National climate action and shipping

T&E COP28 Briefing

December 2023

Summary

In the context of COP28, the question of national, economy-wide climate action is again in the spotlight. Yet while shipping is clearly a fundamental part of national economies, most national climate plans given to the UNFCCC still do not include action on each country's share of shipping emissions. Meanwhile, as the EU's climate laws have shown, regional and national policy is key to chart a course for sustainable shipping worldwide.

Building on our analysis from COP27,[1] this paper looks into depth at the policy measures available to address shipping emissions at national level. We display, for the first time, shipping emission profiles for countries with the administrative and economic capacity to regulate their share of shipping emissions. We find that the USA alone gives a subsidy of €1.4 billion to its shipping industry, while China currently awards just under €1 billion in subsidies. To address these emissions, we display the policy measures that can be used by these and other states to take action on their shipping emissions.

1. Context

In the context of the COP28 negotiations, the issue of national action on shipping emissions is once again at the fore. Most states have not included shipping emissions within their national climate plans to the UNFCCC (nationally determined contributions, NDCs) arguing that shipping (and aviation) are not subject to the Paris Agreement. T&E has elsewhere debunked this argument.[2] At the same time, in initial drafts of the COP28 conclusions countries have been invited to scale up ocean-based climate mitigation action.[3]

[1] Transport & Environment. (November 2022). Less is more: Regional shipping policy and global decarbonisation. Retrieved from https://www.transportenvironment.org/wp-content/uploads/2022/11/COP27_world_country_MRV-3.pdf

[2] Transport & Environment. (October 2021). Shipping and aviation are subject to the Paris Agreement, legal analysis shows. Retrieved from https://www.transportenvironment.org/discover/shipping-and-aviation-are-subject-to-the-paris-agreement-legal-analysis-shows/

[3] UNFCCC. (December 2023). Matters relating to the global stocktake under the Paris Agreement. Retrieved from https://unfccc.int/sites/default/files/resource/GST_0.pdf

The UN body addressing maritime issues, the International Maritime Organization (IMO), agreed in 2023 to climate targets, but the proposed legislative timeline makes the proposed emissions cuts impossible to achieve without action by states outside the IMO.[4] The EU has, therefore, stepped up with climate mitigation actions on shipping emissions. In 2023 European states agreed to a set of laws to reduce shipping emissions notably through its carbon pricing mechanism (ETS) and by a green fuels mandate (FuelEU Maritime). In this analysis, we analyse the shipping emissions profiles of other states and the possible measures that these states can take to mitigate shipping's climate impact.[5]

2. Regional policy

2.1. Policy options

The EU is the first bloc to regulate its share of international shipping emissions. The basket of measures it has used (carbon pricing, fuel standard, alongside other measures such as mandates on renewable energy production and alternative fuels infrastructure) can be a helpful guide for other states, while there are a number of other policies, all listed in Table 1, that should be considered to abate the pollution impacts of shipping. It should be highlighted that given the complexity of the energy transition, no one of these measures alone will be able to effectively decarbonise shipping on its own; a suite of policy measures is needed together to effectively guide the shipping sector to a sustainable future.

Measure	**Description**	**Example**
Monitoring and reporting	*To accurately regulate fuel or emissions, an accurate and verified monitoring system is required*	*EU*: Monitoring, Reporting and Verification (MRV) Regulation
Pollution pricing	*Pricing relevant greenhouse gases or air pollution to narrow the price gap between fossil and clean technologies as well as generating revenues and applying the polluter pays principle*	*EU*: Emissions Trading System (ETS) *Norway*: NOx Fund
Energy/Fuels taxation	*Another method to reduce the price gap between fossil and clean technologies is directly taxing emissions or unsustainable and unscalable fuels*	*EU*: Energy Taxation Directive (ETD)
Fuel standard	*Fuel standards that improve over time on a trajectory to zero-emissions can be used to reduce the air pollution or greenhouse gases from fuels. They should be accompanied by specific mandates for green fuels to avoid the use of unsustainable and unscalable drop-in fuels like LNG and biofuels*	*EU*: FuelEU Maritime Regulation

[4] The International Council on Clean Transportation. (July 2023). IMO's newly revised GHG strategy: what it means for shipping and the Paris Agreement. Retrieved from https://theicct.org/marine-imo-updated-ghg-strategy-jul23/
[5] The same methodology is used as in Transport & Environment, 2022.

Alternative fuels infrastructure and supply mandates	*To ensure the supply and provision of green fuels, specific mandates should also be implemented for the production of sustainable and scalable fuels like RFNBOs and related infrastructure*	*EU*: Renewable Energy Directive (RED) and Alternative Fuels Infrastructure Regulation (AFIR)
Energy efficiency mandates	*Shipping's low price elasticity of demand as well as market and non-market barriers means that specific obligations for energy efficiency improvements are needed alongside other measures*	*IMO*: Carbon Intensity Indicator (CII, although the CII also considers fuel)
Sustainable finance	*Given the important role of banks and financial institution in ship financing, green taxonomy schemes should be put in place so that only truly sustainable projects and investments receive a "green" label*	*EU:* Taxonomy Regulation
Subsidies	*Limited government subsidies are necessary to support early technologies before financial breakthrough. These can be in the form of CAPEX support for green technologies or OPEX support for the deployment of green fuels*	*EU:* Innovation Fund *Norway*: Enova
Speed limits	*Speed limits - exactly like those on roads - are the most cost-efficient and effective way of reducing all forms of pollution with added benefits for marine life*	Various speed limits are in place, mainly at local level related to marine wildlife, for example in the Gulf of St. Lawrence or Swiftsure Bank[6]
Green public procurement	*Governments control certain routes which they tender out to shipping companies. Mandating zero-emissions technologies on those routes can play a key role in guaranteeing green shipping on those routes (e.g. ferries)*	*Norway:* requirements for emission reduction and zero-emissions in public tenders
Zero emission mandates	*The ultimate aim of climate policy, which can already be legislated, is for zero-emission shipping in all areas. Starting with mandates for zero-emission shipping in certain zones gives clarity to business that investments in clean technology will pay pay off*	*Norway:* Zero-emission regulation in World Heritage fjords as from 2026

Table 1: Policy options to decarbonise shipping

[6] World Shipping Council. (November 2023). A global navigational aid to protect whales. Retrieved from https://static1.squarespace.com/static/5ff6c5336c885a268148bdcc/t/6548ca7aff701f6609ef85db/1699269257440/WSC+Whale+Chart_+A+global+navigational+aid+to+protect+whales+%28Nov+2023%29.pdf

2.2. Country profiles

The next section analyses selected countries in detail for their shipping profiles. Countries have been chosen from the G20 group of nations that also fall into the list of Annex 1 countries, given that these countries will have the administrative and regulatory capacity to regulate their shipping emissions.[7] Concretely, this means that these countries have tools at their disposal, such as a pre-existing carbon market and transport fuel mandates, that can be extended to the shipping sector. While not an Annex 1 country, China has been included in the analysis given that it already has a carbon pricing system that includes domestic shipping.

Fig. 3 shows shipping emissions per capita for G20 countries. Australia has by far the largest shipping emissions per capita, at 1,090 tCO_2/capita, given it is an island with a relatively small population but an economy reliant on trade. South Korea (322 tCO_2/capita), Japan (276 tCO_2/capita) and Canada (235tCO_2/capita) similarly have emissions per capita, higher than all G20 non-Annex 1 countries with the exception of Saudi Arabia (334 tCO_2/capita). The two countries with the highest populations have the lowest amounts: Chinese shipping produces 71 tCO_2/capita each year while Indian shipping produces 12 tCO_2/capita. Norway, Iceland and the EU are included together as part of the European Economic Area given the shipping ETS will apply to both all EEA countries.

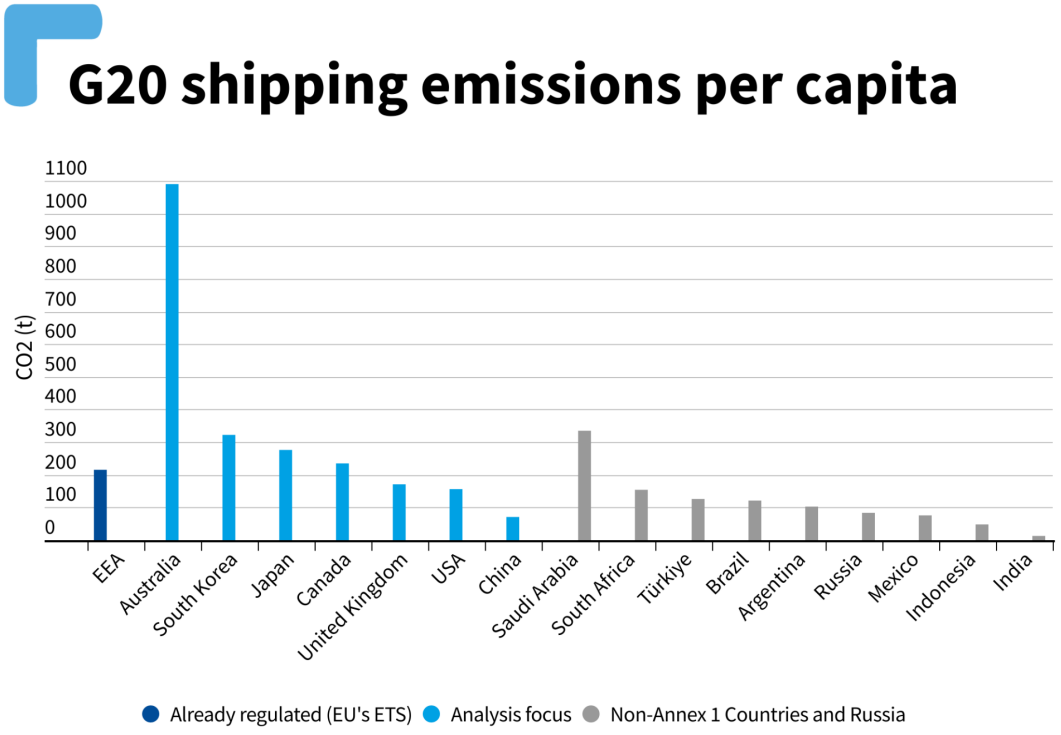


Figure 3: Shipping emissions per capita for G20 countries

[7] OECD. List of Annex 1 Countries. Retrieved from https://www.oecd.org/env/cc/listofannexicountries.htm. Russia has been excluded.

Figs. 4 through to 13 display emissions data for the 9 countries analysed. Shipping emissions have been calculated based on each country's share of international emissions. That is, emissions from voyages between its own national ports and half of emissions from voyages between its ports and foreign ports.

The Figures show that containerships make up the highest proportion of emissions per ship type in most of the countries analysed (China, EEA, the USA, the UK and New Zealand). In Japan, Australia and Canada, bulk carriers make up the lion's share of pollution per ship type, with this amount being particularly high in Australia, at 58% or 16.4 $MtCO_2$. Tanker pollution makes up the highest share per ship type in South Korea at 5.4 $MtCO_2$. Emissions from LNG tankers are between 16% and 18% in Australia, Japan and South Korea, which is notably higher as a share of total emissions than in the other states analysed (the next highest amount is 9% in the USA).

Total subsidies amount to €3.8 billion in the 8 countries without shipping laws. The EEA has agreed on laws to regulate its shipping sector, so will no longer award subsidies and will instead recoup around €7.2 billion euros each year from its shipping sector. The highest subsidy is awarded by the United States, at €1.4 billion, followed by China at €0.9 billion and Australia at €0.5 billion. Taking into account population, the subsidy per capita is highest in Australia at over €21 per capita and second highest in the UK at just less than €8 capita. Subsidy per capita is lowest in Japan (€0.5) and China (€0.9). Given that these indirect subsidies are a function of each country's carbon price, it can be expected that these foregone revenues will increase as the carbon prices increase in each country.

China	
Emissions from ships above 5000 GT	100.3 $MtCO_2$
Population	1.4 billion[8]
GDP per capita	10,143 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	15,533 (52%)
Ship type with highest emissions	Container (38.4 MtCO, 38% of total)
Price of country's carbon price per tonne	9.43 EUR (10.25 USD)[9]
Potential revenue from applying carbon price to shipping	946 million EUR/year

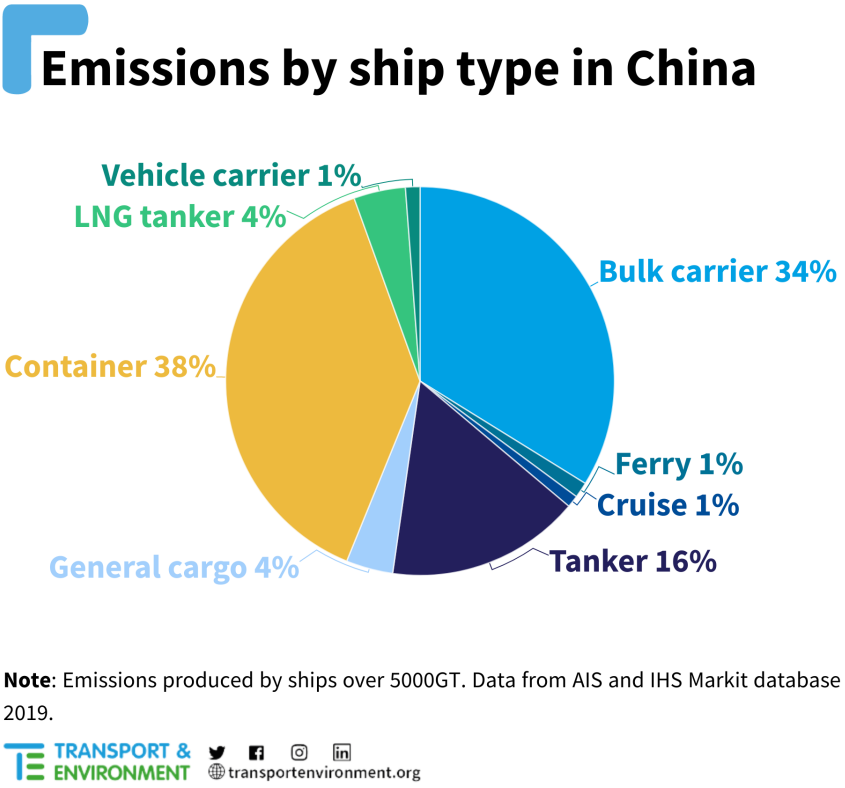


Figure 4: Emissions by ship class in China

[8] Data from World Bank. Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL?end=2019&most_recent_year_desc=true&start=2019, population, GDP per capita and shipping emissions all 2019.
[9] Carbon prices retrieved from https://carboncredits.com/carbon-prices-today/. Currency exchange retrieved from https://www.xe.com/currencyconverter/. All 4 December 2023.

European Economic Area[10]	
Emissions from ships above 5000 GT	95.6 $MtCO_2$
Population	443.5 milion
GDP per capita	35,194 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	12,499 (42%)
Ship type with highest emissions	Container (28.4 $MtCO_2$, 30% of total)
Price of country's carbon price per tonne	74.85 EUR
Yearly revenue from applying carbon price to shipping	7,156 million EUR

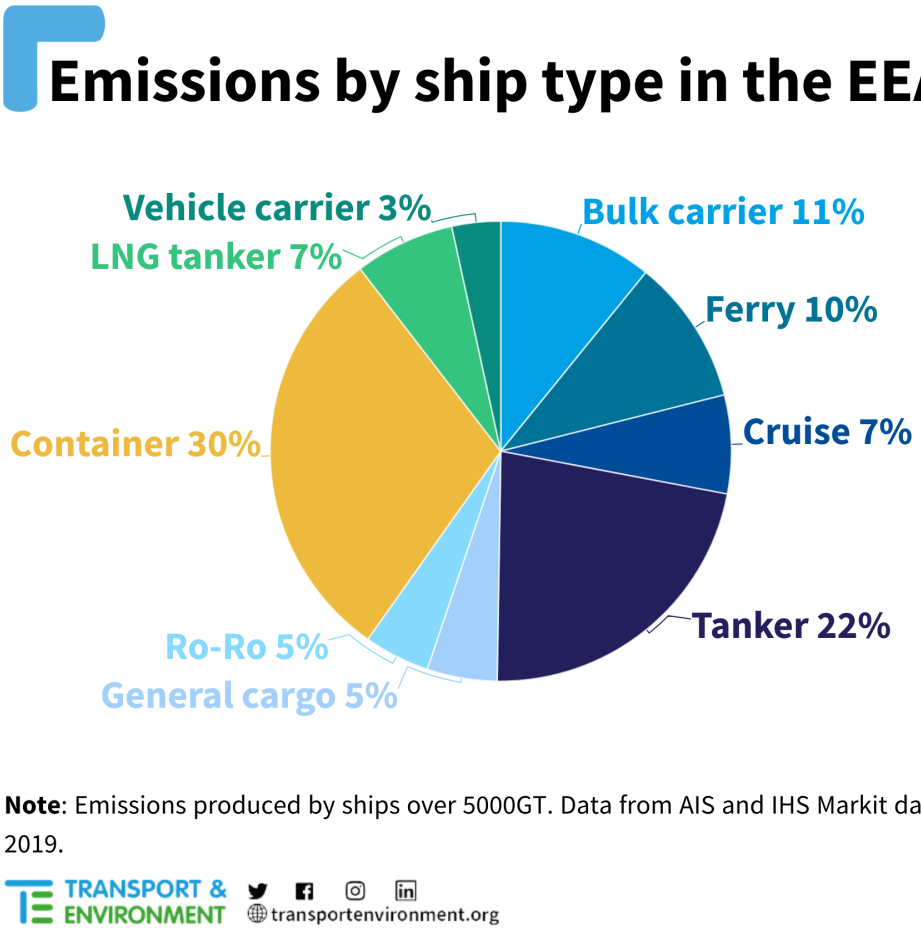


Figure 5: Emissions by ship class in the European Economic Area

[10] European Economic Area - EU27 + Iceland, Liechtenstein and Norway - displayed given that the EU's ETS applies to all these states. UK excluded.

USA	
Emissions from ships above 5000 GT	52.1 $MtCO_2$
Population	328.3 million
GDP per capita	65,120 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	8,751 (29%)
Ship type with highest emissions	Container (17.7 $MtCO_2$, 34% of total)
Price of country's carbon price per tonne	27.14 EUR (29.49 USD in California)[11]
Yearly revenue from applying carbon price to shipping	1,414 million EUR

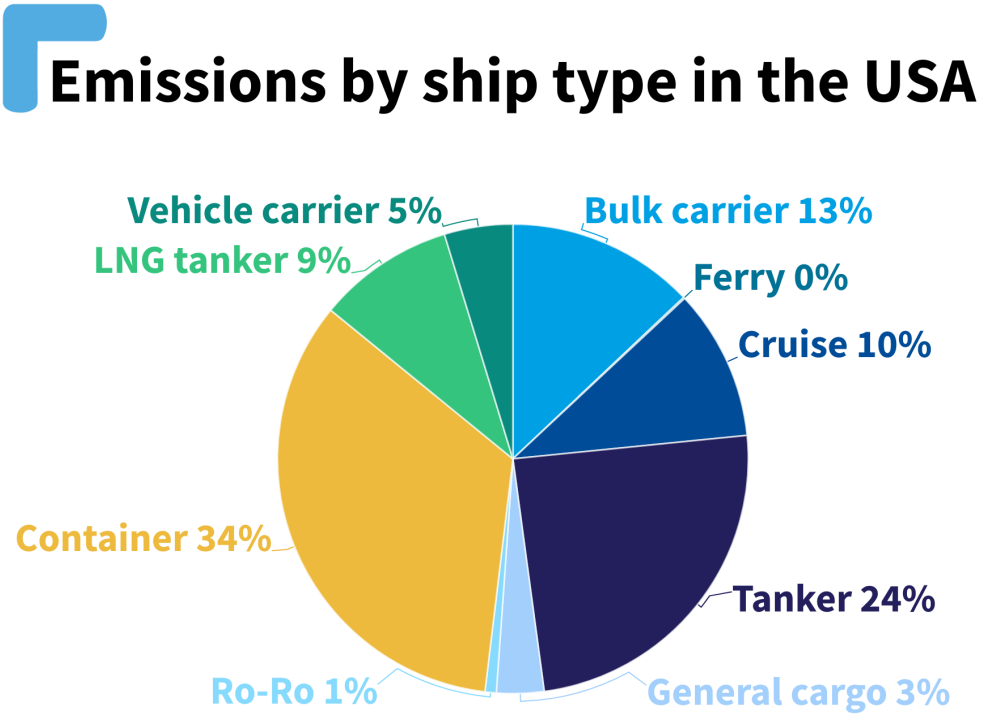


Figure 6: Emissions by ship class in USA

[11] 2023 California carbon price is given as most maritime traffic arrives in that state.

Japan	
Emissions from ships above 5000 GT	34.6 $MtCO_2$
Population	126.6 million
GDP per capita	40,415 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	6,350 (21%)
Ship type with highest emissions	Bulk carrier (7.4 $MtCO_2$, 22% of total)
Price of country's carbon price per tonne	1.81 EUR (289 JPY)[12]
Yearly revenue from applying carbon price to shipping	63 million EUR

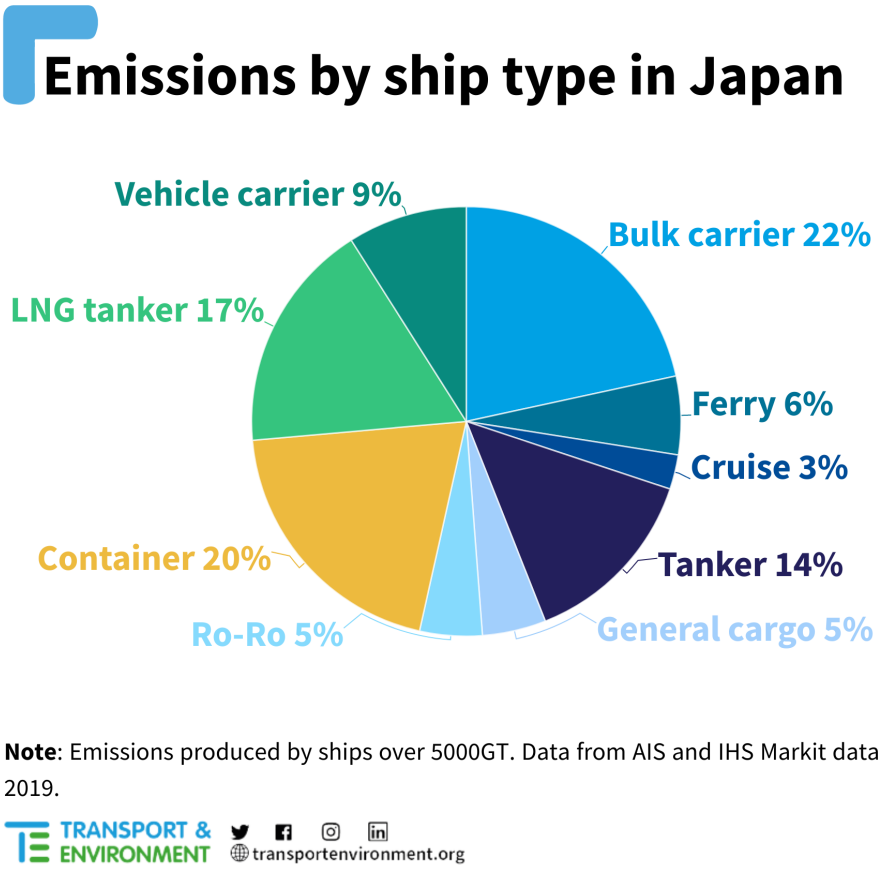


Figure 7: Emissions by ship class in Japan

[12] Rate of Japan's carbon tax. International Carbon Action Partnership. (February 2023). 'Japan's Cabinet approves policy roadmap including plans for national ETS'. Retrieved from https://icapcarbonaction.com/en/news/japans-cabinet-approves-policy-roadmap-including-plans-national-ets

Australia	
Emissions from ships above 5000 GT	28.3 $MtCO_2$
Population	25.3 million
GDP per capita	54,941 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	5244 (18%)
Ship type with highest emissions	Bulk carrier (16.4 $MtCO_2$, 58% of total)
Price of country's carbon price per tonne	19.39 EUR (31.75 AUD)
Yearly revenue from applying carbon price to shipping	549 million EUR

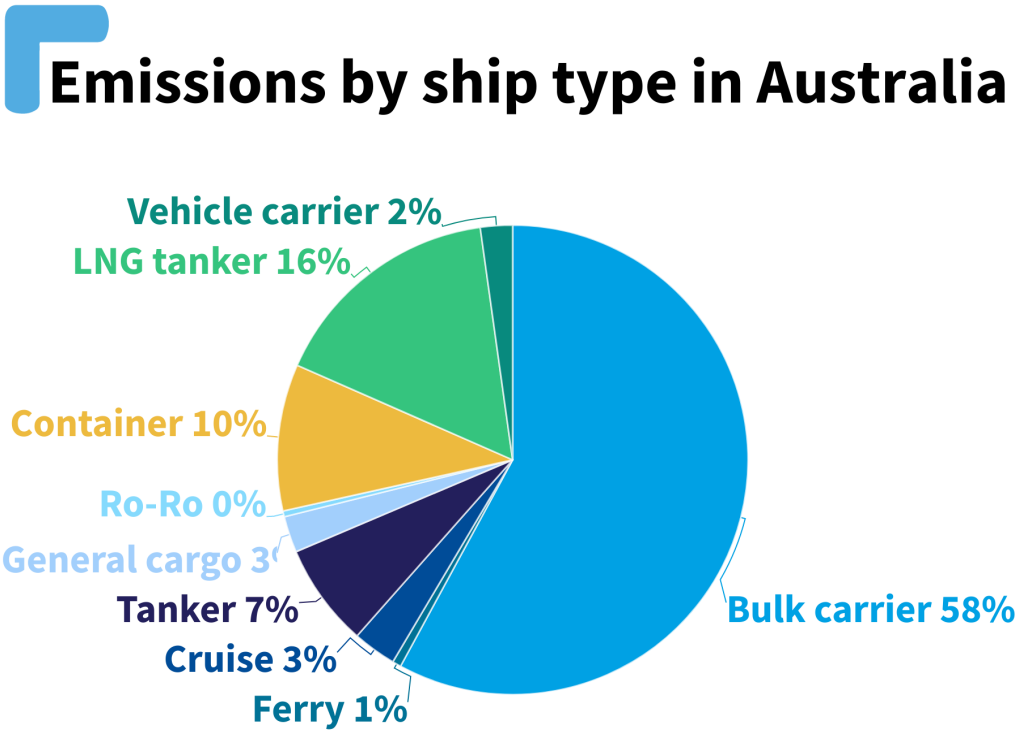


Figure 8: Emissions by ship class in Australia

South Korea	
Emissions from ships above 5000 GT	16.7 $MtCO_2$
Population	51.7 million
GDP per capita	31,902 USD
Number of ships that visit the country's ports(as a % of total global fleet over 5000 GT)	5675 (19%)
Ship type with highest emissions	Tanker (5.4 $MtCO_2$, 32% of total)
Price of country's carbon price per tonne	6.18 EUR (6.72 USD)
Yearly revenue from applying carbon price to shipping	103 million EUR

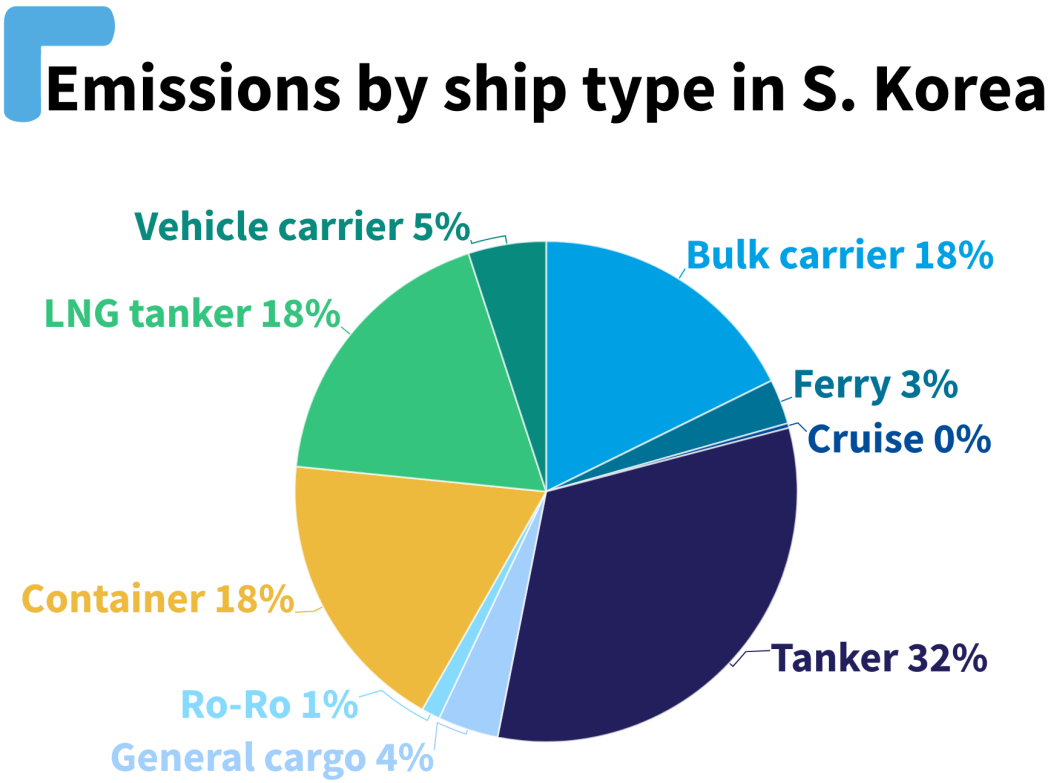
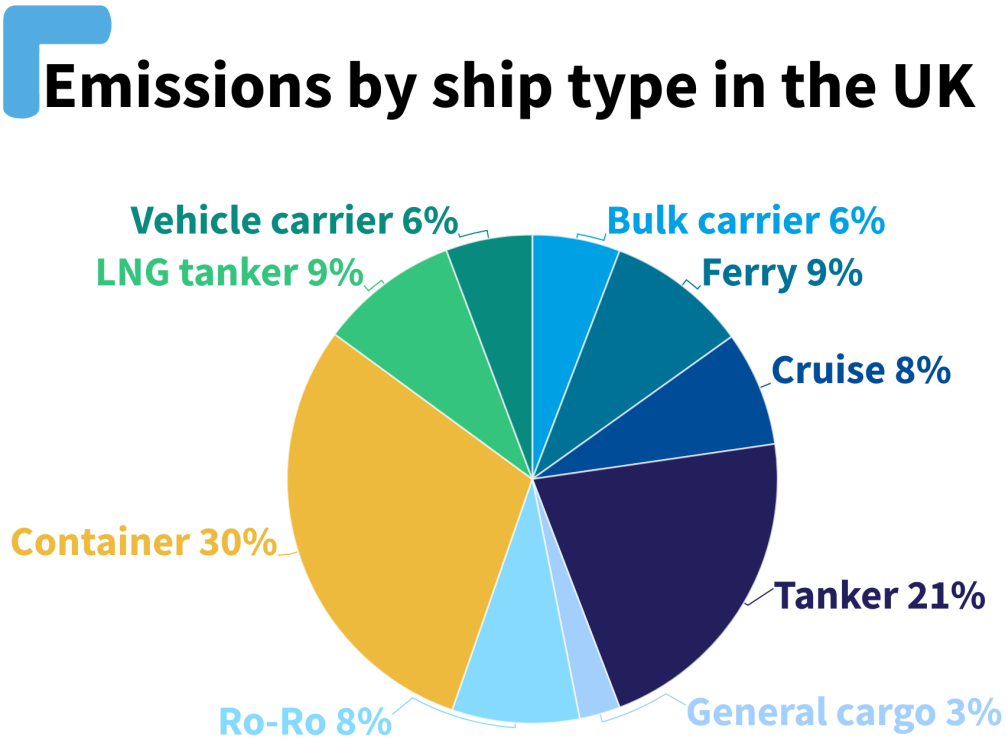


Figure 9: Emissions by ship class in South Korea

United Kingdom	
Emissions from ships above 5000 GT	11.4 $MtCO_2$
Population	66.8 million[4]
GDP per capita	42,747 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	4,416 (15%)
Ship type with highest emissions	Container (3.4 $MtCO_2$, 30% of total)
Price of country's carbon price per tonne	46.37 (39.78 GBP)
Yearly revenue from applying carbon price to shipping	529 million EUR



Note: Emissions produced by ships over 5000GT. Data from AIS and IHS Markit database 2019.

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Figure 11: Emissions by ship class in United Kingdom

Canada	
Emissions from ships above 5000 GT	9.1 $MtCO_2$
Population	37.6 million
GDP per capita	46,374 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	3,306 (11%)
Ship type with highest emissions	Bulk carrier (3.5 $MtCO_2$, 39% of total)
Price of country's carbon price per tonne	27.14 EUR (29.49 USD: Quebec price linked to California carbon market)
Yearly revenue from applying carbon price to shipping	247 million EUR

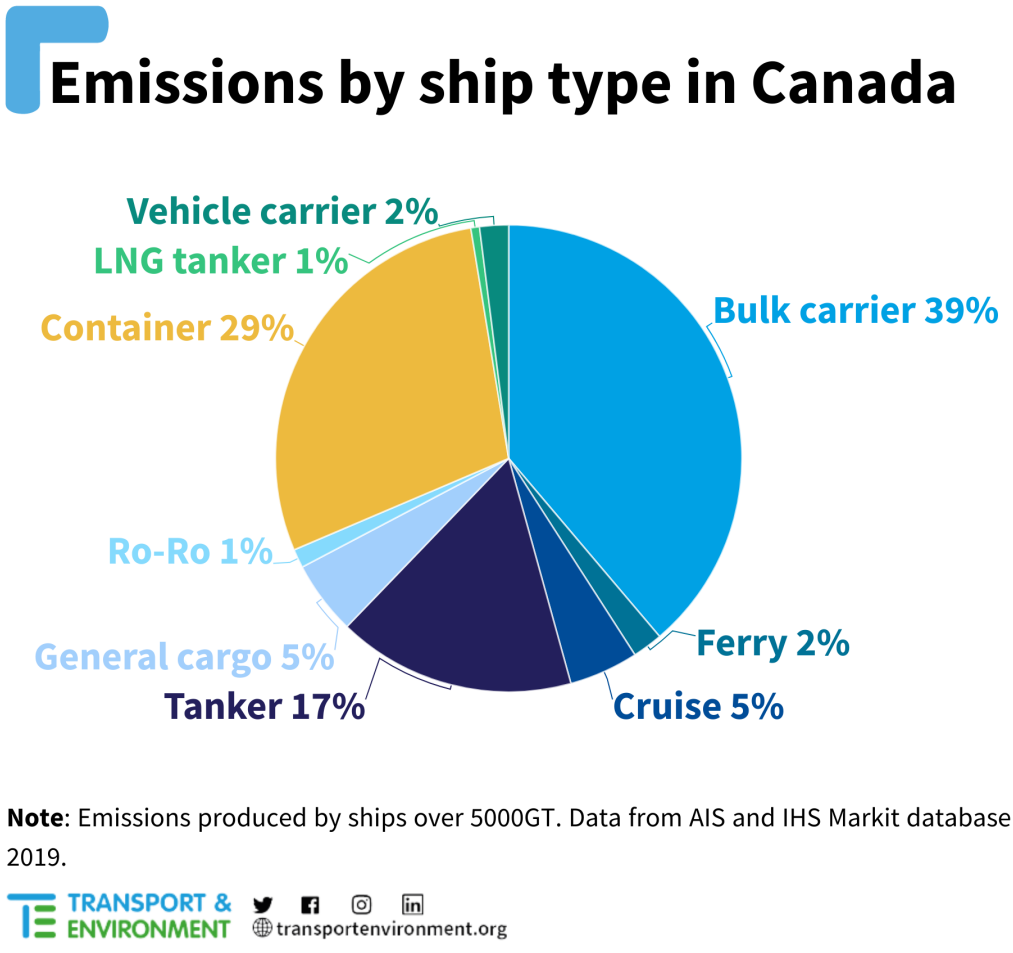
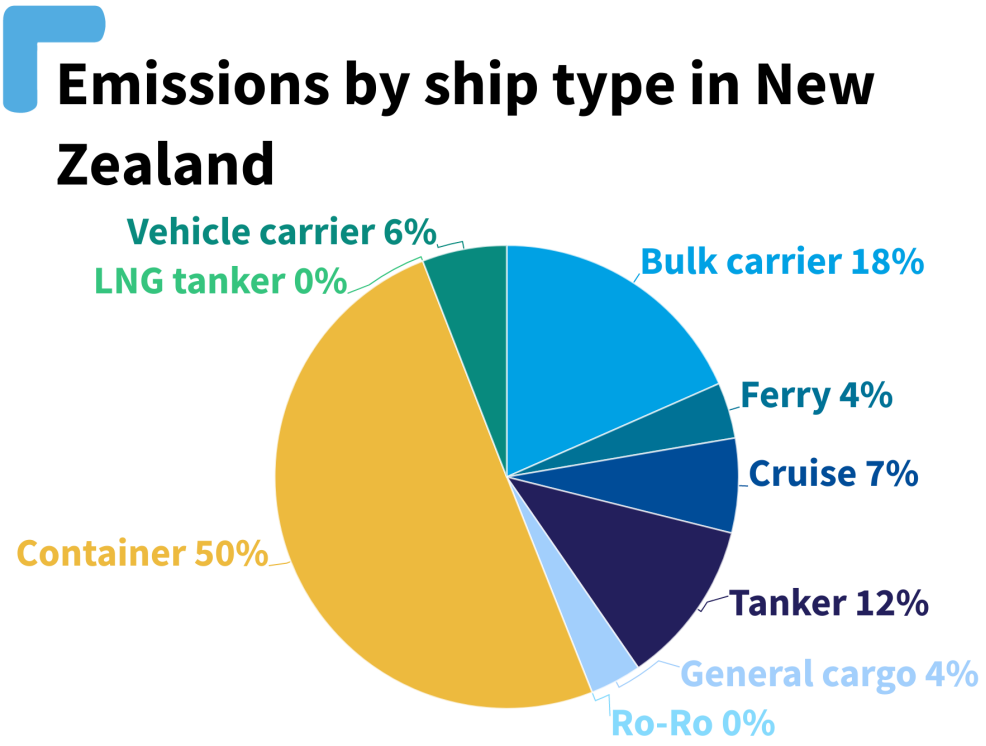


Figure 12: Emissions by ship class in Canada

New Zealand	
Emissions from ships above 5000 GT	0.4 $MtCO_2$
Population	4.9 million
GDP per capita	42,796 USD
Number of ships that visit the country's ports (as a % of total global fleet over 5000 GT)	937 (3%)
Ship type with highest emissions	Container (0.2$MtCO_2$, 50% of total)
Price of country's carbon price per tonne	42.91 EUR (75.5 NZD)
Yearly revenue from applying carbon price to shipping	17 million EUR



Note: Emissions produced by ships over 5000GT. Data from AIS and IHS Markit database 2019.

Figure 13: Emissions by ship class in New Zealand

3. Conclusion and discussion

This paper has set out the shipping pollution profile of selected developed countries and demonstrated concrete policy actions they can take to address these emissions. Given that there are a limited number of ships in the world, whose main destinations are limited to a few large economies, there is a clear need for these countries to put in place policy measures to address shipping emissions.

As demonstrated, there is a broad suite of policy options at hand. These range from green fuel mandates, mandatory energy efficiency requirements, speed reduction, fossil fuel/greenhouse gas pricing and other measures. Potential revenue, for example through pricing pollution in carbon markets, will also be important to address the impacts of pollution whether they be on health or the environment locally or globally. These revenues can also be used in part to support shipping decarbonisation, as has been shown by the EU's Innovation Fund and Norway's Enova. In the US alone, €1.4 billion euros is currently awarded as an indirect subsidy to the shipping industry each year. In China, this amount is €0.95 billion euros and these amounts will go up as each country's carbon price increases.

There is therefore ample opportunity and need for the countries to take action now on their shipping emissions. This should start through putting in place an emissions monitoring and reporting law that could be modelled on the EU's and on top of which other policy measures can be implemented.

Further information

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