

The Maritime Emissions Trading Scheme

**Dr Per Kågeson
Nature Associates**

**Stockholm
12 May 2008**

Final version

1. Introduction

The prime objective of this paper is to provide a summary of a global cap-and-trade system for CO₂ emissions from international shipping suggested by the author in an earlier report commissioned by the Federal Environment Agency in Germany¹ and to compare the proposed scheme with alternative proposals submitted by Norway² and Denmark³ to respectively the IMO's MEPC 56 and MEPC 57. There are similarities between these three options, but also important differences.

A second purpose of this paper is to provide some additional background to the proposed emissions trading scheme and explain some of its design features in greater detail in response to questions raised at meetings with different stakeholders.

2. Requirements on a international scheme

In designing a scheme for making international shipping contribute to climate change mitigation a number of basic requirements must be met. In order to effectively contribute to a cost-efficient reduction of greenhouse gases, such a scheme should above all:

- A. Target real emissions of CO₂;
- B. Provide a marginal incentive that is equal to that enforced in other sectors and neither distort competition within maritime transport nor competition between shipping and other modes of transport;
- C. If not universal from start, be open for gradual expansion into global coverage of shipping emissions.

To become generally acceptable the scheme must in addition⁴:

1. avoid the complexity of allocation of free emissions allowances;
2. not require a reliable emission baseline;
3. be non-discriminating and applicable to vessels of all types and regardless of flag
4. be difficult to evade;
5. be acceptable to Annex 1 countries as well as developing nations;
6. be acceptable in the context of inter-port competition;
7. be legally, politically and institutionally acceptable;
8. be easy to administer, monitor and enforce.

3. The METS

Nature Associates' previous report, commissioned by the German Federal Environment Agency, proposes the creation of a system for CO₂ emissions trading in international

¹ *Linking CO₂ Emissions from International Shipping to the EU ETS* by Per Kågeson, Nature Associates, 2 July 2007, commissioned by the Federal Environment Agency, Germany.

² *IMPERS: A new market-based CO₂ emission reduction scheme*, submitted by Norway to MEPC 56, 29 April 2007.

³ *A global levy on marine bunker, primarily to be applied for the acquisition of CO₂ emission quotas through the purchase of CO₂ credits*, submitted by Denmark to MEPC 57, 21 December 2007.

⁴ The principles expressed in this section of the paper cover all nine principals presented in MEPC 57/WP.8, *Prevention of air pollution from ships. Report from the Working Group on GHG Emissions from Ships*.

shipping that could be linked to the European Emissions Trading System (EU ETS) and other regional or national cap-and-trade schemes that may emerge in future. It is called the *Maritime Emissions Trading Scheme* (METS).

Open system

The fact that international shipping is growing fast and that its CO₂ emissions are currently estimated with some degree of uncertainty make it difficult to know exactly where to put the cap. In a closed system the cap would have to be more generous, as there would be no “emergency exit” available if it proved to have been set too tight. An open system has the advantage of allowing trade with entities in other sectors and other parts of the world that may face a lower marginal abatement cost than the shipping sector. The volume of allowances and the number of potential participants would also be much greater in an open system, which should benefit market transparency and trade. Therefore an open system is preferred. Trade should be permitted with other sectors and cap-and-trade systems, and in addition the shipping industry should be able to use project credits – Emission Reduction Units (ERUs) and Certified Emission Reductions (CERs) – from the Joint Implementation (JI) and Clean Development Mechanism (CDM) respectively.⁵

The scope of the scheme

A fundamental concept of the METS is to tie the permission for a ship to call at a port to the vessel’s participation in a scheme for emissions trading under a common cap. All ships above 400 grt would be the entities responsible for complying with the obligations imposed by the scheme. Non-participating ships, therefore, would not be allowed to call except in an emergency and to load/unload at participating ports. The person or organisation delivering the allowances could be the owner, the operator, the charterer, the ship’s master or someone else. Change of flag state or ownership would not alter the liability of the ship.

Ideally all journeys by ships above 400 grt should be covered by the scheme. However, global coverage may not be possible to achieve from start as it would require full support from developing countries (non-Annex 1 states). One can therefore envisage three possible stages of development:

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

With universal coverage (the final stage) there would be no need to distinguish between fuels used on different voyages as the liability would cover emissions from traffic to all ports of the world. In this case it would be sufficient to rule that the ship must report its fuel consumption annually or, perhaps better, on a quarterly basis (to avoid extensive evasion just prior to the planned scrapping of old vessels) and surrender CO₂ allowances equalling its fuel purchases during the period in question.

However, in a case where the scheme has only partial coverage, it would, in order to reflect real fuel consumption, be necessary to make ships liable for emissions from fuel

⁵ The extent to which purchases of emission credits from project-based mechanisms should be allowed is not discussed in this paper.

bunkered up to, say, three or six months prior to a call at a participating port. With this design, emissions from the return voyages of ships involved in intercontinental traffic would automatically be covered, and shipowners and operators would gain nothing by calling at ports just outside a participating country or region. The geographical scope would thus be global, albeit limited to ships that call at ports of the participating states.

With a system of this kind, ships sailing only on participating ports would have to make sure that they have always submitted allowances enough to match their fuel purchases. The same would apply to frequent visitors who regularly return to such ports.

Infrequent visitors are welcome to call at participating ports after having registered the ship and surrendered CO₂ allowances equal to any purchase of fuel made within the prescribed number of months prior to the call. Of course, no ship would be registered more than once for any purchase of fuel. If an infrequent visitor calls at more than one participating port, it would not be requested to surrender allowances a second time for the same amount of fuel.

In the possible absence of support for a global system, it would be natural in the first phase to build on ports of the Annex 1 countries⁶. However, the IMO and the UNFCCC could also invite other states to participate. The system could over the years be gradually extended to include ports in advanced developing countries. To facilitate the entry of new participants, it is essential to design the scheme in a way that makes it easy to include additional countries and ports. When this happens the system must be able to adjust the cap accordingly and to allow the newcomers a proportional influence over the scheme.

In establishing a regional cap-and-trade scheme for international shipping, the IMO would respect the right of innocent passage (UNCLOS Article 24). Ships travelling through the territorial waters and the Exclusive Economic Zones of the participating states on their way to ports in non-participating countries would not be covered by the scheme.

Emissions based on real fuel consumption

The fuel consumption, that the surrendered CO₂ allowances would have to match, could be declared by using the existing mandatory bunker delivery notes that all ships above 400 grt need to keep according to Regulation 18 of MARPOL Annex VI. The bunker delivery note must be retained on board for a period of three years after the fuel was delivered. The information that must be recorded in the note includes (among other data) the name and IMO number of the receiving ship, port of bunkering, contact information of the marine fuel supplier, and fuel quantity and density.

Vessels calling at participating ports would have to open a CO₂ account in the name of the ship's IMO number. Alternatively a shipping company could choose to create a common account for all of its vessels. Copies of the bunker delivery notes would be sent to the database of the authority in charge of the cap-and-trade scheme. By allowing all participating ports access to the database, a port authority could easily see whether a ship that is about to call at the port has surrendered allowances that equal the fuel deliv-

⁶ Annex 1 countries are states that under the Kyoto Protocol are committed to specific reduction targets for 2008-2012.

ered to the vessel. Ships belonging to an emissions allowance account that shows a deficit would be denied any services in participating ports.

Setting the cap and allocating emissions allowances

A problem with getting a scheme for emissions trading started is the lack of reliable bunker fuel sales statistics. One way of acquiring the data needed for setting the cap could be to make all ships calling at participating ports surrender bunker delivery notes to the authority for the year prior to the launch of the system. Another way would be to count backwards from what is assumed to be the current use of bunker fuels affected by the geographical coverage of the scheme. Where international aviation is concerned, the European Union will probably establish a cap equal to the average annual emission of 2004-2006. A similar approach could be used in shipping.

The initial allocation of allowances would be by auction. Allocation free of charge based on the historic emissions of individual ships would mean having to decide on allowances for many different types of ship and for vessels of different size. In the shipping sector the problem with new entrants and the risk of rewarding companies that sell or scrap facilities is more pronounced than with land-based activities. Ships are by definition movable. The only good reason for “grandfathering” is to protect industries from losing market shares to competitors in non-participating countries. This problem will not occur in shipping when all vessels calling at participating ports, regardless of flag and port of departure, must surrender allowances equal to the fuel used.

A second reason for auctioning is to avoid the generation of windfall profits, which may occur when allowances are given away free of charge.

Administration

The IMO would create a special authority or subsidiary unit for the administration of the scheme. Making the individual parties responsible for this task would hardly work with thousands of ships belonging to shipowners in various parts of the world. It is better to create one common ships register for this purpose and to entrust the relevant authority with monitoring that all ships have surrendered allowances or credits matching their emissions.

Use of revenues

The revenues from auctioning the allowances could be recycled to the shipping sector or used for some other purpose. As long as land-based emitters receive all or some of their allowances for free, recycling some or all of the proceeds makes sense. The original report discusses briefly some ways of making this happen. The IMO’s CO₂ index could potentially be utilized in this process although its use would require large amounts of data.

When the European Union and other regions/nations begin to auction an increasing portion of the allowances to land-based sources, the amount of money recycled to the shipowners could gradually diminish.

Non-discriminating and difficult to evade

The proposed system offers equal treatment to all ships regardless of ownership, flag, size and port of origin. There is no way for a ship that calls at a participating port to avoid the scheme. A global scheme designed in this way would stand a good chance of

being recognised as fair, as it would cover all emissions generated by ships above 400 grt travelling solely in the waters of Annex 1 countries and, in addition, all ships travelling to and from the ports of these countries on transcontinental voyages. This means that countries in other parts of the world would be affected only to the extent that they use shipping for trade with Annex 1 countries. The ports of these countries would not have to participate as the port state control would only take place in Annex 1 countries. Local and regional trade in non-Annex 1 areas would not be affected at all, and neither would long-distance voyages between two non-Annex 1 countries, unless the ship is also used for trips to Annex 1 countries.

If shipping fuel were to be taxed or made subject of a levy, shipowners may try to bunker in non-participating ports. Evasion by this method would not work in a cap-and-trade scheme where allowances must be surrendered for permission to enter a participating port. However, by participating, ports run the risk of losing customers to nearby harbours that do not take part. The risk of losing customers to neighbouring ports would be small. In order to become free-riders, such harbours would have to rely on ships that never call at participating ports.

Becoming a free-rider by calling at a non-participating port would also be conditional on the approval of cargo owners who would have to consider potential negative side-effects such as delayed deliveries or incremental costs of extended land transport by truck or train. One way by which non-participating ports could potentially gain at the expense of participating ports would be to try to establish themselves as hubs for intercontinental ships. In such a case, large ocean-going vessels would call at the hub, where the cargo would be unloaded and moved to participating ports by feeder boats. However, for this concept to work, two prerequisites must be met: the ships used in the intercontinental part of the voyage must be dedicated to this trade and never used for a purpose where they might have to call at a participating port; and the non-participating ports must be located in places where cargo owners do not incur costs or delays. Establishing new hubs takes time and requires investment. In the meantime additional ports may join the trading scheme, making it increasingly difficult to find other non-participating ports to trade with.

Preventing fraud

To reduce the risk of fraud one option might be to entrust a licensed consultant (perhaps classification societies) with checking the annual amount delivered to each ship against fuel payments made by the company in charge of the vessel, and also calculate the approximate fuel requirements for the voyages made based on the ship's log. The authority in charge of the scheme could work out a manual for how performance audits should be done. Alternatively, this exercise could be limited to random checks carried out by port state authorities.

To discourage fraud, the system should enforce a high penalty on cheating. The best deterrence might be to rule that a ship (identified by its IMO number), whose owner, operator or charterer was proven guilty of fraud, would not be accepted in any participating port for some period of time.

Improving the design of the METS

The Maritime Emissions Trading Scheme as presented in the original report is open to improvement. There is for instance need to provide background for a decision on the

length of the time-limit (in the case when the scheme does not receive universal coverage from start). Another potential improvement would be to assess the use of default values as an alternative to making infrequent visitors surrender allowances equal to fuel bunkered during a certain period prior to a call at a participating port. Such a default value would, of course, have to be set at a relatively high level of specific fuel consumption (per vessel km) but would on the other hand be limited to the distance sailed on the ship's voyage to and from participating ports.

4. Norway's proposal

The idea in the submission by Norway to MEPC 56, based on work by Dr Andre Stochniol, is that the IMO should set a cap on the total CO₂ emissions from international shipping and agree on the size of a charge on all such emissions. Furthermore, it is suggested that a fund is established under the IMO to which the charge would be paid. The revenue would be used for:

- maritime industry greenhouse gas improvements;
- CO₂ credits purchased in the emissions trading markets;
- Climate-change adaptation in developing countries.

The first two parts should jointly deliver the emission reductions required for making aggregate shipping emissions stay below the global cap. The second of them would be used for purchasing reduction certificates and units in the emissions trading markets. In an annex, Norway says that the emission charge could be set at a level which corresponds to 40 per cent of the market carbon price for the first four years of operating the scheme.

The proposal is that ship owners should submit a fuel use record to the scheme database for recent voyages at least once a month, along with the volume of work and distance travelled and the CO₂ emission data for each voyage. The records would be submitted to and verified by an authorised official at any arrival port participating in the scheme.

Enforcement should, according to the proposal, take place in selected ports. In the first phase of implementation to start in 2009 enforcement would gradually be implemented in 100 major ports and apply to ships of 1,000 grt and above. In a second phase beginning in 2011 enforcement would reach 400 key ports and include ships of 300 grt and above.

Billing would be centralised and carried out for voyages that ended in the previous month (or longer period). When the market price of CO₂ allowances is \$25 and the charge is \$10, the annual proceeds would amount to \$3 billion to be split on the three funds, one for each of the three objectives mentioned above.

5. Denmark's proposal

The proposal submitted by Denmark to MEPC 57 is in some respects similar to the Norwegian scheme. Denmark suggests that the maritime sector, world-wide, should become subject to a flat bunker levy established at a defined cost level per ton of fuel bunkered. Revenues collected nationally would be channelled to an international maritime greenhouse gas emission fund to be used primarily for the acquisition of CO₂ emission

credits generated in other industrial sectors. However, part of the proceeds would be used for funding of adaptation projects in developing countries, or adaptation under the UNFCCC, and for funding of the IMO Technical Corporation Programme.

The submission underlines that “a reasonable levy level would have to be subject of negotiation” and goes on to say that “if the intent should be that international shipping is to truly cover the costs of emission and redeem these by purchasing emission credits elsewhere, the argument can be made that a levy rate should be linked to the CO₂ credit cost”. An example is provided where the emissions allowance price is €24 per ton CO₂, which under the exchange rate of December 2007 equals approximately \$110 per ton fuel. This would, according to the submitted paper, generate an annual revenue stream of \$30 billion (assuming a world bunker fuel consumption of about 300 Mton). In order to generate proceeds for the remaining two purposes mentioned by Denmark, the levy would have to be even higher.

In contrast to the paper submitted by Norway, the Danish contribution discusses potential problems connected to the introduction of a world-wide levy on bunker fuel, among them evasion by bunkering in non-participating ports or offshore. Concerns are also raised over distortion of trade and that developing nations may face an unfair cost burden. The Danish paper says that charge collection at the point of sale would be administratively complex, as even the definition of the appropriate point of sale for levying the charge would be difficult. It could potentially take place anywhere in the supply chain, but the paper identifies difficulties with all levels. It says, one alternative might be to make the bunker delivery notes include a certificate issued by a recognized body or organization, stating that levy has been paid on the fuel.

Denmark notes that some type of international supervision of the implementation might be needed, and recognizes that this means that participating states would have to surrender part of their national jurisdiction to an international body.

6. Basic requirements

In this section of the current paper, the three proposals will be checked against the three basic requirements listed at the beginning of section 2 (above).

A. Target real emissions

Carbon emissions from shipping can be reduced by five different means:

- Shifting to a fuel with low emissions of carbon (well-to-propeller)
- Supplementing fuels with wind-propulsion and/or solar power
- Improving operations (maintenance of hull, engines and propellers, choice of operational speed, etc)
- Up-grading existing equipment by retrofitting (engines, propellers etc)
- Ordering new, more fuel-efficient, tonnage

To provide incentive to make use, where appropriate, of all five means, a policy instrument must target real fuel consumption, rather than a theoretical value based on assumptions on the specific consumption per vessel kilometre. Two options exist: Enforcing a fuel tax or levy or introducing emissions trading based on bunker delivery notes. Taxing fuel will be difficult in parts of the world. Demanding ships that call at participating

ports to surrender CO₂ allowances equalling the carbon content of fuel bought is a way of getting around this restriction.

The METS would target real emissions as the submission of CO₂ allowances and credits would be based on fuel bought, however, in the case of partial coverage it would be limited to fuel purchased during a specified period prior to a call at a participating port. The Norwegian proposal is based on the participation of a limited number of ports and the system would cover “recent voyages”. According to the submission presented by Denmark, the proposed bunker fuel levy would cover all fuel world-wide. However, Denmark notes that most likely all countries will not participate. The systems proposed by respectively Denmark and Norway will target real emissions only if the scheme’s coverage is universal. In a case where only routes between participating ports were to be included, the schemes would have to build on baselines rather than on the true consumption of fuel as it would be impossible to break-down fuel oil deliveries on single trips or on legs of journeys. Another disadvantage is that it would be difficult to cover emissions at birth and emissions from idling.

B. Provide equal incentive and avoid distorting inter-modal competition

The idea behind market-based policy instruments is to make companies and citizens respond by choosing the least costly measures. What is most cost-efficient may vary over time as a result of changing price elasticities of demand and technological innovation. There is no way for national governments or international bodies, such as the IMO, to know with enough certainty what the future might bring. A technological breakthrough in shipping might in combination with increasing marginal abatement costs in other sectors (when the low-hanging fruits have been picked) change the relative prices enough to make new abatement strategies economically viable. It is therefore essential that maritime shipping faces the same marginal incentive as other modes of transport and land-based installations.

Inter-modal competition

International shipping competes to some extent with other modes of transport. In order not to distort inter-modal competition, transport by different means should ideally face the same responsibility for climate change mitigation.

Road transport is not (yet) subject to emissions trading. However, the average taxation of unleaded petrol and diesel in the sixth largest EU member states (by population) is equivalent to 228 and 177 euro per ton CO₂ respectively. Part of this high level of taxation is explained by the fact that infrastructure costs are internalised by the taxation of road fuels.

Approximately two thirds of European rail transport is electrified. Since emissions from fossil fired power stations are covered by the EU ETS, the price of electricity consumed by rail transport is affected by the cost to the trading sector of remaining within the cap. In a deregulated market, power generators try to pass on the marginal cost of production to all customers, and production in coal fired power stations is generally used to meet increased demand. The marginal cost does also affect costumers who purchase their electricity from hydro and nuclear sources.

In a proposed directive, the European Commission suggests that CO₂ emissions from civil aviation should be included in the EU ETS. The directive would cover emissions

from flights within the EU from 2011 and all flights to and from airports in other countries from 2012.

In order to compete on equal terms with transport by rail and road, short sea shipping should meet the same marginal cost for holding back its emissions of CO₂. This is best achieved in a common cap-and-trade system or in trading schemes that are openly linked to each other. For a levy-based system to provide competition on equal terms it would have to cover all emissions caused by maritime transport and be set a level corresponding to the price of emissions allowances. This may be the case with the Danish model but will not be achieved by the more limited charge proposed by Norway.

Marginal incentive

By being openly linked to other existing and future emissions trading schemes, METS provides a marginal incentive that is equal to those enforced in other sectors.

The incentive provided by the Norwegian system is much smaller as the objective is limited to raising the amount of money needed for buying in the international market the emission credits required for compensating for any emissions above the cap. For a scheme that is introduced in 2012 and where the cap is based on 2005 emissions, the charge needed for purchasing allowances or credits would initially be in the order of 20 per cent of the market price. Norway says in an annex to its submission that a charge equal to 40 per cent of the emission allowance price would be sufficient for raising funds for all of the three identified purposes.

Denmark wants to raise funds for the same three purposes but in the only example provided in its submission, the size of the levy is intended to create a resource stream that would balance the cost of buying allowances and credits equal to the total emissions from global shipping. In this case the marginal incentive provided to shipping would be identical to that in other trading sectors. However, if the intention is to cover 100 per cent of the emission and simultaneously raise money for two additional efforts, the levy would have to exceed the price of emissions permits. If, on the other hand, the ambition were to be limited to partial coverage, the Danish model would suffer from the same drawback as the Norwegian scheme in terms of a poor marginal incentive.

Will there be sufficient emission credits?

In the context of universal coverage it is necessary to analyse whether the supply of emission credits from projects in developing countries will be able to match demand in the 2010s. During the Kyoto period (2008–2012), the aggregated global supply of CER and ERU is expected to be in the range of 1,700 to 2,600 Mt⁷. According to the IETA, output is expected to reach at least 2,200 Mt⁸.

The annual supply of CER and ERU may thus be expected to be in excess of 500 Mt at the end of the Kyoto period. The future rate of growth will above all depend on demand and long term price expectations. At a 10 per cent annual rate of growth, the volume will double by 2020.

⁷ *State and Trends of the Carbon Market 2007*. The World Bank, Washington DC 2007, and, respectively, the UNFCCC (www.unfccc.org).

⁸ *2007 State of the CDM*. International Emissions Trading Association (IETA), Geneva 2007.

In a case where the European Union is committed to reduce greenhouse gas emissions by 30 per cent between 1990 and 2020, the Community's maximum need to acquire emission credits (CER) in 2020 would amount to 420 Mt CO₂e (EU ETS + member states) under the limitations proposed by the European Commission.⁹ At present, the extent to which the aviation industry will be able to use project credits within the EU ETS remains unclear, but the World Bank estimates that demand will be in the range of 30 to 80 Mt in 2012. By 2020 it could be expected to be a great deal larger. At the same time, demand from the United States, Canada, Australia and Japan may be expected to accelerate if all these countries accept reduction targets. Perhaps global demand from land-based sources and aviation will by 2020 have reached as high as 1,000 or 1,500 Mt per year.

If maritime transport were to buy credits balancing its total global emissions, demand in the shipping sector would probably exceed 1,600 Mt in 2020 (at 3% annual growth from 2007).¹⁰ To match a total global demand of about 3,000 Mt, the supply would have to grow sixth-fold in the eight years following 2012. This does not appear likely.

An associated problem with the Danish proposal is that one single body (in charge of the levy on bunker fuels) would buy more than half of all credits. Such market dominance is less likely to be acceptable to other parties in this trade.

The METS would also raise demand for credits but only to a minor extent compared with the model proposed by Denmark. If METS has global coverage and the cap is set at 1,000 Mt (equal to the approximate level in 2005), the net-requirement in 2020 would be around 600 Mt CO₂e to be purchased either from other cap-and-trade systems or from projects in developing countries.

C. Open to gradual expansion

All three proposed models can be designed for gradual expansion into global coverage of shipping emissions in a case where it turns out to be impossible to make the scheme universal from start.

In summary

The below table provides an overview of the extent to which the three market-based instruments for handling emissions from international shipping meet the basic requirements.

Requirements	METS	Norway's proposal	Denmark's proposal
Target real emissions	Yes	Yes, if global	Yes, if global
Provide equal marginal incentive and be non-distorting	Yes	No	?
Open to gradual expansion	Yes	Yes	Yes

⁹ Kågeson, P., *Tools for Cutting European Transport Emissions. CO₂ Emissions Trading or Fuel Taxation?* SNS Förlag, Stockholm, 2008.

¹⁰ Based on emissions from international shipping in the order of 1,100 Mt in 2007 as assumed by IMO BLG in *Report on the outcome of the Informal Cross Government/Industry Scientific Group of Experts established to evaluate the effects of the different fuel options proposed under the revision of the MARPOL Annex VI* (20 December 2007).

It is clear that the proposals from Norway, in particular, and Denmark, depending partly on coverage, only to a lesser extent fulfil the basic requirements. They could be made to live up to these standards by borrowing elements from the METS. However, in doing so they would become variants of emissions trading rather than levy-based schemes. It might therefore be better to study whether there are any potential defects in the design of METS that could be overcome by making use of some of the ideas behind the models proposed by Denmark and Norway.

An additional problem with levy-based schemes is that the level of the charge must be subject to political decisions not only at the launch of the scheme but on a regular basis in order to reflect the market price of CO₂ allowances/credits. Decisions on tax rates in the European Union require unanimity among the 27 member states, and some countries are very reluctant to giving away their right of deciding on tax and charge levels to a supra-national body of any kind.

7. Additional requirements

No free allocation needed

In the METS there is no need to allocate emissions allowances free of charge. By selling the amount of emission allowances allowed under the cap on auction, the shipping sector is collectively allocated enough allowances to keep its net demand for credits at a comparatively low level.

Would not require a reliable emission baseline

A global scheme covering all emissions from sea transport would not require a reliable emission baseline. It would be sufficient to allocate to the sector allowances corresponding to what is believed to have been the emissions in a baseline year, say 2005. However, if the scheme is introduced in stages, it will be necessary to estimate what portion of global emissions that is affected. This could be done either as a back-of-the envelope exercise or based on the collection of bunker delivery notes during a trial year. In the first case one would have to make sure not to overestimate historic emissions. However, even based on a conservative estimate, the allowances allocated to the shipping sector would significantly reduce the need for purchasing emissions credits from projects in developing countries compared to the system proposed by Denmark.

Non-discriminating and difficult to evade

The proposed system (METS) would be applicable to vessels of all types (unless otherwise is decided) and regardless of flag or origin. When based on bunker delivery notes covering any fuel bought during a specified period prior to the call at a participating ports, the scheme would be difficult to evade. The systems proposed by Norway and Denmark would probably have to build on a similar design in order to become operable.

Acceptable to all parties

The METS, should as explained above, be acceptable to Annex 1 countries as well as developing countries and also in the context of inter-port competition.

Legally acceptable

When introduced by the IMO and/or the UNFCCC, METS would be legally, politically and institutionally acceptable.

Avoiding red tape

The scheme must be easy to administer, monitor and enforce. One possible disadvantage with emissions trading is transaction costs, which could potentially become proportionally higher for small companies than for large. If the EU ETS were to be extended to road transport, most experts believe that the liability should be placed upstream with the oil companies that deliver road fuels to the thousands of haulage companies and the millions of motorists. Maybe fear of high transaction costs was a reason for Norway and Denmark to propose a levy. The idea of making one agency responsible for purchasing all emission allowances and credits for the entire global shipping sector could be seen as an extreme variant of upstream liability.

However, the predominant view among emission trading experts is that the efficiency and transparency of the market would gain from a broad and heterogeneous participation. Therefore one should ideally seek a solution to the problem with the high transaction costs in small companies that does not give rise to market dominance by a few major players. Large shipping companies would presumably gain from being allowed to be in charge of their own business. Small companies could choose to ask either the delivering oil company or a broker to buy and to submit the required allowances to their IMO-account. This service would in the first case be part of the fuel purchase and in the latter require a separate contract. The best solution thus appears to be to allow shipowners and operators a choice between an upstream and a downstream approach. The METS provides this opportunity as anyone can submit allowances/credits to the account of a ship (or a shipping company).

8. Making use of the revenues

In the schemes proposed by Norway and Denmark most of the revenue from the levy on bunker fuel would be used for purchasing emission allowances and credits in the carbon market. Only a minor part of the proceeds would end-up financing funds for maritime industry greenhouse gas improvements and climate change adaptation in developing countries.

The METS would raise money from auctioning the amount of CO₂ allowances allocated collectively to the shipping sector. If, for instance, the scheme initially covers two thirds of the emissions from international shipping and the cap is set at the approximate 2005 levels of those emissions, about 700 million CO₂ allowances would be sold annually.

The price per unit will to a large extent depend on the marginal abatement costs in the national and regional trading schemes that are linked to the METS and on the caps in these systems. Open links mean that the equilibrium price will fall somewhere between what, in the absence of links, would have been the case in trading systems with more or less ambitious targets. The least ambitious schemes will thereby “import” a higher price than would have been the result of working in isolation.

It is difficult to forecast the price of emissions allowances, but let us, for the sake of providing an example, assume that the price in 2013 would be €30 per ton CO₂ in a case

where METS is linked to the EU ETS. This would result in gross revenues of €1 billion when two thirds of the emissions from international shipping are covered by the scheme. If by 2020, METS is expanded to cover 85 per cent of emissions from international shipping, the cap is reduced to 90 per cent of the level of these emissions in 2005 and the market price has risen to €35 per ton CO₂, the resulting resource stream would be €8 billion. In the longer term the proceeds would eventually decline when global coverage is reached and the cap is gradually lowered.

Under the above assumptions, the average annual revenue from the METS might be in the order of €25 billion over the next two or three decades. In the first phase of the scheme, it might be necessary to recycle some of the proceeds to the shipping industry so long as other sectors are allocated some of their emission allowances free of charge. The European Commission has proposed that allocation by auction should gradually increase in the EU ETS after 2012 and reach 100 per cent by 2020. However, electrified rail transport will not benefit from free allocation as European power producers will not be given free allowances beyond 2012 and would anyway have been able to transfer the marginal cost to their customers.

Recycling revenues

Returning some of the proceeds to the shipping industry could take the form of funding the IMO Technical Corporation Programme as proposed by Denmark. However, this form of recycling might not be appropriate for any real large resource stream. If the METS were to mirror a system for land-based installations where free allocation is gradually reduced to zero over a period of eight years, the average amount to be recycled would be in the order of €10 billion per year (based on the above example).

This amount of money is probably best recycled in relation to production measured in terms of grt kilometres, dwt kilometres or ton kilometres. None of these parameters are ideal. However, in a case where industry knows in advance that the recycling of revenues will gradually diminish, individual shipping companies will probably refrain from trying to optimize their net-return from new ships by trying to tailor-dress them to the conditions provided by this temporary regulation.

Another way of gradually introducing full responsibility in the shipping sector would be to rule that ships initially only have to surrender allowances equal to a certain portion of their emissions. If starting at a 40 per cent liability in 2013, this would equal the conditions proposed by Norway and, of course, suffer from the same disadvantage of providing only a partial incentive to become more fuel-efficient. However, if a decision is taken to gradually raise the liability to 100 per cent by 2020, companies ordering new ships would presumably consider the long-term effect of the METS rather than the short-term conditions when deciding on the design and operational speed of their vessels.

Use of revenues under full liability

As mentioned above the annual proceeds from auctioning 100 per cent of the allowances allocated to the shipping sector might be in the range of €20-30 billion in case where the first phase of the scheme covers two thirds of all traffic by ships larger than 400 grt. The parties would have to consider whether they want to redistribute this money based on population, share of world trade or some other parameter.

One way of avoiding lengthy and potentially complicated negotiations over the redistribution (which might have to be repeated when the scheme expands), would be to allow the United Nations and its relevant subsidiary bodies to use the money.¹¹ The UN will in future need large funds for dealing with problems directly or indirectly caused by climate change such as scarcity of food due to draughts and floods (and competition with biofuels). Halting deforestation and encouraging reforestation is another important UN task. One fifth of the emissions of greenhouse gases are currently caused by changes in the use of soils. Social unrest and military conflict may also follow climate change and require additional efforts by the UN.

The revenues from auctioning emission allowances in the shipping sector could be fed into one or several funds under the auspices of the United Nations. A small part of the money would have to be set aside to cover the administrative cost of the METS. The best way of allocating responsibility for the trading scheme might be to entrust the UNFCCC (or a subsidiary body) with auctioning the allowances and the IMO with the ships register and the system of CO₂ emission accounts for individual ships and/or shipping companies.

If a similar global scheme for emissions from international aviation is created by the ICAO, the revenues from auctioning allowances to airlines could add to the size of these UN funds. Demand for transport by sea and air are closely connected to GDP per capita and the environmental pressure caused by economic growth. What could better reflect the responsibility for contributing to climate change mitigation at a global level than our share of global trade and international transport?

In summary

The METS allows the shipping industry to contribute to climate change mitigation by:

- Taking technical and operational measures in response to the carbon market price;
- Becoming a net-buyer of emission allowances and emission credits, thereby contributing to reductions in other sectors and in developing countries;
- Providing funding for climate change related missions and tasks carried out by the United Nations and its relevant subsidiary organisations.

Allowing itself to play this role would certainly improve the status of shipping in the eyes of the international community.

¹¹ Norway and Denmark, in their submissions to the MEPC, want to spend part of the revenues from the proposed fuel levies on adaptation projects in developing countries.

Managing the emissions of the maritime sector is particularly under the spotlight. The International Maritime Organisation (IMO) estimates that maritime transport emits around 940m tonnes of carbon dioxide annually and is responsible for about 2.5% of global greenhouse gas. It predicts that these emissions could increase by more than 50% by 2050 if mitigation measures are not put in place. Subsequently, on 16 September 2020, the European Parliament adopted amendments to the EU Emissions Trading Scheme (ETS) Directive, including extending the EU ETS to the maritime sector. Now, following a consultation process, the EC is expected to provide further detail of the new rules that will apply in its package of energy and climate laws, expected during June 2021. World trade and maritime transport are fundamental to sustaining economic growth and spreading prosperity throughout the world, thereby fulfilling a critical social as well as an economic function. However, the sheer scale of the international shipping industry in comparison to other modes of transport means that overall emissions from ships remain a concern, having negative impacts on local port and coastal air quality and hence on human health, and contributing to regional acidification and global climate change. The Ship Emissions Toolkit provides a structured framework as well as decision support tools for evaluating emissions reduction opportunities in maritime transport. The EU emissions trading scheme. The EU considers the EU Emissions Trading Scheme (2003/87/EC) a crucial and cost-effective instrument for meeting its climate objective of reducing greenhouse gas emissions by at least 20% in 2020 compared to 1990. It will be important also for the market formation of CCS, after most technological barriers have been addressed in a demonstration phase. Installations that operate a full CCS chain would not need to hand in allowances for the CO2 that is stored. From 2013 onwards, installations capturing, transporting or storing CO2 should be covered by the trading scheme in a harmonized manner, in order to encourage and provide incentives for full-scale deployment of the option. This report designs a global cap-and-trade scheme for maritime transport and assesses its impacts on the shipping sector, regions and groups of countries. It shows that it is feasible to implement a cap-and-trade scheme for greenhouse gas emissions in the maritime transport sector. Such a scheme ensures that the environmental target is met, while allowing the sector to grow and ensuring that the target is met in the most cost-effective way. An emissions trading scheme would result in an increase in the costs of shipping of less than 10%, depending on the price of allowances. The increase in import values is likely to be less than 1% for most commodity groups, and the impact on consumer prices even lower.