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The GHG fund and the ETS: finding common ground

DISCUSSION PAPER

by

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Summary

The shipping sector contributes with around 3.2 % to worldwide CO₂-emissions and its emissions are expected to grow in the future. Two market based mechanisms have been proposed by EU countries to address the climate impacts and reflect the principle of common but differentiated responsibilities: a GHG Fund and an Emissions Trading Scheme (ETS).

This paper concludes that the differences between the two are primarily due to differences in design, and not to differences in principle. Both systems can be designed to have similar costs to industry, including administrative costs, similar environmental effectiveness, and yield a similar amount of revenue for other purposes than offsetting shipping emissions. Differences remain in short term price volatility.

Based on either the ETS or the GHG Fund hybrid approaches can be designed. They would have in common that emissions above the target line are off-set and revenues raised that can be attributed to developing countries should – through the Green Climate Fund – be recycled back to them for mitigation and adaptation. Furthermore proceeds stemming from developed countries should be used to mitigation and adaptation projects in developing countries only and to enhance emission reductions in the sector itself by providing additional financial incentives e.g. investment subsidies for the deployment of green technologies in the shipping sector.

This way, the hybrid approaches would combine several advantages of the GHG fund and the ETS approach. They would both ensure that the reduction target of the shipping sector is exactly achieved and that the principle of CBDR can be reflected adequately. At the same time would also provide incentives to the shipping sector to spur investments in GHG efficient technologies and thus accelerate the take-up of such technologies while alleviating the cost of addressing the climate change in the shipping sector. The remaining differences in the volatility of prices can be reduced by establishing a clear price path in the GHG Fund and introducing price regulating elements such as a floor price and safety valve in the ETS.

Zusammenfassung

Der Schiffssektor trägt mit rund 3,2 % zu den weltweiten CO₂-Emissionen bei, mit steigender Tendenz. Zwei marktbasierende Mechanismen zu Emissionsreduktion im Schiffssektor wurden von EU-Ländern vorgeschlagen, die dem Prinzip der gemeinsamen aber unterschiedlichen Verantwortung Rechnung tragen: ein Treibhausgasfond und ein Emissionshandelssystem (EHS).

Dieses Papier arbeitet heraus, dass die Unterschiede zwischen den beiden Ansätzen vor allem im Design und nicht in den Grundsätzen liegen. Beide Systeme können so ausgestaltet werden, dass sie ähnliche Kosten (inklusive Verwaltungskosten) für die Industrie verursachen, eine vergleichbare Umweltwirkung haben und eine ähnliche Menge an Einnahmen für Zwecke über die Kompensation von Schiffsemissionen hinaus generieren. Unterschiede bleiben jedoch in der kurzfristigen Preisvolatilität bestehen.

Sowohl auf der Basis des Emissionshandelssystems sowie des Treibhausgasfonds können Hybrid-Ansätze entwickelt werden. In beiden Fällen können Emissionen oberhalb der Ziellinie für Schiffsemissionen kompensiert werden. Einnahmen, die Entwicklungsländern zugeordnet werden können, sollen mittels des grünen Klimafonds zurück in Entwicklungsländer fließen, um dort THG Vermeidung und Anpassung an den Klimawandel zu finanzieren. Einnahmen, die aus Industrieländern stammen, sollen ebenfalls für Emissionsvermeidung und Anpassung nur in Entwicklungsländern verwendet werden sowie zusätzlich Emissionseinsparungen im Schiffssektor durch finanzielle Anreize unterstützen, beispielsweise durch Investitionszuschüsse für Umwelttechnologien.

Auf diese Weise können die Hybrid-Ansätze Vorteile des Treibhausgasfonds mit dem Emissionshandel verbinden. Beide würden sicherstellen, dass das Emissionsreduktionsziel im Schiffssektor erreicht werden kann und das Prinzip der gemeinsamen aber unterschiedlichen Verantwortung gewahrt wird. Gleichzeitig werden Anreize gesetzt, in Umwelttechnologien im Schiffssektor zu investieren und damit die Verbreitung solcher Technologien zu beschleunigen und die Kosten für die Emissionseinsparungen im Sektor zu senken. Der weiterhin bestehende Unterschied, die Preisvolatilität, kann reduziert werden indem im Fall des Treibhausgasfonds ein klarer Preispfad definiert wird und im Emissionshandel preisregulierende Elemente eingeführt werden, wie beispielsweise ein Mindestpreis und ein Sicherheitsventil.

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1 Introduction

Sea transport contributes to global CO₂-emissions with approximately 3.2% (UNEP 2011) and is expected to grow further in the future. So far emissions from international shipping are not covered under the Kyoto protocol. In order to prevent dangerous climate change, the international community faces two challenges: How to economically reduce emissions in the shipping sector and how to scale up finance for climate action.

The International Maritime Organization (IMO) has therefore collected submissions on how a market based mechanism (MBM) in the shipping sector could be designed to address these challenges. Currently two different types are intensively discussed under the IMO: a Greenhouse Gas (GHG) Fund with contribution on bunker fuels and an emissions trading scheme (ETS). Both approaches are based on a non-preferential treatment of all ships, as is customary practice in the IMO. Differentiating between ships based on their flag would provide strong incentives to re-flag ships to non-covered countries and thus result both in only minor emission reductions and a significant distortion in international competition.

However, undifferentiated treatment of all ships conflicts with the principle of common but differentiated responsibilities (CBDR) of the United Nations Framework Convention on Climate Change (UNFCCC). To reconcile this conflict both approaches suggest reflecting CBDR by devoting a certain share of MBM revenues to developing countries.

Despite these communalities, both market-based approaches show a number of differences. In this paper we identify the most significant differences, in particular the certainty to achieve the reduction target, the volatility of the carbon price, the amount of revenues raised and the cost burden for the shipping sector and suggest a two options aiming at combining preferred elements of both approaches.

2 Comparing MBM approaches

2.1 GHG fund

The International Fund for GHG emissions from ships was proposed by Cyprus, Denmark, the Marshall Islands, Nigeria and the International Parcel Tankers Association (IPTA) (MEPC 60/4/8; MEPC 59/4/5). The fund is envisaged to be filled by a GHG contribution to be paid on every ton of bunker fuel purchased by all ships engaged in international trade. The GHG contribution would either be collected by the bunker fuel supplier or directly paid by the ship owner to the International GHG fund. If bunker fuel suppliers would be tasked to collect the GHG contribution, they would be required to register to be eligible to sell bunker fuels in compliance with the scheme. All ships flying the flag of a Party to the new convention and non-party ships entering Party ports must buy fuels at registered bunker fuel suppliers and keep the documentation on board of the ship as evidence. Whereas the choice of point of regulation (ships or bunker fuel suppliers) is important for the practical design of the MBM, it does not affect the environmental integrity as long as compliance can be ensured by the parties.

A global reduction target for International Shipping would be set either by UNFCCC or IMO. The purpose of the fund is to offset shipping emissions above (and only above) this target line,

“A significant reduction of GHG emissions from international shipping in absolute terms is not foreseen” (MEPC 60/4/8). To this goal offset units are purchased from other sectors, e.g. from the Clean Development Mechanism (CDM) or from other mechanisms eligible under the new global climate regime.

The tariff of the GHG contribution needs to be high enough to allow purchasing enough units to offset shipping emissions above the target line. Regular adjustments are needed to ensure that an adequate amount of credits can be purchased. An interval for those updates should be set in the new IMO convention, the initial proposal (MEPC 59/4/5) suggest a time span of four years to provide predictability and certainty to the shipping industry on the one hand and reflect changes in emissions and market prices for credits on the other hand.

The proposal (MEPC 60/4/8) lists apart from mitigation of shipping emissions above the target line also other purposes for the allocation of revenues from the GHG fund. These include adaptation (especially in the most vulnerable developing countries); research and development (R&D); technical cooperation within the IMO framework and administrative costs of the Fund Administrator. These additional revenue uses and resulting financing needs are not included in the example calculation on the level of the GHG contribution (MEPC 60/4/8, p.10).¹ The receipt of revenues for mitigation and adaptation purposes would be limited to those countries which are Parties to the new convention in order to incentivise participation in the scheme.

2.2 Emissions trading system

A global Emissions Trading Scheme for International Shipping was brought forward by Norway, France, Germany and UK (MEPC 59/4/25, MEPC 59/4/26, MEPC 60/4/22, MEPC 60/4/26). The cap and trade scheme would cover emissions from all ships over a size yet to be defined engaged in international voyages. An emission limit, the cap, would be defined and emission rights (allowances) sold/auctioned. At the end of the compliance period every ship owner will have to report their emissions and surrender an amount of allowances equal to these.

It is foreseen that units from other compatible trading schemes and credits from project based approaches such as the Clean Development Mechanism (CDM) are eligible without quantitative limit. Ship owner can therefore acquire units from within the sector or buy them from other sectors. Therefore the cap will not be an absolute emission limit and not thus limit growth in the shipping sector.

Allocation free of charge would require data which is currently not available, give thus rise to substantial administrative efforts, and may in addition cause competitive distortions amongst sector participants. Therefore it is suggested that initially only a certain share of the monitored emissions needs to be covered while this share can gradually be stepped up to 100% (MEPC 59/4/25).

An exemption clause is foreseen which can be used to cater for voyages to and from small island developing States (SIDS) and least developed countries (LDCs). Exemptions would have to be approved by the IMO on the condition that they do not lead to carbon leakage.

¹ It is assumed that the support of the Adaptation Fund will include but not be limited to the 2% share of proceeds of credits issued for CDM projects going to the Adaptation Fund.

2.3 Comparison

2.3.1 Certainty to achieve the reduction target

Provided that there are no issues of non-compliance an ETS always ensures that the agreed GHG reduction is achieved. From an environmental perspective it thus provides a high level of target certainty. Whether the target under the GHG fund is achieved or not depends on the ability to predict the price developments on the global carbon market. Since prices are volatile, over or underachieving the reduction target is therefore not unlikely. This may be addressed by retroactively reflecting the difference while determining the contribution tariff for the next period.

2.3.2 Volatility of the carbon price

Predicting offset prices will be a challenge. There have been substantial fluctuations in the market price for CDM-Credits (Certified Emission Reductions – CERs) over the past four years from nearly 25 Euro in mid-2008 to below 1 Euro in 2013(Point Carbon 2013).

Under the GHG fund approach policy makers would be confronted with this task while under an ETS shipping companies would have to estimate the prices. Although “wrong” expectations at the policy-makers level would have more serious impacts in terms of providing inadequate price signals, shipping companies generally prefer fixed tariffs over a volatile market price since it eliminates one commodity for which they would have to hedge their expectation. From the perspective of the covered entities the over a certain period fixed tariff is therefore considered as an advantage of the GHG fund.

2.3.3 Amount of revenues raised

The tariff of the GHG fund is determined in such a way that the revenues raised allow covering the expected cost for purchasing the offset units required to meet the shipping sector target. The amount of revenues would be roughly equivalent to the amount which would be raised under an ETS with free allocation of allowances, if only a share equivalent to the quantity of emissions above the shipping sector target would be auctioned or sold. This amount of revenues would only last to achieve the target. Reflecting CBDR through the distribution of revenues would not be possible following the tabled GHG fund proposal since the revenues would not suffice. If the revenues should be used to cover other purposes, the tariff would need to be increased accordingly. The amount of revenues raised in an ETS with full auctioning would be substantial higher and thus offer the opportunity to reflect CBDR in the spending of revenues.

2.3.4 Cost burden for the shipping sector

The amount of revenues raised obviously determines the cost burden for the shipping sector. The higher the amount of revenues, the higher the direct cost of the shipping sector. Compared to an ETS with full auctioning or selling of allowances, the GHG fund aiming at beating the shipping sector’s target line would result in a lower cost burden for the shipping sector. This is seen as one of the most prominent advantages of the GHG fund approach supporters.

However, this approach would not allow reflecting CBDR through the use or more specifically through the differentiated redistribution of revenues since there would be no revenues left for this purpose. In addition, it could be put into question why under a global approach which

would ensure no distortion of competition, the shipping sector should achieve such a preferential treatment, which usually is only granted under regional GHG regulations to alleviate distortions of international competition. If such distortion is avoided, the shipping sector should be faced with the full cost of internalizing the external cost of climate change, i.e. with the full cost of carbon units required to cover all its GHG emissions.

3 Options to reflect 'common but differentiated responsibilities' & use of revenues

3.1 Options to reflect common but differentiated responsibilities

At the core of the UNFCCC climate regime is the principle of common but differentiated responsibilities (CBDR). Several proposals have been brought forward how the principle of common but differentiated responsibilities could be met by an MBM in the shipping sector. They can be classified in two groups, either by exempting certain ships or routes so that only the shipping attributed to developed countries is regulated or by a differentiated distribution of revenues raised by an MBM covering all ships non-discriminatory (GHG-WG 3/3/3).

In order to only cover shipping attributed to developed countries shipping emissions could be differentiated e.g. depending on i) the flag state; ii) the country of genuine control of the ship, iii) the route of the ship or iv) the final destination of its' cargo. All these options have in common that the coverage of the scheme would be substantially lower than in a universally applied scheme. Additionally there is a danger of avoidance: flags and country of domicile of the ship-owner ("country of genuine control") can be changed and routes adapted. Determining the final destination of cargo is expected to be complex, especially for container ships carrying cargo for destinations both in developed and developing countries, and the verification of the data would yield a high administrative burden. The environmental effectiveness of a scheme covering only a part of global shipping and with the risk of avoidance will be lower than in a scheme covering all ships. Furthermore this would not be in line with IMO approach of uniform treatment of all ships and flag States.

Another possibility is an un-discriminatory coverage of all ships and ensuring equity by spending the revenues in line with the CBDR principle. This option would enhance the environmental effectiveness, reduce substantially the risk of avoidance and be in line with the IMO approach. If meeting the CBDR principle depends on the use of revenues, the spending should be as carefully designed as the collection of the contribution when setting up the MBM. This option is further developed in the present discussion paper.²

² In the case of emissions from international aviation a similar question is discussed in order to reflect "special circumstances and respective capabilities" (SCRC) when introducing market based instruments (Cames; forthcoming). They include two proposals on criteria to define which countries qualify for special treatment (by distinguishing different market blocks or how fast aviation markets are growing), these (or similar) definition could also be used in the shipping sector to distinguish more than just two groups (developed and developing countries) and would lead to a reduced coverage of the scheme – as argued for the case of distinguishing developing and developed countries. Also a phased implementation with certain countries being partially or fully exempted from parts of the obligation under the MBI for a certain period of time will have a similar implication, albeit to a lesser

3.2 Use of revenues

A MBM in the shipping sector will incentivise ship owners to reduce fuel consumption and thus emissions of their fleet by adding to the cost of fuels. If on top of this the revenues raised by the MBM are spent in a way to enable further emissions reductions both in the shipping sector and in other sectors, the MBM will multiply its impact. A MBM from the shipping sector should contribute to reach four goals:

- Reaching the emission target for the shipping sector by off-setting emissions above the target line,
- reflecting the principle of CBDR by recycling back proceeds stemming from developing countries to the group of all developing countries
- raising funds for mitigation and adaptation projects in developing countries by contributing to the Green Climate Fund and
- enhancing the development and deployment of green technologies in the shipping sector with the support of the Green Shipping Fund.

These elements are presented in more detail below. Furthermore the administrative costs of the fund itself are envisaged to be covered by the MBM itself and thus need to be covered by the proceeds raised. As they are expected to be minimal, they are not elaborated further in this paper.

3.2.1 Proceeds stemming from developing countries

As the MBM is envisaged to cover all ships, part of the proceeds will be stemming from developing countries. The share of proceeds stemming from the group of developing countries should be deducted first from the overall proceeds stemming from the MBM and be used to fund mitigation and adaptation project in the participating developing countries.

Instead of building up a Green Climate Fund financed by the shipping sector alone, the share of proceeds could be administered by the Green Climate Fund established by the UNFCCC parties in December 2011 at Durban, South Africa, and thus ensure a coordinated approach and avoid unnecessary administrative costs by doubling structures. The Green Climate Fund is currently building up its infrastructure (<http://gcfund.net/home.html>), the goal is to raise US\$ 100 billion additional climate finance. Climate finance is provided by developed countries to *“promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the needs of those developing countries particularly vulnerable to the adverse effects of climate*

extent. Furthermore several proposals were tabled at the ICAO taking into account early action and exemption thresholds (e.g. de minimis). These are important consideration to ensure the acceptability and practicability of the scheme, but will not be able to address the CBDR concern alone, as both developed and developing countries may benefit and it is expected that not all developing countries will benefit. There are three proposals concerning SRCS which can be addressed by targeted spending of revenues: revenue channeling, technical assistance/cooperation and – especially in the case of a central off-set buyer – emission unit sourcing. These approaches are similar to the use of revenues for off-sets, Green Climate Fund and Green Shipping Fund elaborated in this paper.

change” (<http://gcfund.net/about-the-fund/mandate-and-governance.html>). Therefore the contribution from the shipping sector that stems from developing countries should not contribute to the goal of the fund to raise US\$100 billion annually from 2020 but should be added on top of it. In order to incentivise ratification of the convention establishing a GHG fund, options to earmark the funding generated in the shipping sector to developing countries being parties to the new convention should be agreed with the Green Climate Fund.

Quantifying the contribution of developing countries based on the flag or country of residence of the ship owner would yield unrepresentative results. The quantification should rather be based on the incidence, asking “who really pays” for the costs induced by the MBM) of the contribution, a question that was also addressed by the Report by the High-level Advisory Group on Climate Change Financing (AGF 2010a, AGF 2010b). Shipping is the predominant and most economic mode of transport in international trade. Shipping companies will likely be able to pass on the price increase (AGF 2010b). Consumers in the importing country will have to bear the price increase, unless there is very strong competition from domestic producers or they will refrain from buying a certain good if it becomes more expensive. The price increase due to an increase in shipping costs will constitute only a small share of the final price of this good to the end-consumer, so that the reduction in demand is likely to be very small. In some cases exporters will not be able to pass through the full cost increase and will have to reduce other costs or accept a lower profit margin. In general it can be assumed that the share in global imports can be used as a rule of thumb on you pays for the cost of a MBM in international shipping. Based on this indicator, developing countries bear the cost for about one third of the GHG contribution collected (AGF 2010b).

3.2.2 Off-sets for emissions above the target line

A target line for GHG emissions from the shipping sector will be defined when establishing the MBM. The target should reflect the contribution of shipping to worldwide emissions and the emission reductions necessary to prevent dangerous climate change. If shipping emissions exceed the emission target in a given year, the MBM shall provide the resources to off-set shipping emissions above the GHG-target line. This is based on the principle that emissions in one sector can be compensated by emission reductions in other sectors. The use of units from other schemes as off-sets is an option to cater for the concerns of shipping industry that their growth might be hampered and offers the opportunity to tap low cost emission reductions in other sectors and thus act as a cost reducing mechanism.

The environmental integrity is not affected as long as emissions are effectively reduced in other sectors. High quality standards for eligible offsets are therefore essential. In the case of other schemes with an absolute limit on emissions (e.g. the EU ETS) emission reduction can be assumed safely to occur as long as the absolute limit (or cap) does not exceed “business as usual” (BAU) emissions. In the case of project based mechanisms (e.g. the CDM) no quantitative limit exists, the reduction is estimated by comparing the actual emissions of a single project with a baseline which is inevitable a hypothetical reference scenario. As those hypothetical savings can be recognized in the shipping sector, the question of whether the project would have been carried out also without the project based mechanism or not (additionality) is crucial to the integrity of the project-based credits generated and thus the environmental integrity of the market based instrument in the shipping sector. An option could be to only allow project types where there are no doubts on the environmental integrity. Depending on the international

developments other mechanisms, such as national appropriate mitigation actions (NAMAs) which are currently being developed under the UNFCCC, should be eligible as long as the environmental integrity can be assured.

3.2.3 Green Climate Fund

After deducting the contribution of developing countries and the expenses for off-setting emissions above the target line, the remaining revenues could be spend in equal shares for mitigation and adaptation projects in developing countries and the support of emission reduction measures in the shipping sector itself.

Again it should be considered to use the existing infrastructure of the Green Climate Fund instead of building up a new fund to support mitigation and adaptation projects in developing countries. As opposed to the share that can be attributed to developing countries, this money stems from developed countries and can be considered as new and additional climate finance. Therefore it can contribute to reaching the \$ 100 billion goal of the Green Climate Fund. Again options of earmarking for countries being parties to the convention could be discussed.

3.2.4 Green Shipping Fund

The Green Climate Fund aimed at mitigation and adaptation to climate change in general could be complemented by a more specific fund oriented towards the shipping sector itself. This would add to the push-factor of price increase of shipping fuels a strong pull factor for development and deployment of green technologies in the shipping sector. Estimates are that ship designs can be up to 50% more fuel efficient but due to non-market barriers this potential is not realised at the moment (Buhaug et al., 2009). The risk for investors would be minimized and thus trigger the deployment of technologies that might not be economically viable if only the fuel price increase by the GHG contribution were taken into account. Especially in the beginning of the scheme when experiences on the development of the level of the GHG contribution do not exist yet, a Green Shipping Fund may play an important role in reducing insecurities and thus trigger emission reductions from the very start. Emission reductions in the shipping sector will in contrast to off-sets have a dampening effect on the level of the GHG contribution as they reduce the difference between emissions and the target line. The amount of money involved in the fund would be limited, as expenditures on shipbuilding R&D in OECD countries amounted to USD 1.4 billion in 2008 (the 1st year for which comprehensive data are available), and sudden increases could probably not be put to productive use (OECD ANBERD 2013).

There are many options to set-up a fund. One option is establishing an innovative technology deployment scheme, that could grant investment subsidies and/or preferential access to credits with attractive conditions. The amount available for subsidies or credits would be made available at regular intervals during the year, e.g. every three months and would be granted to those which offer the largest emission reduction per money spent. Ship owners would apply for those subsidies and credits and would be ranked according to the projected mitigation cost per t of CO₂ equivalent (CO₂e). The applicants with the lowest mitigation cost would be served up to the limit of the available budget. In order to avoid unrealistic applications that later cannot be realised e.g. due to over-optimistic assumptions in terms of economic feasibility as happened severe conventional fines should apply if subsidies are not obtained. An advantage of the approach is

that it is technology neutral – new technologies can be included as soon as they are available without need to be specifically incorporated into the funding rules specifically – and establishes a basis for comparison amongst applications. And contrary to other funding schemes there is no risk of overshooting the budget. There might be other viable options to ensure the goal of the fund: adding a pull factor for green development in the shipping sector. A detailed description and assessment would deserve a paper of its own.

4 Incorporating elements of the ETS in the GHG Fund

This approach tries to combine the main advantages of both the GHG fund and the ETS. The hybrid approach “enhanced GHG Fund” is based on a fixed tariff for the contribution as under the GHG fund. However, the tariff should be based on a long term price path projection for internalizing the full external GHG costs of the shipping sector. This price path should be continuously increasing and should be reviewed after certain periods of time (i.e. 1, 3 or 5 years). However, to provide certainty to investments in efficiency improvements in the shipping sector, at the reviews the tariff path may only be increased but not alleviated. Alternatively the tariff could also be based on the weighted average carbon prices observed in previous year in one or several of exchanges where carbon units are traded. In this respect, the hybrid approach would be rather similar to the ETS. Whether the tariff would be due on fuels sold or consumed and whether it is payable by bunker fuel providers or the ships is an administrative detail which does not have to be decided in the first place.

This approach would combine several advantages of the GHG fund and the ETS:

- It would provide a clear long term incentive for internalizing external GHG costs of the shipping sector and avoid that shipping companies would have to deal with the volatility and hedging of carbon prices.
- In terms of environmental integrity, it would provide the same level of certainty that the shipping sector’s target line is always achieved, since the revenues raised would always be higher than those required to beat the target line.
- It would treat the shipping sector in the same way as other sector without distortions in competition and thus avoid an unjustified preferential treatment to the shipping sector.
- It would allow raising sufficient revenues to cover the cost required to achieve the shipping sector’s target line and would in addition provide sufficient revenues to reflect CBDR through the differentiated redistribution of revenues.

Particularly the last bullet is important to understand the merits of the hybrid approach. The next section therefore addresses the way for which purposes revenues should be used and how they should be allocated to the different purposes.

4.1 Setting the level of the GHG contribution and its distribution

The level of the GHG contribution should be defined in a way to incentivise emission reductions in the shipping sector. Giving emissions a price is key to incentivise running the existing fleet in the most emission effective way. Decisions whether to invest in emission saving technologies and in low emitting new ships will depend not only on the current price to emissions, but mainly on the expected price in future years. Planning security that also in coming years there will be a stable price to emissions is a pre-condition to trigger green investment deci-

sions. Therefore the GHG contribution should be crafted in a way to generate enough revenues to fulfil the multiple functions of the fund and provide planning and investment security for a longer time horizon. This could be done by setting the contribution at a higher level than necessary to buy enough offsets (e.g. a certain percentage above that level or a certain fixed amount of money above that level). An option could be to define a GHG contribution pathway at the moment of introduction of the scheme securing the minimum level. A technical committee could be assigned to regularly check whether the amount of revenues raised is sufficient to fund the different goals of the fund (reflecting CBDR; off-set emissions above the target line; support adaptation and mitigation activities in developing countries; and promote low-carbon technologies in the shipping sector itself). If the revenues raised are not sufficient to meet the defined goals, the level of the GHG contribution per ton of fuel would be raised. As there is some flexibility in the distribution among the different uses, minor changes would not require changes but only major differences to the envisaged development.

There are three uses of the proceeds from the GHG fund: Off-setting emissions above the target line, fund mitigation and adaptation projects in developing countries and support emission reduction efforts in the shipping sector itself. And there are two groups of countries the revenues stem from: developing and developed countries. All ships would be covered by the scheme (and thus the un-discriminatory approach of the IMO is fulfilled). The spending of the revenues reflects the principle of common but differentiated responsibilities in two ways. First the proceeds stemming from developing countries are recycled back to the participating developing countries via the Green Climate Fund adding on top of the US\$ 100 billion goal (see Figure 1). Second, the proceeds stemming from developed countries are used for three purposes: to off-set emissions above the emission target for the shipping sector, to provide new and additional climate finance and support emission reduction measures in the shipping sector itself. In this way the main share also of the proceeds stemming from developed countries are channelled to developing countries – the contribution to the Green Climate Fund will go entirely to developing countries and most off-sets are expected to be generated in developing countries, too. The Green Shipping Fund is addressed un-discriminatory to all ships, so part of it will benefit developing countries.

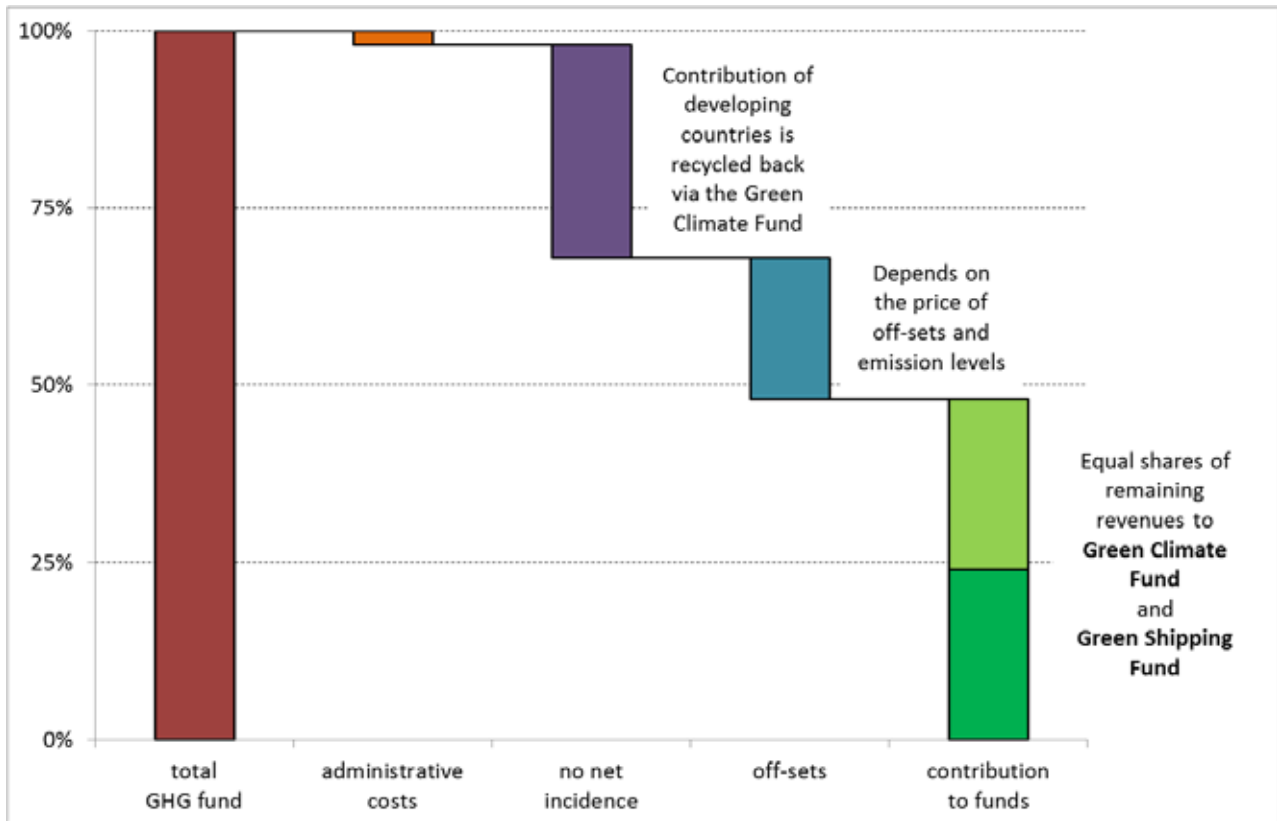


Figure 1 Elements of the proposed GHG fund

The three goals of off-setting emissions above the target line; funding mitigation and adaptation projects in developing countries; and incentivise emission reductions in the shipping sector are considered to be of equal importance. Therefore each of them should receive an equal share of revenues.

The GHG contribution per ton CO₂ could be calculated based on the revenues needed to purchase off-sets equivalent to one ton of CO₂ on every ton covered by the scheme. This would yield higher revenues than if only the estimated revenues needed to purchase off-sets above the target line are divided by the total amount of emissions covered by the scheme and thus ensure the capability to fulfil the other purposes as well. The moment the off-sets are purchased, prices might differ compared to the level expected when setting the level of the GHG contribution. If prices are lower/higher than expected the remaining revenues dedicated to the Green Climate Fund and the Green Shipping Fund will be adapted accordingly (increased in the case of low prices for off-sets and reduced in the case of high off-set prices). This flexibility ensures that – except in extreme cases – the necessary amount of offsets can always be purchased.

4.2 Environmental effectiveness

The GHG contribution will give emissions a price and thus incentivise and reward emission reductions. The push effect of increased costs is enhanced by adding a pull-factor: the Green Shipping Fund. The price per ton is defined in advance and gives the ship operators planning security. It is expected that the GHG contribution alone will not achieve that shipping emissions are reduced to the target line. The emissions goal can nevertheless be reached by using the revenues generated to purchase off-sets for emissions above the target line. The certainty to

achieve the target is by this design enhanced compared to a conventional tax. If the GHG contribution per ton of CO₂ is comparable to the cost of one ton of CO₂ in linked markets the probability is very high that enough resources will be available to purchase off-sets with the proceeds stemming from industrialized countries. Changes in the price of off-sets compared to the moment the level of the GHG was set are absorbed by the adjusting the budget available for the Green Climate Fund and Green Shipping Fund. Extreme volatility of prices may pose a difficulty, though. Therefore at regular intervals a technical committee should assess whether the level of the GHG contribution is still adequate and raise it, if need be.

5 Incorporating elements of the GHG Fund in the ETS

In principle, the ETS and GHG Fund can be designed in such a way that they deliver the same emissions while generating the same revenues. The tariff in the GHG Fund would need to be raised beyond the level envisaged in the current proposal to offset emissions above the emission target, e.g. by adding an element to the tariff or applying a multiplier. The higher tariff would raise revenues for purposes other than purchasing offsets. The net cost to the industry of the ETS could be lowered by allocating a share of the allowances for free.

Regular revisions of the tariff and the use of a long term price path as an anchor in the hybrid approach to the GHG Fund should ensure that the emission target is met and that planning and investment uncertainty is reduced. Similar elements could be implemented in an ETS to ensure that the volatility in revenues and planning and investment uncertainty is reduced. The next section discusses alternative designs for an ETS that incorporate some of the elements of the GHG Fund.

5.1 Price volatility and investment certainty

Even though the ETS and the GHG fund can be designed to generate the same amount of revenues for offsetting and/or other purposes, and therefore the long term average value of the allowances will equal the long term average of the contribution, the value of the allowances will be more volatile in the short term than the contribution. Volatile allowance prices are not a problem per se for the shipping sector, which is well accustomed to dealing with volatile costs (fuel prices for example) and revenues (freight rates). However, volatility may have a negative impact on investments in energy efficiency, as benefits become less predictable.³

The ETS proposal allows ship-owners to purchase out-of-sector emission rights. The price of these emission rights, the carbon price, acts as a price ceiling on the price of allowances. Volatility in an ETS is due to day-to-day movements in the carbon price. Volatility is thus greater in an ETS than in the GHG Fund proposal, even when all allowances in the ETS are allocated for free i.e. when the price of allowances is initially set to zero. The day-to-day movements in the carbon price still define volatility in the ETS for offsets purchased, whereas the fluctuations in the price of offsets is dampened by the fixed contributions in the GHG fund which is only changed at regular intervals.

³ In reality, the impact of the volatility may be less significant as the main benefit of improving efficiency is reducing fuel costs, which are currently much higher than carbon prices.

Fluctuations in the price of allowances and/or carbon price causes volatility in revenues raised and the cost burden to ship-owners. To some extent, this may impede investments in fuel-saving technologies and in low emitting new ships. There are several ways to reduce price volatility. The design of the system can reduce volatility by introducing price floors and price caps of allowances. Moreover, actors can reduce the volatility they are exposed to by using financial tools.

A price floor could be set for allowances in the auction, provided that this floor is lower than the carbon price. The price floor would initially be implemented as a reserve price at the auction. If parties bid less than the reserve price, allowances are not auctioned. After the auction, a price floor can be implemented by a quantity measure: The auctioneer needs to temporarily set aside allowances if the price of allowances approaches the floor (Grubb, 2012). This hybrid approach to an ETS limits fluctuations in the price of allowances, but does not shield the sector from fluctuations in the carbon price.

A price ceiling on allowances in the ETS can be introduced as a 'safety valve': the system allows the regulator to sell an unlimited number of allowances at a previously agreed maximum price. Although a safety valve reduces the risk of high prices, it reduces the environmental effectiveness because selling these allowances increases the emissions cap.

By introducing a price floor and a safety valve, emission allowances will remain volatile, but prices will move between the price floor and the price cap. Hence, there is larger investment certainty.

In addition to these regulatory changes, ship-owners have several means at their disposal to minimize the risks of fluctuating prices of offsets and allowances. They can buy allowances or offsets when the carbon price is low and sell them at a later date if they have adequate funds of their own. Ship-owners can use a myriad of financial instruments if funds are insufficient: they can buy futures which allow them to obtain allowances in the future at current carbon prices, they can buy options which gives them the right to buy allowances at a predetermined price, they can use hedges to reduce the losses incurred when the price of allowances rises and so on.

The fact that an allowance is a tradable financial asset for the ship-owner is seen as an advantage of the ETS. However, the use of arbitrage is meant to bring the same stability to the price of allowances as the fixed tariff in the GHG Fund. As arbitrage brings with it additional trading risks, proposals have been made to limit the danger of speculation and over-allocation in the ETS. These proposals include more frequent auctions, a limited bid size and restricted participation for a number of recognized actors (MEPC 60/4/41).

5.2 Cost burden for the shipping sector

The direct cost of the ETS relates to the purchases of allowances below the cap, the costs of out-of-sector emission rights above the cap and the costs of investing in fuel efficiency. The carbon price or price of allowances (possibly reduce to zero when free allocation takes place) defines the share of direct cost attributable to the ETS auctioning mechanism. Ship-owners may reduce these direct costs through arbitrage. As allowances are sold for emissions below the cap, revenues should be larger in the ETS than in the original proposal for the GHG fund. However, this outcome is dependent upon the condition that the tariff in the GHG fund compensates for off-

sets only. A hybrid tariff that internalizes the external cost of emissions in the shipping sector could well lead to the same direct costs and revenues as the ETS.

The direct costs of the ETS approach correspond to those of the original proposal for the GHG Fund if all allowances are allocated for free. The basis for the free allocation of allowances could be historical emissions of ships based on actual fuel use, historical emissions based on average fuel use per ship type, or output-based measures such as kilotons of freight transported.

Free allocation, although less costly to the shipping sector than auctioning, has a number of disadvantages. It can lead to windfall profits which may be undesirable. It could increase the administrative burden if data need to be collected and verified for the free allocation. And it could create distortions in the shipping sector when for example allowances are allocated on the basis of output and some ship types have much higher emissions per unit of output than others, or when allowances are allocated on the basis of historical emissions and some ships have already reduced their emissions.

5.3 Administrative complexity and costs

Often it is assumed that the implementation of environmental taxes (or similar such as the system for Greenhouse Gas Contribution) is less complicated and entails fewer transaction and administrative costs than the implementation of systems of tradable rights. According to Crals and Vereeck (2005) this is a mistake, however, the result of policy-makers being more familiar with taxes than with tradable rights.

Although the literature on environmental economics has been discussing transaction and administrative costs of tradable permit systems (e.g. LECG, 2003; Jaraite et al., 2010; Heindl, 2012), hardly any *comparative* analysis of the costs incurred by environmental policy instruments has been performed (Krutilla, 1999; Crals and Vereeck, 2005). As far as such comparisons are made (see e.g. Crals and Vereeck, 2005; Keohane, 2009), the transaction and administrative costs of tradable permits and taxation seem similar, however, although dependent on design of the system.

According to Crals and Vereeck (2005) the set-up costs may be higher for tradable permit systems than for taxes. If the GHG contributions can be levied and collected by an established tax agency, set-up costs are negligible and sunk, while for a system for tradable rights new organisations have to be established. In the case of the maritime sector there is no established tax agency, however. This means that both types of systems face the same kind of set-up costs.

Monitoring, enforcement and compliance make up a substantial part in total administrative costs. According to Keohane (2009), emissions monitoring alone accounts for roughly two-thirds of administrative costs in the case of tradable permits. In principle, these costs are the same for both tradable permits and taxation. Regardless of whether emissions are taxed or capped, they must be measured.

However, dependent on the specific design of the instrument costs may differ. As Crals and Vereeck (2005) note: “Basically, there are two ways to monitor ...: upstream where producers are monitored, and downstream where policing is focused on the end-users. Significant differences between the two approaches exist with regard to the type and number of market players that need to be monitored. Whereas an upstream scheme has fewer and larger agents, down-

stream monitoring involves more players and thus higher costs. Yet, downstream monitoring may yield significant public awareness benefits.”

The proposals for a METS assume ships or ship-owners as the trading entities, which implies downstream monitoring. The proposals for a GHG Fund mention two possibilities: GHG contributions paid by ships or ship-owners (downstream), or GHG contributions paid by bunker-fuel suppliers (upstream). In the latter case, the number of participants will be substantially lower than if ship-owners have to pay GHG contributions or have to trade permits. Therefore, it may be assumed that monitoring, enforcement and compliance costs will be lower in the case of GHG contributions paid by bunker-fuel suppliers than in the case of a METS where ships are the trading entities.

Trading costs include the costs of searching trading partners, negotiating the price and establishing contracts. At first sight, such costs may appear much higher in the case of tradable permits than in the case of taxation. However, a METS should not be seen as a system in which individual ship owners search other individual trading partners after which negotiations about the price starts. Any possible trading scheme for the maritime sector will be a large scale system based upon brokered markets (with intermediaries but with market players still holding the rights) or dealer markets (where intermediaries hold the rights). Financial institutions or insurance companies can reduce search costs by acting as brokers between buyers and sellers (Crals and Vereeck, 2005). In the case of broker markets, the sale of a permit is a spot transaction that does not entail any contracting costs. Furthermore, the METS as well as the GHG Contributions system is open to other trading schemes such as the European ETS and the Clean Development mechanism. This means that a broker market for CO₂ allowances already exists, which reduces the transaction costs. In practice, the negotiation, search and contract costs in the case of the METS will hardly be any higher than the administrative costs of paying taxes.

Experiences of the EU ETS may give some insight in the magnitude of trading costs, although it is difficult to distinguish between the costs of monitoring and reporting emissions, which would be required in both MBMs, and the costs of emissions trading itself. A survey of Irish businesses shows that it costs them a few cents per tonne of CO₂ to trade (Jaraite et al., 2010). In the EU, compliance costs of paying taxes are typically 2-4% of tax revenue (European Commission, 2004), so at a CDM price of € 15 also a few cents per tonne of CO₂.

Both ETS and tax compliance costs tend to be higher for small firms than for large firms. One difference between the administrative costs of the GHG Fund and the ETS is the number of actors that may be affected. If the GHG Fund or the ETS is applied to fuel suppliers and not to ships, the number of actors would probably be smaller, so they would pay on average higher contributions per actor and have relatively lower costs of compliance. We cannot quantify the savings in administrative costs.

Regardless of whether a contribution is levied on emissions or emissions are capped in an ETS, a major share of the administrative costs comprises of monitoring and reporting emissions. These costs are the same in the ETS and the GHG Fund in which the ships are liable for paying the contribution. If the fuel suppliers are liable for paying a contribution to the GHG Fund, or if they are the regulated entities in the ETS, the number of entities that have to monitor emissions (or rather, fuel sales) would be lower so the administrative costs could also be lower. Other cost items of these systems are the costs of paying the contribution or the costs of allowances

trading. The empirical evidence suggests that these are roughly comparable at a few tenths of a percent of the value. The costs of the administration are also very similar. Hence, we conclude that there is no empirical evidence to suggest that the administrative and transaction costs of an ETS are higher than the costs of a GHG Fund in which the ship is liable.

5.4 Environmental effectiveness

The cap in the ETS would normally ensure that the emission target can always be reached. The marginal costs of shipping would also be higher than in the current proposal for the GHG Fund as the cost of allowances in the ETS (whether allocated for free or auctioned) apply to emissions below the cap as well. This would create an added incentive to minimize on fuel use in the short run (reduction in speeds, running at full loading capacity, scrapping of fuel-inefficient ships or routes) and in the long run (fuel-saving technologies and low emitting new ships).

However, this assumes that the tariff of the GHG Fund does not fully internalize the external cost of GHG emissions in shipping. The higher tariff in the hybrid approach could ensure that marginal costs are at a comparable level in the GHG Fund. Furthermore, the ability to purchase offsets and trade in out-of-sector emission rights allows the shipping sector to emit GHGs beyond the cap in the same way that the hybrid approach to the GHG Fund allows for the purchase of and trade in offsets below and above the cap. Both MBMs could therefore be equally effective in curbing emissions, provided that the direct costs of the allowances in the ETS are as high as the tariff in the GHG Fund.

One element of the MBMs designs warrants further attention. The offsetting of emission levels beyond the cap or target depends on revenues raised and the quality of offsets, as the proposals allow for the purchase of CDMs or some other approved carbon credit. These could include Voluntary Carbon Offsets, and carbon credits based on various standards such as Gold Standard, CCBA Credits, VER and so on. The quality of offsets is not just dependent on the type of carbon credit, but also on the quality of projects selected by the operational entity in the case of a single carbon credit. A poor choice of offset type and/or projects within a single type of offset could hamper the intended purpose of offsetting shipping emissions. Hence, it is important to set standards for the quality of the allowances in order to guarantee the environmental effectiveness of any system.

6 Conclusions

The shipping sector contributes with around 3.2 % to worldwide CO₂-emissions. With the introduction of a market based mechanism the shipping sector can do an important step to reduce emissions and contribute to the effort to combat climate change. The mechanism faces the challenge to reconcile two principles which at first glance are contradictory: the uniform treatment of all ships on the one hand and common but differentiated responsibility (CBDR) on the other hand. While a uniform GHG contribution/CO₂-price can cater for the former and reduce significantly the risk of avoidance; revenue spending is the key for the latter principle.

Two MBMs have been proposed by EU countries to address the climate impacts: a GHG Fund and an ETS. This paper concludes that the differences between the two are primarily due to differences in *design*, and not to differences in principle. Both systems can be designed to have similar costs to industry, including administrative costs, similar environmental effectiveness,

and yield a similar amount of revenue for other purposes than offsetting shipping emissions. Differences remain in short term volatility and the possibility to pass through opportunity costs.

Hence a hybrid approach could be designed, starting either from the ETS or the GHG Fund. Under a hybrid approach, revenues raised that can be attributed to developing countries should – through the Green Climate Fund – be recycled back to them for mitigation and adaptation. The remaining proceeds should in the first place be used for offsetting shipping emissions above the target line through purchasing units from other sectors. Half of the finally remaining share of revenues can – in order to reflect CBDR – be devoted to mitigation and adaptation projects in developing countries only. The other half of the finally remaining revenues should be used to enhance emission reductions in the sector itself by providing additional financial incentives e.g. investment subsidies for the deployment of green technologies in the shipping sector.

This way, the hybrid approaches would combine several advantages of the GHG fund and the ETS approach. They would both ensure that the reduction target of the shipping sector is exactly achieved and that the principle of CBDR can be reflected adequately. At the same time would also provide incentives to the shipping sector to spur investments in GHG efficient technologies and thus accelerate the take-up of such technologies while alleviating the cost of addressing the climate change in the shipping sector. The remaining differences in the volatility of prices can be reduced by establishing a clear price path in the GHG Fund and introducing price regulating elements such as a floor price and safety valve in the ETS.

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