

Shipping's carbon emissions

Design and implementation of market-based measures
Part 1: a cap-and-trade emissions trading system





Contents

1	Introduction and Summary	4
2	What is an Emissions Trading System (ETS)?	6
2.1	Why adopt an ETS in shipping?	6
2.2	Two-phase approach to the implementation of an ETS	7
2.3	How an ETS could work for shipping	7
3	Design of an ETS	8
3.1	An ETS framework	8
3.2	Structures	9
3.2.1	Shipping registry	9
3.2.2	Registry of a UNFCCC credit-generating mechanism e.g. the CDM Registry	9
3.2.3	National registries	9
3.2.4	International Transaction Log (ITL)	9
3.2.5	Auctions	10
3.2.6	Secondary markets	10
3.3	Entities	10
3.3.1	IMO and UNFCCC	10
3.3.2	Responsible entities	10
3.3.3	Flag and port states	11
3.3.4	Bunker fuel suppliers	11
3.4	Processes	11
3.4.1	Issue of Shipping Emissions Units	11
3.4.2	Purchase of fuel	11
3.4.3	Auction processes	11
3.4.4	Post-auction transactions	12
3.4.5	Surrender of SEUs	12
3.4.6	Monitoring and verification	12
3.4.7	Generation of revenue	12
3.5	Documentation	12
3.5.1	IMO ship number	12
3.5.2	Bunker Delivery Note	13
3.5.3	Certificates of emissions units and credits	13
3.5.4	Certificates of Compliance	13
3.5.5	Contracts	13
4	Implementation of an ETS	14
4.1	Phase 1: purchasing offset credits	14
4.1.1	Key elements and benefits	14
4.1.2	Costs	15
4.2	Phase 2: transition to cap-and-trade	15
5	Frequently asked questions	18
6	Glossary	20
7	List of acronyms	22

List of Figures

1	Basic framework of an ETS for shipping	8
2	Stepped increases in offset carbon dioxide (CO ₂) over a Phase 1 lasting nine years	14
3	Basic framework of Phase 1 implementation	16
4	A quantitative indication of the effect of the proposed cap-and-trade ETS on shipping's CO ₂ emissions	17

1 Introduction and Summary

In this 'manual', the UK Chamber of Shipping develops further the themes put forward in the discussion paper 'A global cap-and-trade system to reduce carbon emissions from international shipping' published by the UK Chamber of Shipping, together with a number of other national associations in September 2009. The key advantages of a cap-and-trade Emissions Trading System (ETS) were described in that paper as:

- providing for certainty of environmental outcome
- allowing the market to set the price of carbon
- allowing the shipping company to find the most cost-effective solutions
- fitting well with other existing carbon reduction infrastructures and accommodating any future United Nations (UN) mandated schemes
- not restricting the growth of world shipping.

In the search for a mechanism that will provide the necessary reductions in carbon dioxide (CO₂) emissions at the lowest cost to ship operators (and therefore international trade), the market-based approach of cap-and-trade is attractive in allowing choice and flexibility within a global, goal-based system. Establishing a price for CO₂ emissions for the shipping sector, through the interaction with other existing and future trading schemes, offers the opportunity for a genuinely global market.

Buying a shipping allowance, or 'emissions unit', would be similar to buying any other commodity – there is a price, a payment and a delivery. The price would then necessitate an assessment, in corporate decisions about levels of emissions, of both the internal costs of abatement and the market price of allowances. Because shipping companies would be able to buy and sell units in other existing and future emissions trading markets, such an approach would also create more purchasing options.

Since the last discussion paper, the International Maritime Organization (IMO) has continued its work on market-based measures including the establishment of an expert group which was asked to consider the relative merits of the various proposals submitted to date. The group reported to the 61st session of the IMO's Marine Environment Protection Committee (MEPC) in September 2010 that, while all the

proposals had the potential to deliver significant greenhouse gas (GHG) emissions reductions, a definitive comparison of the options was not possible because of their lack of maturity. The aim of this document is, therefore, to facilitate further debate by providing more information on the structure and establishment of a possible ETS.

An ETS offers the opportunity to deliver reductions beyond those which can be achieved by technical and operational



measures alone. The Chamber fully supports the introduction of a mandatory Energy Efficiency Design Index (EEDI) to improve the efficiency of the future fleet, and also the use of the Energy Efficiency Operational Indicator (EEOI) and Ship Energy Efficiency Management Plan (SEEMP) to optimise the performance of the existing fleet. However, we believe that these measures alone will not be sufficient, particularly when set against a growing world fleet.

This paper builds on our 2009 publication and sets out to answer some of the questions of the IMO expert group and others within the industry. It provides further details of how an ETS could work, focusing on design, structures, processes and documentation.

In particular, this 'manual' introduces new thinking in describing in practical terms how an ETS could be readily

established for international shipping through a two-phase process – with the introduction of an 'enabling process' in a first phase and the option of moving towards a complete ETS in the second. The proposed ETS and its enabling step would be global and flag-neutral, applying to all internationally trading ships of over 400 GT.

The enabling step would have the following core elements:

- the ship operator would be required to buy and then surrender offset (carbon) credits in proportion to its bunker fuel purchases, with the surrender rate set by the IMO
- the offset credits used for compliance would be purchased from the existing open market through emissions reduction projects certified by the United Nations Framework Convention on Climate Change (UNFCCC) (e.g. the Clean Development Mechanism (CDM)) or equivalent mandated schemes considered acceptable by the IMO member states
- since offset credits would be purchased from the open market, the funds would result directly in CO₂ reductions outside the shipping sector and should satisfy the principle of 'Common But Differentiated Responsibilities' (CBDR)
- no new central fund would be created, thus avoiding issues of hypothecation and sovereignty of taxation, which are difficult for many member states
- this scheme could be implemented relatively quickly and easily by the IMO, with a minimum of administrative overheads
- shipping would contribute a defined percentage reduction of total CO₂ emissions outside the sector with no restriction on the growth of world shipping
- it would not be necessary to establish a baseline, or conduct benchmarking of the existing fleet to introduce this phase, but it would still produce an accurate record of vessel fuel consumption and emissions.

Phase 1 would establish several components common to any market-based measure (MBM) – trading or levy – including reporting, monitoring and verification mechanisms. Once Phase 1 was operating smoothly, decisions could be taken on the nature of the second phase to be implemented. If that were an ETS as envisaged, a transition to Phase 2 could be managed by the introduction of a 'cap' and the issue/auction of Shipping Emissions Units (SEUs) to the level of the cap. At that stage, funds would be raised from the auction of shipping emissions units, which could be put to a number of different uses such as adaptation and mitigation, as well as shipping research and development.



2 What is an Emissions Trading System?

An Emissions Trading System (ETS) is a cap-and-trade mechanism which establishes a cap on net carbon dioxide (CO₂) emissions and allows the market forces of supply and demand to drive the allocation of emissions rights so as to achieve reductions in the most cost-effective manner. The aim of any ETS for shipping is to reduce the industry's contribution to atmospheric CO₂ levels by accelerating the cost-effective delivery of improvements in the energy efficiency of individual ship operators. A truly global and flag-neutral system would be the preferred approach. However, the methodology proposed would also allow a differentiated approach based on the United Nations Framework Convention on Climate Change (UNFCCC) principle of 'Common But Differentiated Responsibilities' (CBDR) according to countries' respective capabilities.

The attraction of the cap-and-trade system is that a market-based approach would allow choice and flexibility in the pursuit of CO₂ emission reduction targets. This goal-based approach suits an industry as diverse as international shipping and would allow ship operators to make the necessary reductions at lowest cost. The additional costs imposed by an ETS would force shipping companies to consider where to allocate shareholder capital in order to maximise returns, thereby driving efficiency in achieving the environmental aim, with the 'decision to emit' requiring an assessment of both the internal costs of abatement and the market price of allowances. The creation of a genuinely global market for carbon for shipping – and its interaction with other existing trading schemes – would also mean that a price was established. A system based on this general approach would also allow shipping companies to buy units in other existing and future emissions trading markets.

2.1 Why adopt an ETS in shipping?

There are two basic philosophies for reducing CO₂ emissions from shipping:

- a market-based measure (MBM) which would establish a price for carbon
- a standards approach, based on a set of standards for energy efficiency in the shipping sector.

These approaches are not mutually exclusive. Indeed, they would support and complement each other.

Given the need for an MBM, available options are based on two broad principles. These are a taxation (levy) arrangement and an ETS. Further options exist, which offer various hybrid forms of these.

Achieving significant efficiency gains in the international shipping fleet through setting standards against an efficiency index (such as the Energy Efficiency Design Index (EEDI)) would take time, reflecting the development and uptake of new technologies and the fact that shipping is already the most fuel and carbon efficient mode for transporting large cargo volumes. During this lead-in period, a market-based measure based on trading would serve as a powerful tool to drive further efficiency gains inside the shipping sector by setting a price for CO₂ emissions and would, at the same time, reduce emissions outside the sector through the purchase of offset credits. A standards approach not linked to an ETS or emission-reduction projects outside the shipping sector would of itself not be sufficient to address the urgency of the climate change issue which has been reaffirmed at the UNFCCC Conference of the Parties (COP 16) in Cancun in December 2010.

An ETS linked to other non-shipping trading regimes or certified emissions reduction schemes would have two major benefits over other market-based measures. It would deliver a precise environmental outcome (by setting a cap on the shipping sector's net contribution to atmospheric CO₂) and do so at lowest cost (by enabling an individual ship operator to make informed choices regarding the purchase of emissions units/offset credits or investment in abatement measures). That wider linkage and the involvement of non-shipping parties would also enhance the stability of the market, as well as promote alignment of the carbon price for shipping with that of global markets and provide liquidity to assist the balance of supply and demand.

The centralised sale of emissions units to ship operators (see section 3.2.5) has the potential to give rise to significant revenues, which could then be used for climate change adaptation and mitigation purposes.

2.2 Two-phase approach to the implementation of an ETS

This paper shows how an ETS for shipping could be established in two phases. These are explained in more detail in chapter 4.

The first phase – likely to last several years – would be an enabling step in which the foundations would be laid for an ETS. At this stage, there would be no cap or auctioning of Shipping Emissions Units (SEUs), only the requirement for a responsible entity to purchase offset credits from a UNFCCC certified project. The quantity of credits required would correspond to a percentage of bunker fuel purchased.

The second phase would constitute a move to a complete cap-and-trade system by the introduction of a cap and an emissions trajectory for the shipping sector, and auctioning of SEUs.

2.3 How an ETS could work for shipping

It is suggested that any global ETS in the shipping sector could apply to internationally trading ships of all flags above a certain size, notionally 400 GT.

The responsible entity would be the individual company identified as the Document of Compliance (DOC) holder under chapter IX of the International Convention on the Safety of Life at Sea (SOLAS).

The responsible entity for the emitting unit (i.e. ship) would buy SEUs at auction or from the secondary market for compliance purposes. The SEUs would be held in an account in a shipping registry administered by the International Maritime Organization (IMO). Each SEU would be the equivalent of one tonne of CO₂ emitted from a vessel.

The number of SEUs allocated to auctions during a period would be capped by the IMO under the auspices of the UNFCCC. SEUs would be created by the conversion of Assigned Amount Unit (AAU)s, as defined by the Kyoto protocol, or any equivalent units defined by the UNFCCC. The conversion would take place through an existing structure known as the International Transaction Log (ITL), which is a UNFCCC electronic 'gateway' for the transaction and tracking of emissions units. The ITL is described in section 3.2.4 and is linked to registries of emission trading schemes.

The UNFCCC would assign SEUs to the IMO (a sector approach) or to governments with emission targets under the Kyoto Protocol (a distributed approach).

The responsible entity would calculate CO₂ emissions from all fuel purchased based on a fuel type conversion factor. At the end of a specified compliance period, the responsible entity would be required to surrender emissions units and offset credits equivalent to its CO₂ emissions during the period. This would be monitored and verified by port and flag states.



Actual reductions of CO₂ emissions from ships would be delivered through the price incentive inherent in this scheme alongside the current, ongoing IMO work on the EEDI, Energy Efficiency Operational Indicator (EEOI), and Ship Energy Efficiency Management Plan (SEEMP). This is further discussed in item 4 of section 4.1.1.

Trading of emissions units would occur because ship operators face different costs for reducing emissions. Those who implement relatively inexpensive energy efficient technologies or operational measures would either buy fewer SEUs or sell their surplus of SEUs to those who would have relatively higher costs in adopting such measures. By giving a financial incentive to control emissions, and the flexibility to determine how and when to reduce emissions, the capped level of CO₂ entering the atmosphere is achieved at lowest cost.

Emission reduction projects undertaken outside the shipping sector would be a key mechanism that would help the responsible entity to manage the cost of compliance, while contributing to an overall reduction in emissions. This 'offset mechanism' enables a responsible entity to offset its emissions by purchasing emission reduction credits generated by such projects and certified by the UNFCCC. Offset credits lower the overall cost of an emission reduction scheme to the shipping sector by bringing in lower-cost emission reduction opportunities from outside the cap. The Clean Development Mechanism (CDM), Joint Implementation emissions reduction project (JI) and the Reducing Emissions from Deforestation and Forest Degradation Mechanism (REDD+) are examples of offset mechanisms.

3 Design of an ETS

3.1 An ETS framework

An Emissions Trading System (ETS) for the shipping sector can be represented by the framework shown in figure 1.

The basic components common to any ETS framework are: structures, entities, processes and documentation. The initial distribution of Shipping Emissions Units (SEUs) would

take place via an auction referred to as the primary market. Subsequent transactions would take place via the secondary market either through use of an exchange or 'over the counter', i.e. a direct transaction with a counterparty.

Each of the components shown in figure 1 is reviewed in turn in the following sections.

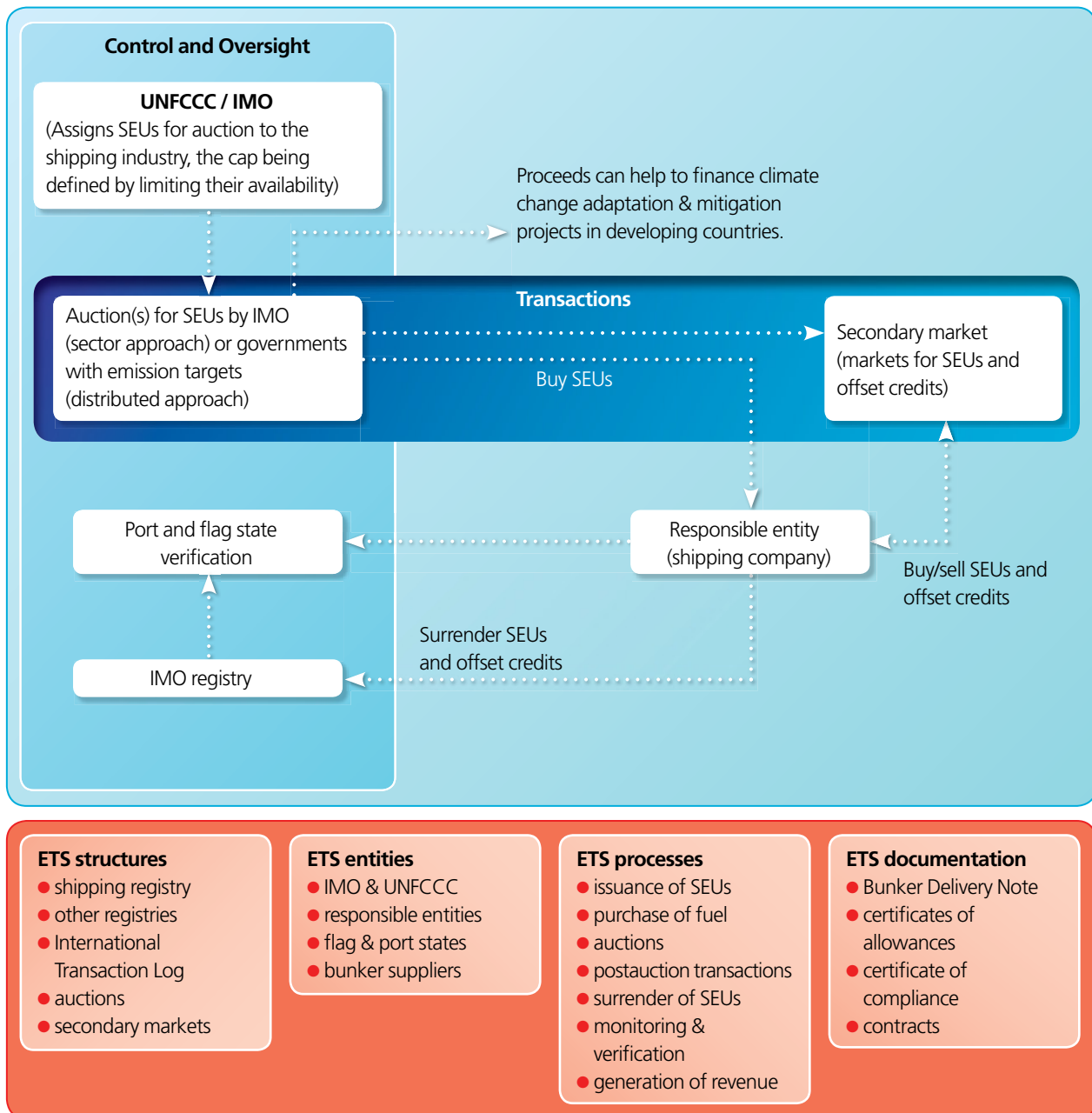


Figure 1: Basic framework of an ETS for shipping

3.2 Structures

The components that are common to any emissions trading system are registries, the International Transaction Log, auctions and secondary markets.

3.2.1 Shipping registry

An emissions trading registry is a web-based application that forms the backbone infrastructure for a carbon market by settling physical emissions trades – delivering units from the accounts of sellers to those of buyers. There is, as yet, no registry for the shipping industry in existence and one would need to be established.

Responsible entities would have legally binding compliance obligations and would, therefore, have to open a holding account in the shipping registry; accounts would be registered under the Document of Compliance (DOC) holder and emitting entities identified by the IMO ship number. In addition to these accounts, the shipping registry could also contain other accounts available to any individual or organisation (e.g. banks, bunker suppliers and parties within contractual arrangements). This would facilitate, for example, bunker suppliers, if they so wished, providing a service selling SEUs, other emissions units and offset credits – or the contractual redistribution of responsibility for compliance where multiple parties have an interest in an emitting entity.

The shipping registry, controlled by the IMO, would record:

- carbon emissions units allocated to and held in each account
- the movement of emissions units and offset credits between accounts (including allocations, transfers, surrender and retirements)
- verified emissions of emitting entities (ships) within a compliance period
- compliance status of emitting entities.

The shipping registry would perform the following functions:

- account management – allowing account holders and the registry administrators to create, update and close holding accounts as well as record emissions
- surrender and retirement of emissions units – allowing emitting entities (through 'surrender' of emissions units) and competent authorities (through 'retirement' of emissions units) to demonstrate compliance with emissions reduction targets
- internal and external transfers – allowing account holders to transfer emissions units within the shipping registry or between the shipping registry and other registries (e.g. Clean Development Mechanism (CDM) and national registries)

- 'carry-over' of emissions units – in accordance with emissions trading rules
- reconciliation – with the United Nations Framework Convention on Climate Change (UNFCCC) International Transaction Log (ITL) on a periodic basis to ensure the shipping registry records were consistent.

3.2.2 Registry of a UNFCCC credit generating mechanism, e.g. the CDM Registry

A credit generating mechanism would enable a responsible entity to offset its own emissions by purchasing credits from emission reduction projects situated outside the shipping sector. The CDM is an example of such an offset mechanism, and its requirement to record the specific emission reduction project to which a Certified Emissions Reduction (CER) is linked on the CER certificate would enable the IMO to set eligibility criteria for such projects.

Purchase of CERs by the shipping sector would provide an additional and significant source of revenue for developers of projects in developing countries. In this way, the purchase of offset credits by the shipping sector is supportive of the UNFCCC principle of 'Common But Differentiated Responsibilities' (CBDR).

Other offset mechanisms include Emissions Reduction Units (ERUs) from Joint Implementation emissions reduction projects (JIs) and the Reducing Emissions from Deforestation and Forest Degradation Mechanism (REDD+), which aims to reduce emissions from deforestation and forest degradation and provide positive incentives to such reductions through the mobilisation of financial resources from developed countries.

The CDM registry holds accounts for, and manages the transactions of, CERs. Only projects within the CDM are allowed to hold accounts.

3.2.3 National registries

National registries hold accounts at a national level for industries outside the shipping sector. These already exist for those industries and countries that are currently regulated through an ETS.

3.2.4 International Transaction Log (ITL)

The ITL is administered by the UNFCCC and verifies transactions proposed by registries to ensure they are consistent with the regulations of the ETS. Also, in this proposal, the ITL performs the function of converting Assigned Amount Units (AAUs) or equivalent units defined by the UNFCCC to SEUs for allocation to the responsible entities. The shipping registry needs to be linked to the ITL in order to send transaction proposals for checks to be performed upon.



The ITL would also be used by the IMO to check compliance and performance against the shipping target.

3.2.5 Auctions

A central auction is generally the most cost-efficient approach for bidders, in that it provides simplicity and transparency to the auction process, and fair and equitable access to small- and medium-sized operators. Auction processes are described further in section 3.4.3. The auctions would be conducted by a regulated market authorised under the legislation governing financial markets.

The central auction could either be through an existing regulated carbon (or financial) market exchange or a newly established, regulated market exchange.

3.2.6 Secondary markets

The ETS would be an open system. Responsible entities would have free access to secondary markets and would not be confined to purchasing credits only in shipping auctions. Such secondary markets are already in place under existing carbon trading mechanisms, and include both exchanges and the facility for 'over the counter' transactions. The latter could be between individual shipping companies, or between a shipping company and a broker (perhaps a bunker supplier that has chosen

to operate in the market in order to offer an additional service to customers).

3.3 Entities

The key entities (companies and organisations) which would be necessary participants in an ETS for shipping are listed in figure 1.

3.3.1 IMO and UNFCCC

A shipping registry administrator would need to be appointed by the IMO within a legal framework developed by that organisation. The IMO and the UNFCCC would have to agree and specify the quantity of SEUs to be issued to the shipping sector, its emissions reduction trajectory and the extent to which offset credits may be used for compliance. The IMO would then have oversight of the whole process in order to monitor the compliance of responsible entities and the performance of the shipping sector against the emissions reduction targets. In this proposal, it is assumed that the IMO would be responsible for the administrative tasks related to these functions and associated resource requirements.

3.3.2 Responsible entities

The entity responsible for compliance with the ETS would be the DOC holder under the International Convention on the

Safety of Life at Sea (SOLAS), chapter IX/I. This legal person, which may be the ship operator, technical operator, ship manager or ship owner/demise charterer, would have the obligation to ensure that sufficient carbon emissions units/offset credits were surrendered to match the volume of bunkers purchased.

It is recognised that, in the case of a vessel being on a long-term time charter which commences prior to, and continues beyond, the entry into force of an ETS, the issue of financial responsibility for emissions units may not have been addressed in the time-charter agreement. This issue, for a finite but potentially lengthy transition period, could have significant financial impact for the ship owner and needs to be addressed further in the system design, possibly by the creation of an alternative legal mechanism to cover this eventuality.

Throughout this document, in discussion of the mechanisms of trading, the term 'responsible entity' is taken to apply equally to another party (e.g. the charterer) with contractually agreed responsibility on behalf of the DOC holder.

The responsible entity or a related party having a contractual agreement to this effect with the responsible entity would be engaged in two core processes:

1. purchase of fuel; and
2. purchase and surrender of SEUs.

This process would allow the operator choices as to how to run its business, for example what balance to adopt between investment in carbon dioxide (CO₂) reduction measures (i.e. technological or operational measures to increase efficiency) and the trading of SEUs and offset credits.

In cases where the ship charterer pays for fuel under a charter party agreement, the responsibility for purchasing and surrendering SEUs and offset credits could be addressed straightforwardly in this arrangement. For example, the charterer could have a direct link to the ship account in the registry to perform transactions directly on behalf of the responsible entity. The structure of the proposed market would allow for a number of variations on the exact mechanism used, in order to best suit the needs of individual commercial and contractual arrangements.

3.3.3 Flag and port states

Flag states would be responsible for monitoring compliance of a responsible entity with the agreement setting up the ETS and issue compliance certificates as appropriate. Port states, meanwhile, have an important verification role by carrying out on-board checks of compliance certificates.

3.3.4 Bunker fuel suppliers

In addition to providing fuel in the normal way, bunker suppliers would also be able to buy and sell on emissions units and offset credits, which could be bought by the responsible entity at the same time as fuel. In this way, they would have the opportunity to offer a complete service to ship operators who did not wish to access carbon markets directly.

3.4 Processes

This section describes the practicalities of trading.

The responsible entity would purchase SEUs from an auction or a secondary market. If it had fewer SEUs than required to match the bunkers consumed, it would be able to choose between reducing emissions via practical CO₂ reduction measures or purchasing more SEUs or offset credits to make up the difference. There would also be the option of selling any excess emissions units.

3.4.1 Issue of Shipping Emissions Units

This would rely on the UNFCCC establishing the SEU as a new emissions unit for shipping. One SEU would have to be surrendered for every tonne of CO₂ emitted by a vessel. SEUs would not be created as such, but would be generated by the conversion of an Assigned Amount Unit (AAU) or equivalent defined by the UNFCCC.

It would be possible to apply a cap to shipping emissions by limiting the total number of SEUs available through the auction process.

3.4.2 Purchase of fuel

Fuel would be purchased in the normal way. A Bunker Delivery Note (BDN) would be received – as now – with every purchase and would detail the type and amount of fuel purchased, allowing the associated CO₂ emissions to be calculated from a standard formula and accounted for. For example, one tonne of Heavy Fuel Oil (HFO) (ISO8217 grades RME – RMK) is equivalent to 3.114 tonnes of CO₂; one tonne of Liquefied Natural Gas (LNG) is equivalent to 2.9312 tonnes of CO₂.

3.4.3 Auction processes

SEUs would be distributed through an auction process; this process would be open to all (responsible entities and others) in order to provide liquidity and a more stable market. The timing of the auctions would need to be matched against the demand for emissions units and therefore a series of regular fixed auctions would be preferable. Regulated auctioning of emissions units already takes place within established ETSs.

3.4.4 Post-auction transactions

Following the auction, it would be possible for SEUs to be bought or sold in secondary markets together with further emissions units such as AAUs or equivalent, or approved offset credits, for example, if a responsible entity's emissions were higher than anticipated. Similarly, if there was an excess of SEUs at the end of the compliance period, for example because of the use of energy efficiency measures, then the surplus could be sold or carried over to the next compliance period.

There would be several ways of doing this:

- buying or selling from intermediaries (e.g. banks and specialist traders) or, if applicable, bunker suppliers
- using the services of a broker – transactions could be tied to using a broker for fuel purchases
- joining one of the several exchanges that list carbon allowance products
- buying from other emission trading systems' auctions.

Ship operators would have the opportunity to use existing market measures such as hedging or forward buying to mitigate carbon price variations, in the same way that many companies currently manage their bunker purchases. Fleet acquisitions and divestments would be easily catered for simply by buying or selling credits.

3.4.5 Surrender of SEUs

A responsible entity covered by the ETS for shipping would be legally required to surrender sufficient emissions units and offset credits, via its registry account, to cover its actual emissions within a fixed compliance period. In Phase 1 of this proposal, as set out in Chapter 4.1 and which does not involve an auction process, the length of the compliance period could be relatively short. In Phase 2, the fully established ETS, this period would take account of the frequency of auctions of SEUs. The responsible entity would surrender SEUs and offset credits from a registry account as and when necessary throughout the year, or would need to ensure that there were sufficient valid SEUs held in the registry account for the administrator to cancel on its behalf.

3.4.6 Monitoring and verification

The flag state would be responsible for monitoring compliance in respect of its registered ships (for example on an annual basis) and for issuing compliance certification.

States that were parties to the agreement establishing the ETS would also verify compliance at national level through the pre-existing port state control mechanisms. Port state officers would check a ship's Bunker Delivery Notes and compare them with the electronic carbon account balance also provided by the ship. The principle of verification would be met by the ship demonstrating that it had surrendered credits or SEUs equivalent to its bunker purchases within previous compliance periods. In the event of discrepancies demonstrating non-conformance, standard port state control penalties would apply. These could include a fine in addition to the surrender of additional SEUs.

In particular, flag and port states would also be able to check that reported emissions volumes matched the data on BDNs as recorded in the shipping registry.

3.4.7 Generation of revenue

Through auctioning SEUs, the ETS would have the potential to generate significant revenues in addition to the contribution

to carbon reduction projects, which arises directly from the purchase of offset credits. These revenues could then also be used for climate change mitigation and adaptation purposes, energy efficiency improvements or compensation to those affected by the introduction of a carbon cost. This has been the subject of considerable political debate, but so far there is no agreement on the need for or purpose of any such fund. These revenues might provide the mechanism to reconcile the disparity between the IMO's principle of 'No More Favourable Treatment'

and that of 'Common But Differentiated Responsibilities' which are applied by the UNFCCC.



3.5 Documentation

Documentation would be an important aspect of any ETS or other market-based measure for the shipping sector.

3.5.1 IMO ship number

The IMO ship identification number scheme became mandatory in 1996 and is aimed at enhancing maritime safety and pollution prevention, as well as facilitating the prevention of maritime fraud. The IMO ship number is made up from the three letters 'IMO' followed by the seven-digit number assigned by IHS Fairplay to all ships at the construction stage.



This unique seven-digit number is assigned to propelled, sea-going merchant ships of 100 GT and above upon keel-laying, with few exceptions.

The IMO number is shown on the ship's certificates and is never reassigned to another vessel.

In May, 2005, the IMO adopted a new regulation and amendments extending the scheme which entered into force in January, 2009. These now require every company and registered owner to be provided with an identification number which conforms to the IMO Unique Company and Registered Owner Identification Number Scheme. This number is already in use on various mandatory certificates held by the vessel.

3.5.2 Bunker Delivery Note

As mentioned in section 3.4.2, a Bunker Delivery Note (BDN) detailing the amount of fuel purchased would be provided by the bunker supplier with every fuel purchase, as required under the International Convention for the Prevention of Pollution From Ships (MARPOL) Annex VI.

3.5.3 Certificates of emissions units and credits

The scheme administrator, which would be the IMO in the case of the shipping sector, would issue certificates of emissions units. Specific emissions reduction projects are already identified in Certificates of Emissions Reduction.

3.5.4 Certificates of Compliance

Flag states (or, where delegated, their recognised organisations) would issue compliance certificates periodically in respect of their registered ships. The certificates would be issued to the responsible entity following a satisfactory audit/verification of bunker fuel purchased, as recorded on BDNs as against surrendered emissions units.

3.5.5 Contracts

Direct SEU transactions would require a contract between the buyer and the seller, normally with the signature of a 'master agreement'. If the counterparty were a market exchange, this would involve the company signing its general terms and conditions in order to set up electronic access to the exchange. Existing exchanges include the Europe Climate Exchange and the European Energy Exchange.

4 Implementation of an ETS

An essential element for the establishment of an Emissions Trading System is the creation of a legal framework for the core processes, including facilities for responsible entities to purchase and surrender offset credits and emissions units together with the introduction of a new source of emissions units (in this case SEUs).

The ETS could be initiated through a phase-in period (Phase 1). The advantages of this are described in section 4.1. This would use an approach based purely upon the surrender of offset credits to account for a gradually increasing proportion of shipping's CO₂ emissions.

Following this, Phase 2 would see the introduction to the market of SEUs via an auctioning process and the setting of a cap on the number of these units, which would be available to the industry. That cap would then be lowered gradually over time, in accordance with decisions made by the IMO regarding the emissions reduction trajectory, which would facilitate reductions in the shipping industry's net contribution to atmospheric CO₂ and drive technological advances to accelerate efficiency gains in the global fleet.

4.1 Phase 1: purchasing offset credits

The objective of Phase 1 would be to implement without delay an enabling approach, which would lead to an ETS for the shipping sector. Most of the proposals submitted to the IMO for establishing a market-based measure rely in some measure on offset credit purchasing. This is a simple and effective methodology, which could be easily and quickly implemented by the IMO to address the need for progress and would be able to deliver the desired environmental outcome while providing a sound basis for future development.

Phase 1 would involve establishing the common processes of an ETS as shown in figure 3. By introducing monitoring and reporting, Phase 1 would allow bunker purchases to be recorded and analysed, thereby providing data which were essential for the implementation of Phase 2. It would also provide a period during which the industry would be able to adjust to working with the common ETS mechanisms and accounting for CO₂ emissions, thereby easing the introduction of Phase 2 from a responsible entity's perspective. The intent

would be that any offset credit or emissions unit considered acceptable by the IMO member states could be utilised for compliance purposes. Phase 1 could, if desired, be entered into on a voluntary basis.

Assuming uptake by the whole industry, figure 2 shows an example of the increasing proportion of shipping's CO₂ emissions which would be offset over a nine-year Phase 1 with three increments of 5%, 10% and 15% offsetting.

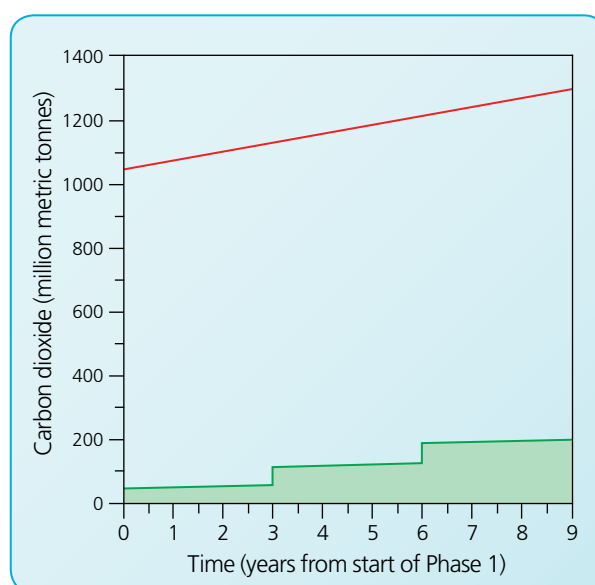


Figure 2: Stepped increases in offset CO₂ over a Phase 1 lasting 9 years.

The red line is indicative of shipping's total emissions, accounting for growth, while the green stepped line represents the uptake of offset credits: the first 3 years at 5% of the emissions estimates used in this manual, the next three at 10%, and the final three at 15%.

4.1.1 Key elements and benefits

Based on the ETS framework described in Chapter 3, the key elements and benefits of the offset credit purchasing phase are described below:

1. Phase 1 would require responsible entities to ensure that emissions units and offset credits are surrendered equivalent to a defined proportion of their CO₂ emissions during the compliance period; the percentages applicable in successive periods would be fixed by the parties to the controlling IMO convention.

2. The offset credits used would be purchased from the open market, rather than dedicated units auctioned to the shipping industry. The funds raised from their purchase would result directly in carbon reductions through existing or future UN mandated schemes (e.g. the Clean Development Mechanism (CDM) and Joint Implementation emissions reduction project (JI)). With this approach, no new central fund would be created until Phase 2, thus removing the concern of many parties over fund governance and administration. Issues of hypothecation and sovereignty of taxation would also be avoided during Phase 1.
3. This phase could be implemented relatively quickly and easily by the IMO, with a minimum of administrative overheads, and would not restrict the growth of world shipping.
4. As stated in section 2.3, actual reductions of CO₂ emissions from ships would be delivered through the price incentive inherent in this scheme alongside the ongoing IMO work on the various efficiency indices (EEDI, EEOI, and SEEMP). These would be complementary to the scheme and could be easily linked directly if desired. For example, a new ship attaining a specified index level might benefit from a reduced contribution rate.
5. In an ETS not involving free allowances, as proposed for Phase 2, there would be no need to establish a baseline, or conduct benchmarking of the existing fleet to introduce this phase. A particular benefit is that this proposal would establish an accurate record of vessel fuel consumption and emissions, thus delivering the monitoring and recording of global fuel consumption and CO₂ emissions as described in Chapter 3, which is necessary for the introduction of either a complete ETS or any planned strategy for emissions reductions.
6. This methodology would enable some flag states to mandate a higher surrender rate than the basic IMO requirement. It would also be possible for individual companies to surrender offset credits at a higher rate than mandated, should they wish to demonstrate a leading position in making emissions reductions.
7. By controlling how the balance between calculated CO₂ emissions and surrendered offsets changes over time, it would be possible to facilitate the phasing-in of the full ETS.
8. There is currently a significant over-supply of carbon offset credits in world markets, resulting in a low price; so the introduction of demand from shipping would stimulate renewed investment in CO₂ reduction technologies. There would be no need to introduce additional credits into the market, at least in the early operation of the scheme. It is envisaged that the first few years would be at a contribution rate of 5%. This would mean a shipping demand for less than 50 million credits per annum, which could easily be borne by the current market.
9. Other market mechanisms (discussed in section 3.4.4), which would help to reduce the risk associated with market volatility, would also be available during this phase.
10. As in Phase 2, bunker suppliers would be able to offer a complete service as described in section 3.3.4 to ship operators wishing to take advantage of this.

4.1.2 Costs

The costs to shipping in this initial introductory phase would be relatively easy to pass on to the customer of the goods that the ship was transporting in a similar way to any other cost associated with the running of the ship. Where there was a contractual obligation – as in the case of a time charter where the charterer determines the scheduling, speed, route etc of the ship and buys the fuel – the management of the carbon credit surrender could be written into the contract or charter party.

In broad terms, and using the proportions described in this manual, 5% of a ship's emissions per annum would be offset during the first three-year period. Current costs of carbon are around €15 per tonne. So, for a medium-sized ship burning 40 tonnes of fuel per day, therefore emitting approximately 120 tonnes of CO₂ per day for 250 days, this would amount to approximately €22,500 per annum in the first period, rising to €67,500 in the third.

The overall cost to the global industry would, during the first period, be that associated with 5% of the approximately 1,050 million tonnes of CO₂ emitted per annum; at €15 per tonne, this would be around €0.8 billion. Shared between 50,000 ships, it would average out at €16,000 per ship per year, with larger ships consuming more fuel paying more than small ships. At current bunker prices, this would equate to approximately 0.7% of fuel costs.

Costs in future periods would be determined by the ratio set by the IMO member states.

4.2 Phase 2: transition to cap-and-trade

During Phase 2, SEUs would be issued through auctioning to the level of the cap and responsible entities would surrender a mix of SEUs and offset units to meet their obligations. The transition from Phase 1 to Phase 2 is shown graphically in Figure 4 at the end of this section. There would be an

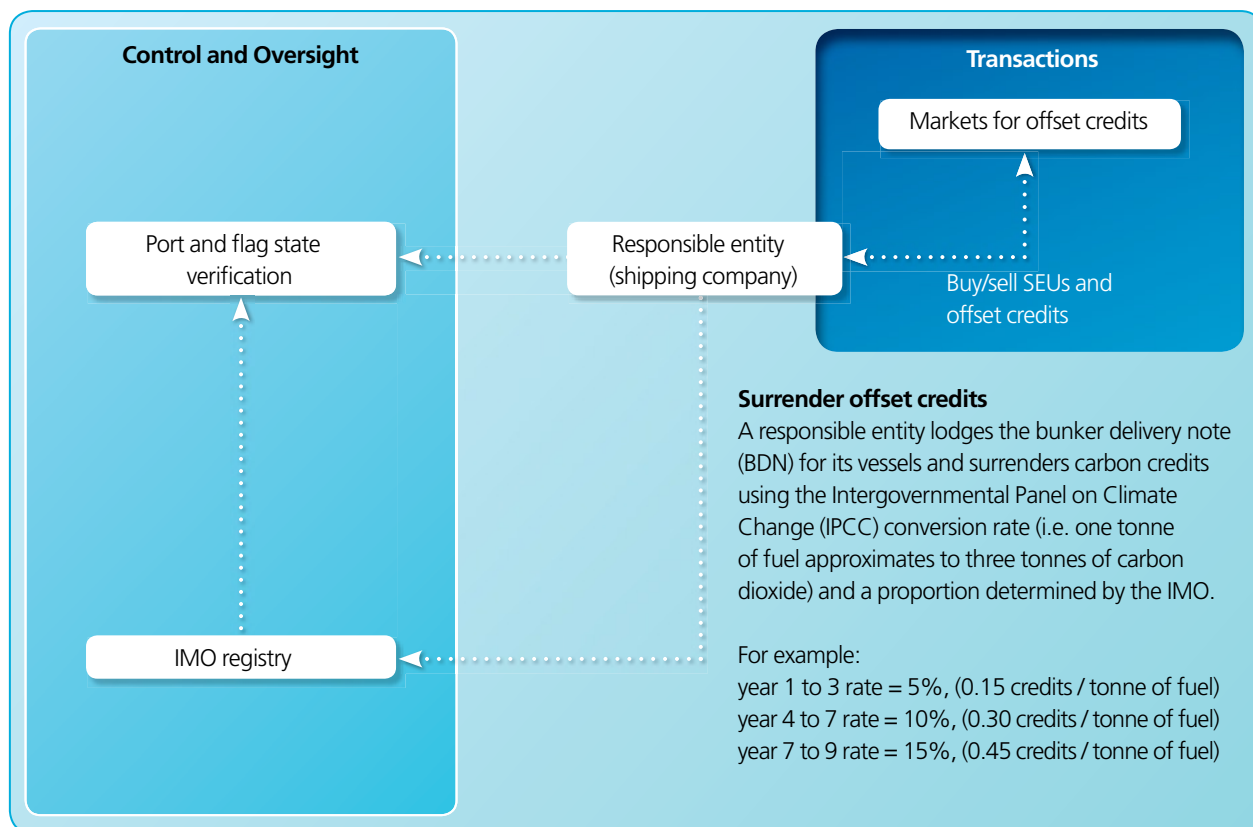


Figure 3: Basic framework of Phase 1 implementation.

To enable early implementation of a market-based instrument, the first phase of an ETS can simply be the purchase of offset credits in proportion to bunker purchases.

immediate transition from 15% offsetting during years 7-9 of Phase 1 to a situation in Phase 2 where 100% of the entity's CO₂ emissions would have to be accounted for.

The delivery in Phase 1 of detailed data on CO₂ emissions from international shipping would facilitate the decision-making process for Phase 2, including particularly decisions on the appropriate level at which to set the cap. During Phase 2, SEUs would be auctioned up to the level of the cap and responsible entities would surrender units for 100% of their emissions. These units would be a mix of SEUs and eligible offset credits, thus ensuring that there would be no restriction on the growth of international sea-borne trade. Although an immediate transition to 100% is shown here, it would be possible to construct a progressive implementation of the cap-and-trade phase.

To enable transition from Phase 1 to a full ETS, the remaining processes and structures would have to be established. These would include, primarily the setting-up of the auctioning process, the use and distribution of revenues generated through the auction process, the introduction of a cap and the introduction of SEUs to the market place. The benefits of Phase 1 as described in points 4 and 9 of section 4.1.1 would continue through the transition phase to become also benefits of a cap-and-trade ETS. With the introduction of SEUs would

come flexibility for individual responsible entities to determine the means by which they should meet the requirements of the ETS. At the same time, the industry as a whole would be surrendering auctioned SEUs, as well as offset credits as necessary to account for its CO₂ emissions above the level of the cap.

The fully established structure of the ETS would be as shown in figure 1 and its framework could be built as described in Chapter 2. Figure 4 shows the implementation of the ETS in terms of CO₂ emissions, from the beginning of Phase 1 through until a number of years into the full cap and-trade system. During Phase 1, the offset credits purchased and surrendered would indicate the industry's level of emissions reduction. The 'point of transition' to a full ETS would be that moment in time at which the cap would be set on the availability of SEUs, and 100% of CO₂ emissions would have to be accounted for. The cap would be introduced with a defined emissions reduction trajectory.

It is suggested that the duration of Phase 1 should allow adequate time for the industry to prepare for a full cap-and-trade ETS and therefore that the point of transition should take place immediately following Phase 1 (i.e. after year 9). The first auction of SEUs would amount to the level of the cap, i.e. the remaining 85% of emissions after the level of

offsetting implemented during Phase 1. Shipping would thus move from a percentage offset system (15% in this proposal) to a full cap-and-trade ETS in a single step. An appropriate reduction trajectory for the cap might be 95% year-on-year after its introduction (i.e. in year 10, 95% of 85% of industry emissions; and thereafter 95% of the preceding year). This would mean that shipping's net contribution to global CO₂ would be driven down by 5% per year after the point of transition. This 95% trajectory is the assumption used in figure 4.

If a progressive implementation of Phase 2 was desired, the auctioning of SEUs would commence at the end of Phase 1, as described in section 3.2.5, and would increase proportionately to the percentage of emissions to be accounted for, in accordance with a timetable agreed by the IMO member states, until 100% of emissions were covered by the combination of offset credits and SEUs.

The choice and flexibility of compliance options, through the surrender of different types of emissions units and offset credits would allow responsible entities themselves to make the most cost-effective decisions and investment for their businesses, while enabling the global shipping industry to meet the desired contribution toward reducing atmospheric CO₂. The incentive for further reductions would lie in the emissions reduction trajectory and the carbon market, and they would be achieved by implementing operational and technical measures.

Figure 4 shows how this proposal for a cap-and-trade ETS would work, by comparing projected emissions with the required offsetting and use of SEUs to meet expected international requirements on the basis of the assumptions set out in this manual. In the industry emissions (with no abatement) curve, a 2.5% growth per annum in the emissions of the shipping sector is assumed.

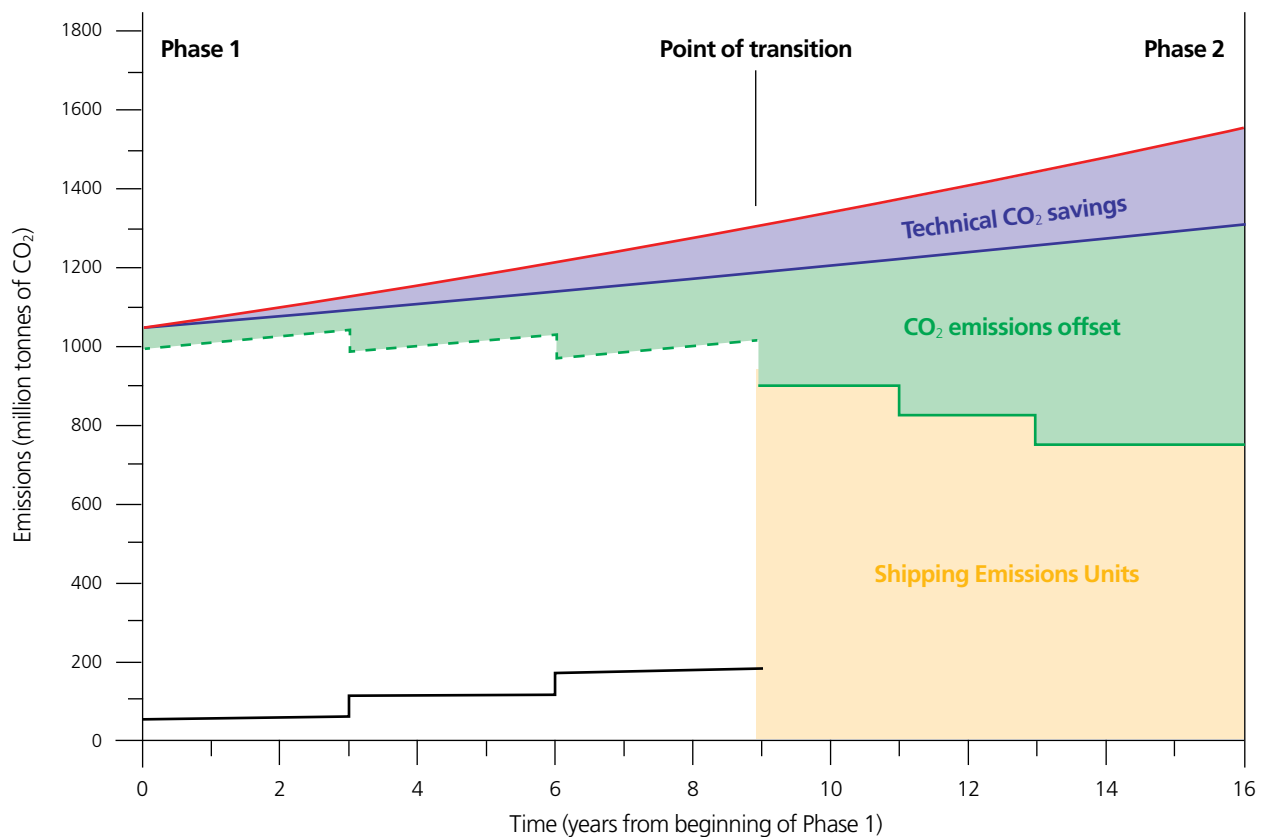


Figure 4: A quantitative indication of the effect of the proposed cap-and-trade ETS on shipping's CO₂ emissions.

The red curve shows shipping's projected emissions without any abatement, assuming 2.5% growth and the blue curve the reduced level because of the EEDI, operational and technical measures; the blue shaded area is therefore the quantity of CO₂ not emitted as a result of technical measures. The black stepped line depicts shipping's uptake of offset credits during Phase 1 and is mirrored by the dashed green line showing net emissions resulting from this. After the introduction of Phase 2, the solid green line corresponds to the cap on SEUs reducing year-on-year. The cream shaded area is the volume of CO₂ accounted for by SEUs while the green shaded area is that which is offset by the purchase of credits.

5 Frequently asked questions

A levy system is much simpler than an ETS, isn't it? Doesn't ETS just introduce unnecessary and avoidable complexity?

While the structural depiction of an ETS may appear more complex than that of a levy, it is not significantly more complicated to engage with. Ship operators and managers (or their representatives) would purchase credits and SEUs by one or a selection of means according to their choice – just like buying any other commodity such as bunker fuel itself. It is anticipated that ship operators or managers who charter ships under arrangements in which the charterer pays fuel costs would use the same contractual mechanisms in new charters, to place responsibility for settling the carbon account on the charterer.

Accepting the principle that it is appropriate for these voyage costs to remain with the charterer in such cases, work is continuing on how to achieve this for ships on existing long-term time charters. One possibility is a separate regulation to place responsibility for the emissions of these vessels directly upon fuel purchasers.

Similarly, the documentation and verification systems fit within the IMO's port and flag state control regimes. From a regulatory point of view, the parts of the system which need oversight and collection of funds are more centralised than under a bunker levy arrangement, where there would be diverse and geographically dispersed bunker suppliers.

Would the market not be susceptible to speculation and distortion by non-shipping influences in the system?

Minimising the potential for market distortion, especially that motivated purely by profit, is essential. Parties other than responsible entities provide liquidity, which further mitigates the possibility of any party gaining a disproportionate market share and establishes a market price for carbon through the linking of shipping to other schemes and credits. There is currently a surplus of credits in the global carbon markets, so the shipping market would not be vulnerable to excessive external demand.

In addition, while financial services authorities do not currently regulate physically-settled commodity markets (such as trading in Certified Emissions Reductions (CERs)), although they do regulate derivative products linked to these markets, such regulation is currently under consideration by the European Commission among others.

Would the auction be intended to set the price for carbon or to define the distribution of available credits?

Both. The auction process would set the price of shipping's carbon emissions. By the integration of the shipping market with other global carbon markets, this should be close to the market-driven global price.

It would also define the initial distribution of SEUs throughout the industry. Credits purchased would, however, be tradable during the year, so the auction would not directly indicate the level of emissions of any of its bidders; merely their initial purchase choice. In addition, ship operators would not need to go to auction since they would be able to buy from another participant directly or from an exchange or broker, in some cases perhaps a bunker supplier.

The auction would allocate (clear) SEUs at a given price. For example, if a sealed bid auction were used, participants would submit a bid for a specified number of SEUs at a given price. The auction would then clear a set number of SEUs (say 100) to the top bidders. All these top bidders would pay the price submitted for the 100th unit. One alternative to the sealed bid process would be for the auction to be held in a step-by-step approach, with SEUs being sold at incrementally decreasing prices in successive time periods.

Would bunker suppliers be obliged to provide an interface to the ETS by supplying credits or emissions units?

No, while many might choose to do so, it is not the intent of this paper that they should be required to.

Would it not be more efficient to report carbon dioxide (CO₂) emissions directly, rather than relying on a conversion factor applied to fuel consumption?

While this would offer a slightly simpler regulatory system, it would rely on accurate reporting of emissions, either as a result of technological measurement or by an auditable process of calculations, thus increasing the complexity of the verification process, and therefore the costs, for responsible entities. The IMO would also be required to produce standards and testing procedures to cover equipment for monitoring CO₂ emissions.

How would one account for CO₂ emission reduction technologies which might be fitted on board ships in future?

The process for this should be straightforward. Such technological solutions to CO₂ emissions would, in any case, need to be certificated as complying with internationally agreed standards set by the IMO. To enable them to be taken into account in the settling of a ship's carbon account, this certification would need to be filed with the registry and to contain data as to the effectiveness of the system in reducing CO₂ output per volume of fuel burnt at the end of the compliance period. A reduction factor dictated by this would then be applied to the ship's emissions as calculated from its total reported fuel consumption and the appropriate fuel-type conversion factors. The correct functioning and operation of the equipment would be verified through flag-and port-state control.

How soon could Phase 1 be established?

It is hoped that adoption of Phase 1 would follow swiftly from the acceptance at the International Maritime Organization (IMO) of the principle of a market-based instrument. It could then enter into force soon after this, subject to allowing sufficient time for industry to prepare for the system. This could be achieved very swiftly, as most of its necessary components are already in existence, and could be adopted on a voluntary basis of companies so wished.

Once embarked upon, would Phase 1 commit the industry to an ETS?

Not necessarily. While the Chamber perceives significant benefits in a full cap-and-trade ETS to follow Phase 1, the proposal laid out for Phase 1 would not commit the IMO to that solution.



6 Glossary

Assigned Amount Unit (AAU): a tradable unit of one tonne of CO₂ forming part of a country's 'Assigned Amount', which is the quantity of greenhouse gases that an Annex I (developed) country can release in accordance with the Kyoto Protocol, during the first commitment period of that protocol (2008-12).

Anthropogenic: caused by human activities.

Bunkers: fuel used on-board ship.

Bunker Delivery Note (BDN): a document received with bunkers when purchased, which details the name and International Maritime Organization (IMO) number of the receiving ship, the port at which the fuel was taken on, the date of delivery and fuel quality data. BDNs are required by regulation and must be kept on board and be available for inspection at any time. They are retained for a period of three years after the fuel oil has been delivered.

Cap: an upper limit on emissions imposed by an international organisation as part of a system to encourage or impose emissions reductions. In the case of the system proposed in this manual, the limit would be set by the IMO on the availability of Shipping Emissions Units (SEUs) through the auction process and would be linked to a clearly defined reduction trajectory.

Cap-and-trade: the process of an Emissions Trading System (ETS) operating under the constraint of a 'cap' imposed on the availability of emissions units.

Certified Emissions Reduction (CER): a Kyoto Protocol unit equal to one metric tonne of CO₂ equivalent. CERs are issued for emission reductions from Clean Development Mechanism (CDM) project activities. Two special types of CER called temporary certified emission reduction (tCERs) and longterm certified emission reductions (lCERs) are issued for emission removals from afforestation and reforestation CDM projects.

Compliance period: the period over which the required proportion of a responsible entity's CO₂ emissions are to be balanced by its surrender of emissions units and offset credits, and at the culmination of which this is verified.

Conference of Parties (COP): a meeting of the parties to the United Nations Framework Convention on Climate Change.

Distributed Approach: an approach to the ETS whereby emissions units are not auctioned from a central fund, but through a number of existing (e.g. national) registries to which they are provided in quantities determined by the IMO.

Document of Compliance (DOC): a document issued to every company which complies with the requirements of the International Safety Management Code. It is issued by a flag administration (or an organisation recognised by an administration) and a copy is kept on board the ship so that the Master can produce it upon request for verification.

Emissions trading: the purchase and sale of emissions units and offset credits in respect of carbon emissions. Trading allows transfers of AAUs across international borders or emissions units between companies covered by a cap-and-trade scheme. It is a general term often used for the Kyoto mechanisms: JI, CDM and emissions trading.

Flag states: countries that have ships registered in their territory and which, therefore, have legal oversight of those ships.





International Maritime Organization (IMO): the UN's specialist maritime agency.

IMO Company Identification Number Scheme: this scheme entered into force on the 1st of January, 2009 following its introduction in 2004 through the adoption of resolution MSC.160(78). The number is unique to the company and/or registered owner. Only one number is issued to the company, whether it undertakes one or both roles. The scheme applies to ships of 100 GT or above engaged on international voyages. The number stays the same when a company changes its name.

IMO Ship Identification Number Scheme: introduced in 1987 and made mandatory in 1996, this assigns a permanent number to each ship for identification purposes. This number remains unchanged upon transfer of the ship to other flags and is inserted on a ship's certificates. The IMO number is never reassigned to another vessel.

International Transaction Log (ITL): a central database of all tradable credits under the Kyoto Protocol. It is the application that verifies all international transactions and their compliance with Kyoto rules and policies.

Kyoto Protocol: adopted at the Third Conference of the Parties to the United Nations Convention on Climate Change held in Kyoto, Japan, in December 1997, the Protocol commits industrialised-country signatories to reduce their greenhouse gas (or 'carbon') emissions by an average of 5.2% compared with 1990 emissions in the period 2008-2012.

International Convention for the Prevention of Pollution From Ships (MARPOL): the IMO's international convention governing maritime pollution.

Master agreement: a contract reached between parties, in which the parties agree to most of the terms that will govern future transactions or future agreements. A master agreement permits the parties to negotiate future transactions or agreements quickly, because they can rely on the terms of the master agreement, so that the same terms need not be repetitively negotiated – and also to negotiate only the deal-specific terms.

Port state: a state at whose port a ship calls, rendering that ship subject to port state control (see below).

Port state control: the inspection of visiting foreign ships in a country's ports, for the purpose of verifying that the competency of the master and officers onboard and the condition of a ship and its equipment comply with the requirements of international conventions (e.g. SOLAS and MARPOL); and that the ship is manned and operated in compliance with applicable international law.

Responsible entity: the commercial entity with regulatory responsibility for accounting for a ship's carbon dioxide (CO₂) emissions. This would be the DOC holder. It should be noted, however, that participation in the ETS and the settling of a ship's account at the end of the compliance, or other commercially dictated period, could be contractually re-assigned to a third party. An example of this would be in cases where the charterer of a ship – who would already be contracted to cover the cost of bunkers as a voyage cost – would also be required to pay for equivalent credits and/or SEUs.

Shipping Emissions Unit (SEU): an Assigned Amount Unit (AAU) converted for use solely in a ship emissions trading scheme.

Sectoral approach: an approach to the ETS whereby emissions units are auctioned centrally to the international shipping industry; this would be distinct from the general auction and trading processes that will cover all other industry sectors.

SOLAS: the IMO's international convention governing safety of life at sea.

United Nations Framework Convention on Climate Change (UNFCCC): the international legal framework adopted in June 1992 at the Rio Earth Summit to address climate change. It commits the parties to the UNFCCC to stabilise human-induced greenhouse gas emissions at levels that would prevent dangerous man-made interference with the climate system.

7 List of acronyms

AAU	Assigned Amount Unit
BAU	Business As Usual
BDN	Bunker Delivery Note
CER	Certified Emissions Reduction
CBDR	Common But Differentiated Responsibilities
CDM	Clean Development Mechanism
CO₂	Carbon dioxide
COP	Conference of Parties
DOC	Document of Compliance
ERU	Emissions Reduction Unit
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Indicator
ETS	Emissions Trading System
HFO	Heavy Fuel Oil
GHG	Greenhouse gas
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ITL	International Transaction Log
JI	Joint Implementation emissions reduction project
LNG	Liquefied Natural Gas
MARPOL	International Convention for the Prevention of Pollution From Ships
MBM	Market-based measure
MEPC	Marine Environment Protection Committee
REDD+	Reducing Emissions from Deforestation and Forest Degradation Mechanism
SEEMP	Ship Energy Efficiency Management Plan
SEU	Shipping Emissions Unit
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change







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