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BACKGROUND PAPER

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International Shipping in a post-2012 climate deal

Summary

- International shipping emissions are a substantial and fast-growing source of carbon emissions. Maritime emissions now exceed those of all but a handful of countries and have roughly doubled since 1990.

- In seeking to incorporate shipping emissions in the global climate framework, there is a need to respect both the UNFCCC principle of Common But Differentiated Responsibili ties and the IMO principle of No More Favourable Treatment.

- A scheme to limit emissions could differentiate between Annex I and non Annex I parties in two ways:
  - At the point of application – which would require a definition of 'Annex I emissions'; and / or
  - In the distribution of revenues.

- Allocation either by flag or by nationality of ownership is inequitable and also impractical, as it would lead to large-scale evasion and therefore carbon leakage.

- Allocation according to route is feasible, although a degree of evasion is possible, depending on the stringency of the scheme. Of course limiting any scheme to emissions on routes to Annex I ports could reduce the environmental benefit of such a scheme.

- It is possible to design an otherwise uniform policy with a threshold which exempts those Parties most exposed to negative impacts. So for example, applying a scheme only to ships over 3,000 Gross Tonnes would exempt all trade to the Cook Islands

- A uniform policy covering all ships could raise between $ 10 billion and $ 45 billion annually. This revenue should be channelled towards a mixture of adaptation, technology transfer, REDD, and CDM / JI projects, so that all non Annex I parties benefit from the scheme, by between 2 and 15 times their costs.

- A uniform policy is likely to slow growth in exports by a maximum of 1-2% (under a scenario where all emissions are paid for) and will have only a small impact on tourism if other modes of transport are also addressed.

- A uniform policy is unlikely to raise the cost of food imports by much more than 0.5%, even for those islands most dependent on food imports. A policy focused on Annex I imports would not have this effect.

- Any policy is likely to have a positive impact on demand for shipyard services: a major sector of the Korean economy and a fast-growing sector of the Chinese economy.

Background

Emissions from international shipping are a significant and fast-growing source of carbon dioxide. Maritime emissions now exceed those of all but a handful of countries (Table 1) and have roughly doubled since 1990 (Figure 1).

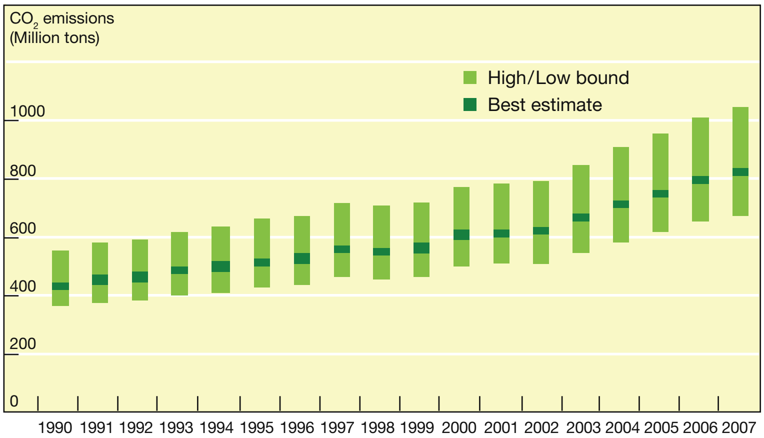
TABLE 1

Entity	*CO_2 emissions from fossil fuels (Mt CO_2, 2004)*
United States of America	6,046
China (Mainland)	5,007
Russian Federation	1,524
India	1,342
Japan	1,257
Maritime transport (2007)	847
Germany	808
Canada	639
United Kingdom	587

Source: Countries: CDIAC, 2008[1]; Maritime Transport: MARINTEK et al, 2008[2]

FIGURE 1

Best estimate CO_2 emission 1990-2007
International shipping



Source: MARINTEK et al, 2008

These emissions were excluded from Annex I targets under the Kyoto Protocol (along with emissions from international aviation), due to the difficulty of allocating international emissions to individual countries. However, Article 2.2 of the Protocol states that

"The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhoUSe gases not controlled by the Montreal Protocol from […] marine bunker fuels, working through […] the International Maritime Organization."

Little progress has been made to date in limiting emissions (see Table 2), but since COP13 in Bali there has been renewed interest in incorporating the international maritime sector into a strengthened post-2012 global climate agreement. The rest of this paper examines ways in which this could be achieved, and possible impacts of such policies on developing countries.

Allocation to states or a global sectoral approach?

Part of the difficulty with shipping emissions is the apparently conflicting principles of the IMO and the UNFCCC. IMO treats all ships equally ('No More Favourable Treatment'), and generally develops global policies to reflect the global nature of the sector. UNFCCC operates on the principle of Common But Differentiated Responsibilities (CBDR), whereby developed countries take a lead in recognition of their greater historical responsibility and capacity to act.

These two principles will have to be reconciled creatively if progress is to be made. There are two ways of doing so:

Climate policy for maritime transport can start by differentiating commitments for Annex I and non Annex I countries. In doing so, responsibilities have to be differentiated according to the route of vessels. National policies implemented to limit allocated emissions should not discriminate on the ground of nationality of the ship or its owner.

Alternatively, climate policy for maritime transport can start by having uniform policies for all ships. In that case, in order to satisfy the principle of common but differentiated responsibilities, the net impacts of the policy on non Annex I countries should be less than the net impact on Annex I countries. One way to do so is to implement a revenue-raising uniform policy and differentiate between countries in the USe of the revenue.

1 Allocation – differentiated commitments

By flag

Allocation of international shipping emissions to Parties on the basis of flag is widely recognised to be impractical and inequitable. 77% of emissions are from ships registered to non Annex I Parties, and the ease with which ships can change flag would lead to large scale evasion.

By ship owner

In contrast to fleet registration, fleet ownership is concentrated in Annex I countries. Table 2 shows that six of the ten largest ship-owning countries are Annex I countries.

TABLE 2

Country	*Total controlled fleet (1,000 dwt)*
Greece	170,181
Japan	147,507
Germany	85,043
China	70,390
Norway	48,697
United States	48,261
Hong Kong (China)	45,053
Republic of Korea	32,287
United Kingdom	26,757
Singapore	25,723

Source: UNCTAD RMT, 2007

However, it may not always be possible to specify the nationality of a ship's owner. UNCTAD (2007)[3] specifies that 'determining (the country of domicile of the owner) has required making certain judgements'. Furthermore, allocation to countries of ownership could be evaded by relocating the domicile country. It is known from other sectors that the location of company head offices are flexible and are often in countries with favourable tax regimes. Many ships are owned by investment vehicles such as Limited Partnerships (UK), Kommanditgesellschafte (Germany) or Commanditaire Vennootschappen (Netherlands). Currently, many are located in Annex I countries, probably because their investors are located in these countries, but if it became financially attractive to move to other countries, they could do so easily. On these grounds, we do not consider allocation to the country of the owner of the vessel a viable option.

By route

Route-based allocation could result in a climate policy covering only emissions from ships on routes to Annex I ports.

Port calls of ships are registered in logs and can be verified if needed with port authorities. In most cases, ships also register fuel use in their logs. In any case, they can be required to do so. So it is possible to calculate for example emissions on the last route of a ship to a port in an Annex I country on the basis of a ship's log. The only exception to this rule would be when ships transfer their cargo to other ships at sea. In the liquid bulk trade, ship-to-ship (STS) transfer is common, where often a large tanker offloads its cargo to several smaller tankers at sea, which in turn transport the cargo to the port.

However, it would be possible to evade paying an emissions charge for the full route. One could offload cargo in non Annex I countries and transport it by another mode of transport to an Annex I country. Alternatively, a ship could make an extra port call in a non Annex I country closest to its port of destination.

An extra port call would be costly, as a ship would have to reduce speed, sail into the port, turn around and accelerate to its cruise speed again. Furthermore, in many cases a port call would imply a detour. Even if no cargo was unloaded or loaded, and the port call only took a couple of hours, the total delay would be still be at least six to eight hours. Nonetheless, example calculations show that the incentive for evasion could be sufficient to overcome these costs, although these calculations are based on ships paying for ALL emissions. Under a scheme where ships paid only for a proportion of emissions, the incentive would be proportionally lower.

A large (4,000 TEU) containership sailing from Shanghai to Antwerp sails approximately 10,500 nautical miles at 23 knots. This ship has an average fuel consumption of 200 tonnes per day, so it emits about 12,000 tonnes of CO_2 on the trip. At carbon prices of US$ 10, 30 and 50 per tonne of CO_2 these emissions would cost US$ 120,000, US$ 360,000 and US$ 600,000, respectively. Operating such a ship may cost between US $ 150,000 and 300,000 per day. So adding an extra stop just outside an Annex I country and reducing emissions by 80% would be feasible at carbon prices of US$ 30 per tonne of CO_2 if the port call takes about one day (neglecting port dues).

A large (300 dwt) tanker sailing from the Persian Gulf to Rotterdam sails approximately 6000 nautical miles at 16 knots. With an average fuel consumption of 95 tonnes per day it emits about 4,800 tonnes of CO_2 on the trip. At carbon prices of US$ 10, 30 and 50 per tonne of CO_2 these emissions would cost US$ 48,000, US$ 144,000 and US$ 240,000, respectively. Operating such a ship may cost between US$ 100,000 and 150,000 per day. So adding half a day to the trip in order to halve emissions could be worthwhile at carbon prices of US$ 30 per tonne of CO_2.

By exemption

A scheme that is otherwise global in application could be designed to exclude the most vulnerable or least developed parties by use of a threshold. The most promising variable for such a *de minimis* threshold is ship size, ie the scheme would apply only to ships over a certain number of Gross Tonnes (GT). The topic needs further investigation, but preliminary research indicates that smaller ships tend to be used for trade between less developed countries, and some remote island states are serviced by only quite small ships:

- all ships sailing to the Cook Islands are smaller than 2,400 GT
- Bangladesh imports and exports most goods with ships below 7,000 GT

So as an example, a threshold of 3,000 GT would exclude the Cook Islands and much trade to other Small Island Developing States, at the price of around 5% of global shipping emissions. A higher threshold would exempt trade between an increasing number of developing countries.

A further possible benefit of a size threshold could be the exemption of European short-sea shipping, ruling out concerns that freight currently shipped around Europe could transfer to a more carbon-intensive mode of transport such as road.

2 Uniform policies

Recently a number of related proposals have been made at both IMO and UNFCCC that would cover emissions from all ships (above a given size) regardless of nationality or route. It should be noted that the obligation is on the owner of the ship, not the Party itself. These proposals seek to respect the principle of CBDR by raising revenue (through a levy, or auctioning of emissions permits, or purchase of CDM credits) that is then redistributed so that there is a net benefit to non Annex I parties.

This section examines the potential size of such revenues and how they might be distributed in order to benefit all different groupings of non Annex I parties. It then discusses some of the objections that have been raised by developing country parties regarding trade, food imports and others.

Use of Revenues

One proposal that gives a detailed account of how revenues could be spent is the International Maritime Emissions Reduction Scheme or IMERS (Stochniol, 2008)[4].

The total revenue collected by IMERS depends on its parameters, especially the target, carbon price and emissions pathways. In an example given by Stochniol (2008), for a levy of US$ 27 per tonne of fuel, the receipts would be approximately US$ 10 billion per annum. (In other proposals, where all permits are auctioned, this figure is in the order of US$ 30-45 billion per annum.) Revenues would be divided as in table 3:

TABLE 3

Total revenue	**42%**	**Adaptation**	32%	LDCs
			8%	SIDs
			60%	Other developing countries and EITs
	42%	**Mitigation**	50%	REDD
			50%	JI/CDM
	16%	**Technology**	50%	Short-term technology transfer
			50%	Long-term R&D

Source: Stochniol, 2008

Stochniol (2008) also presents the costs and benefits of IMERS for different country groups, assuming that the costs of IMERS are the additional costs of imports (see Table 5). Developed countries would pay the lion's share of total revenue but receive only little from the funds. In contrast, all other country groups receive more than their costs. For these country groups, the components for which they receive funds differs. The LDCs and SIDS would benefit most from the scheme due to the significant adaptation financing. In contrast, the BRIC countries will benefit mostly from the CDM / JI investments and REDD funding.

TABLE 5

Country group	*Share of revenue payment*	*Share of revenue receipts*
Developed Countries	59%	5%
Economies in Transition (without Russia)	2%	3%
BRIC	16%	30%
Least Developed Countries	1%	15%
Small Island Developing States	1%	4%
Other Developing Countries	22%	44%

Source: Stochniol, 2008

Impacts on developing countries

Exports

Some countries have expressed concern about the impact on their exports of applying market-based instruments to shipping CO_2 emissions (or fuel use), as this would raise the fuel costs of transport, leading to higher prices and reduced demand.

Fuel costs typically constitute between 30 and 60% of the overall transport costs (RA and CE, 2008)[5]. At a fuel price of around US$ 700 per tonne (the level of July 2008), a carbon price of US$ 30 per tonne of CO_2 would add 13% to fuel costs and 4-8% on total transport costs. At a fuel price of around US$ 450 per tonne (the price level of January 2008)[6], the same carbon price would add 6-12% to total transport costs.

Transport costs in turn make up only a small fraction of the total costs. UNCTAD (2007)[7] estimates total freight costs (for all modes of transport) to be 5.9% of the value of imports; the share is lower in developed countries (4.8 %) and higher in developing countries (7.7%, ranging from 4.4% in America to 10% in Africa).

Based on the estimates above, an increase in transport costs between 4 and 8% and a share of transport costs in value of 4 to 10%, it can be estimated **that the increase in costs of import is less than 1% on average.**

There is only scarce information on price elasticity of maritime transport. Oum et al. (1990)[8] present elasticities ranging from 0 to -1.1, with the low values (-0.06 to -0.25) typically for dry bulk for which there are hardly any alternative modes of transport, and the higher values (0 to -1.1) for general cargo. Meyrick and Associates et al. (2007)[9] estimate the elasticity of non-bulk maritime transport to and from Australia at -0.23. Assuming an elasticity of -0.25, the 4-8% rise in transport costs could result in a reduction in maritime transport of 1-2% relative to a baseline which is forecasted to grow at over 3% per year (MARINTEK et al., 2008)[10].

For two reasons, these figures represent the *maximum* likely reduction in trade:

- The reduction in exports is likely to be lower than this reduction in transport, as a share of the transport reduction will result from logistics improvements and other measures to reduce emissions, such as slow steaming.
- Calculations presented assume a charge is applied to ALL emissions from ships. Under schemes such as IMERS, ships would only pay for a proportion of emissions, depending on the target. The target, and therefore the cost of the scheme, is negotiable.

Food import costs

Islands with the highest food imports relative to their GDP have been identified, as these are likely to be the Parties most affected by a rise in the cost of shipping. Emissions associated with food imports have been estimated bottom-up using figures from the UN Food and Agriculture Organisation. The increase in the costs of food imports arising from a range of carbon prices being imposed on all shipping emissions is presented in Table 6. At a carbon price of US$ 30 per tonne of CO_2, food price increases are little more than half of one percent.

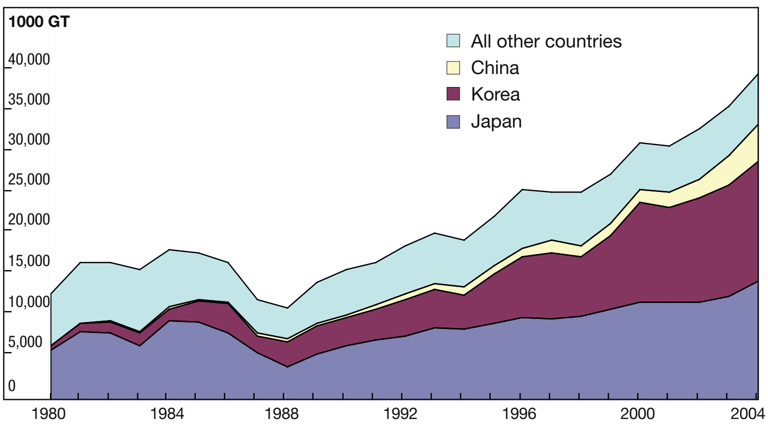
TABLE 6

Country	*Increase in costs of food imports (% of food import values)*		
	US$ 10/tonne of CO_2	*US$ 30/tonne of CO_2*	*US$ 50/tonne of CO_2*
Sao Tome and Principe	0.12-0.21%	0.37-0.62%	0.62-1.03%
Cape Verde	0.06-0.10%	0.18-0.30%	0.30-0.50%
Tonga	0.11-0.18%	0.33-0.55%	0.55-0.91%
Dominica	0.04-0.06%	0.11-0.18%	0.18-0.30%
Samoa	0.11-0.18%	0.32-0.53%	0.53-0.88%
Saint Lucia	0.01-0.02%	0.03-0.06%	0.06-0.09%

Source: FAO.from Ships, phase 1 report

FIGURE 2

Ship deliveries



Source: Lloyds register

Tourism

For some states, a significant share of GDP is earned in the tourism sector, and many tourists arrive by ship. Including maritime transport in a global climate policy regime could increase the costs of cruise travel and if this cost increase were to be passed through in prices, it could lower demand.

This would not be primarily due to the own price elasticity of demand, as most studies find tourism demand to be price inelastic (price elasticities of -0.4 to -0.8, although there are notable exceptions)[11]. More important is the choice tourists face: cross-elasticities in tourism demand seem to be high (Maloney and Montes Rojas, 2005)[12], implying that demand shifts easily from one destination to another. Cross-elasticities between modes of transport are not reported, but if these are as high as between destinations, one would expect a shift in demand to other modes of transport. However, these other modes also have emissions, and if these are also included in climate policy, relative prices of cruises are not expected to change much.

The relative price of cruise holidays would only rise if maritime transport is included in climate policy, but aviation and car travel are not.

Shipbuilding

Including maritime transport in a climate policy is likely to result in a demand for ships with lower CO_2 emissions, either by modifying existing ships or replacing them with new ships. As a consequence, including shipping is likely to have a positive effect on demand for shipyard services. As Figure 2 shows, most of the major shipyards are in Asia, and a significant number of them are in two non Annex I countries.

This effect would be most marked for a policy covering all emissions globally, but would also apply to a scheme covering routes to Annex I parties.

NOTE: this briefing has been prepared using research carried out for WWF-UK by CE Delft. The original paper, *Left on the High Seas: Global Climate Policies for International Transport*, is available at www.ce.nl

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