A proposal for an IMO-led global shipping industry decarbonisation programme

TRAFIGURA

Table of contents

Overview

Trafigura, one of the world's largest ship charterers, proposes that the International Maritime Organization introduces a carbon levy of between USD250 and USD300 per metric tonne of CO_2 equivalent on shipping fuels, in order to make zero- and low-carbon fuels more economically viable and more competitive.

We believe that only through the introduction of a significant levy on carbon-intensive fuels can sufficient progress be made towards the decarbonisation of the global shipping industry.

Left to right

Jose Maria Larocca,
Head of Oil & Petroleum Products

Rasmus Bach Nielsen,
Head of Fuel Decarbonisation

In 2018, the International Maritime Organisation (IMO) received widespread support when it announced a landmark strategy to reduce shipping emissions. It outlined a plan to reduce emissions intensity by at least 40 percent compared to 2008 levels by 2030, and by at least 70 percent by 2050, as well as reducing total emissions by 50 percent by 2050 thereby ensuring that the international shipping industry plays its part in helping to achieve the objectives of the Paris Agreement.

The IMO is working to reduce shipping emissions at a time when greenhouse gas emissions are increasing. The Fourth IMO Greenhouse Gas Study, published in August 2020, predicts that emissions could increase by as much as 130 percent by 2050, compared to 2008 levels.

Drastic and quick action is required. New shipping rules were introduced by the IMO at the beginning of 2020 that require the use of shipping fuels with lower sulphur content and there are efforts underway to implement further efficiency standards. However, despite the positive focus of these actions, they do not help to meet greenhouse gas emissions reduction targets alone. The ships in use, the fuels that power them and the related infrastructure need to start changing.

Trafigura proposes that the IMO introduce a 'partial feebate' system – a self-financing system – where, when a fuel is used that has a carbon dioxide equivalent (CO_2e) intensity above an agreed benchmark level, a levy is charged, and where a fuel is used that has a CO_2e profile below the benchmark level, a subsidy is provided.

To change the industry and achieve this evolution, the world's governments , shipowners and charterers urgently need to work with the IMO to agree and implement a levy on carbon-intensive fuels, and to subsidise the use of low- and zero-carbon alternatives. In addition to subsidising zero- or low-carbon fuels, the revenue raised from this levy could be partly used to fund further research and development into alternative fuels. Revenue in part should be used to help Small Island Developing States and other developing countries to manage energy-transition processes and to help them mitigate the consequences of climate change.

As one of the world's largest charterers of vessels, responsible for more than 4,000 voyages each year, we recognise that a carbon levy will have an immediate effect on shipping costs which companies – including ours – would bear. This increase in operational costs will spur charterers to change behaviour to reduce emissions, charter more efficient ships and switch to lower carbon fuels.

Great efforts have been made in recent years through the Global Maritime Forum, the Getting to Zero Coalition and through other initiatives to create awareness, develop solutions and catalyse a modern maritime sector to take responsibility for its climate impact.

It is now time to put a price on carbon emissions in the shipping industry in the form of a global, mandatory industry levy.

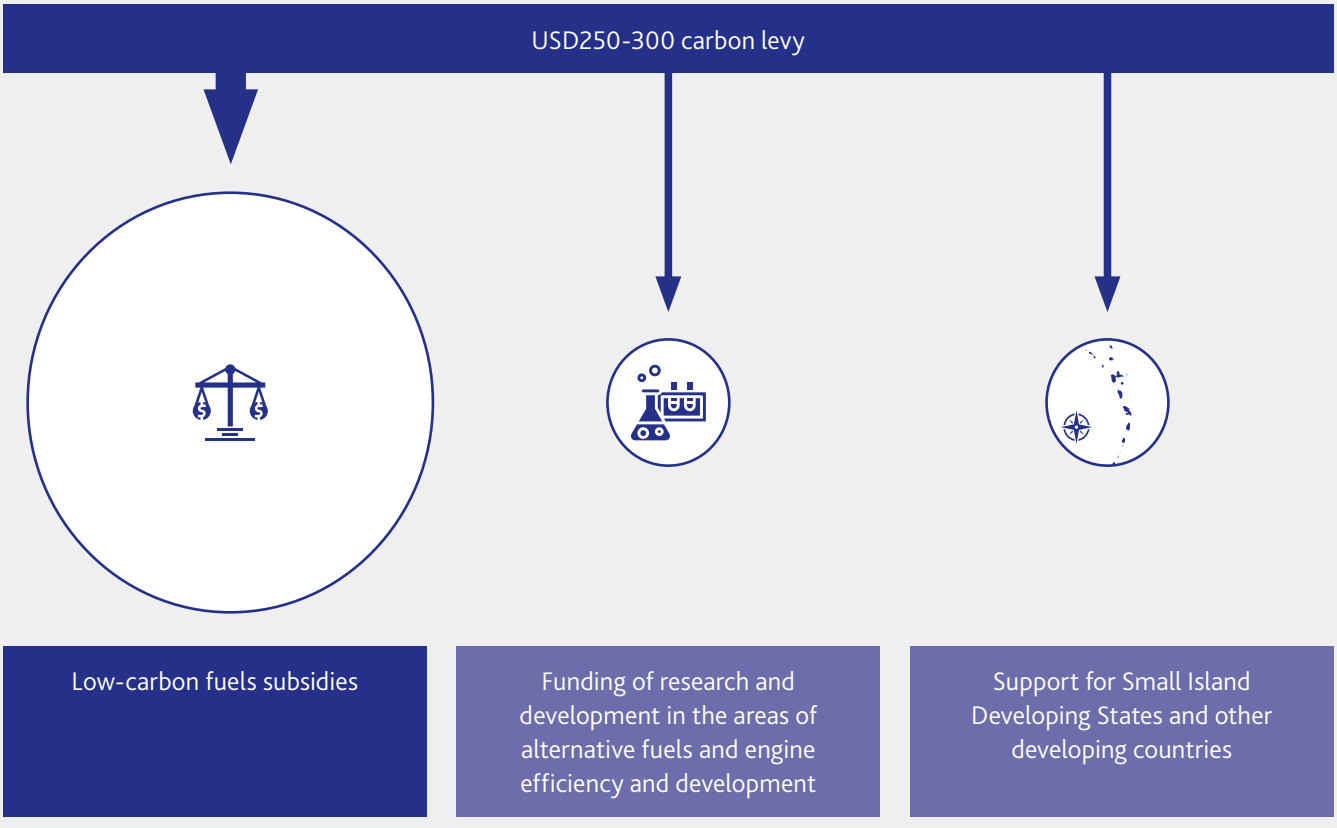
A global carbon levy

Trafigura is proposing the introduction of a global carbon levy on carbon-intensive shipping fuels in the form of a partial feebate system. The system would be overseen by the IMO and would involve charging a levy on carbon-intensive fuels and subsidising low- and zero-carbon fuels.

The revenue raised by the levy would primarily be used to subsidise and incentivise low and zero carbon fuels and subsequently also be used to fund the research and development of alternative fuels, and in part to help Small Island Developing States and other developing countries with the energy transition and to mitigate the impact of climate change.

The inclusion of these elements is why we refer to the scheme as a partial feebate system. While significant details would have to be negotiated within the IMO, we believe that the combination of a market-based measure through the partial feebate system, the funding of research and development and the provision of financing support to Small Island Developing States and other developing countries (see box below) could provide the scope and impact to make it a comprehensive IMO-led global maritime decarbonisation programme.

Carbon levy proposal



A.1. Closing the competitiveness gap

According to our in-depth analysis and commissioned independent research, a carbon levy of between USD250 and USD300 per metric tonne of CO_2 equivalent (CO_2e) is required to close the competitiveness gap between carbon-intensive fuels and low- or zero-carbon alternatives.

The carbon levy would need to be adjusted as the competitiveness gap narrows. As significant initial investments are required in new and alternative fuels systems, it is likely that the competitiveness gap will be large during the early years of a global decarbonisation programme. With time, as infrastructure is built and economies of scale are made in the production of zero- and low-carbon fuels, the gap should narrow. The levies charged and subsidies obtained should consequently also decrease. This proposal is supported by a recent Goldman Sachs report, **Carbonomics – The green engine of the economic recovery**, which states that around 50 percent of global greenhouse gas emissions require a carbon price of more than USD100 per metric tonne of CO_2e to be decarbonised with current technologies. The analysis goes on to suggest that carbon prices could reach up to USD1,000 per metric tonne, particularly in the aviation and shipping transportation industries.

In order for investors, fuel off-takers and shipowners to invest in zero- or low-carbon fuels and appropriate propulsion technology, an early agreement on a global comprehensive carbon levy system and clear regulations are required. Once these are in place, market participants will be able to make longer term investments and commitments to this transition.

A market-based measure explained

A market-based measure is an instrument that uses price and markets to incentivise greenhouse gas emitters to reduce their emissions. Taxes, subsidies and emissions-trading schemes are examples of market-based measures. Applied to marine fuels, a market-based measure would make the use of fuels with low- or zero-carbon emissions more economically viable. Ideally, the market-based measure would feature a mechanism that would allow for the tracking of carbon-intensive and low- and zero-carbon fuel prices and the regular adjustment of the competitiveness gap.

The IMO has given serious consideration to market-based measures since 2006. As far back as 2009, the IMO Marine Environment Protection Committee (MEPC) recognised that technical and operational measures would not be reduced satisfactorily greenhouse gas emissions from international shipping in view of world trade growth projections. An overwhelming majority of members agreed at the time that a market-based measure is needed as part of a comprehensive package of measures for the effective regulation of greenhouse gas emissions from international shipping.

For further information visit: http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx

Carbon dioxide equivalent (CO_2e) explained

In this proposal, we use CO_2e to account for the main greenhouse gas contributors: carbon dioxide, methane and nitrous oxide. In order to assess these greenhouse gases on an equal basis, we use the following global warming potential factors:

Global warming potential of greenhouse gases

GREENHOUSE GASES	GLOBAL WARMING POTENTIAL (OVER A 100-YEAR TIME HORIZON)	ATMOSPHERE LIFETIME (YEARS)
Carbon dioxide (CO_2)	1	100+
Methane (CH_4)	25	12
Nitrous oxide (N_2O)	298	114

Methane is 25 times more potent than CO_2 over a 100-year time horizon. Currently, it is being debated whether a shorter time horizon should be used for the global warming potential of methane. For example, on a 20-year time horizon, methane is 86 times more potent than CO_2.

"Research and development will be crucial, as the targets agreed in the IMO initial strategy will not be met using fossil fuels. There is a need to make zero-carbon ships more attractive and to direct investments towards innovative sustainable technologies and alternative fuels." (www.imo.org)

A.2. Funding research and development

In 2019, the international shipping industry submitted a proposal to the IMO for an International Maritime Research and Development Board (IMRB), which would create a Research and Development Board and Fund, financed by a global tax of USD2 per metric tonne on all bunker fuels.

According to the estimates in the IMRB proposal, the global tax would generate approximately USD500 million annually for research and development purposes. It is acknowledged in the proposal that the tax is not a market-based measure and that the cost to the global shipping industry would be less than one percent of total shipping costs. In addition, the proposal contains detailed suggestions on how the board and the fund would be governed and managed.

Significant work went into the proposal and much of it can and should be built upon. The proposal also makes it clear that the industry would welcome the introduction of a market-based measure, citing that it does not intend to frustrate or delay its development should there be a consensus for such a measure among member states.

If agreed, the IMRB proposal is unlikely to have an impact on market behaviour. Indeed, in its impact analysis, it is concluded that the proposal would neither significantly affect fuel costs nor likely have a material impact on the development of alternative fuels.

It should be noted that if the global tax were introduced and raised USD500 million annually for research and development purposes, this total would be only a fraction of the monies currently dedicated to low-carbon technologies research, which stood at USD20 billion in 2019.

The private sector is likely to allocate even greater resources to relevant research and development. However, research and development alone will not create the conditions in which a reduction in emissions of at least 50 percent can be achieved by 2050.

A.3. Climate impact on Small Island Developing States and developing countries

A number of Small Island Developing States and developing countries stand to be disproportionately affected by changing trading patterns, global warming and rising sea levels.

To mitigate these impacts, we propose that a dedicated IMO mandate could be given to the Green Climate Fund to further support Small Island Developing States. With even as little as one percent of the proposed carbon levy, this could generate as much as USD2 billion per year for the Green Climate Fund, a sizeable sum compared to the just over USD8 billion raised since its inception in 2010.

The Green Climate Fund has the operational and governance capacity to direct significant resources to climate-change mitigating efforts and to help the energy-transition.

The need for a carbon levy

B.1. Emissions from the maritime sector are significant

According to **The Fourth IMO Greenhouse Gas Study**, published in August 2020, greenhouse gas emissions increased from 977 million metric tonnes in 2012 to over 1,076 million metric tonnes in 2018. Emissions are projected to continue to increase significantly if mitigation measures are not urgently put in place.

The study concludes that emissions may increase to 90-130 percent of 2008 emissions by 2050, undermining the objectives of the Paris Agreement. In addition, the IMO study reports a 150 percent increase in methane emissions between 2012 and 2018. As such, to achieve the 2030 emissions target and avoid significant disruption to the industry, urgent action is required.

B.2. No public comprehensive global proposals exist to address zero-emissions shipping

The IMO and its member states have considered various proposals to reduce emissions from the maritime industry and we welcome the European Commission proposal to include shipping emissions in the European Union Emissions Trading Scheme. However, at present, there are no public comprehensive efforts under consideration to incentivise the greater use of low- or zero-carbon fuels on a global scale by 2030.

B.3. The shipping industry needs a market-based measure

Using the IMRB proposal as a starting point, we suggest that IMO member states come together and agree a market-based measure. Whether this measure takes the form of a cap-and-trade system or an outright levy, only a market-based measure will bring about the required market shift. For example, a market-based measure would enable risk mitigation of future production of green fuels by placing a price on carbon.

INTERNATIONAL MARITIME ORGANIZATION

The IMO is committed to supporting Sustainable Development Goal 13, which calls for action to combat climate change and its impact. In 2018, the IMO made a number of commitments to reduce CO_2 emissions across international shipping consistent with the goals of the Paris Agreement. They include:

- Reduce international shipping emissions intensity by at least 40 percent by 2030, compared to 2008 levels
- Reduce international shipping emissions intensity by at least 70 percent by 2050, compared to 2008 levels
- Total annual GHG emissions from international shipping should be reduced by at least 50 percent by 2050 compared to 2008

If the use of carbon-intensive fuels is going to be reduced significantly by 2030 change needs to happen very soon.

A proposed market-based measure: a partial feebate system

Trafigura proposes the introduction of a partial feebate system – a self-financing system where, when a fuel is used that has a CO_2e intensity above an agreed benchmark level, a levy is charged, and where a fuel is used that has a CO_2e profile below the benchmark level, a subsidy is provided.

With this partial feebate system in place, shipowners and charterers will be incentivised to reduce their use of fuels with high CO_2 profile levels, to increase their use of more fuel-efficient ships and to eventually switch to full use of low- and zero-carbon fuels.

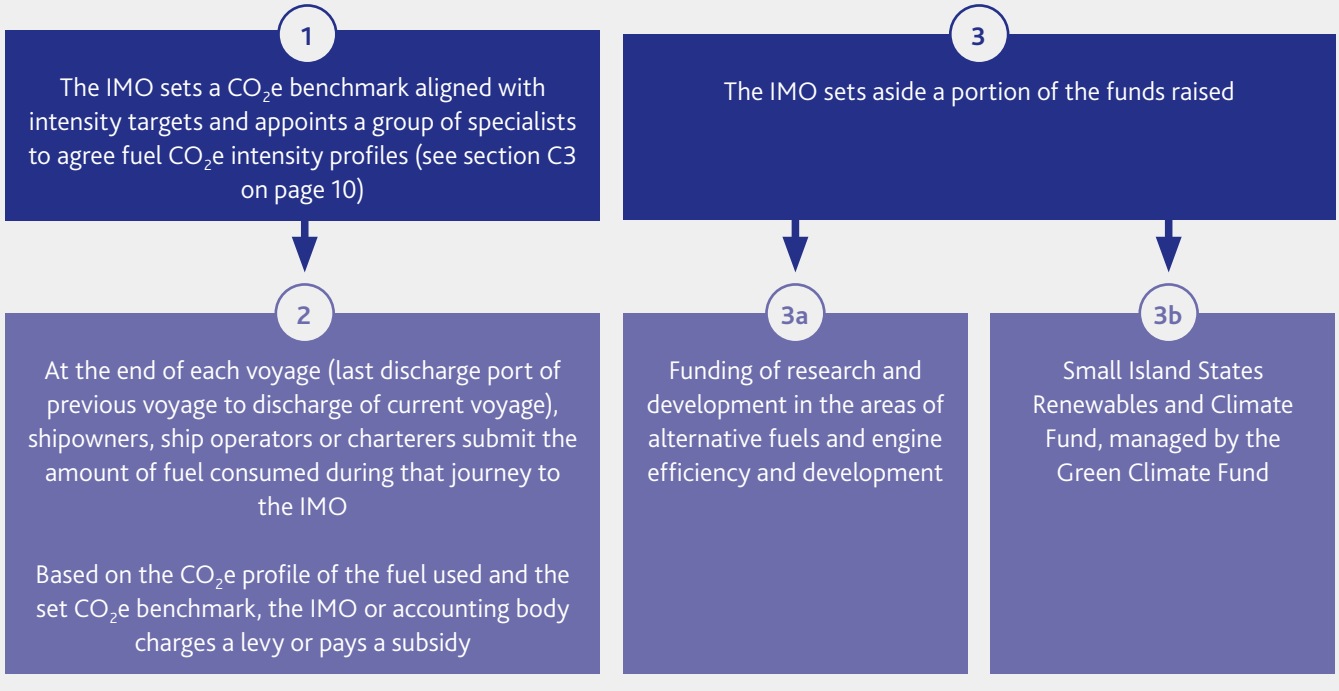
The benchmark CO_2e intensity level should be set in accordance with the 2030 and 2050 intensity targets outlined by the IMO and adjusted as necessary as the shipping industry works toward achieving these goals. In addition, the partial feebate system could generate funds that could be used to finance research and development activity and to help Small Island Developing States and developing countries manage the impact of climate change and energy-transition processes.

C.1. Legal basis for a carbon levy

As outlined in the IMRB proposal, a global effort to reduce shipping industry emissions and the introduction of a carbon levy could be based on amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL). This would provide the legal basis for the carbon levy, setting out governance and accountability arrangements and providing the framework for collection of levies and the distribution of subsidies.

How a partial feebate system could work

The IMO agrees a market-based measure under the auspices of MARPOL. The competitiveness gap is closed using a partial feebate system. Significant resources are dedicated to research and development and climate change mitigation in Small Island Developing States and other developing countries.



C.2. Carbon levy collection

In order to charge levies and pay subsidies, the IMO would need accurate and reliable information about the quality of the fuels and amounts used. It is suggested that shipping companies become obliged to disclose usage between the last discharge port of previous voyage to discharge port of current voyage, as is already the case within the European Economic Area (EEA) and/or EU ports. As suggested in the IMRB proposal, it is proposed that the IMO Fuel Data Collection System be used as a departure for a new reporting system. Actual voyage consumption details and other forms of evidence would have to be submitted to the IMO, and be held available for spot audits and verifications.

Feedstocks and logistical considerations

We recognise that the adoption of low- and zero-carbon fuels will depend on the development of two underlying trends: the evolution of renewable power and the growth of carbon capture. The importance of these trends should not be underestimated.

Replacing the carbon-intensive fuels used by ships today with green methanol or green ammonia would require an estimated 5,500 terawatt-hours of energy, which is equal to around 20 percent of current global power generation. The volume of CO_2 needed to make the required amount of green methanol would be equal to an amount almost 17 times the size of today's carbon capture market (673 million metric tonnes versus 40 million metric tonnes).

In addition, we recognise that switching to alternative fuels is likely to have an impact on on-board tank space and would likely increase fuel consumption volumes (which could double on a metric tonne basis depending on the type of fuel).

The above assumptions do not include the additional infrastructure costs involved to make this switch.

To minimise possibilities for corruption or incomplete reporting, shipping companies, operators and charterers could be required to accept that disclosed information becomes mandatory reporting and failure to disclose should result in fines significant enough to avoid non-reporting. This way, the IMO would have a number of sources available to verify disclosure accuracy.

C.3. Levy and subsidy levels

The purpose of the levies and the subsidies is to close the competitiveness gap between carbon-intensive fuels and low- and zero-emission fuels. In determining the size of the levies and the subsidies, we believe it is necessary to consider the greenhouse gas emissions associated with the grade and the source of the fuel, from well-to-propeller. We believe that this would be the most accurate and legitimate approach to ensuring the transition to low- and zero-carbon fuels.

In the short term, it appears likely that a wide range of fuels will be tested and will need to be given a CO_2e intensity profile. This profile will grow in importance because low- and zero-emission fuels will have significantly different carbon footprints, depending on the feedstock used. We expect to see fossil fuels used as feedstock, creating "grey" and "blue" fuels, and also renewable sources used, creating "green" fuels.

Trafigura believes a group of IMO-appointed specialists should be created to set the CO_2e intensity profiles of fuels. The group would be responsible for carrying out rigorous and unbiased assessments of fuel production routes determining which gases or pollutants (black carbon for example) should be factored in.

The size of the levy or the subsidy applied to a fuel would be based on the difference between the CO_2e benchmark set to meet the IMO emissions targets and the specific CO_2e profiles of alternative fuels (see box on page 11).

Well-to-propeller

C.4. Shipping decarbonisation study

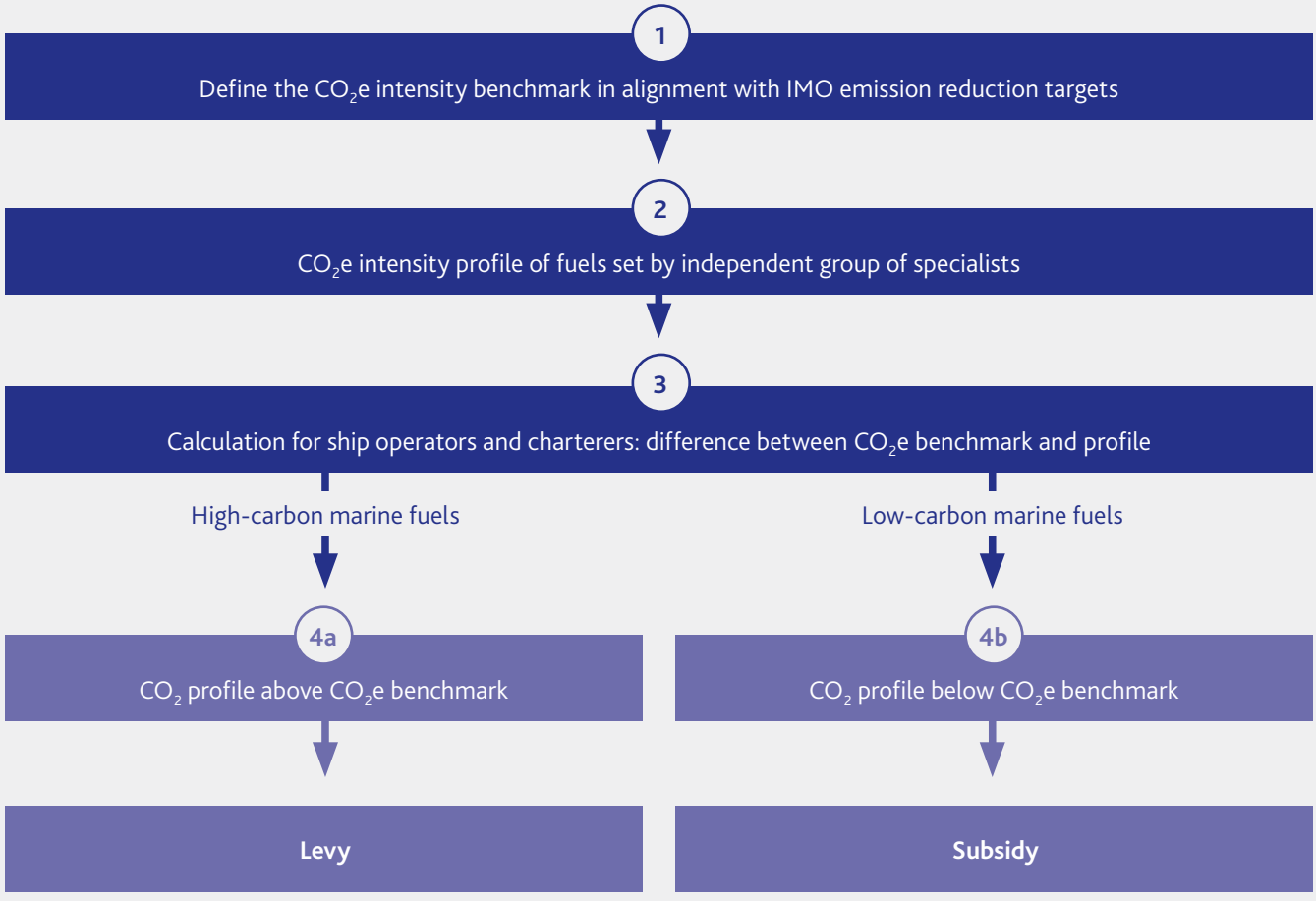
In 2019, Trafigura commissioned Texas A&M University to carry out research on closing the competitiveness gap between carbon-intensive shipping fuels and clean alternatives. Drawing on work with the university, which involved identifying the production cost of low- and zero-carbon fuels using data on the predicted costs of renewable electricity, carbon capture and electrolysers, we believe a levy between USD250 and USD300 per metric tonne of CO_2e on carbon-intensive fuels is needed (see appendix).

C.5. Impact assessment

As with the proposal of any significant regulatory change, it is important that a comprehensive impact assessment of the proposed reform is carried out. The brief impact assessment set out in the IMRB proposal would need to be expanded on. High priority needs to be given to efforts to identify positive and negative impacts of the proposed reform before a detailed proposal can be developed and approved.

Given that the competitiveness gap between currently used fuels and their zero- and low-carbon alternatives is likely to be widest in the beginning, the levy and subsidies will be most significant at the outset. These will likely decrease as the gap narrows, once new infrastructure investments have been made and the costs for zero- or low-carbon fuels are likely to have fallen through technology improvements.

Proposed partial feebate system step-by-step



Acknowledgements

This proposal is based on extensive research, which has included the consideration of various discussions, contributions, papers and proposals relating to previous market-based measures for bunker fuels. In particular, we wish to acknowledge previous proposals from bodies in Cyprus, Denmark, the Marshall Islands and Nigeria.

With regard to the various elements of our proposal, we would like to acknowledge the review, **A Literature Survey on Market-Based Measures for the Decarbonization of Shipping**[1], which provides an excellent overview of various proposals, and **A Carbon Levy for International Maritime Fuels** by Ian Parry, Dirk Heine, Kelley Kizzier, and Dr Tristan Smith, which was particularly valuable in making the case for a partial feebate system.

Furthermore, we would like to acknowledge the paper, **Carbon Levy Evaluation – could a carbon levy in shipping be an effective way to help reach the IMO greenhouse gas reduction goals?**, which was published by BHP Group, BW, DNB, and DNV GL in 2019. Their aim was to facilitate discussion of the subject. They have achieved this and this is our contribution to the debate.

We also wish to acknowledge a paper by Shell, **Decarbonising Shipping: All Hands on Deck – An industry perspective**, which was published in July 2020, and a presentation by University Maritime Advisory Services (UMAS), **Aggregate Investment for the Decarbonisation of the Shipping Industry**, which was given in January 2020. Both documents provide important perspectives on the subject.

We would like to thank the staff which we worked with at the Secretariat of the Global Maritime Forum, IMO, UMAS, IMF and the World Bank, who kindly shared their knowledge with us. While the proposal bears our name, it draws on years of debate of market-based measures within the IMO and research, debate and discussion elsewhere. We would also like to give special thanks to our academic partner, Texas A&M University, for their support with our shipping decarbonisation study.

Lastly, we wish to acknowledge all the private companies in the sector, which we hope we will be working with in decarbonising our industry.

1 Sotiria Lagouvardou, Harilaos N. Psaraftis, Thalis Zis, "A Literature Survey on Market-Based Measures for the Decarbonization of Shipping", Sustainability 2020, No. 12 (10) (12 May 2020).


NORDIC SKIER
GEORGE TOWN

Appendix: Summary of study and levy calculation

The proposed USD250-USD300 levy has been calculated following research carried out in collaboration with Texas A&M University. The findings of the study are summarised below.

As part of this work to set a price for carbon emissions, we carried out a life cycle assessment of various fuels, both on a well-to-propeller and a tank-to-propeller basis. However, we decided to use the well-to-propeller approach, to ensure that all emissions are accounted for.

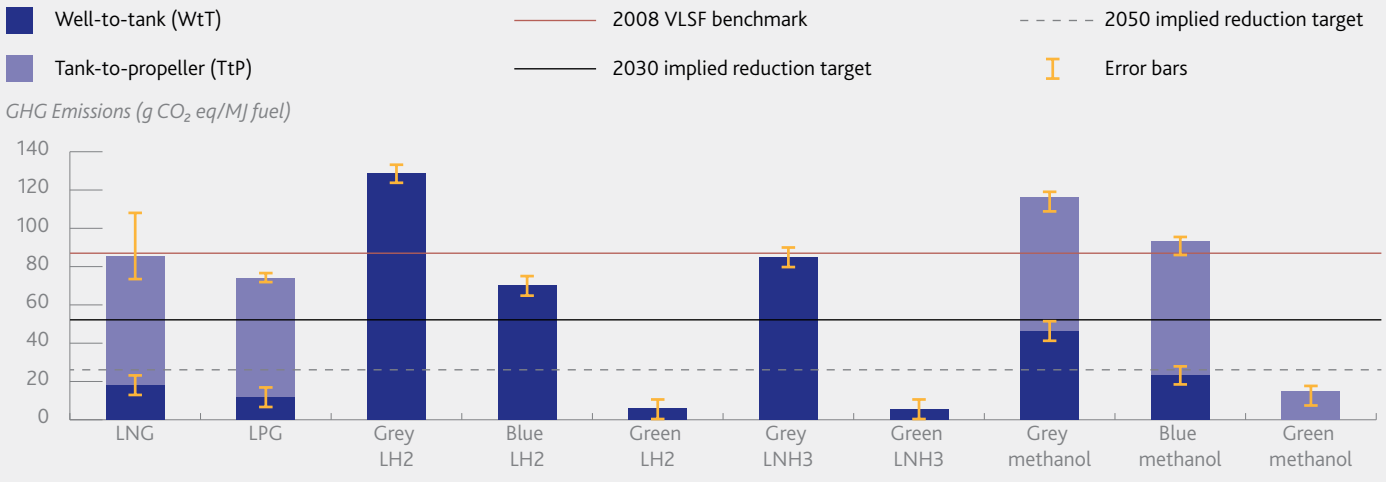
Our intention here was not to model the potential fuel mix we are expected to see but rather those individual fuels that would be compliant with the IMO targets. We also used CO_2e/g/MJ as a unit for energy intensity to compare all fuels on an equal/levelised basis.

We drew inspiration from California's Low Carbon Fuel Standard (LCFS) in designing this proposal. The programme assigns a carbon intensity (CI) score to each transportation fuel and compares it to a declining carbon intensity benchmark. This is set to align with California's low-carbon fuel standard (LCFS) target of a 20 percent emission intensity reduction by 2030 based on 2010 levels.

The carbon intensity score factors in emissions from the feedstock origination, production and distribution of the fuel, as well as its combustion in the vehicle. This is similar to our proposal that an emission measurement from well-to-propeller is key to achieving significant emission reduction.

The LCFS has created a database of carbon intensity scores for a wide variety of fuels, which can then be used by other states looking to implement a similar programme, as Oregon has done. We believe a similar exercise can be done for shipping fuels by an independent group of specialists working under the auspices of the IMO.

Well-to-propeller emissions for surveyed alternative marine fuels
Global



Source: Texas A&M University, Trafigura Research

Error bars reflect degree of uncertainty

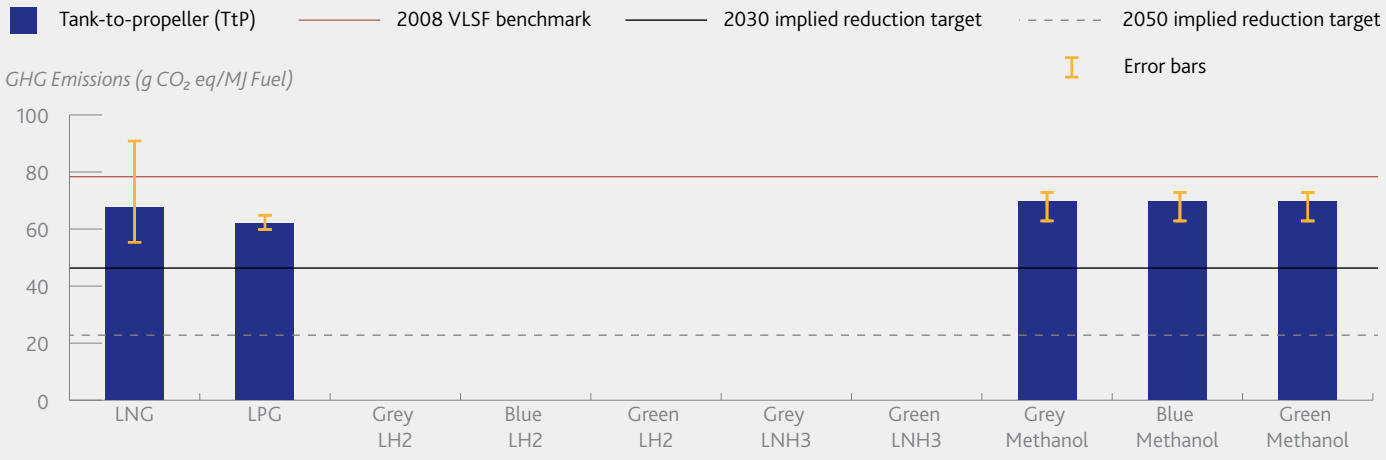
Emission reductions vs. VLSF well-to-propeller*	
LNG	2%
LPG	15%
Green hydrogen	93%
Green ammonia	93%
Green methanol	84%

Emission reductions vs. VLSF tank-to-propeller	
LNG	15-20%
LPG	21%
Hydrogen	100%
Ammonia**	100%
Methanol	11%

* Future NH3 production will require a small diesel injection

** WtP accounts for upstream emissions and therefore overall emissions reductions figures are lower than their TfP comparatives (except methanol)

Tank-to-propeller emissions for surveyed alternative marine fuels
Global



Source: Texas A&M University, Trafigura Research

Error bars reflect degree of uncertainty

Based on our assessment, we concluded that only through the use of green fuels (and in particular non-carbonaceous fuels for tank-to-propeller) could the shipping industry meet the emissions targets set by the IMO for 2030 and 2050.

Once we identified which fuels were potential zero- or low-carbon propulsion fuels, we set attainable alternative fuel production costs, based on foreseeable electricity, carbon capture and electrolyser costs (see assumptions below).

Next, we divided the cost difference by the amount of CO_2 saved by using cleaner fuels on a tank-to-propeller basis. This resulted in a carbon levy value close to USD300 per metric tonne.

Determining the production cost of fuel:

- Power price and fuel consumption
- Equipment capex
- Carbon capture cost

Assessing CO_2e saving from using alternative fuel:

- CO_2e profiles determined by specialists
- The difference with VLSF is the CO_2e cost

Calculation:

$$\frac{\text{Production cost difference: Cost of clean fuel - VLSF cost}}{\text{Emission cost: VLSF}CO_2\text{e - Clean fuel }CO_2\text{e}} \rightarrow \text{USD250-300 levy (or a subsidy)}$$

The assumptions we used:

Power price: $0.02/kWh
Carbon capture cost: $50/mt
Electrolysis cost: $300/kW (70% utilisation)
Emission profile of Very Low Sulphur Fuel Oil: WtP – 87.8 CO_2e g/MJ and TtP – 75 g/MJ
Emission profile of Green ammonia: WtP – 5.7 CO_2e g/MJ and TtP – 0 g/MJ
Emission profile of Green methanol: WtP – 14.2 CO_2e g/MJ and TtP – 69.6 g/MJ
Cost of VLSF: $350/mt

trafigura.com
TJ/0336.1e