



ISSUES IN BRIEF

Conspicuously Absent: Shipping Emissions in Climate Change Policy



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Human activities are contributing to climate change. Fossil fuel combustion in particular contributes to increased levels of carbon dioxide (CO₂) and other greenhouse gases (GHGs) in the atmosphere. With increased GHG levels come rising average land and ocean temperatures, rising sea levels, loss of biodiversity, and increasing severity and frequency of storms, floods, and droughts (US EPA 2014).

The international climate change regime focuses mainly on the reduction of GHG emissions to stymie the above-mentioned effects. This effort is facilitated through the United Nations Framework Convention on Climate Change (UNFCCC), a convention that relies on state actors to meet state GHG emissions reduction targets through state-determined means. This framework maintains maximum sovereignty by granting flexibility to state emissions mitigation approaches by allowing a state to let its individual situation determine what areas are most feasible to mitigate. As a part of that maintenance of sovereignty, individual sectors are generally not mentioned in UNFCCC agreements. There are two exceptions to this sectoral exclusion, however: aviation and maritime shipping.

There is nothing more important to the global economy than international trade, and maritime shipping is the common carrier of

that trade. Ninety percent of all trade by volume is transported by ship and it is speculated that without maritime shipping, half the world might starve while the other half might freeze (ICS 2015). The International Maritime Organization (IMO) describes shipping as "perhaps the most international of all the world's great industries" (IMO 2016), which might also make

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it the most complex. International vessels that have intricate webs of multi-state ownership traverse the global commons of the high seas carrying goods that have been produced or extracted in piecemeal all over the world for delivery to national and international markets. There is virtually nothing about this industry that is not international.

This level of integration complicates matters considering this single industry is also responsible for the production of nearly three percent of total world CO₂ emissions (IMO 2016). This number may not seem like much on its own, but these emissions rival those of the fifth largest emitting nation (CAIT 2016). Furthermore, nearly 100 percent of these ocean-going vessels use bunker fuel, a viscous petroleum product that is relatively inexpensive, making it attractive to an industry where fuel accounts for up to 60 percent of operating costs (Corbett and Winebrake 2008). However, bunker fuel combustion results in higher levels of emissions than other fuel oils due to the high viscosity and level of impurities. While top emitting nations are setting goals to cap or reduce emissions in the very near future, marine shipping emissions are continuing to rise and are expected to increase to 6–14 percent of the global share by 2050 (Darby 2016).

The Unanswered Question: Who “Owns” Shipping Emissions?

There can be little doubt that international marine shipping is contributing to climate change in an increasing capacity, but what is being done to address these substantial emissions? Although aviation and marine shipping are the only sectors to be specifically included in climate change agreements on a global level, the international community approaches the mitigation of these emissions with ambiguity and increasingly evident hesitation. The Intergovernmental Panel on Climate Change (IPCC) recommended in 1994 that “emissions from international aviation and marine bunker fuels should be calculated as part of the national GHG inventories of Parties (to the UNFCCC) but should be excluded from national totals and reported separately because of their international nature” (IPCC 1996). This recommendation is contradictory as it suggests that bunker fuel emissions both be counted and not counted nationally. This also implies that parties can and should address emissions from any sector except international shipping as these emissions are removed from national totals, thus national reduction obligations. This recommendation leaves in its wake the burning question: who, exactly, is responsible for these emissions?

In 1997, parties to the UNFCCC answered this question by naming the IMO as the responsible body in the text of the Kyoto Protocol by stating that:

the Parties included in Annex I (developed countries) shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively (Kyoto Protocol 1997).

This mention of shipping within the text of the Kyoto Protocol solidified a seemingly permanent relationship between the IMO and the UNFCCC where the IMO is charged with an ambiguous guardianship of international marine emissions by aiding states in their reduction of emissions in the most international of sectors. However, marine shipping and aviation are both conspicuously absent in the 2012 extension to the Kyoto Protocol as well as the historic 2015 Paris Agreement. The IMO presented only at a “side event” at the Paris climate negotiations, a clear signal that shipping emissions do not enjoy a pressing priority in the international climate change regime.

Besides the absence of a direct reference to marine shipping in the Paris Agreement, there is also a distinct lack of action to mitigate bunker fuel emissions since 1997 on part of the

IMO. In fact, the continuous “progress” that the IMO has reported at each conference of the parties (COP) since the signing of the Kyoto Protocol did not take tangible shape until 2011 when a chapter was added to an existing convention that implemented mandatory efficiency measures for all new ships 400 gross tons or above, which covers virtually all international cargo vessels (MARPOL Annex VI Chapter 4). The IMO hails this as the “first legally binding climate change treaty to be adopted since the Kyoto Protocol” and it is expected to reduce CO₂ emissions by up to 26 percent by 2030 compared to business as usual (IMO 2016). As good as this may sound, international shipping emissions are still expected to increase 50 to 250 percent by 2050 *despite* efficiency gains (IMO 2016). This is due to the projected increase in international trade in nearly every country, which is being driven by a deepening integration and specialization of markets; a process which is itself enhanced by the convenience and low cost of maritime shipping. In October 2016, IMO members agreed upon a plan to adopt an initial strategy to reduce maritime emissions by 2018. No solid plan had been defined as of March 2017.

Even more troubling is that besides a few fringe examples, there is nothing published by the IMO, academia, NGOs, governments, or otherwise to suggest that viable policy, operational, or technological alternatives exist or are being developed to aid the target GHG reductions. It seems as though the crux of this vast and global problem of both innovation and mitigation deficiencies rests on the issue of emissions ownership.

As it stands, the IMO has been put in charge of this enormous and important mitigation task by the UNFCCC. The IMO is a logical choice, as it is a UN body that specializes in all things maritime, and this choice does receive a considerable amount of support from governments, the private sector and NGOs (ICS 2015; K. Metcalf, personal communication 2016; S. Raptis, personal communication 2016). However, the IMO is the smallest specialized UN agency, has no enforcement mechanisms, has very little funding or staff, and is comprised of state participants (although some state representatives are from the private sector), and depends on state actions and enforcement.

While the IMO may be a logical choice to facilitate emission reductions in international shipping, it is not at all a logical choice to develop, implement, and enforce anything beyond efficiency measures, measures which are near universally supported because of the cost saving aspect. Further action must be completed by states because we live in a world of states: the UNFCCC has state parties, the IMO has member states, the Kyoto Protocol and the Paris Agreement use state emission reduction targets, and the Kyoto Protocol suggests that states work through the IMO to reduce emissions. Because of this entrenched state system, international shipping emissions can no longer remain stateless if meaningful reductions are to be made.

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State Allocation Options: A Continuing Dilemma

Yet, a state cannot include shipping emissions in their reduction targets if the international community cannot figure out how these emissions should be allocated to states. In fact, Christiana Figueres, the former Executive Secretary of the UNFCCC, stated that emissions from international vessels are not even covered under the legalities of the convention simply because they are not national emissions (personal communication 2016). This is an issue that parties

to the UNFCCC have grappled with from the onset, almost immediately upon recognizing the unique nature of shipping emissions in 1994. Twenty-three years later, there is still no answer.

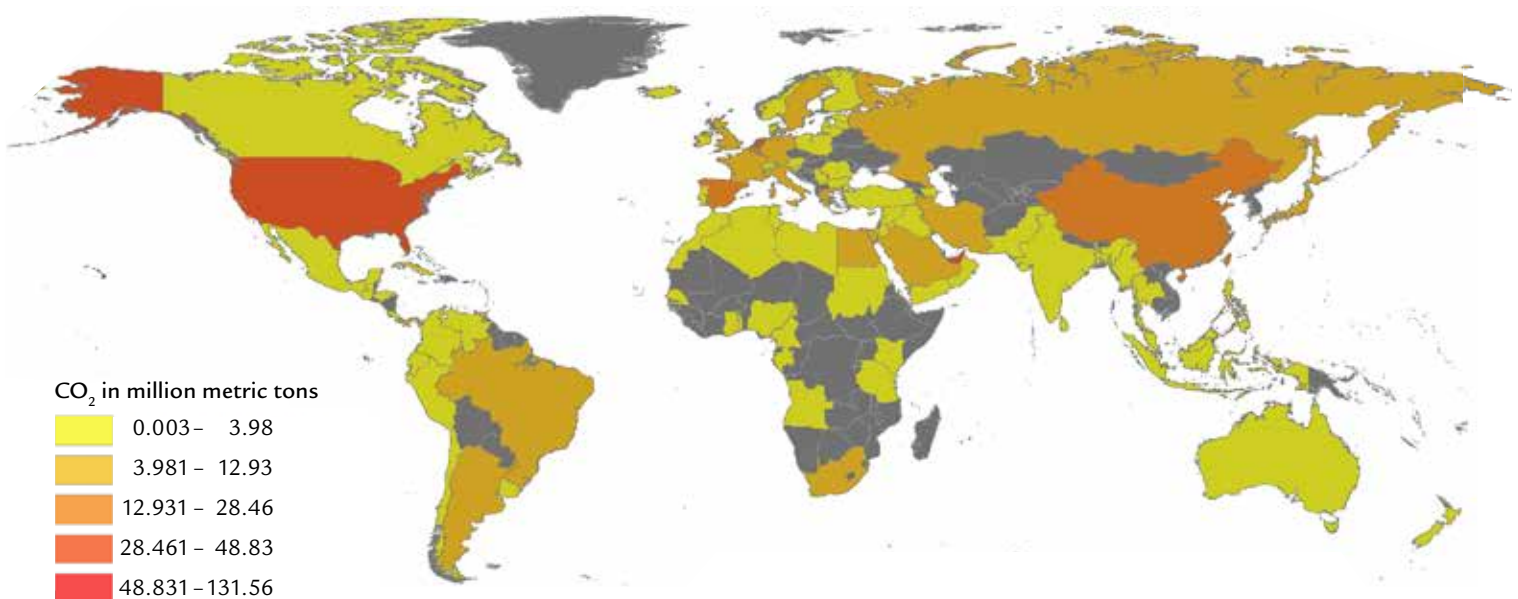
At COP1 in Berlin in 1995, Parties to the UNFCCC devised allocation options for consideration, four of which are still being discussed:

1. Allocation to the country where the bunker fuel is sold;
2. Allocation to the country of departure or destination of the vessel;
3. Allocation to the country of departure or destination of the passengers or cargo; and
4. Allocation to the country of the transporting company, the country of the operator, or the country of registration of the vessel (SBSTA 1996).

Since 1997, parties have not seriously discussed the issue of state allocation in UNFCCC meetings. It *must* be actively revisited to achieve a downward trend in shipping emissions. As discussed below, each option for state allocation dramatically differs in its political and geographical ramifications in terms of which corners of the globe would bear the burden of the responsibility of production, and thus mitigation.

Allocation option 1 places the burden of responsibility on the states that sell the greatest amount of bunker fuel. The data in Figure 1 is from the International Energy Agency (IEA). As illustrated, the burden of responsibility falls heavily on the United States and Singapore and excludes all states colored in gray from all measure of responsibility, although it is certain that all states benefit from international shipping in some fashion. This metric does not take into account the fact that Singapore is a convenient bunkering point on routes that pass through the Strait of Malacca and not necessarily a dominant or direct participant in international trade in other metrics. The U.S. is accurately represented as a leader in this metric as it is also a leader in international trade.

Figure 1: Emissions per Country Based on Amount of Bunker Fuel Purchased, 2012



Source: Map created by the author using ArcGIS Reference Layers Database; IEA Projection; GCS_WGS_1984.

Allocation option 2 is slightly flexible, allowing for either the country of departure or destination of the vessel to be held responsible for mitigating emissions. However, this option is problematic when one considers that a vessel does not necessarily make a neat route from Port A to Port B and back again. A vessel might instead stop at six ports between the origin and destination, ports and states that would not be accounted for in this option.

Allocation option 3 attempts to fill in some of the holes in option 2 by placing responsibility on the country of the departure or destination of cargo. All the stops along the route from Port A to Port B would be accounted for in this option if cargo is loaded or unloaded at any port. Table 1 (option 3) shows the contrast in geographic responsibility compared with Figure 1 (option 1). Here, seven and six out of the top 10 largest ports by shipping volume (as measured by trailer equivalent, or TEU, and by kiloton, respectively) are located in China, which would render the East Asian country overwhelmingly responsible for mitigating emissions. The port in Rotterdam dominates the European continent and the Middle East and Australia appear for the first time as leaders in TEU and kiloton volume, respectively. South America, Africa, and North America do not have ports that rank at all with this metric, although based on WTO statistics for 2014, the U.S. ranks number one in the world for imports and number two for exports, not just ship cargo (WTO 2016). The differentiation between imports and exports, thus producers and consumers, is not made in this metric and precise data on imports and exports via ship by volume per country are unavailable, even by the ship data expert, Lloyd’s List.

Table 1: Largest Ports by Volume, 2014

Port	TEU,* millions	Port	Kilotons
Shanghai, China	35.29	Shanghai, China	678,376
Singapore	33.87	Singapore	581,268
Shenzhen, China	24.03	Guangzhou, China	500,975
Hong Kong, China	22.23	Qingdao, China	465,055
Ningbo-Zhoushan, China	19.45	Port Hedland, Australia	446,922
Busan, South Korea	18.65	Tianjin, China	445,780
Qingdao, China	16.62	Rotterdam, Netherlands	444,733
Guangzhou Harbor, China	16.16	Ningbo, China	429,912
Jebel Ali, Dubai, UAE	15.25	Dalian, China	337,366
Tianjin, China	14.05	Busan, South Korea	335,411

Source: World Shipping Council 2017. *Trailer Equivalent Unit

Allocation option 4 holds within it the most geographically diverse suite of options by listing three in one, which are discussed separately here. Option 4(a) states that the country where the shipping company is located should be responsible for mitigating shipping emissions. This would clearly be Europe for both TEU and deadweight ton (DWT) capacity as Tables 2A and 2B list on the following page, as four out of the top 10 owner countries are European, the largest being Denmark for TEUs and Greece for DWT. Singapore, South Korea, Japan, and China also appear as leaders in both metrics with the U.S. appearing as the eighth largest country by DWT capacity. South America, Africa, and Australia do not appear in this metric at all.

Table 2A: Top 10 Countries with Largest Shipping Companies by Volume, 2015

Country (Company)	TEU* in millions
Denmark (Maersk)	2.5
Switzerland (MSC)	2.5
France (CMA CGM)	1.5
Taiwan (Evergreen)	1.0
China (COSCO)	0.9
China (China Shipping)	0.8
Germany (Hapag-Lloyd)	0.7
South Korea (Hanjin)	0.6
Japan (Mitsui OSK)	0.6
Singapore (APL)	0.5

Table 2B: Top 10 Countries with Largest Aggregated Shipping Load by Weight, 2015

Country	DWT** in millions
Greece	279.4
Japan	230.7
China	157.6
Germany	122.0
Singapore	84.0
South Korea	80.2
Hong Kong (China)	75.3
United States	60.3
United Kingdom	48.4
Norway	46.4

Table 3: Top 10 Flagging Countries by Percentage of World Total, 2015

Country	DWT** by percent
Panama	20.13
Liberia	11.65
Marshall Islands	10.02
Hong Kong (China)	8.62
Singapore	6.58
Malta	4.69
Greece	4.50
Bahamas	4.33
China	4.33
Cyprus	1.92

Source: UNCTAD 2015 *Trailer Equivalent Unit **Deadweight tonnage

Allocation option 4(b) places responsibility for shipping emissions on the country where the ship operator resides. A ship operator is essentially a management company either within or contracted by the shipping company that is responsible for the oversight of all technical and operational tasks of a vessel. Data on this metric are expensive and elusive as ship operators tend to be more ambiguous, service-based entities, but while there is some overlap with the largest shipping companies, the largest ship operators appear to be located in Singapore, China, Taiwan, Japan, the Middle East, Europe, and even the U.S. (Heitmann and Khalilian 2010). While not evenly spread across the Northern Hemisphere, it is the most even distribution presented in these five allocation options.

Finally, allocation option 4(c), listed in Table 3, places the burden of responsibility on the flagging country. Already, flagging states are the entities that are ultimately responsible for the enforcement of all international maritime rules and regulations. As shown in Table 3, this is the only metric that highlights the developing world. Central America, Africa and Polynesia appear for the first time, as Panama, Liberia and the Marshall Islands are the top three flagging countries by share of the world in DWT capacity, with Singapore, China and the small islands of the Bahamas following closely behind. While this metric enjoys precedence within the IMO, it might also be the least effective if employed as is.

Inconvenient Truths about Flags of Convenience

What we know today as “flags of convenience” is an unintended consequence of early 20th century Prohibition in the U.S. when American cruise liners began to flag their vessels in the Bahamas to be able to continue to serve alcohol to their passengers (DeSombre 2006). After Congress repealed Prohibition in 1933, ship owners continued the practice as they found other benefits such as lower overhead costs as a result of less stringent regulations and the

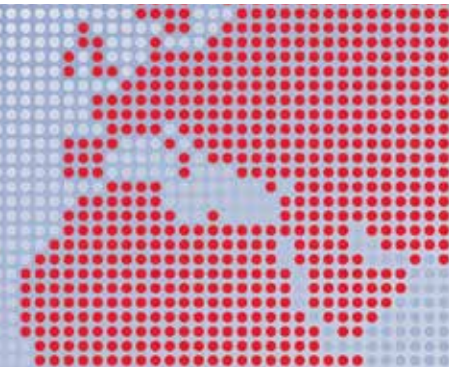
ability to employ cheaper labor. The flag determines the “nationality” of a vessel and “which domestic and international laws they are subject to...A ship registered to Panama is legally considered to be a Panamanian ship even if the owner is American, and even if it never sails to Panama, and the only rules it needs to follow are those that Panama imposes” (DeSombre 2016). Flagging fees represent a considerable source of income for developing countries. Panama, for example, a country with only one national fleet line of its own and a limited presence in international trade, earns approximately \$500 million annually from flagging fees (DeSombre 2006). While open registries may provide an economic boon to developing countries, the result is that nearly 77 percent of the international fleet is registered to countries that have no obligations under the Kyoto Protocol, only future commitments under the Paris Agreement, and a comparatively limited capacity to enforce international rules and regulations. Moreover, a flag can be changed to another country within a matter of hours, rendering responsibility under this metric even more elusive.

A striking example of the limited enforcement capacity of flagging countries and the inability of the IMO to compel such enforcement is seen with the oil tanker *Prestige*. This particular vessel flew a Bahamian flag, had a Greek captain, a Filipino and Romanian crew, was registered in Liberia, owned by a Swiss company that was itself owned by Russian nationals, was carrying oil from Latvia to Singapore, classified by the U.S., and insured by the United Kingdom (DeSombre 2006). When the ship sank in 2002, causing the largest oil spill in both Spain and Portugal’s histories, the 11 countries that had stakes in this one vessel pointed fingers at each other with no one party taking responsibility. As this exemplifies, the flag state is not always willing or able to take responsibility and the IMO did not step in to force the Bahamian hand. The *Prestige* also exemplifies the great need to be able to say with certainty who and what is responsible for all matters pertaining to ships so that catastrophes of all sorts may be mitigated. If that party is to be the flagging state, then mechanisms need to be put into place to ensure responsibility is carried through and to either provide support to countries that may need assistance in enforcement or preventing countries from offering open registries.

Conclusion

As the allocation map and tables exemplify, there is no easy answer, nor is there a common denominator that can be easily extracted from the allocation options to identify responsibility for shipping emissions. Without state allocation, as has been the case for more than two decades, it is nearly impossible to meaningfully reduce emissions from maritime shipping, a sector that will continue to increase its contributions to global emissions as trade among countries of the world continues and grows. Because responsibility for emissions remains unassigned, states are not able or willing to prioritize the creation of an environment that might induce innovation in shipping technology or operations. As policymakers and scientists have realized, however, even if all parties to the 2015 Paris Agreement meet their nationally determined emissions targets — targets which exclude shipping — the world will not be able to limit the planet’s increasing surface temperatures to well below 2 degrees Celsius. Every percent of emissions reductions counts and every sector should be included. Without proper incentives for states to include these emissions in their state totals beyond it being the “right thing to do,” the complexity of allocation will continue to remain a barrier to any further mitigation action.

Shipping — the most integrated and global of all sectors — should not continue to be left out of a state-run system. If any GHG reduction targets are ever to be met, responsibility must be assigned, innovation must occur, emissions reductions must take place, and shipping must be included in the international effort to limit climate change. ●



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