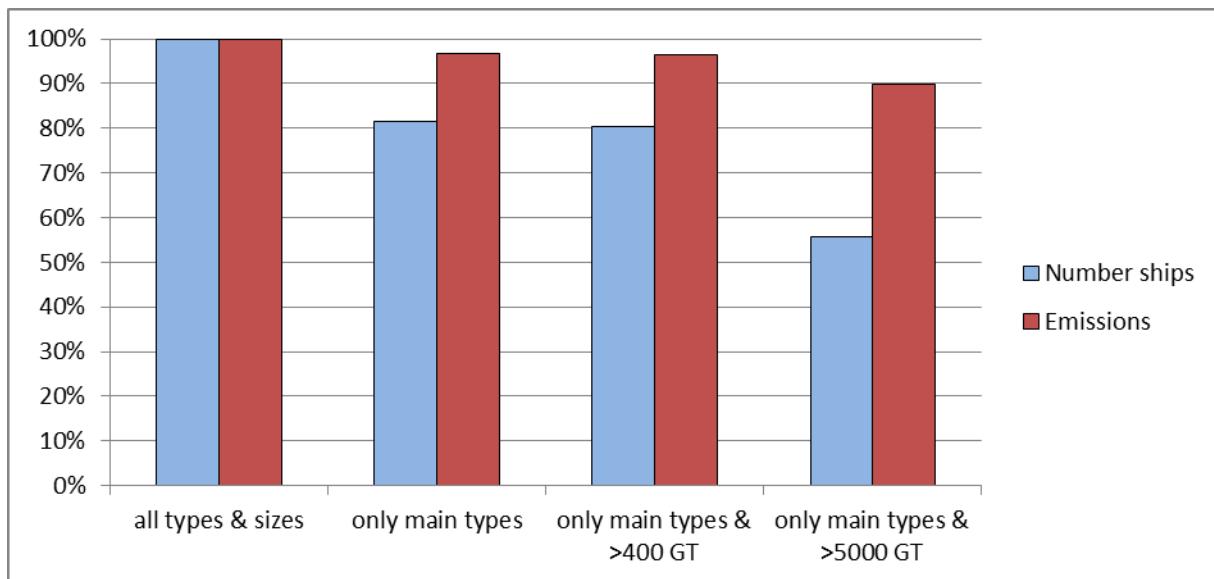
Table VIII.1: Number of ships and CO2 emissions in 2010 for EU scope per ship type and size

VesselType	VesselSize/Group	Vessels	CO2 emissions [t]
01 Oil tanker	A - GT < 300	11	1.930
01 Oil tanker	B - 300 <= GT < 400	20	6.169
01 Oil tanker	C - 400 <= GT < 500	19	5.826
01 Oil tanker	D - 500 <= GT < 5000	239	315.429
01 Oil tanker	E - 5000 <= GT	1208	15.404.869
02 Chemical tanker	C - 400 <= GT < 500	6	2.485
02 Chemical tanker	D - 500 <= GT < 5000	513	1.839.139
02 Chemical tanker	E - 5000 <= GT	1577	13.971.459
03 LPG	A - GT < 300	1	414
03 LPG	C - 400 <= GT < 500	1	780
03 LPG	D - 500 <= GT < 5000	130	570.398
03 LPG	E - 5000 <= GT	210	1.668.018
04 LNG	E - 5000 <= GT	163	5.220.857
05 Other tanker	B - 300 <= GT < 400	3	893
05 Other tanker	C - 400 <= GT < 500	2	643
05 Other tanker	D - 500 <= GT < 5000	45	100.519
05 Other tanker	E - 5000 <= GT	19	322.459
06 Bulker	A - GT < 300	1	277
06 Bulker	C - 400 <= GT < 500	1	669
06 Bulker	D - 500 <= GT < 5000	126	295.112
06 Bulker	E - 5000 <= GT	2732	21.940.872
07 General cargo	A - GT < 300	9	767
07 General cargo	B - 300 <= GT < 400	16	2.393
07 General cargo	C - 400 <= GT < 500	25	4.841
07 General cargo	D - 500 <= GT < 5000	3158	5.876.285
07 General cargo	E - 5000 <= GT	1349	7.583.619

VesselType	VesselSize/Group	Vessels	CO2 emissions [t]
08 Other dry	B - 300 <= GT < 400	1	462
08 Other dry	C - 400 <= GT < 500	3	1.156
08 Other dry	D - 500 <= GT < 5000	145	290.648
08 Other dry	E - 5000 <= GT	394	4.277.142
09 Container	D - 500 <= GT < 5000	64	285.627
09 Container	E - 5000 <= GT	1964	54.565.733
10 Vehicle	D - 500 <= GT < 5000	2	10.692
10 Vehicle	E - 5000 <= GT	438	5.591.435
11 Roro	D - 500 <= GT < 5000	34	68.615
11 Roro	E - 5000 <= GT	356	6.137.373
12 Ferry	A - GT < 300	155	320.221
12 Ferry	B - 300 <= GT < 400	49	152.251
12 Ferry	C - 400 <= GT < 500	82	246.061
12 Ferry	D - 500 <= GT < 5000	311	2.217.155
12 Ferry	E - 5000 <= GT	488	16.888.627
13 Cruise	A - GT < 300	5	1.177
13 Cruise	B - 300 <= GT < 400	4	2.215
13 Cruise	C - 400 <= GT < 500	3	1.761
13 Cruise	D - 500 <= GT < 5000	33	66.249
13 Cruise	E - 5000 <= GT	173	6.209.402
14 Yacht	A - GT < 300	74	27.102
14 Yacht	B - 300 <= GT < 400	81	47.167
14 Yacht	C - 400 <= GT < 500	147	130.178
14 Yacht	D - 500 <= GT < 5000	265	540.787
14 Yacht	E - 5000 <= GT	13	123.603
15 Offshore	A - GT < 300	49	23.155
15 Offshore	B - 300 <= GT < 400	23	14.008

VesselType	VesselSize/Group	Vessels	CO2 emissions [t]
15 Offshore	C - 400 <= GT < 500	25	24.482
15 Offshore	D - 500 <= GT < 5000	618	1.122.327
15 Offshore	E - 5000 <= GT	145	701.982
16 Service	A - GT < 300	483	285.312
16 Service	B - 300 <= GT < 400	356	288.537
16 Service	C - 400 <= GT < 500	210	201.886
16 Service	D - 500 <= GT < 5000	474	878.640
16 Service	E - 5000 <= GT	93	572.357
17 Fishing	A - GT < 300	55	11.026
17 Fishing	B - 300 <= GT < 400	27	8.582
17 Fishing	C - 400 <= GT < 500	35	15.574
17 Fishing	D - 500 <= GT < 5000	248	276.232
17 Fishing	E - 5000 <= GT	25	110.212
18 Miscellaneous	A - GT < 300	13	2.508
18 Miscellaneous	B - 300 <= GT < 400	2	551
18 Miscellaneous	C - 400 <= GT < 500	6	1.633
18 Miscellaneous	D - 500 <= GT < 5000	45	28.637
18 Miscellaneous	E - 5000 <= GT	44	140.280
Total		19.844	178.047.885

The ships covered by the analysis emitted around 180 Mt CO₂ in the EU scope (journeys from and to EU ports). The results are summarised in the following figure:



COVERAGE OF NUMBER OF SHIPS AND CO₂ EMISSIONS DEPENDING ON THE COVERAGE OF SHIP TYPES AND SIZES, 2010 DATA FOR EU SCOPE

If for the 13 main ship types, only vessels with at least 400 GT are considered. As result, the number of ships is reduced to 81% of the total still covering 97% of the total emissions.

If only the 13 main ship types and vessels of at least 5000 GT are covered by a measure, the number of ships goes down to about 11,000 (56% of the total number) representing 160 Mt CO₂ emitted (90% of the total amount).

A size threshold higher than 5000 GT would not lead to such high level of emissions covered and would therefore not ensure the environmental effectiveness of the measure.

People could also argue that the introduction of a size threshold may create a distortion of trade competition, as short sea shipping would not be covered by the measures as much as deep sea shipping. However, short sea shipping and deep sea shipping are not serving the same market.

Another analysis has been carried out to identify a possible correlation between the size and the flag of ships calling into EU ports. In case of a strong correlation, a size threshold might lead to different relative coverage of ships flying different flags.



SHARE OF EU PORT CALLS BY FLAG, SOURCE: IHS FAIRPLAY 2011

Available data only allow differentiating between ships smaller and larger than 20000 GT. The analysis shows that the share of port calls by EEA flagged ships is 77% for both groups. Out of the remaining 23% port calls, the second largest groups are port calls by ships flying American flags (mainly Panama and Bahamas) with 13% respectively 12% of the port calls (smaller/ larger than 20000 GT). This analysis provides no evidence of correlation between size and European/ non-European flags. As a consequence, the size threshold should not lead to a significant different coverage of EU/ EEA flagged ships.

In conclusion, the number of ships covered by a measure to reduce maritime GHG emissions can be reduced significantly if certain categories and in particular smaller vessels are excluded. A higher threshold of 5000 GT as used under SOLAS would reduce the estimated administrative costs for the shipping sector from 148 to 82 M€ per year while covering 90% of the total emissions. No impacts have been identified on the coverage of different flags.

ANNEX IX - LIST OF IMO PROPOSALS (24 MAY 2011)

Proposed market-based measures	Proponent(s)	Mechanism for GHG reduction	
		In-sector emission reductions	Out-of-sector emission reductions
An International Fund for Greenhouse Gas emissions from ships (GHG Fund)	Cyprus, Denmark, the Marshall Islands, Nigeria and IPTA (MEPC 60/4/8, GHG-WG 3/2/1 GHG WG 3/3/4)	Price incentive on fuel use	Prescribed purchase of out-of-sector project offset credits by a fund; Potential for supplementary reductions from use of remaining proceeds
Consolidated proposal of the Efficiency Incentive Scheme (EIS) based on the Leverage Incentive Scheme (LIS) and the Vessel Efficiency System (VES)	Japan & World Shipping Council (MEPC 60/4/37 MEPC 60/4/39 GHG-WG 3/3/2)	Mandatory EEDI; Existing ship standard with fuel-based charge Leveraged refund incentive	Potential for supplementary reductions from use of remaining proceeds
Port State arrangements utilizing the ship traffic, energy and environment model, STEEM (PSL)	Jamaica (MEPC 60/4/40)	Price incentive on fuel use	Potential for supplementary reductions from use of remaining proceeds
Ship Efficiency and Credit Trading (SECT)	US (MEPC 60/4/12 MEPC 61/5/16 MEPC 61/INF.24)	Mandatory EEDI; Efficiency trading	
Global Emission Trading System (ETS)	Norway, United Kingdom, France & Germany (MEPC 60/4/22 MEPC 60/4/26 MEPC 60/4/41 MEPC 60/4/54 GHG-WG 3/3/5 GHG-WG 3/3/6 GHG-WG 3/3/8)	Price incentive on fuel use	Purchase out-of-sector project offset credits by shipping sector; Potential for supplementary reductions from use of remaining proceeds
How technical and operational measures are the only direct and effective means to deliver cuts in CO ₂ emissions	Bahamas (MEPC 60/4/10, GHG-EG 3/2)	Mandatory emission reduction target	
A Rebate Mechanism (RM) for a market-based instrument for international shipping	IUCN (MEPC 60/4/55 MEPC 61/5/33)	Price incentive on fuel use	Prescribed purchase of out-of-sector project offset credits by a fund; Potential for supplementary reductions from use of remaining proceeds

ANNEX X - DESCRIPTION OF MARKET BARRIERS

Work by the International Maritime Organisation (IMO) and other organisations¹⁵⁷ have indicated that there are significant negative or low marginal abatement cost opportunities to reduce GHG emissions in the maritime transport sector, i.e. the fuel cost savings would almost or entirely exceed the cost of the measures. The use of such opportunities would lead to reductions in GHG emissions and in transport costs. However, a number of market barriers are contributing to prevent their implementation.

Three main categories of market barriers exist. As these categories sometimes overlap, it can be difficult to distinguish between different types of barriers. Moreover, the different categories are not mutually exclusive, in other words several categories of barriers may impact the adoption of one solution. Market failure barriers are the most widespread.

1. Market failures barriers

a. Split of incentives

This market failure occurs when the commercial shipping market does not have the ability to implement a cost effective solution because the maritime transport actor (e.g., the ship owner) making the investment in a solution does not realise the benefit (e.g., fuel saving) of the investment.

In other words, the people benefiting from energy efficiency are not the people paying for it.¹⁵⁸ In the shipping industry, it occurs when there is a disconnect between the vessel owner, who controls investment spending and energy conservation efforts, and the operator, who is responsible for fuel cost. This primarily occurs when vessels – especially bulk carriers, tankers, and containerships – are hired under contract for a time charter or bare boat charter.¹⁵⁹ In such cases, it is the charterer who pays for fuel but the ship owner who is responsible for any investment in energy-efficiency equipment. Another “split incentive” issue is that shipowners do not typically expect to own a vessel for its entire life, or are uncertain of how long they want to own the vessel. It is not guaranteed that shipowners can obtain a premium for a ship in a second hand sale that has better than expected fuel efficiency.¹⁶⁰

Moreover, commercial practises in the maritime industry hinder the implementation of a cost effective solution. For example, in a spot charter, a ship will be compensated through

¹⁵⁷ CE Delft Study "Technical support for European action to reducing Greenhouse Gas Emissions from international maritime transport"; European Commission Joint Research Centre Reference Report "Regulating Air Emissions from Ships", the "Second IMO GHG Study 2009", the submission to the IMO "Marginal abatement costs and cost effectiveness of energy-efficiency measures" (MEPC 61/INF.18) and the master thesis "Unlocking the potential for CO₂ abatement in ships arriving and departing from UK ports" by Jenny Hill of Imperial

¹⁵⁸Jaff et al, 1994

¹⁵⁹Wijnolst et al, 1997

¹⁶⁰Brealey et al, 2005

demurrage if the terminal is not ready to take the vessel when it arrives. However, if the ship slows down (thereby reducing GHG emissions) to arrive at a later time when the terminal is available, the ship is not compensated for the extra voyage time incurred.

Furthermore, shipping cycles also prevent the uptake of efficient technology. Large changes in vessel charter rates over different shipping cycles mean that when rates are high, vessel owners are unwilling to take any time out of service (e.g. to install an energy efficiency solution). When charter rates are low, vessel owners may not have the funds required to make an investment in an energy efficiency improvement.

b. Lack of information

This market failure relates to the lack of accurate information on the energy efficiency of existing vessels, specifically the lack of accurate fuel consumption information.

It also generates technological barriers. For a specific technology, a lack of confidence in the technology because of a lack of operational data/experience can prevent the adoption of efficient technologies. For example, there are concerns regarding the ability of marine diesel engines to efficiently and safely operate for extended periods at low speeds. This can hinder implementation of the speed reduction solution.

Furthermore, small shipping companies may lack the staff to analyse, make the decision, and oversee the implementation of a solution. The marine industry is extremely diverse and has a large number of small companies that may not have the management time or expertise needed to evaluate and implement GHG solutions. This may be further complicated by the use of third-party ship managers that serves to remove the ship owner – from whom the impetus for energy efficiency improvements is typically expected – from day-to-day operational issues involving their ships.

c. Access to finance

Even when an investment is profitable, it may not be possible for an owner or operator to get access to finance for this investment. This can occur for various reasons:

- Uncertainty over future fuel prices represents an economic barrier to virtually all solutions involving an installation cost (e.g., waste heat recovery). Uncertainty over the magnitude of fuel reductions for a given solution can also adversely impact the investment decision.
- Furthermore, shipping business cycles also prevent the uptake of efficient technology. Large changes in vessel charter rates over different shipping cycles mean that when rates are high, vessel owners are unwilling to take any time out of service (e.g. to install an energy efficiency solution). When charter rates are low, vessel owners may not have the funds required to make an investment in an energy efficiency improvement, as the risks become higher for financiers.
- When solution is only marginally economic at the current fuel price, the expected rate of return can be too low to compensate for the investment risk taken.

Moreover, a cost effective solution may not be implemented due to management issues, such lack of staffing or time to implement a technology. However, the ability of shipping company to increase their staff is highly dependent on the freight rates variations.

2. Operational or Physical Barriers

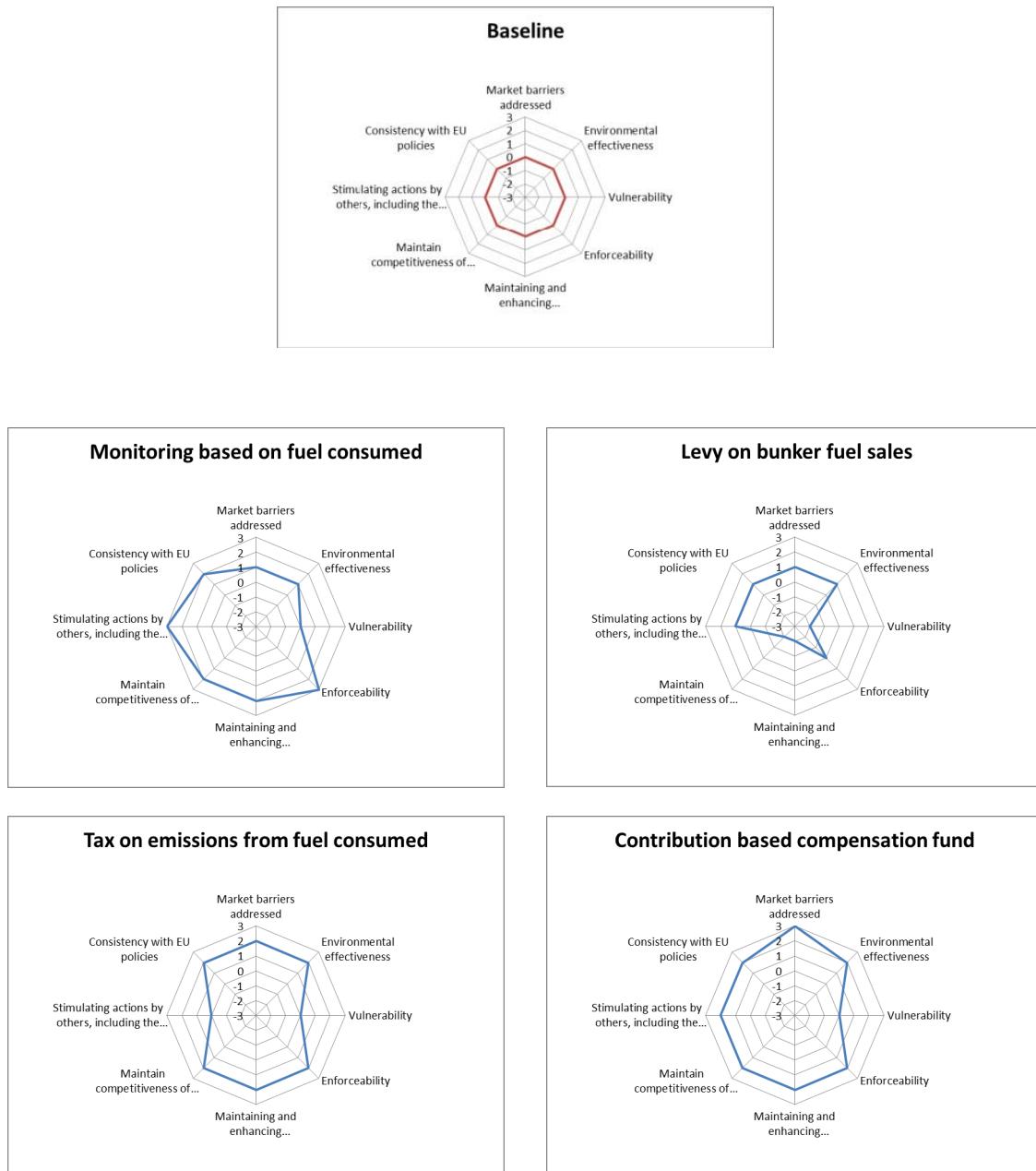
Operational or physical barriers occur when a solution cannot be utilised on a specific vessel due to physical space constraints or other matters that impact vessel operations. Examples of this include:

- Waste heat recovery on a small vessel. The vessel may not have the physical room to install the waste heat recovery heat exchanger in the funnel.
- Solar cells: On a container ship, the ability to put a large array of solar cells is problematic given the use of deck space for container stowage. Similarly, bulk carriers require removable hatch covers that would complicate the use of deck mounted solar arrays.
- Proposals to install and deploy sails may be problematic on vessels with limited deck space such as bulkers and containerships.

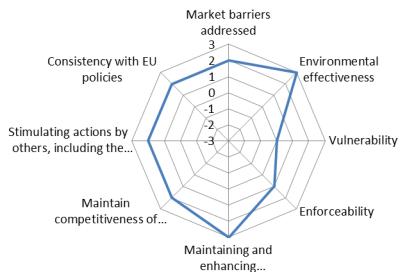
3. Regulatory Barriers

Regulatory barriers are based on concerns over (existing and potential future) regulations that impact the implementation of a given solution. There is a range of different types of regulatory barriers, such as competition regulation; domestic, regional or international law prohibiting certain activities or limitations in the legislative authority and legislative processes. For example some abatement solutions such as hull cleaning and propeller polishing are prohibited in certain ports due to local regulations that prohibit the release of the cleaning residues in local waters.

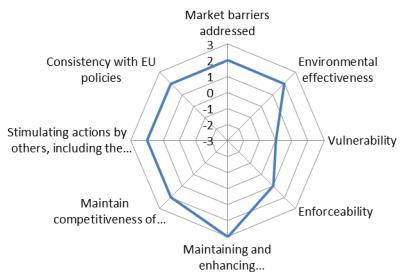
ANNEX XI - GRAPHICAL REPRESENTATION OF THE COMPARISON OF THE POLICY OPTIONS



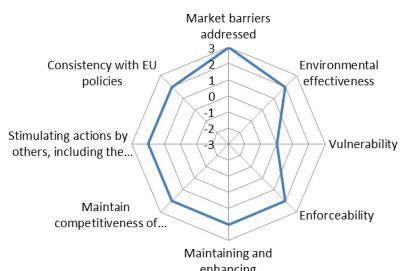
Closed ETS with free allocation



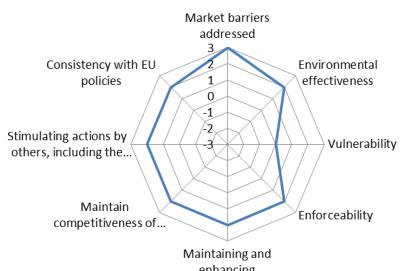
Open ETS with free allocation



Open ETS with full auctioning



Target based compensation fund



ANNEX XII - ANNUAL COMPLIANCE CYCLE FOR MONITORING, REPORTING AND VERIFICATION OF EMISSIONS

1. General remarks

As regards the geographical scope, the following routes will in principle be covered in a non-discriminatory manner for all ships regardless their flag:

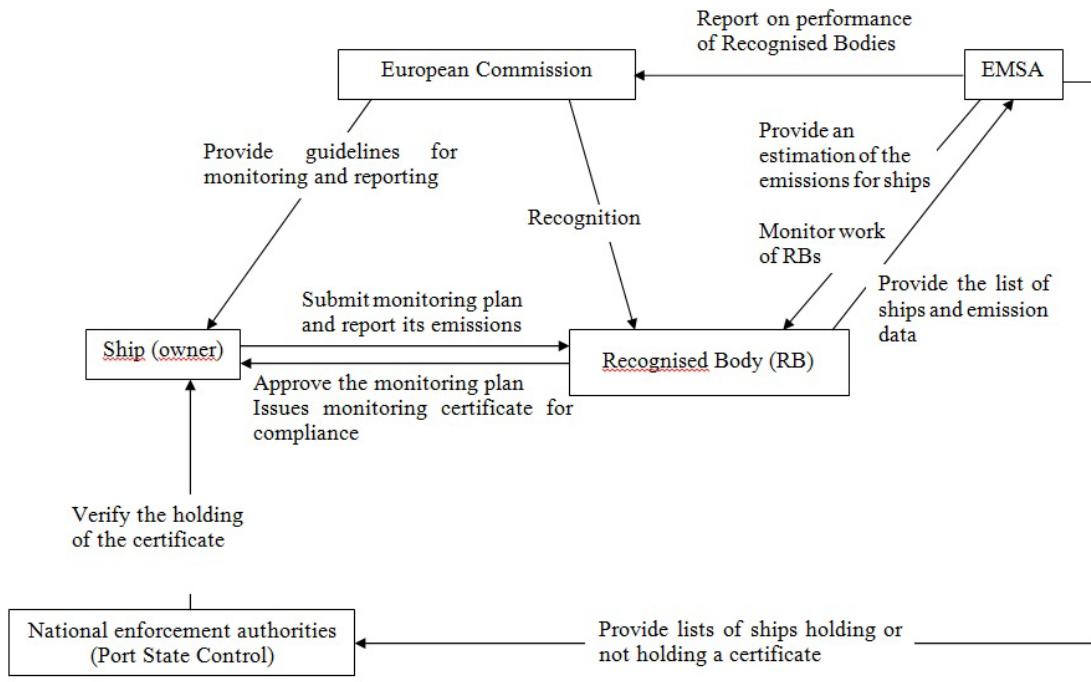
- intra-EU journeys
- journeys from the last non-EU port to the first EU port of call (incoming journeys)
- journeys from an EU port to the next non-EU port of call (outgoing journeys)

Tasks related to the check of monitoring plans, emission reports, communication with ship owners and operators and the issuance of certificates would be ensured by recognised bodies or other accredited independent third parties. Such bodies, in particular Recognised Organisations, already have extensive experience and play an important role for maritime safety.

Enforcement of the MRV obligations would be ensured by Member States, more concretely by Port Authorities under the existing Port State Control regime.

The proposed MRV measure should take the form of a Regulation. For the implementation of the proposed MRV system, delegated acts would be needed to determine the necessary technical details. Guidance documents will be developed to facilitate the implementation.

2. Compliance cycle



ANNEX XIII - ADMINISTRATIVE COSTS AND ADMINISTRATIVE BURDEN

Source: AEA Technology and others, 2012

1. ENFORCEMENT BY NATIONAL COMPETENT AUTHORITIES (FOR ALL OPTIONS EXCEPT OPTION 3A - LEVY ON BUNKER FUEL)

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€41,50	5	40	€1.660,00	0,1	€166,00	€0,00	€0,00	0	€166	€166	€4.482	€4.482
Verification		11	86	€3.569,00	1	€3.569,00	€0,00	€0,00	0	€3.569	€3.569	€96.363	€96.363
Total				€3.735,00		€0,00				€3.735	€3.735	€100.845	€100.845

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€41,50	5	40	€1.660,00	0,1	€166,00	€0,00	€0,00	0	€166	€166	€4.482	€4.482
Verification		7	53	€2.199,50	1	€2.199,50	€0,00	€0,00	0	€2.200	€2.200	€59.387	€59.387
Total				€2.365,50		€0,00				€2.366	€2.366	€63.869	€63.869

For option 3a, the enforcement is considered as part of the compliance check done by the national competent authorities in charge of compliance.

2. MONITORING BASED ON FUEL CONSUMED (OPTION 2)

- For ship owners and ship operators

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€41,50	24	192	€7.968,00	0,1	€796,80	€0	0	€797	€797	18400	€14.661.120	€14.661.120
Preparation of the monitoring plan		6	48	€1.992,00	0,1	€199,20	€0	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data		3	24	€996,00	1	€996,00	€0	80	€996	€996	18400	€18.326.400	€18.326.400
Adjusting existing data		3	24	€996,00	1	€996,00	€0	0	€996	€996	18400	€18.326.400	€18.326.400
Filling in forms and tables, including recordkeeping		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Verification		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	18400	€81.217.600	€81.217.600
Submitting the information		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Total				€3.116,00		€3.750,00			€7.066	€7.269		€48.414.400	€33.753.280

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€41,50	20	160	€6.640,00	0,1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Preparation of the monitoring plan		5	40	€1.660,00	0,1	€166,00	€0	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data		2	16	€664,00	1	€664,00	€0	80	€664	€664	11400	€7.569.600	€7.569.600
Adjusting existing data		2	16	€664,00	1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Filling in forms and tables, including recordkeeping		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Verification		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	11400	€50.319.600	€50.319.600
Submitting the information		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Total				€3.486,00		€3.750,00			€7.236	€7.705		€62.490.400	€6.434.720

- For public authorities

- For national competent authorities controlling the compliance

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	50	400	€16.600,00	0,1	€1.660,00	€0,00	€0,00	0	€1.660	€1.660	27	€14.820	€14.820
Designing information material		200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		680	5440	€225.760,00	0,1	€22.576,00	€0,00	€0,00	0	€22.576	€22.576	27	€609.552	€609.552
Verification of the information submitted		340	2720	€112.880,00	1	€112.880,00	€0,00	€0,00	0	€12.880	€12.880	27	€3.047.760	€3.047.760
Total						€43.756,00	€200.000,00	€0,00		€44.769	€44.769		€3.908.772	€3.908.772

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	50	400	€16.600,00	0,1	€1.660,00	€0,00	€0,00	0	€1.660	€1.660	27	€14.820	€14.820
Designing information material		200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	-	-	1	€206.640	€206.640
Informing the subjected entities		420	3360	€139.440,00	0,1	€13.944,00	€0,00	€0,00	0	€13.944	€13.944	27	€376.488	€376.488
Verification of the information submitted		210	1680	€69.720,00	1	€69.720,00	€0,00	€0,00	0	€69.720	€69.720	27	€1.882.440	€1.882.440
Total						€31.964,00	€200.000,00	€0,00		€35.324	€35.324		€2.510.388	€2.510.388

- For EU competent authority controlling the compliance

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)	
Familiarizing with the information obligation	€57,00	50	400	€26.800,00	0,1	€2.680,00	€0,00	€0,00	0	€2.680	€2.680	27	€2.680	€2.680
Designing information material		200	1600	€107.200,00	0,1	€10.720,00	€200.000	€0,00	0	€210.720	€210.720		€210.720	€210.720
Informing the subjected entities		13800	110400	€7.396.800,00	0,1	€739.680,00	€0,00	€0,00	0	€739.680	€739.680		€39.680	€39.680
Verification of the information submitted		4600	36800	€2.465.600,00	1	€2.465.600,00	€0,00	€0,00	0	€2.465.600	€2.465.600		€2.465.600	€2.465.600
Total						€3.218.680,00	€200.000,00	€0,00		€3.418.680	€3.418.680		€3.418.680	€3.418.680

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)	
Familiarizing with the information obligation	€57,00	50	400	€26.800,00	0,1	€2.680,00	€0,00	€0,00	0	€2.680	€2.680	27	€2.680	€2.680
Designing information material		200	1600	€107.200,00	0,1	€10.720,00	€200.000	€0,00	0	€210.720	€210.720		€210.720	€210.720
Informing the subjected entities		8550	68400	€1.582.800,00	0,1	€158.280,00	€0,00	€0,00	0	€158.280	€158.280		€158.280	€158.280
Verification of the information submitted		2850	22800	€1.527.600,00	1	€1.527.600,00	€0,00	€0,00	0	€1.527.600	€1.527.600		€1.527.600	€1.527.600
Total						€1.999.280,00	€200.000,00	€0,00		€2.199.280	€2.199.280		€2.199.280	€2.199.280

3. LEVY ON BUNKER FUEL SALES (OPTION 3A)

- For bunker fuel suppliers

Actions required	Tariff (per hour)	Time per fuel supplier (man-days)	Time per fuel supplier (hours)	Price (per fuel supplier)	Frequency (per year)	Price (per fuel supplier & per year)	Outsourcing costs (per fuel supplier & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per fuel supplier & per year)	Total administrative burden (per fuel supplier & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	10	80	€3.320,00	0,1	€332,00	€0,00	0	€332	€332	1200	€398.400	€398.400
Designing information material		20	160	€6.640,00	0,1	€664,00	€0,00	100	€664	€664	1200	€796.800	€0
Retrieving relevant information from existing data		30	240	€9.960,00	1	€996,00	€0,00	100	€996	€996	1200	€11.952.000	€0
Adjusting existing data		30	240	€9.960,00	1	€996,00	€0,00	100	€996	€996	1200	€11.952.000	€0
Filling in forms and tables, including recordkeeping		5	40	€1.660,00	1	€166,00	€0,00	100	€1.660	€1.660	1200	€1.992.000	€0
Verification		4	32	€1.328,00	1	€132,00	€4.000,00	100	€5.328	€5.328	1200	€6.383.600	€0
Submitting the information		1	8	€332,00	1	€332,00	€0,00	100	€332	€332	1200	€398.400	€0
Paying the tax		1	8	€332	1	€332,00	€0,00	0	€332	€332	1200	€398.400	€398.400
Total				€24.568,00		€1.000,00			€28.568		€664	€4.281.600	€796.800

- For national competent authorities

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	10	80	€3.320,00	0,1	€332,00	€0,00	0	€332	€332	27	€3.964	€3.964
Controlling the payment of the contribution		11	88	€3.652,00	1	€3.652,00	€0,00	0	€3.652	€3.652	27	€9.604	€9.604
Total				€3.984,00		€0,00			€3.984		€3.984	€107.568	€107.568

4. TAX ON EMISSIONS FROM FUEL CONSUMED (OPTION 3B)

- For ship owners and ship operators

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	24	192	€7.968,00	0,1	€796,80	€0	0	€797	€797	18400	€14.661.120	€14.661.120
Preparation of the monitoring plan		6	48	€1.992,00	0,1	€199,20	€0	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data		3	24	€996,00	1	€996,00	€0	80	€996	€996	18400	€18.326.400	€3.665.280
Adjusting existing data		3	24	€996,00	1	€996,00	€0	0	€996	€996	18400	€18.326.400	€18.326.400
Filling in forms and tables, including recordkeeping		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Verification		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	18400	€81.217.600	€81.217.600
Submitting the information		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Paying the tax		1	8	€332	1	€332,00	€0,00	0	€332	€332	18400	€6.108.800	€6.108.800
Total				€1.648,00		€3.750,00			€3.398		€7.601	€54.523.200	€39.862.080

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	20	160	€6.640,00	0,1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Preparation of the monitoring plan		5	40	€1.660,00	0,1	€166,00	€0	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data		2	16	€664,00	1	€664,00	€0	80	€664	€664	11400	€7.569.600	€1.513.920
Adjusting existing data		2	16	€664,00	1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Filling in forms and tables, including recordkeeping		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Verification		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	11400	€50.319.600	€50.319.600
Submitting the information		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Paying the tax		1	8	€332	1	€332,00	€0,00	0	€332	€332	11400	€3.784.800	€3.784.800
Total				€8.818		€3.750			€7.568		€6.037	€86.275.200	€80.219.520

- For public authorities

- For national competent authorities

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	60	480	€19.920,00	0,1	€1.992,00	€0,00	€0,00	0	€1.992	€1.992	27	€53.784	€53.784
Designing information material		200	1600	€6.400,00	0,1	€6.640,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		680	5440	€225.760,00	0,1	€22.576,00	€0,00	€0,00	0	€22.576	€22.576	27	€609.552	€609.552
Verification of the information submitted		340	2720	€112.880,00	1	€112.880,00	€0,00	€0,00	0	€12.880	€12.880	27	€3.047.760	€3.047.760
Controlling the payment		170	1360	€56.440,00	1	€56.440,00	€0,00	€0,00	0	€6.440	€6.440	27	€1.523.880	€1.523.880
Total				€200.528,00		€200.000,00		€0,00		€201.541	€201.541		€5.441.616	€5.441.616

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	60	480	€19.920,00	0,1	€1.992,00	€0,00	€0,00	0	€1.992	€1.992	27	€53.784	€53.784
Designing information material		200	1600	€6.400,00	0,1	€6.640,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		420	3360	€139.440,00	0,1	€13.944,00	€0,00	€0,00	0	€13.944	€13.944	27	€376.488	€376.488
Verification of the information submitted		210	1680	€89.720,00	1	€89.720,00	€0,00	€0,00	0	€89.720	€89.720	27	€1.882.440	€1.882.440
Controlling the payment		105	840	€34.860,00	1	€34.860,00	€0,00	€0,00	0	€34.860	€34.860	27	€941.220	€941.220
Total				€27.156,00		€200.000,00		€0,00		€28.169	€28.169		€3.460.572	€3.460.572

- For EU competent authority

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)	
Familiarizing with the information obligation	€67,00	55	440	€29.480,00	0,1	€2.948,00	€0,00	€0,00	0	€2.948	€2.948	27	€2.948	€2.948
Designing information material		200	1600	€107.200,00	0,1	€10.720,00	€200.000	€0,00	0	€210.720	€210.720	27	€210.720	€210.720
Informing the subjected entities		13800	110400	€7.396.800,00	0,1	€739.680,00	€0,00	€0,00	0	€739.680	€739.680	27	€739.680	€739.680
Verification of the information submitted		4600	36800	€2.465.600,00	1	€2.465.600,00	€0,00	€0,00	0	€2.465.600	€2.465.600	27	€2.465.600	€2.465.600
Controlling the payment of the tax		2300	18400	€1.232.800,00	1	€1.232.800,00	€0,00	€0,00	0	€1.232.800	€1.232.800	27	€1.232.800	€1.232.800
Total				€1.451.748,00		€200.000,00		€0,00		€1.651.748	€1.651.748		€1.651.748	€1.651.748

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Total administrative costs (per year)	Total administrative burdens (per year)	
Familiarizing with the information obligation	€67,00	55	440	€29.480,00	0,1	€2.948,00	€0,00	€0,00	0	€2.948	€2.948	27	€2.948	€2.948
Designing information material		200	1600	€107.200,00	0,1	€10.720,00	€200.000	€0,00	0	€210.720	€210.720	27	€210.720	€210.720
Informing the subjected entities		8550	68400	€4.582.800,00	0,1	€458.280,00	€0,00	€0,00	0	€458.280	€458.280	27	€458.280	€458.280
Verification of the information submitted		2850	22800	€1.527.600,00	1	€1.527.600,00	€0,00	€0,00	0	€1.527.600	€1.527.600	27	€1.527.600	€1.527.600
Controlling the payment of the tax		1425	11400	€763.800,00	1	€763.800,00	€0,00	€0,00	0	€763.800	€763.800	27	€763.800	€763.800
Total				€2.763.348,00		€200.000,00		€0,00		€2.963.348	€2.963.348		€2.963.348	€2.963.348

5. CONTRIBUTION BASED COMPENSATION FUND (OPTION 3C)

➤ Private based compensation fund

- For ship owners and ship operators

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€1,50	24	192	€7.968,00	0,1	€796,80	€0	0	€797	€797	18400	€14.661.120	€14.661.120
Preparation of the monitoring plan		6	48	€1.992,00	0,1	€199,20	€0	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data		3	24	€96,00	1	€96,00	€0	80	€96	€96	18400	€18.326.400	€18.326.400
Adjusting existing data		3	24	€96,00	1	€96,00	€0	0	€96	€96	18400	€18.326.400	€18.326.400
Filling in forms and tables, including recordkeeping		1	8	€32,00	1	€32,00	€0	0	€32	€32	18400	€6.108.800	€6.108.800
Verification		2	16	€64,00	1	€64,00	€3.750	0	€414	€414	18400	€81.217.600	€81.217.600
Submitting the information		1	8	€32,00	1	€32,00	€0	0	€32	€32	18400	€6.108.800	€6.108.800
Setting up the fund (central)				€0,00	0,1	€0,00	€70,00	0	€70	€70	18400	€1.288.000	€1.288.000
Setting up the fund (work by affiliated members)			9	€373,50	0,1	€37,35	€0,00	0	€37	€37	18400	€687.240	€687.240
Contribution to the fund administration		0	9	€373,50	1	€373,50	€373,50	0	€747	€747	18400	€13.744.800	€13.744.800
Total						€1.727	€1.194		€8.920	€8.124		€64.134.440	€49.473.320

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€1,50	20	160	€6.640,00	0,1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Preparation of the monitoring plan		5	40	€1.660,00	0,1	€166,00	€0	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data		2	16	€64,00	1	€64,00	€0	80	€64	€133	11400	€7.569.600	€1.513.920
Adjusting existing data		2	16	€64,00	1	€64,00	€0	0	€64	€64	11400	€7.569.600	€7.569.600
Filling in forms and tables, including recordkeeping		1	8	€32,00	1	€32,00	€0	0	€32	€32	11400	€3.784.800	€3.784.800
Verification		2	16	€64,00	1	€64,00	€3.750	0	€414	€414	11400	€50.319.600	€50.319.600
Submitting the information		1	8	€32,00	1	€32,00	€0	0	€32	€32	11400	€3.784.800	€3.784.800
Setting up the fund (central)				€0,00	0,1	€0,00	€70,00	0	€70	€70	11400	€798.000	€798.000
Setting up the fund (work by affiliated members)			9	€373,50	0,1	€37,35	€0,00	0	€37	€37	11400	€425.790	€425.790
Contribution to the fund administration		0	9	€373,50	1	€373,50	€373,50	0	€747	€747	11400	€8.515.800	€8.515.800
Total						€3.897	€1.194		€8.090	€7.559		€2.229.990	€6.174.310

The administrative burden under a privately managed compensation fund is similar to the administrative burden under option 3b (tax on emissions).

➤ Public based compensation fund

- For ship owners and ship operators

The administrative burden under a publicly managed compensation fund is similar to the administrative burden under option 3b (tax on emissions).

- For public authorities

- For national competent authorities

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation		55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€19.302	€49.302
Designing information material	€41,50	200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		680	5440	€22.576,00	0,1	€22.576,00	€0,00	€0,00	0	€22.576	€22.576	27	€609.552	€609.552
Verification of the information submitted		340	2720	€12.880,00	1	€12.880,00	€0,00	€0,00	0	€12.880	€12.880	27	€3.047.760	€3.047.760
Setting up the fund		191000	191000	€12.797.000,00	0,1	€1.279.700,00	€0,00	€0,00	0	€1.279.700	€1.279.700	1	€1.279.700	€1.279.700
Fund administration	€67,00		204000	€13.668.000,00	1	€13.668.000,00	€0,00	€0,00	0	€13.668.000	€13.668.000	1	€13.668.000	€13.668.000
Informing the subjected entities		440	3520	€235.840,00	1	€235.840,00	€0,00	€0,00	0	€235.840	€235.840	1	€235.840	€235.840
Total													€19.096.794	€19.096.794

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation		55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€19.302	€49.302
Designing information material	€41,50	200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		420	3360	€13.944,00	0,1	€13.944,00	€0,00	€0,00	0	€13.944	€13.944	27	€376.488	€376.488
Verification of the information submitted		210	1680	€69.720,00	1	€69.720,00	€0,00	€0,00	0	€69.720	€69.720	27	€1.882.440	€1.882.440
Setting up the fund		119000	119000	€7.973.000,00	0,1	€797.300,00	€0,00	€0,00	0	€797.300	€797.300	1	€797.300	€797.300
Fund administration	€67,00		126000	€8.442.000,00	1	€8.442.000,00	€0,00	€0,00	0	€8.442.000	€8.442.000	1	€8.442.000	€8.442.000
Informing the subjected entities		220	1760	€117.920,00	1	€117.920,00	€0,00	€0,00	0	€117.920	€117.920	1	€117.920	€117.920
Total													€1.872.090	€1.872.090

- For EU competent authority

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation		55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€1.826	€1.826
Designing information material	€41,50	200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		13800	110400	€4.581.600,00	0,1	€458.160,00	€0,00	€0,00	0	€458.160	€458.160	27	€458.160	€458.160
Verification of the information submitted		4600	36800	€1.527.200,00	1	€1.527.200,00	€0,00	€0,00	0	€1.527.200	€1.527.200	27	€1.527.200	€1.527.200
Controlling the membership		2300	18400	€763.600,00	1	€763.600,00	€0,00	€0,00	0	€763.600	€763.600	27	€763.600	€763.600
Setting up the fund		191000	191000	€12.797.000,00	0,1	€1.279.700,00	€0,00	€0,00	0	€1.279.700	€1.279.700	1	€1.279.700	€1.279.700
Fund administration	€67,00		204000	€13.668.000,00	1	€13.668.000,00	€0,00	€0,00	0	€13.668.000	€13.668.000	1	€13.668.000	€13.668.000
Informing the subjected entities		440	3520	€235.840,00	1	€235.840,00	€0,00	€0,00	0	€235.840	€235.840	1	€235.840	€235.840
Total						€2.757.426,00	€200.000,00						€18.140.966	€18.140.966

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation		55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€1.826	€1.826
Designing information material	€41,50	200	1600	€66.400,00	0,1	€6.640,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		8550	68400	€2.838.600,00	0,1	€283.860,00	€0,00	€0,00	0	€283.860	€283.860	27	€283.860	€283.860
Verification of the information submitted		2850	22800	€946.200,00	1	€946.200,00	€0,00	€0,00	0	€946.200	€946.200	27	€946.200	€946.200
Controlling the membership		1425	11400	€473.100,00	1	€473.100,00	€0,00	€0,00	0	€473.100	€473.100	27	€473.100	€473.100
Setting up the fund		119000	119000	€7.973.000,00	0,1	€797.300,00	€0,00	€0,00	0	€797.300	€797.300	1	€797.300	€797.300
Fund administration	€67,00		126000	€8.442.000,00	1	€8.442.000,00	€0,00	€0,00	0	€8.442.000	€8.442.000	1	€8.442.000	€8.442.000
Informing the subjected entities		220	1760	€117.920,00	1	€117.920,00	€0,00	€0,00	0	€117.920	€117.920	1	€117.920	€117.920
Total						€1.711.626,00	€2							

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€1,50	55	440	€18.260,00	0,1	€1.826,00	€0	0	€1.826	€1.826	18400	€3.598.400	€3.598.400
Preparation of the monitoring plan		6	48	€1.992,00	0,1	€199,20	€0	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data (MRV)		3	24	€96,00	1	€96,00	€0	80	€96	€96	18400	€18.326.400	€3.665.280
Adjusting existing data (MRV)		3	24	€96,00	1	€96,00	€0	0	€96	€96	18400	€18.326.400	€18.326.400
Filling in forms and tables, including recordkeeping (MRV)		1	8	€32,00	1	€32,00	€0	0	€32	€32	18400	€6.108.800	€6.108.800
Verification (MRV)		2	16	€64,00	1	€64,00	€3.750	0	€4.414	€4.414	18400	€8.217.600	€8.217.600
Submitting the information (MRV)		1	8	€32,00	1	€32,00	€0	0	€32	€32	18400	€6.108.800	€6.108.800
Surrendering allowances		1	8	€32,00	1	€32,00	€0,00	0	€32	€32	18400	€6.108.800	€6.108.800
Purchasing allowances		1	8	€32,00	1	€32,00	€0,00	0	€32	€32	18400	€6.108.800	€6.108.800
Designing information material		6	48	€1.992,00	0,1	€199,20	€0,00	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data (benchmarks)		3	24	€96,00	0,1	€96,00	€0,00	80	€100	€20	18400	€1.832.640	€366.528
Adjusting existing data (benchmarks)		3	24	€96,00	0,1	€96,00	€0,00	80	€100	€20	18400	€1.832.640	€366.528
Filling in forms and tables, including recordkeeping (benchmarks)		1	8	€32,00	0,1	€32,00	€0,00	0	€33	€33	18400	€6.108.800	€6.108.800
Verification (benchmarks)		2	16	€64,00	0,1	€64,00	€375,00	0	€441	€441	18400	€8.121.760	€8.121.760
Submitting the information (benchmarks)		1	8	€32,00	0,1	€32,00	€0,00	0	€33	€33	18400	€6.108.800	€6.108.800
Total						€6.540	€125		€0.665	€0.709		€96.243.360	€78.650.016

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€1,50	55	440	€18.260,00	0,1	€1.826,00	€0	0	€1.826	€1.826	11400	€20.816.400	€20.816.400
Preparation of the monitoring plan		5	40	€1.660,00	0,1	€166,00	€0	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data (MRV)		2	16	€64,00	1	€64,00	€0	80	€664	€133	11400	€7.569.600	€1.513.920
Adjusting existing data (MRV)		2	16	€64,00	1	€64,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Filling in forms and tables, including recordkeeping (MRV)		1	8	€32,00	1	€32,00	€0	0	€32	€32	11400	€3.784.800	€3.784.800
Verification (MRV)		2	16	€64,00	1	€64,00	€3.750	0	€4.414	€4.414	11400	€50.319.600	€50.319.600
Submitting the information (MRV)		1	8	€32,00	1	€32,00	€0	0	€32	€32	11400	€3.784.800	€3.784.800
Surrendering allowances		1	8	€32,00	1	€32,00	€0,00	0	€32	€32	11400	€3.784.800	€3.784.800
Purchasing allowances		1	8	€32,00	1	€32,00	€0,00	0	€32	€32	11400	€3.784.800	€3.784.800
Designing information material		5	40	€1.660,00	0,1	€166,00	€0,00	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data (benchmarks)		2	16	€64,00	0,1	€64,00	€0,00	80	€66	€13	11400	€756.960	€151.392
Adjusting existing data (benchmarks)		2	16	€64,00	0,1	€64,00	€0,00	80	€66	€13	11400	€756.960	€151.392
Filling in forms and tables, including recordkeeping (benchmarks)		1	8	€32,00	0,1	€32,00	€0,00	0	€33	€33	11400	€378.480	€378.480
Verification (benchmarks)		2	16	€64,00	0,1	€64,00	€375,00	0	€441	€441	11400	€5.031.960	€5.031.960
Submitting the information (benchmarks)		1	8	€32,00	0,1	€32,00	€0,00	0	€33	€33	11400	€378.480	€378.480
Total						€6.744	€125		€0.869	€0.231		€12.502.040	€5.235.224

- For public authorities

- For national competent authorities

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipment costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€1,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	0	0	€1.826	€1.826	27	€49.302	€49.302
Designing information material		200	1600	€66.400,00	0,1	€664,00	€200.000	0	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		680	5440	€225.760,00	0,1	€22.576,00	€0,00	0	0	€22.576	€22.576	27	€609.552	€609.552
Verification of the information submitted		340	2720	€112.880,00	1	€112.880,00	€0,00	0	0	€12.880	€12.880	27	€3.047.760	€3.047.760
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	0	0	€3.320	€1.660	27	€89.640	€44.820
Familiarizing with the information obligation (benchmarks)		50	400	€16.600,00	0,1	€1.660,00	€0,00	0	0	€1.660	€1.660	1	€1.660	€1.660
Designing information material (benchmarks)		200	1600	€64.400,00	0,1	€6.400,00	€0,00	0	0	€6.400	€6.400	1	€6.400	€6.400
Informing the subjected entities (benchmarks)		13800	110400	€458.160,00	0,1	€458.160,00	€0,00	0	0	€458.160	€458.160	1	€458.160	€458.160
Verification of the information submitted (benchmarks)		4600	36800	€1.527.200,00	0,1	€152.720,00	€0,00	€50.000,00	0	€202.720	€202.720	1	€202.720	€202.720
Del														

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€19.302	€19.302
Designing information material		200	1600	€6.400,00	0,1	€6.400,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		420	3360	€13.944,00	0,1	€13.944,00	€0,00	€0,00	0	€13.944	€13.944	27	€37.488	€37.488
Verification of the information submitted		210	1680	€9.720,00	1	€9.720,00	€0,00	€0,00	0	€9.720	€9.720	27	€1.882.440	€1.882.440
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	27	€9.640	€4.820
Familiarizing with the information obligation (benchmarks)		50	400	€16.600,00	0,1	€1.660,00	€0,00	€0,00	0	€1.660	€1.660	1	€1.660	€1.660
Designing information material (benchmarks)		200	1600	€6.400,00	0,1	€6.400,00	€0,00	€0,00	0	€6.640	€6.640	1	€6.640	€6.640
Informing the subjected entities (benchmarks)		8550	68400	€2.838.600,00	0,1	€283.860,00	€0,00	€0,00	0	€283.860	€283.860	1	€283.860	€283.860
Verification of the information submitted (benchmarks)		2850	22800	€946.200,00	0,1	€946.200,00	€0,00	€50.000,00	0	€144.620	€144.620	1	€144.620	€144.620
Delivering the free allocations		1425	11400	€473.100,00	0,1	€47.310,00	€0,00	€0,00	0	€47.310	€47.310	1	€47.310	€47.310
Total													€3.088.600	€3.043.780

o For EU competent authority

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0	€0,00	0	€1.826	€1.826	1	€1.826	€1.826
Designing information material		200	1600	€6.400,00	0,1	€6.400,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		13800	110400	€4.581.600,00	0,1	€458.160,00	€0	€0,00	0	€458.160	€458.160	1	€458.160	€458.160
Verification of the information submitted		4600	36800	€1.527.200,00	1	€1.527.200,00	€0	€0,00	0	€1.527.200	€1.527.200	1	€1.527.200	€1.527.200
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	1	€3.320	€1.660
Familiarizing with the information obligation (benchmarks)		50	400	€16.600,00	0,1	€1.660,00	€0,00	€0,00	0	€1.660	€1.660	1	€1.660	€1.660
Designing information material (benchmarks)		200	1600	€6.400,00	0,1	€6.400,00	€0,00	€0,00	0	€6.640	€6.640	1	€6.640	€6.640
Informing the subjected entities (benchmarks)		13800	110400	€4.581.600,00	0,1	€458.160,00	€0,00	€0,00	0	€458.160	€458.160	1	€458.160	€458.160
Verification of the information submitted (benchmarks)		4600	36800	€1.527.200,00	0,1	€1.527.200,00	€0,00	€50.000,00	0	€202.720	€202.720	1	€202.720	€202.720
Delivering the free allocations		2300	18400	€763.600,00	0,1	€76.360,00	€0,00	€0,00	0	€76.360	€76.360	1	€76.360	€76.360
Total													€942.686	€941.026

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0	€0,00	0	€1.826	€1.826	1	€1.826	€1.826
Designing information material		200	1600	€6.400,00	0,1	€6.400,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		8550	68400	€2.838.600,00	0,1	€283.860,00	€0	€0,00	0	€283.860	€283.860	1	€283.860	€283.860
Verification of the information submitted		2850	22800	€946.200,00	1	€946.200,00	€0	€0,00	0	€946.200	€946.200	1	€946.200	€946.200
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	1	€3.320	€1.660
Familiarizing with the information obligation (benchmarks)		50	400	€16.600,00	0,1	€1.660,00	€0,00	€0,00	0	€1.660	€1.660	1	€1.660	€1.660
Designing information material (benchmarks)		200	1600	€6.400,00	0,1	€6.400,00	€0,00	€0,00	0	€6.640	€6.640	1	€6.640	€6.640
Informing the subjected entities (benchmarks)		8550	68400	€2.838.600,00	0,1	€283.860,00	€0,00	€0,00	0	€283.860	€283.860	1	€283.860	€283.860
Verification of the information submitted (benchmarks)		2850	22800	€946.200,00	0,1	€946.200,00	€0,00	€50.000,00	0	€144.620	€144.620	1	€144.620	€144.620
Delivering the free allocations		1425	11400	€473.100,00	0,1	€47.310,00	€0,00	€0,00	0	€47.310	€47.310	1	€47.310	€47.310
Total													€925.936	€924.276

7. OPEN ETS WITH FREE ALLOCATION (OPTION 4B)

The administrative costs and administrative burden under this option are equal to option 4a (closed ETS)

8. OPEN ETS WITH FULL AUCTIONING (OPTION 4C)

- For ship owners and ship operators

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	29	232	€9.628,00	0,1	€962,80	€0	0	€963	€963	18400	€17.715.520	€17.715.520
Preparation of the monitoring plan		6	48	€1.992,00	0,1	€199,20	€0	0	€199	€199	18400	€3.665.280	€3.665.280
Retrieving relevant information from existing data (MRV)		3	24	€996,00	1	€996,00	€0	80	€996	€996	18400	€18.326.400	€3.665.280
Adjusting existing data (MRV)		3	24	€996,00	1	€996,00	€0	0	€996	€996	18400	€18.326.400	€18.326.400
Filling in forms and tables, including recordkeeping (MRV)		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Verification (MRV)		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	18400	€81.217.600	€81.217.600
Submitting the information (MRV)		1	8	€332,00	1	€332,00	€0	0	€332	€332	18400	€6.108.800	€6.108.800
Surrendering allowances		1	8	€332,00	1	€332,00	€0,00	0	€332	€332	18400	€6.108.800	€6.108.800
Puchasing allowances		1	8	€332,00	1	€332,00	€0,00	0	€332	€332	18400	€6.108.800	€6.108.800
Total				€5.146		€3.750			€8.896	€8.099		€63.686.400	€49.025.280

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per vessel (man-days)	Time per vessel (hours)	Price (per vessel)	Frequency (per year)	Price (per vessel & per year)	Outsourcing costs (per vessel & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per vessel & per year)	Total administrative burden (per vessel & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	29	232	€9.628,00	0,1	€962,80	€0	0	€963	€963	11400	€10.975.920	€10.975.920
Preparation of the monitoring plan		5	40	€1.660,00	0,1	€166,00	€0	0	€166	€166	11400	€1.892.400	€1.892.400
Retrieving relevant information from existing data (MRV)		2	16	€664,00	1	€664,00	€0	80	€664	€133	11400	€7.569.600	€1.513.920
Adjusting existing data (MRV)		2	16	€664,00	1	€664,00	€0	0	€664	€664	11400	€7.569.600	€7.569.600
Filling in forms and tables, including recordkeeping (MRV)		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Verification (MRV)		2	16	€664,00	1	€664,00	€3.750	0	€4.414	€4.414	11400	€50.319.600	€50.319.600
Submitting the information (MRV)		1	8	€332,00	1	€332,00	€0	0	€332	€332	11400	€3.784.800	€3.784.800
Surrendering allowances		1	8	€332,00	1	€332,00	€0,00	0	€332	€332	11400	€3.784.800	€3.784.800
Puchasing allowances		1	8	€332,00	1	€332,00	€0,00	0	€332	€332	11400	€3.784.800	€3.784.800
Total				€1.449		€3.750			€8.199	€7.668		€34.666.320	€87.410.640

- For public authorities

- For national competent authorities

If all ships above 400GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€49.302	€49.302
Designing information material		200	1600	€6.400,00	0,1	€640,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		680	5440	€25.760,00	0,1	€2.576,00	€0,00	€0,00	0	€22.576	€22.576	27	€609.552	€609.552
Verification of the information submitted		340	2720	€112.880,00	1	€112.880,00	€0,00	€0,00	0	€112.880	€112.880	27	€3.047.760	€3.047.760
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	27	€83.640	€44.820
Auctioning allowances		60	480	€19.920,00	1	€19.920,00	€0,00	€100.000,00	50	€19.920	€9.960	27	€3.237.840	€1.618.920
Managed the revenue generated		30	240	€9.960,00	1	€9.960,00	€0,00	€0,00	50	€9.960	€4.980	27	€268.920	€134.460
Total													€7.509.654	€6.711.454

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	27	€49.302	€49.302
Designing information material		200	1600	€6.400,00	0,1	€640,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		420	3360	€13.940,00	0,1	€13.940,00	€0,00	€0,00	0	€13.944	€13.944	27	€376.488	€376.488
Verification of the information submitted		210	1680	€6.972,00	1	€6.972,00	€0,00	€0,00	0	€6.972	€6.972	27	€1.882.440	€1.882.440
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	27	€83.640	€44.820
Auctioning allowances		60	480	€19.920,00	1	€19.920,00	€0,00	€100.000,00	50	€19.920	€9.960	27	€3.237.840	€1.618.920
Managed the revenue generated		30	240	€9.960,00	1	€9.960,00	€0,00	€0,00	50	€9.960	€4.980	27	€268.920	€134.460
Total													€6.111.270	€3.313.070

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	1	€1.826	€1.826
Designing information material		200	1600	€6.400,00	0,1	€6.400,00	€200.000	€0,00	0	€7.653	€7.653	1	€206.640	€206.640
Informing the subjected entities		13800	110400	€1.581.600,00	0,1	€158.160,00	€0,00	€0,00	0	€158.160	€158.160	1	€158.160	€158.160
Verification of the information submitted		4600	36800	€1.527.200,00	1	€1.527.200,00	€0,00	€0,00	0	€1.527.200	€1.527.200	1	€1.527.200	€1.527.200
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	1	€3.320	€1.660
Auctioning allowances		60	480	€9.920,00	1	€9.920,00	€0,00	€2.000.000,00	50	€2.019.920	€1.009.960	1	€2.019.920	€1.009.960
Managed the revenue generated		30	240	€9.960,00	1	€9.960,00	€0,00	€0,00	50	€9.960	€4.980	1	€9.960	€4.980
Total													€1.227.026	€3.210.426

If all ships above 5000GT are included:

Actions required	Tariff (per hour)	Time per CA (man-days)	Time per competent authority (hours)	Price (per CA)	Frequency (per year)	Price (per CA & per year)	Equipement costs (per entity & per year)	Outsourcing costs (per CA & per year)	Business as usual costs (% of administrative costs)	Total administrative costs (per CA & per year)	Total administrative burden (per CA & per year)	Number of entities concerned	Total administrative costs (per year)	Total administrative burdens (per year)
Familiarizing with the information obligation	€11,50	55	440	€18.260,00	0,1	€1.826,00	€0,00	€0,00	0	€1.826	€1.826	1	€1.826	€1.826
Designing information material		200	1600	€6.400,00	0,1	€6.400,00	€200.000	€0,00	0	€206.640	€206.640	1	€206.640	€206.640
Informing the subjected entities		8550	68400	€2.838.600,00	0,1	€283.860,00	€0,00	€0,00	0	€283.860	€283.860	1	€283.860	€283.860
Verification of the information submitted		2850	22800	€946.200,00	1	€946.200,00	€0,00	€0,00	0	€946.200	€946.200	1	€946.200	€946.200
Controlling of the surrendering		10	80	€3.320,00	1	€3.320,00	€0,00	€0,00	50	€3.320	€1.660	1	€3.320	€1.660
Auctioning allowances		60	480	€9.920,00	1	€9.920,00	€0,00	€2.000.000,00	50	€2.019.920	€1.009.960	1	€2.019.920	€1.009.960
Managed the revenue generated		30	240	€9.960,00	1	€9.960,00	€0,00	€0,00	50	€9.960	€4.980	1	€9.960	€4.980
Total													€3.471.726	€2.455.126

9. TARGET BASED COMPENSATION FUND (OPTION 5)

The administrative costs and administrative burden under this option are equal to option 3c (contribution based compensation fund)

ANNEX XIV – SPECIFIC ELEMENTS OF OPTION 2 – MONITORING AND REPORTING BASED ON FUEL CONSUMED

CO₂ emissions from ships relate to the emission factor associated (in CO₂ per tonnes of fuel) of the type of fuel consumed and the volume of fuel consumed (in tonnes).

Fuels used for maritime transport are much more diverse compared to those used in other transport modes. However, default values for emission factors (as e.g. provided by Decision 2007/589/EC based on IPCC 2006 figures for standard fuel types) can be used to lower administrative effort.

Fuel consumption on EU related routes required for the monitoring of emissions is already available for almost all ships. In this context, Regulation 18 of MARPOL Annex V already makes compulsory the availability of bunker delivery notes^{¹⁶¹} for ships engaged in international transport over 400 GT. So, the global fuel consumption of a ship is already monitored. However, in order to get the fuel consumed on EU related routes, the global fuel consumption has to be split between different routes (at least for ships involved in routes related to third countries).

Regulation V/28 of SOLAS already require all ships of 500 GT and above, engaged on international voyages exceeding 48 hours, to submit a daily report to their company, to include ship's position, ship's course and speed. So, the fuel consumption per route can be monitored.

Several technical methods exist for the actual measurement of fuel consumption and this measurement is already done for commercial reasons. The choice of method depends on the available equipment on board a ship. There are no current international regulations mandating the use of specific equipment or a certain level of accuracy in the measurements. The particular method to measure fuel consumption need not be prescribed by a European scheme.

¹⁶¹ The bunker delivery note includes the name and IMO number of the ship receiving the fuel, the port of bunkering, the marine bunker supplier contact information, fuel quantity and density.

ANNEX XV – SPECIFIC ELEMENTS OF OPTION 4 – EMISSIONS TRADING SCHEMES

A link to external carbon market mechanisms will result in an equalisation of prices. The potential range of impacts will be strongly determined by the available supply of allowances from for instance the EU-ETS, sectorial trading mechanisms or other carbon market mechanisms. The assessment does not look into potential sources of this supply and the impact of the potential demand from the maritime sector on these sources of supply (see Annex VI).

New allowances created for the maritime sector can be allocated for free to the ship owners and ship operators or auctioned. The auctioning of allowances allows revenue generation that could inter alia be rechanneled in the sector to remove some market barriers. A central European entity could be in charge of auctioning allowances with full hypothecation.

The competent authority in charge of approving monitoring plans, receiving and validating verified emissions reports would be the Member States or a central EU competent authority. Moreover, the control of the surrendering of required allowances will also be done by the Member States, in accordance with existing provisions of Directive 2003/87/EC or by a central EU competent authority.