

BACKGROUND RESEARCH PAPER

Carbon Pricing for International Shipping (IMO 2020)

1. Purpose of Paper

To present initial research in regard to a potential “1.5 Carbon¹ Tax” proposal for international shipping to inform RMI and other high ambition Pacific Islands States participating in negotiations under the International Maritime Organisation (IMO) emissions reduction Roadmap.

2. Why this Research?

Shipping is a large and increasing emitting sector. Progress to confirm measures at IMO to decarbonize the industry commensurate with 1.5°C is slow and provides no guarantee that an adequate *Revised IMO Strategy on reduction of GHG emissions from ships* (Revised Strategy)² will be agreed and then implemented. The speed and scale of transformational change required of the sector is radical, and the use of ambitious Market Based Measures (MBMs) would appear on available evidence to be essential. The issue of the industry’s obligation to pay for its past, current or future carbon or other GHG pollution has not thus far been addressed.

MBMs are noted in the *Initial IMO Strategy on reduction of GHG emissions from ships* (Initial Strategy)³ as a possible tool in the basket of measures needed, but are flagged for consideration only as medium term measures (i.e. between 2023-2030). A proposal by International Chamber of Shipping (ICS) et al⁴ to Marine Environment Protection Committee (MEPC) 75 to introduce a mandatory \$2/tonne fuel levy to subsidize an IMO mandated research and development⁵ fund as a short-term measure, allows an opportunity to advance the requisite debate on MBMs. Pacific high ambition States have argued several times⁶ that the overall debate on the role and function of MBMs in the IMO emissions reduction roadmap should be an immediate priority within the debate on short term measures (i.e. before 2023), in large part to avoid the situation where the merits of an individual MBM, such as that proposed by ICS et al, are discussed in isolation and in the absence of agreed overall definition of MBMs. Thus far, these submissions have been ignored.

MBMs were extensively canvassed in IMO between 2007-2011, in a fractious and ultimately abandoned debate (Psaraftis, 2012)⁷. It is highly likely that, when the debate is reopened, it will be approached with high caution. Given this, a proposal for a specific substantive MBM from RMI, leveraging its registry strength, and supported by Pacific high ambition States and possibly others, would likely act as a circuit breaker for opening up not only the debate on MBMs but also the deeper issues of shipping obligations viz a viz principles of Polluter Pays and Loss and Damage.

For the purposes of this initial research we have made the following assumptions:

¹ Carbon is used here as a proxy for all GHG pollution caused by emissions from shipping. Such GHG emissions may include methane, as associated with LNG fuel use and NO_x, as potentially associated with ammonia, for example.

² The *Initial IMO Strategy on reduction of GHG emissions from ships* is due to be revised in 2023.

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<http://www.imo.org/en/OurWork/Documents/Resolution%20MEPC.304%2872%29%20on%20Initial%20IMO%20Strategy%20on%20reduction%20of%20GHG%20emissions%20from%20ships.pdf>

⁴ MEPC 75/7/4 (ICS, BIMCO, CLIA, INTERCARGO, INTERFERRY, INTERTANKO, IPTA and WSC) *Proposal to establish an International Maritime Research and Development Board (IMRB)*

⁵ ICS et al further define ‘development’ for the purposes of their proposal as ‘applied research’.

⁶ See for example ISWG GHG 4/2/3 (Antigua et al), ISWG GHG 3/2/4 (Kiribati et al) and 3/2/9 (Belgium et al), MEPC 72/7/7 (France and RMI).

⁷ Psaraftis, H. (2012) *Market-based measures for greenhouse gas emissions from ships: a review*. WMU J Marit. Affairs (2012) 11:211–232 <https://link.springer.com/content/pdf/10.1007/s13437-012-0030-5.pdf>.

- As shown in the 4th IMO GHG Study⁸, shipping is not on track to meet the low levels of ambition specified in the IMO Initial Strategy for GHG Reduction. But those levels of ambition are not close to sufficient for shipping to make a proportionate response to avoiding more than a 1.5°C global average temperature increase. To avoid this level of temperature increase it is necessary that an approximate halving of absolute GHG reductions are achieved across all sectors this decade (ISWG GHG 7/2/18, IPCC etc.) and that the global economy reaches zero emissions by at least 2050. Much higher levels of ambition need to be confirmed in the Revised Strategy by 2023 if shipping is to be consistent with a 1.5°C agenda.
- Emissions reductions for shipping should be addressed within the sector.
- MBMs are an essential component of the basket of measures needed to implement the Revised Strategy. MBMs were reported by IMO to UNFCCC in 2009 as an essential component of the basket needed for the shipping sector⁹. There does not appear to have been any science agreed since 2009 to negate that finding. The inclusion of MBMs as a **possible** measure under the 2018 Initial Strategy signals a shift in the priority accorded this measure at IMO.
- The term tax/levy is used interchangeably in this paper and not defined further at this stage of the research. The legal distinction does not appear entirely clear at international law. UK considers levies to be both nationally and internationally applicable, whereas taxes can only be charged and accrued by States¹⁰. Streng (2020)¹¹ agrees with this distinction between taxes and levies, and notes that under a taxation policy the amount of revenues flowing towards the shipping sector is uncertain and depends on political decisions. However, it is not entirely clear that an international levy must be so directed as narrowly defined by UK.
- Of the available MBMs (emissions trading schemes (ETS), cap and trade, R&D funds, taxes, levies, subsidies, etc.) a carbon tax/levy presents in most reviewed literature as the most effective in terms of universality, effectiveness, revenue generation and ease/cost of application. A carbon tax/levy appears the only option that would allow for a punitive

⁸ MEPC 75/7/15 (29 July 2020) *Fourth IMO GHG Study – Final Report*. Submitted by Secretariat.

⁹ MEPC 60/Inf.9 (15 January 2010) *United Nations Climate Change Conference 2009, IMO submissions and activities* Note by the Secretariat, includes: “the development of technical and operational measures for new and existing ships, as well as market based instruments to, inter alia, act as an incentive for the shipping industry to invest in more fuel-efficient technologies, and also serve other purposes such as raising funds for climate change mitigation and adaptation activities, research and development and the offsetting of emissions”. AWG-LCA 8 “It was agreed by overwhelming majority that a market based instrument was needed as part of a comprehensive package of measures to regulate GHG emissions from international shipping.” (11) “The Committee noted that there was a general preference for the greater part of any funds generated by a market based instrument under the auspices of IMO, to be used for climate change purposes in developing countries through existing or new funding mechanisms under UNFCCC or other international organizations. Assessments have shown that a market based instrument for international shipping may generate funds in the magnitude of billions of dollars annually if applied to all ships in line with other IMO instruments.” (13) “A future GHG regime for international shipping must not negatively affect sustainable development and should not lead to distortion of international competition and create new barriers in international trade”(24). “Recognising the fundamental importance of the principle of CBDR under the UNFCCC regime – consequent with its own philosophy of assisting developing countries... .. IMO and its Member Governments are working hard to address the special needs of developing countries and to satisfy the CBDR principle. Creative and innovative means are under consideration, which would see substantial funds, obtained from carbon offsetting or trading measures (MBMs) applied by shipping being dedicated to climate change mitigation/adaptation in developing countries...”(29)

¹⁰ UK submission ISWG-GHG 7/8/1 *Economic incentives to reduce GHG emissions from international shipping*. UK advises that emissions levies are compulsory payments per unit of emission or related emission-generating activity to a centralized authority with the intention of incentivizing emissions reduction. Revenue generated by levies is earmarked for a specific use and can be paid to either a State or an international body. Emissions taxes are compulsory payments per unit of emission or related emission-generating activity to an administering State with the intention of incentivizing emissions reduction. In contrast to levies, revenue generated by a tax is not earmarked for a specific use and must be paid to the administering State.

¹¹ Streng, M., Van Saase, N., Jansen, M. and Kuipers, B. (2020) *The impact of emission pricing in the Green Deal on Dutch and European maritime transportation*. Erasmus Centre for Urban, Port and Transport Economics.

measure to be imposed on the polluters with the revenue available as compensation to the most vulnerable of those affected by the impacts of that pollution.

- Such a tax/levy should be advanced under the principle of **Polluter Pays**. Shipping is a major and increasing emitter of GHG pollution¹² that contributes to the increasing climate crisis creating unacceptable loss and damage to the global environment and society, to the extent it creates an increasingly existential threat to at least some Pacific Island States and significant loss and damage to all Pacific Island States.
- The tax should be mandatory and universal, and exemptions should be avoided.
- The initial tax rate to be levied should be sufficient to force measurable change away from a carbon based industry and be regularly revised upwards.
- The collection mechanism for a mandatory levy on fuel developed by ICS et al, provides evidence that an adequate basis for a workable system is potentially achievable and this is not considered further here.
- The ratio of allocation of revenue generated is open for discussion, but it is assumed here that a majority share would be directed to climate change mitigation and adaptation/loss and damage for the priority needs of the Climate Most Vulnerable States and a minority to stimulate industry research, development and deployment (RD&D) or other in-sector subsidies.
- The tax/levy could be applied either to the fuel or the carbon emissions produced. In theory, both would have the same impact on the reduction of emissions. The administrative burden is considered relatively low for a fuel levy but not necessarily for an emission levy¹³. Streng et al consider the risk of evasion and carbon leakage higher for a fuel levy, though acknowledge this is also a risk for an emission levy. A tax levied at point of bunker is assumed here. It is further assumed that the tax rate would be proportionate to the carbon content equivalent of the fuels. This leaves an issue to be resolved in regard LNG where the carbon intensity is lower than for Heavy Fuel Oil (HFO) or diesel but the potential for methane slip needs to be addressed. Similarly, other, as yet unproven, alternative maritime fuels, such as ammonia, may generate levels of other GHG pollutants.
- The tax/levy is being considered under a process of the IMO, the dedicated UN specialized agency mandated with the regulation of international shipping matters. Although the specialized agencies are independent international organizations, as a member of the UN family it is assumed that the decision by the IMO on adopting a tax will be, at least, consistent with the highest level global policy of the UN.

3. UN Guidance

The UN Secretary General, in the UN General Assembly and in numerous international fora, has offered consistent strong guidance in regard carbon pricing for polluting sectors, including shipping.

At CoP25 he recalled that *“the Paris Agreement was a solemn promise”* and advised that *“a price on carbon is vital if we are to have any chance”* of delivering on that promise. Members were directed to *“make progress on carbon pricing”* and *“shift taxation from income to carbon”*. The Secretary General noted that it was essential to *“ensure the transition to a green economy is a just*

¹² The recently released 4th IMO GHG study, which is expected to be ratified at MEPC75, shows shipping to contribute just under 3% of all global emissions and the overall quantity of sectoral emissions to be increasing (MEPC 75/7/15).

¹³ The available literature specific to MBMs and the maritime is detailed below. Additionally https://www.un.org/esa/ffd/wp-content/uploads/2019/04/18STM_CRP4-Environmental-tax-issues.pdf finds similarly for when looking at carbon taxes more generically.

transition” and concluded that “without the full engagement of the big emitters all our efforts will be completely undermined.”¹⁴.

If the decision reported by IMO to UNFCCC in 2009 was correct, i.e. that MBMs are an essential part of the basket of measures for shipping, and if it is agreed that a carbon tax/levy is likely the most effective MBM for this sector, then such a tax must be considered consistent with current UN policy if addressed as a ‘now’ priority.

The UN Secretary General and other UN agencies such as UNFCCC have also consistently noted the urgency and upscaling of direct action required to ensure a 1.5°C agenda. There appears no reason to question or diminish such directives given their strong evidence-based origins. Multiple science, including the pre-Covid19 released IPCC 1.5°C report¹⁵, has already doubled down on the directive to act with urgency and ambition. The pandemic only compresses the time frames for taking action and Ms. Figueres, lead negotiator for the Paris Agreement, advised recently that Covid-19 has shrunk the 10 years the world had to address climate change to now no more than 18 months¹⁶. The World Climate Research Programme report published recently¹⁷ reviews all known science and concludes that without immediate and significant action, a 1.5°C upper limit global warming is unlikely to be achieved. Pacific leaders have consistently advised that any failure to limit warming below 1.5°C poses a direct existential threat.

The science is clear that the current level of ambition expressed in the Initial Strategy must be substantively increased in the Revised Strategy, to be consistent with broader and higher-level UN policy. This, in turn, means that all measures under the current Roadmap process need to be considered in anticipation of the Revised Strategy defining substantively higher levels of ambition than those currently being considered.

4. Literature Review

Shipping does not currently pay for its GHG pollution. No literature reviewed found that shipping pays any punitive tax or other compensation for the GHG pollution it creates. ITF-OECD (2018, 2019a, 2019b)¹⁸ found that most countries do not tax carbon emissions from shipping while governments provide significant subsidies to the shipping sector in various forms from generic to specific schemes, from government expenditures to fiscal exemptions for ship fuel. Similarly, Parry et al (2018)¹⁹, reporting for the International Monetary Fund (IMF), found international maritime fuels are underpriced from an environmental perspective as there is no charge for their GHG, particularly CO₂, emissions which are significant and expected to expand steadily without policy action, and the environmental case for a maritime carbon tax is increasingly recognized.

¹⁴ <https://www.un.org/sg/en/content/sg/statement/2019-12-02/secretary-generals-remarks-opening-ceremony-of-un-climate-change-conference-cop25-delivered>

¹⁵ <https://www.ipcc.ch/sr15/>

¹⁶ <https://www.rnz.co.nz/programmes/post-covid-podcast/story/2018748032/after-the-virus-the-environment>

¹⁷ Sherwood, S. et al (2020) *An assessment of Earth's climate sensitivity using multiple lines of evidence* World Climate Research Programme https://climateextremes.org.au/wp-content/uploads/2020/07/WCRP_ECS_Final_manuscript_2019RG000678R_FINAL_200720.pdf

¹⁸ International Transport Forum (ITF) OECD (2018) *Decarbonising maritime transport; pathways to zero-carbon shipping by 2035 Case-Specific Policy Analysis* <https://www.itf-oecd.org/decarbonising-maritime-transport-2035>; (2019a) *Support policy for decarbonisation of maritime transport with carbon pricing* <https://www.itf-oecd.org/sites/default/files/docs/future-maritime-trade-flows.pdf>; (2019b) *Maritime Subsidies: Do They Provide Value for Money?* <https://www.itf-oecd.org/maritime-subsidies-do-they-provide-value-money>

¹⁹ Parry, I., Heine, D., Kizzier, K and Smith, T. (2018) *Carbon Taxation for International Maritime Fuels: Assessing the Options*. International Monetary Fund (IMF) Working Paper No. 18/203. <https://www.imf.org/en/Publications/WP/Issues/2018/09/11/Carbon-Taxation-for-International-Maritime-Fuels-Assessing-the-Options-46193>

A number of expert analyses have been produced since the issue of MBMs was debated by IMO in the late 2000's. Psaraftis considered the outcome of the IMO debate to 2011, including the ten proposals considered by the Expert Group appointed by the IMO Secretary General. The summary notes that the Expert Group worked from the assumption that by making a ship owner pay for their ship's CO₂ emissions, an MBM is an instrument that implements the 'polluter pays' principle. In that sense, it helps internalize the external costs of these emissions.

A tax/levy is the most efficient and cost effective MBM available. Amongst the proposals then considered, neither the Expert Group nor the MEPC reached any consensus on which MBM was most preferable or effective. The proposals by Japan (MEPC 60/4/37 - levy plus rebate to more efficient ships) and Jamaica (60/4/40 - CO₂ levy) most closely resembled a carbon tax.

There appears concurrence in the expert literature that a tax/levy is the most cost effective MBM to implement, and most commentators consider that a tax/levy is likely the most efficient in effecting reductions. Psaraftis found the 2010 Expert Group analysis was largely informed by the US Congressional Budget Office document 'Policy Options for reducing CO₂ emissions' (2008) which compares cap-and-trade with a levy system and concludes that a levy on emissions would be the most efficient incentive-based option for reducing emissions, could be relatively easy to implement and CO₂ reductions would be nearly double with a levy scheme than a cap and trade scheme. Psaraftis also cites McIlveen and Helm (2010) that a carbon tax is the most cost-effective measure, given the likely shape of the damage and cost functions associated with climate change and the possibility that, in choosing a quantity-based approach, we might easily pick the wrong quantity. They opined a tax may enable a more long-term, credible carbon price to be established.

ITF-OECD found a carbon price for shipping would make clean energy sources more attractive compared to fossil fuels, in particular HFO, the most widely used international shipping fuel whose price does not reflect its environmental impacts. While HFO is not taxed, cleaner energy sources, such as electricity, are often subject to high taxes and it is considered that carbon pricing can help to create demand for low and zero-carbon fuels, needed to scale up the production of alternative fuels and renewable energy sources for producing fuels. In similar vein, Parry et al consider that a climate levy for shipping may be the most effective and cost-efficient potential policy instrument and conclude that maritime carbon taxes are economically and administratively promising. They note that a performance standard for new ships (currently implemented by IMO) has only one-third of the effectiveness of carbon taxes for the same implicit CO₂ price. Streng et al considers a levy collected through bunker fuel suppliers can be effectively enforced and as is simple to administer.

Dominioni et al (2019)²⁰ also found the most efficient and effective option among maritime carbon-pricing schemes remains a globally applied fuel tax or levy, with a tax rate set equal to the climate and public health costs of combusting bunker fuels. BHP et al (2019)²¹ evaluated a carbon levy from an industry-led perspective, finding it would be an effective enabler if designed for a level playing field. They consider research and empirical evidence have shown that CO₂ pricing works, and a transparent carbon levy scheme, charged on CO₂ emissions, works best because limited carbon price volatility allows businesses to invest in abatement measures under conditions of greater certainty. They cite the report of the High-Level Commission on Carbon Prices as concluding that a well-designed carbon price is an indispensable part of a strategy for reducing

²⁰ Dominioni, G., Heine, D. and Romera, B. (2019) *Regional Carbon Pricing for International Maritime Transport Challenges and Opportunities for Global Geographical Coverage*. Policy Research Working Paper 8319 <http://documents1.worldbank.org/curated/en/714251516824511861/pdf/WPS8319.pdf>

²¹ BHP, BW, DNB, DNV GL²¹ (2019) *Carbon Levy Evaluation. Could a carbon levy in shipping be an effective way to help reach the IMO greenhouse gas reduction goals?* <https://www.globalmaritimeforum.org/content/2019/10/Could-a-carbon-levy-in-shipping-be-an-effective-way-to-help-reach-the-IMO-greenhouse-gas-reduction-goals-DNV-BW-BHP-DNB.pdf>

emissions in an efficient way. BHP et al draw lessons learned from CO₂ pricing in the petroleum sector whose common finding is how external factors, including market changes, global oil prices, changes in energy systems and security of supply, affect emission levels and suggest similar effects of external factors should be expected for a shipping levy.

What are the objectives of a tax/levy. In terms of specifying the objectives of imposing a tax, the literature produces mixed reports. Three common elements are discernible, the first two most clearly agreed. Firstly, most commentators consider the role of a tax in reducing the price differential between BAU carbon based technologies and lower carbon alternatives, particularly alternative fuels and, secondly, that the use of revenue raised to incentivize RD&D and industry uptake of low or zero carbon technologies, including alternative fuels, to be primary objectives. Less clearly stated is the punitive nature of a polluter tax, providing a financial penalty or disincentive to the polluter continuing a BAU path and generating revenue that can then be utilized as compensation for the victims of the pollution, be this communities or environment. In the literature, a number of commentators reference the need for at least some revenue to be used to assist developing countries, SIDS/LDCs in particular²² although there is divergence as to the form of this assistance.

Whilst not indicating preference for any particular mechanism, the UK submission to ISWG GHG 7 considers MBMs can be understood as "*fiscal and other economic incentives and disincentives to incorporate environmental costs and benefits into the budgets of households and enterprises*"²³. These aim to bring about better outcomes for society as a whole by ensuring that the individuals or organizations responsible for an activity account for the costs they impose on others through their decisions, with the intention that this will change wider behaviors.

The UK submission states that emissions levies, taxes and trading schemes establish a cost for the generation of emissions. They can be broadly categorized as either price-based (mechanisms which directly put a price on emissions or emissions-related activity, e.g. taxes and levies) or quantity-based (mechanisms which set a limit on emissions and indirectly put a price on emissions by creating a market for the trade in emissions permits or credits, e.g. trading schemes).

Kachi et al (2019)²⁴ undertook a broad review of carbon pricing options and found a climate levy which placed an appropriate set price on each tonne of GHG emitted by ships as most likely to steer the shipping sector towards decarbonisation, can adhere to both the principle of No More Favorable Treatment (NMFT) and Common But Differentiated Responsibility – Respective Capability (CBDR-RC), and has comparatively low transaction costs. The report cites Stavins (1998) definition of market based environmental policies as "*regulations that encourage behavior through market signals rather than through explicit directives regarding pollution control levels or methods*" – for example "*tradeable permits or pollution charges*". They cite the OECD definition of market based instruments as those that "*seek to address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services*" (OECD, 2007). The report finds a robust price on GHG emissions, as part of a broader policy package, could efficiently help speed up adoption of measures to reach the goal of decarbonizing the sector by 2050.

²² It is noted that, this study aside, none of the literature referenced has considered this issue through the lens of the climate most vulnerable.

²³ ISWG-GHG 7/8/1 *Economic incentives to reduce GHG emissions from international shipping* available to IMO members on IMODOCS.

²⁴ Kachi, A., Mooldijk, S. and Warnecke, C. (2019) *Carbon pricing options for international maritime emissions*. New Climate Institute for Climate Policy and Global Sustainability. <https://newclimate.org/wp-content/uploads/2019/04/Carbon-pricing-options-for-international-maritime-emissions.pdf>

Any tax/levy will be revenue generating, potentially raising billions to hundreds of billions of dollars in coming years. There is not concurrence in the literature as to how such revenue should be utilized or what purposes should be prioritized. Parry et al note allocation of the (potentially sizeable) revenues is highly contentious (e.g. some see maritime taxes as a natural and urgent source of climate finance and others a funding source for technology RD&D and other programs within the maritime sector) and opine that an option (which might permit more aggressive pricing) is to limit revenues raised (while preserving mitigation incentives) by charging ship operators for the difference between their emissions and a benchmark level.

OECD-ITF notes that even where technologies exist, a major bottleneck for scaling innovations is the unbalanced playing field between fuel oil and alternative fuels and considers the ambition of an IMO GHG reduction RD&D program could be to bridge this gap, in combination with measures such as carbon pricing. Additionally, they consider revenues from a carbon pricing mechanism could be used in part to compensate affected countries for adverse trade impacts of decarbonisation of maritime transport, as could support via capacity building and technical assistance to develop green shipping.

Parry et al consider that, unlike most alternative mitigation instruments, carbon taxes promote and strike a cost-effective balance between the full range of potential opportunities and, unlike other pricing instruments, a tax provides more certainty over prices and is simpler to administer and comply with. Their research found that although some design specifics of carbon taxes may appear contentious, there are workable options for moving policy forward. In regard potential compensation for vulnerable countries they consider compensation mechanisms, if required to reconcile the principle of CBDR-RC and global application of the maritime carbon tax (preferred due to the high mobility of the tax base and the undesirability of introducing trade distortions), should be practical, not least because the burden of maritime carbon taxation is generally small in relation to countries' GDP. Parry et al consider that taxes would need to be accompanied by measures to develop and deploy alternative fuel technologies if the deep emissions reductions envisioned by mid-century are to be achieved.

Kachi et al also consider a price on carbon can provide a broad economic incentive to reduce ship GHG emissions and develop low-carbon technologies and products, particularly incentivizing inventors and investors to develop and fund low-carbon products. They quote Faber et al (2016) finding that the most important factors driving efficiency improvements are fuel prices and freight rates. High fuel prices increase the relative attractiveness of more efficient vessels and decrease the payback period required for additional capital expenditure of energy efficiency improvements.

Kachi et al also argue a price based on the carbon content of the fuel increases the competitiveness of lower carbon fuels and especially alternatives like hydrogen and this is likely to result in increased investment in energy efficient ships, as well as operational improvements and would therefore give a competitive advantage to firms and ship builders and owners who invest in technology to reduce emissions. In addition to reducing GHG emissions, they consider a carbon price can also generate revenues that can be used to address disproportionate impacts (e.g. food price increases for remote countries and islands that depend on imports for their food security), finance climate adaptation efforts in developing countries, and fund RD&D in the shipping sector. They recommend a levy be accompanied by some form of compensation for developing countries from revenues, thereby implementing the CBDR-RC principle, as well as for in-sector RD&D.

BHP et al consider the primary purpose of carbon pricing should be providing financial incentives to invest in emission reduction technologies and solutions and, to raise funds for RD&D piloting and initial scaling with regards to onboard ship systems, and for alternative fuels and onshore infrastructure. Any proceeds beyond that could go towards globally well-established environmental funds like the Global Environment Facility (GEF) and the Green Climate Fund (GCF).

In summary from across the studied literature, there are consistently justifications for the following objectives:

- To create incentive for increased efficiency and reduced carbon intensity by increasing the cost of operating in proportion to emissions and fuel use
- To enable stimulation of innovation and take-up of technologies and fuels that reduce GHG emissions
- To provide compensation for economies for adverse impacts

What price to put on shipping carbon? In terms of pricing a tax there are three main considerations: what level of tax is required to produce transformational change, should it be a static or flexible rate, and what the entry level price should be. A number of sources give indications of what an effective price structure might be, but it is obvious there is a need for updated and hard independent analysis to now be undertaken and made publicly available.

Psaraftis cites modeling by Devanney (2010) as estimating that with a base bunker fuel oil price of \$465/ton, a \$50/tonne bunker levy will achieve a 6% reduction in total VLCC emissions over their lifetime. A reasonable estimate of the reduction from a \$150/tonne levy is calculated at 11.5%.

An industry think piece from Ship Technology (2016)²⁵ reported that following the Paris Agreement, the IMF suggested implementing a carbon tax of \$30/tonne of CO₂ emitted from maritime and aviation fuels, which would raise around \$25 billion a year in 2014 even after compensation for developing countries is factored in. The report also noted that in October 2015, the ICS rejected a call from OECD-ITF to impose a \$25 levy on carbon. More recently, OECD-ITF quote Smith et al (2019) in recommending a carbon price in the order of US\$50-100/tonne CO₂²⁶ as needed to generate sufficient uptake of alternative fuels or renewable energy sources on the pathway towards decarbonisation of maritime transport.

Parry et al advise that economic models are available for assessing the future emissions impacts of carbon taxes though they note that, for practical purposes, it may be challenging to implement prices considerably higher than in other pricing schemes (typically around \$5-\$30/tonne of CO₂ at 2018 levels)²⁷. They use the example of a carbon tax rising to US\$75/tonne of CO₂ in 2030 (\$240/tonne of bunker fuel), and \$150/tonne in 2040, and calculate these by themselves would reduce maritime CO₂ emissions below BAU levels by nearly 15% in 2030 and 25% in 2040, raise revenues of about \$75 billion in 2030 and \$150 billion in 2040, while increasing shipping costs by 0.075% of global GDP in 2030. Clearly these rates do not meet 1.5 and there is a need for more detailed modelling of price.

Parry et al also find a revenue neutral carbon tax with the same emissions price (i.e. one that taxes operators with relatively high emissions intensity and subsidizes operators with relatively low emissions intensity) is only slightly less effective at reducing CO₂ and increases average shipping costs by 0.005% of global GDP in 2030. The analysis notes that while there are different candidate designs for carbon taxes that should be considered, including the possibility of a revenue-limiting tax, the global burden of the tax appears to be small.

²⁵ Ship Technology (2016) *Debating a carbon tax in global shipping* <https://www.ship-technology.com/features/featuredebating-a-carbon-tax-in-global-shipping-4885856/>

²⁶ This would equate to a tax of 160-320 US\$/tonne of fuel. The price of low sulfur HFO in Rotterdam over the past 6 months has varied between 149-537 US\$/ton. At present the price is about 300 US\$/tonne of fuel. The highest tax in the range of 320 US\$/tonne of fuel added to the lowest recent price of 149 US\$/tonne would be less than the highest recent fuel price of 537 US\$/tonne. This would seem to imply that if the tax were effective and reduced fuel demand, the price could be lowered enough to eliminate the effect.

²⁷ This should be avoided by an architecture of the scheme that does not invite such comparisons, and that does not allow transfers of the burden to other sectors. Any carbon trading scheme would be open to this problem, and would risk failure (as far as CO₂ emissions from ships are concerned) if the price of carbon credits falls.

In their submission to ISWG GHG 7, UK does not indicate a desirable price but do state that levies and taxes enable authorities to set a clear price signal for the sector and avoid the fluctuations of a traded market. UK conclude that if appropriately designed, levies, taxes and trading schemes have a high ability to meet these targets. With the correct design elements, these core measures could contribute to meaningfully altering behavior and decreasing emissions from the sector.

IMarEST²⁸ (2018) found that the “depending on how prices evolve for renewable electricity in coming decades, 100% absolute reduction of shipping GHG by 2050 appears achievable for a marginal abatement cost [of carbon] of 100 to 500 US\$/t”.

Modelling exercises undertaken for the UK Clean Maritime Plan²⁹ suggest that a carbon price of US\$20 per tonne of CO₂ in the mid-2020s rising to around US\$210 per tonne of CO₂ in 2050 could be enough to meet the IMO’s minimum level of ambition for 2050. Other scenarios consider more ambitious interpretations of the IMO’s Initial Strategy, including targets of zero operational shipping GHG emissions globally by 2040 and 2050. In those scenarios, the carbon price could start at a modest level of around \$6/tonne CO₂ in the late-2020s and by 2050 increase to about \$450-650/tonne CO₂ (Frontier Economics et al)³⁰. These scenarios illustrate what the carbon price levels would need to be if carbon prices were the only policy measures put in place to achieve the IMO’s levels of ambition and decarbonize shipping. This research also considers that depending on how a potential carbon pricing mechanism is designed, there is a possibility to recycle revenues generated from carbon pricing back into the wider shipping system. This revenue recycling would lower the costs for cutting emissions from ships and hence the carbon prices required - this possibility is not considered in the scenarios.

BHP et al are of the view that a carbon price needs to be set at a level that incentivizes real GHG emission reduction efforts through technological and/or operational solutions. The carbon price should send a clear signal to industry stakeholders to start investing in decarbonization, but it should also not disrupt trade or have a disproportionate impact on States. In their report the price is largely set by considering costs of funding of RD&D and reducing or “levelizing” the additional cost of alternative fuels. Cognizance was had to targets set by the Paris Agreement, and related price levels, levels applied to other industries, and the cost impact on consumers and GDP. Well before 2035, a review would determine the future levy needed. This would be conducted with a view to incentivize full decarbonization of shipping, while taking into account the progress on technologies and alternative fuels by that time, and broader progress on climate change. The following staged approach concept is envisaged - with price escalation within each stage:

Stage	Use of proceeds	Level (per tCO ₂)	Annual proceeds ¹
Stage 1: Short term (Until 2030)	R&D and piloting	USD 5-30	USD 4-24 billion
Stage 2: Mid-term (2030-2035)	Further piloting, initial scale-up and infrastructure	USD 10-50	USD 8-40 billion
Review and determine levels for Stage 3			
Stage 3: Long term (From 2035)	Towards full scale-up and transition	Level TBD	TBD, but total volume may decrease as decarbonization accelerates

²⁸ IMarEST (16 February 2018) ISWG-GHG 3/3 *The costs of GHG reduction in international shipping*

²⁹Frontier Economics, UMAS, E4tech and CE Delft (2019). Reducing the Maritime Sector’s Contribution to Climate Change and Air Pollution. Scenario Analysis: Take-up of Emissions Reduction Options and their Impacts on Emissions and Costs (including the Technical Annex). Available online: <https://www.gov.uk/government/publications/clean-maritime-plan-maritime-2050-environment-route-map>

³⁰https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/816018/scenario-analysis-take-up-of-emissions-reduction-options-impacts-on-emissions-costs.pdf (see section 4.3)

In their review Kachi et al conclude that the impact of a climate levy depends on its price level. A levy allows the regulator to set the price. They consider a low levy is unlikely to incentivize the shipping sector to sufficiently reduce GHG emissions to achieve the 2050 target and align the sector with the goals of the Paris Agreement. However, a carbon price that is high enough to make renewable energies and low-carbon technologies competitive with fossil fuels, will be effective in contributing to the decarbonisation of the international shipping sector³¹.

They suggest the price level could be set equal to the carbon price necessary for the shipping sector to align with the 2°C or 1.5°C Paris Agreement targets. They quote Lloyd’s Register and UMAS (2017) as concluding a carbon price as high as US\$250/tonne of fuel makes zero-emission alternatives highly competitive and would likely lead to complete decarbonisation by 2035³². However, they consider an immediate levy in that price range is unlikely to attract widespread support from industry and governments.

Kachi et al consider the price under a climate levy should follow a defined pre-set trajectory, providing investors with certainty and therefore incentivizing investments in technical and operational measures. They echo several other commentators in suggesting an option is to start with a relatively low carbon price, which prevents market distortion or a shock to world trade. The levy could then be increased on an annual basis to provide certainty for investors and make the transition to zero-carbon fuels and technologies attractive such that fossil fuels are phased out by around 2050. By increasing the levy each year, they argue IMO is able to react to technological changes in the sector. The research notes that several jurisdictions with carbon prices have taken this approach of gradually increasing the carbon price, for example in British Columbia (British Columbia, 2018).

Kachi et al also canvas previous literature on price setting. They note at MEPC61 India and China argued that in order for an MBM to comply with the CBDR-RC principle, all participating countries should be at the same level of technological and economic development. If this is not the case, an MBM favors developed countries and impedes developing countries. They consider the perception of the extent to which such a carbon price would favor certain countries over others may be larger than reality. They noted that AGF (2010) considered a low levy (\$25/tonne of CO₂) is expected to have a small impact on commodity prices and they quote Halim, Smith and Englert (2019) as evidence that a carbon price in the range of US\$10–50/tonne of CO₂ would increase maritime transport costs by only 0.4–1.6%, and conclude the impact on transport mode choices would be minimal. Also, the impact on countries’ GDPs would be minor, with a carbon price of US\$90/tonne of CO₂ having an effect of ~0.002% of GDP for large developing countries. Comparatively, a US\$30/tonne of CO₂ could have an economic impact of ~1% of GDP for a remote Small Island Developing State³³.

In summary/conclusion:

- There are a broad range of values/levels for carbon price within the literature. These represent a range of:
 - assumptions around stringency e.g. objective for rate of CO₂ reduction

³¹ That level of price must take into account the likelihood of fossil fuel prices adapting to lower demand. This means that the tax must in itself ensure the high price level.

³² The LR/UMAS study says that “zero-emissions options only become competitive with conventional propulsion for carbon prices of in the order of \$250/tonne”. The report does not mention that this will lead to complete decarbonisation by 2035. <https://www.lr.org/en/insights/global-marine-trends-2030/zero-emission-vessels-2030/>. It also assumes the base price of the fuel is not reduced to compensate for the carbon price, and that the zero-emission alternatives are available and not more expensive.

³³ This calculation may not include effects where transport to/from SIDS are only marginally viable, so that a small change eliminates enough of the transport to cross a threshold whereby it ceases services altogether.

- input assumptions for price of fossil fuels and the alternative non-fossil fuels (more recent literature often has lower prices for alternative non-fossil fuels, and therefore lower levels of carbon price for the same stringency, as the evidence emerges these are likely to be more affordable than expected even a few years ago)
 - differences in the models used to estimate the carbon price needed to achieve a given amount of decarbonisation
 - a number of sources cite \$250/t of fuel as a price that would be needed to incentivize adoption of alternatives to fossil fuel (a price reached without assumptions about reinvestment of the revenue raised which would reduce the price level needed), but this price level is derived from 2017 literature and without an analysis of the pathway needed to achieve decarbonization consistent with 1.5°C. More recent literature has indicated that for shipping to reach zero operational emissions by 2040 or 2050, carbon prices would need to reach \$250-380/tonne CO₂ by 2050. Again, these price levels are reached without assumptions about reinvestment of the revenue raised which would reduce the price level needed.
- Most of these prices are all levels of tax/levy estimated on what would be needed to ‘close the gap’ between fossil and non-fossil fuels. Actual price levels experienced in the industry would be a function of the design of the tax/levy. Reinvesting some share of revenue in the sector reduces the effective price and therefore any increase in transport cost and the impacts on States, but this needs to be traded off against the use of revenue for compensation.

Should the tax/levy be applied domestically or globally? All literature reviewed indicates a strong preference for any MBM to be applied globally. Parry et al note that maritime carbon taxes could be collected domestically but the more immediately relevant option would be international collection from ship operators through establishment of an IMO-administered fund. Likewise, Kachi et al find that with a fuel tax, emissions are priced upstream, at the point of sale to the ship based on the carbon content of the fuel. Crucially, for the sector, a fuel tax would have to be applied globally to be effective. They also point out that applying an MBM on fuel supplies is, in theory, the simplest way to implement such a measure whilst noting that issues of enforcement and carbon leakage risk would need to be addressed if this was done via fuel suppliers. Making shipping companies responsible is a more promising approach with enforcement to be checked as part of Port State Control. On this point Kachi et al also note that, in part, a lack of capacity among Flag States means that an MBM that relies on Flag State enforcement is unlikely to be effective.

BHP’s industry analysis concludes shipping is uniquely placed to enact international legislation through the work of IMO and a scheme will have to address impact on states, the critical role of international shipping in global trade, and how it can be properly enforced, collected, and deployed. In regards collection of funds, it is considered that proceeds should be collected by a entity such as the IMO with enforcement modelled after MARPOL and linked to the data collection system. This will ensure the shipping sector has control over the proceeds, and a level playing field is established for enforcement and collection.

Dominioni et al (2019) also consider a global levy to be the most effective instrument. Streng (2020) considers an important argument in favor of a tax is that the governance related to the collected money will be executed by the Member States, which are experienced in this. In case of a levy, the responsibility should lay with a responsible and trusted organization which manages and spends the collected money. In the case of a global levy, when the IMO manages the revenue flows of the levy, the contributing countries and parties only indirectly influence spending of the revenues.

There is agreement that any such scheme needs to be compulsory or mandatory. There is divergence as to whether it should also be universal. For example, Kachi et al consider a size and weight threshold of the ships to be included of 5,000 GT and above, as a reasonable cut off for compulsory participation in the MBM, and note ships above this threshold account for 85% of

global maritime GHG emissions. They further note that the IMO data collection system as well as the EU monitoring, reporting and verification regulations use this threshold of 5,000 GT. Alternatively Streng et al consider that competition distortion should be avoided and all ships should be subject to the levy.

5. Guiding Principles

A tax/levy, if adopted, will be advanced under the IMO emissions reduction Roadmap process and in anticipation of MBMs being included in the basket of measures adopted in the Revised Strategy. Under the Initial Strategy, MBMs are listed as possible mid-term measures³⁴. It is assumed that they will be confirmed as essential and ‘now’-term in the Revised Strategy to be consistent with a 1.5°C agenda³⁵.

There is sufficient directive from the literature to demonstrate an initial evidence base to narrow the choice of instrument to a tax/levy. Whether the IMO now completes the necessary step of prioritizing a carbon tax under the Initial Strategy is a political decision for member States. The previous attempt to negotiate an MBM in IMO was unsuccessful and there is as yet no clarity on whether members will agree to confirm MBMs as an essential measure, agree to advance the debate on MBMs as a ‘now’ priority, or what type of MBMs would be favored by members.

In making their decisions, the IMO member States have already agreed to be guided by a number of **Principles** set out in the Initial Strategy, as represented in **Figure 1**.

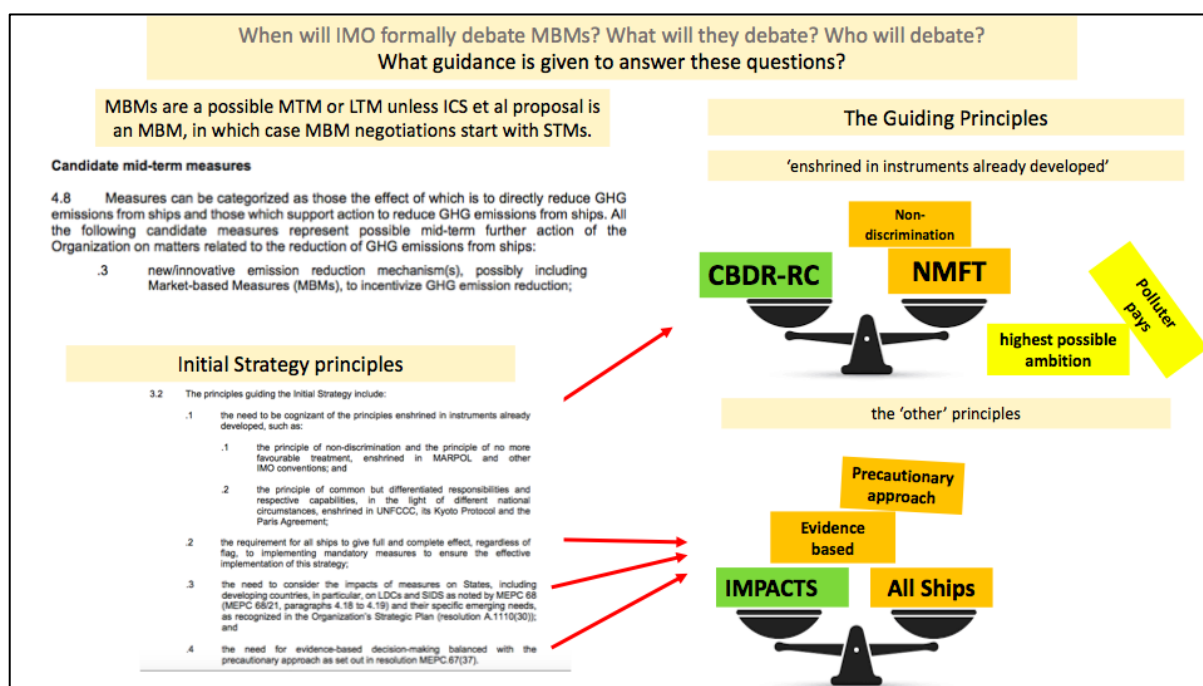


Figure 1: IMO Principles and the Initial Strategy

Members have agreed to be cognizant of the principles enshrined in instruments already developed, such as:

- non-discrimination,
- No More Favorable Treatment (NMFT),

³⁴ “4.8.3 new/innovative emission reduction mechanism(s), possibly including Market-based Measures (MBMs), to incentivize GHG emission reduction”.

³⁵ In 2009 IMO reported to UNFCCC that it considered MBMs as an essential component of any basket of measures (MEPC 60/Inf.9) where the objective is aligned to a 1.5°C agenda. The IMO would be inconsistent with overall UN policy not to price carbon as a ‘now’ priority.

– Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC)

and ‘other principles’, defined as the implementation of mandatory measures regardless of flag, the need to consider the impacts of measures on States, and the need for evidence-based decision-making balanced with the precautionary approach.

No guidance is given to the respective weighting or hierarchy of these potentially competing principles. The actual definition of these ‘principles’ is not clearly stated, and the relevant section of the Initial Strategy appears to be open to challenge.

For example, the principle of Polluter Pays is well established in international environmental law, already enshrined in existing IMO instruments, and was central in the previous IMO debate on MBMs, yet it is not specifically recognized in the Initial Strategy. The principle of CBDR-RC has been extensively debated by States at UNFCCC and is well enshrined in relevant processes and instruments there, yet its definition in the context of IMO has never been formally defined. How this is now to be given effect by IMO in the context of MBM negotiations, and how the obvious tension between CBDR-RC and NMFT is to be balanced or traded is completely undefined.

It can be assumed that IMO will find that CBDR-RC applies at and to the level of Member States. In contrast, the convention of NMFT, who status as an internationally recognized principle in its own right is not yet clear, is currently applied to ships, not States.

There would appear an obvious connection between the named principles of non-discrimination and NMFT. It is possible that as NMFT at IMO applies only to treatment of ships, and not to States themselves, that the principle of non-discrimination has been included in the Initial Strategy to imply that measures should be applied universally to all States. In which case an obvious tension is established with CBDR-RC which is clear that different responsibilities lie on States dependent on their respective capabilities.

Nor is it clear what the overlap between the principles listed in 3.2.1 and the additional principle listed at 3.2.2 of the Initial Strategy, “*the requirement for all ships to give full and complete effect, regardless of flag, to all mandatory measures...*”. On face value it appears a simple duplication on the clauses in 3.2.1.1. If it is held that NMFT is, in fact, a principle and not a simple convention, the simplest reading is that it can only confirm that measures agreed by IMO will apply to all ships. NMFT in itself is not cause to not apply CBDR-RC across all Member States participating in IMO to the extent possible.

The list of examples given in the Initial Strategy is not exclusive and is assumed to include all other relevant principles already enshrined in instruments already developed. These include the Polluter Pays principle³⁶, already enshrined by IMO for example in instruments related to oil pollution from ships to water and the Principle of Highest Ambition enshrined in the Paris Agreement³⁷.

Applying Polluter Pays to MBMs implies that ships that pollute with GHG emissions should be directly liable for the consequences of such pollution, and allow for the establishment of a punitive tax to raise revenue to compensate for the resulting loss and damage to communities and environment, arguably with the most affected and most vulnerable to climate change being first in line.

³⁶ IMO has adopted the Polluter Pays principle in at least three of its conventions; the IOPC Fund (which comes on top of the CLC Convention, which is itself also adopting such a principle), the OPRC Convention and the HNS Convention. <http://www.imo.org/en/MediaCentre/HotTopics/Pages/HNS-2010.aspx>

³⁷ Voight, C. and Ferreira, F. (2016) *Dynamic Differentiation: The Principles of CBDR-RC, Progression and Highest Possible Ambition in the Paris Agreement*. *Transnational Environmental Law* Vol 5 Special Issue 2 <https://www.cambridge.org/core/journals/transnational-environmental-law/article/dynamic-differentiation-the-principles-of-cbdr-rc-progression-and-highest-possible-ambition-in-the-paris-agreement/59D247C2EFFAD77F980A4CA67B5C4ED3>

Applying the principle of Highest Possible Ambition, established by full consensus of the international community at Paris in 2015, would imply that making all possible effort to reduce shipping's contribution to the climate crisis is both *a priori* and a priority of the IMO strategy. In the current debate it appears this is only one objective to be weighted against others, such as non-impedance of world trade.

The further 'principles' named in 3.2.2: the need to *consider* the impact on States, and evidence-based decision-making *balanced with* the precautionary approach, also potentially raise a number of issues.

Regardless of these inconsistencies and anomalies, a universal carbon tax combined with a mandatory levy to subsidize incentivization of RD&D, assuming it were implemented as a 'now' priority, can be considered consistent with the principles as currently defined in the Initial Strategy if:

- The objective of the tax/levy is consistent with the principle of Highest Possible Ambition.
- Through use of revenues, it provides options both for addressing CBDRRC in a fundamental way (e.g. direct compensation to the climate most vulnerable/least capable) as well as for addressing some of the specific impacts (disproportionate negative impacts on developing countries, especially SIDS and LDCs), which are explicitly referenced in the Initial Strategy.
- The tax/levy is predicated under the principle of Polluter Pays. Combustion of fossil fuels within the maritime sector results in generation of GHG pollution creating unacceptable adverse effects and harm to the global population, most likely to be disproportionate for the Climate Most Vulnerable.
- There would be non-discrimination between ships, or types of bunker to ships and, regardless of whether they were of compliance flag or not, they will be treated equally. The tax/levy would need to be mandatory and preferably universal. Exemptions are discouraged. All ships of all flags would pay an equitable carbon tax on all fossil fuels bunkered. No ship would be treated more favorably than another.
- The principle of CBDR-RC would be met through transfer of the majority revenue generated, for mitigation and adaptation needs of the Climate Most Vulnerable and as compensation for loss and damage caused, for administration under UNFCCC sanctioned processes.
- The IMO Initial Strategy creates a new principle requiring that impacts on states must be assessed and addressed. The disproportionate negative impact on States arising from the IMO Initial/Revised Strategy can be, at least in part, compensated for through increased access to equitable climate financing.
- The allocation of the RD&D subsidy component administered under IMO sanctioned process entails evidence-based decision-making balanced with the precautionary approach to provide maximum efficiency. The guiding principles imply that this spending needs to ensure that fleets owned/serving SIDS/LDCs are prioritized. States shown to be disproportionately negatively impacted could also receive priority access to the RD&D fund.

6. Options for Pacific Decision-Makers to Consider in Regards a Carbon Tax Design

The literature provides some guidance on the components of a preferred design but it obvious that there is more detailed analysis required. Cognizant of this caveat, in this section we propose key components of a preferred design for Pacific high ambition delegations to consider, based on available knowledge.

Guiding objectives:

The **objective** of the tax/levy needs to be first defined. It is assumed that for Pacific high ambition States the primary objective is to provide the **most effective** instrument for peaking global shipping

emissions as quickly as possible and aggressively reducing emissions to zero before³⁸ 2050 and commensurate with a 1.5°C agenda. It is further assumed that a strong secondary objective is for fair compensation for the loss and damage needs of the Climate Most Vulnerable States. Thus, the instrument will need to comprise more than one component: a pollution tax, a subsidy to incentivize relevant RD&D, and finally the cost of administering the instrument.

It is preferable for the design to be the **simplest possible** without reducing the effectiveness of the tool. This may require considering the trade-offs between simplicity and efficacy.

Scope/coverage:

It is assumed that, to the greatest extent possible, the tax should be **universally and mandatorily applied** to all maritime fossil fuels, and exemptions (e.g. for ice bound ships or marginally viable Pacific routes, or fuel used for auxiliary power) should be avoided. A universal and mandatory instrument will presumably also be the most cost-effective and easily implemented.

Tax/Levy price level:

The tax/levy could be at a fixed or flexible rate. It is assumed here the tax rate is **adjustable and will increase over time**.

The ultimate price at which a tax/levy achieves transformational change is currently unknown. Where the objective is to **reduce or remove the price differential** between current fossil fuel bunker and low or zero carbon alternatives then the ultimate price is set by the difference between fossil fuel bunker costs and the alternative. Where the alternative is an alternative fuel such as ammonia or hydrogen, then the future price of sustainably sourced alternative fuel is unknown but considered likely to be several hundreds of dollars per ton higher than fossil fuels. Additionally, the price over time given future reducing production costs and economies of scale with increased uptake of such fuels is thought to significantly reduce this difference. There are currently available alternatives, such as wind hybrid propulsion and improved auxiliary or hotel load efficiencies that could substantially reduce a portion of bunker needed almost immediately.

The rate of tax/levy needed to be effective in reducing the price differential is in the region of hundreds of dollars per tonne of fuel. Given that the industry has shown itself capable of adapting to changing fossil fuel price levels in a range of several hundreds of dollars a tonne in recent time, tax rates in a similar range should not distort the market to any greater degree than changing fossil fuel price. Those ships that increase their fuel efficiency measures (i.e. use less fuel) and transition away from carbon based fuels earliest will incur the lowest penalties and should therefore have the lowest operational costs.

The entry price level needs to be determined, but will be on a scale from the lowest possible amount (e.g. \$2/tonne fuel oil as recommended by ICS et al) to the predicted ceiling for stimulating transition away from carbon consistent with the required targets³⁹, potentially in the order of hundreds of dollars per tonne of fuel. A low entry rate is unlikely to have any marked or noticeable impact. Some commentators contend that regardless of this, a nominal rate should be used initially in order not to alarm the industry or to create any market distortion. This is a false logic. A 1.5°C agenda does not allow for any notion that the decarbonisation of the industry is in any way optional. Shipping cannot continue as a GHG polluting industry, it must peak emissions as quickly as possible and then drastically reduce its emissions profile to zero. The industry has benefited to date through artificially low fuel costs due to various subsidies and the lack of a punitive tax on

³⁸ As with the terms 'at least' in the context of the Initial Strategy target and 'with ambition toward' in the Paris Agreement, 'before' is currently undefined but is assumed to mean commensurate with a no more than 1.5°C threshold.

³⁹ If commensurate with 1.5°C then the Revised Strategy targets must be significantly increased.

pollutants caused by its activities⁴⁰. Given the speed and scale at which the industry must now reduce its emissions and the findings of the 4th IMO GHG study that overall industry emissions are continuing to trend upward, an initial starting rate is needed at **an immediate minimum floor of \$250 per tonne/HFO**.

Equity considerations:

For the objective to be achieved, the tax needs to **reward the least polluting ship**. This assumes the user of the least efficient ship will pay the highest tax per tonne/km cargo transported. If it is true that the most efficient shipping is used for the most profitable or highest returning routes, the tax will create increased disparity within the market with advanced and large trading economies most likely being serviced by the most efficient shipping. This cannot be avoided if the tax is to achieve its objective and therefore creates an issue of inequity to be resolved either through remedying or mitigating the increased penalty. It is assumed that there is a strong correlation between those States most affected and the Climate Most Vulnerable.

There are a number of existing, established and mandated options for dispersing such revenue to the Climate Most Vulnerable, all outside of the IMO e.g. the Green Climate Fund. For the purposes of this paper it is sufficient to assume that no new IMO mechanism is required for this purpose and allocation of such portion of the revenues generated would occur under the jurisdiction and mandate of a parallel UN agency (e.g. UNFCCC).

The portion of the tax rate that is attributed to a punitive pollution tax with the revenue generated dedicated to loss and damage for the Climate Most Vulnerable outside the sector versus the amount dedicated to subsidizing RD&D incentivization and spent within sector, is likely to be the most contentious point of negotiation amongst Member States and related industry and civil society actors. Only a subset of commentators currently agree that any compensation should be paid via a pollution tax and a further subset of these consider such compensation should be tied to the shipping sector needs of vulnerable States.

In 2009 IMO reported to UNFCCC that there was agreement by IMO members that the majority of revenues generated by any MBM should go to adaptation and mitigation needs and there is no clear reason why this opinion should have changed today. Also in 2009, a global commitment was made to fund the priority mitigation and adaptation needs for developing countries, and a price of \$100 billion per annum by 2020 was struck. Clearly this figure is grossly inadequate to the real financing needs of states facing existential threat today. In addition to future decarbonisation, it is argued that international shipping has a responsibility to compensate the Climate Most Vulnerable for the loss and damage created, historically, today and in the future from its activity.⁴¹

Revenue use in-sector:

There is a potential use of a portion of the revenue generated by the tax in **incentivizing industry transition** through subsidizing the RD&D investment cost required⁴². The size or duration of this subsidy need is unclear⁴³. ICS et al propose a \$5 billion total raised over 10 years, the basis for their proposed rate of \$2 per tonne on bunker. Other sources⁴⁴ contend an investment of \$1.4 trillion

⁴⁰ See ITF-OECD (2018) and Parry et al (2018)

⁴¹ As a global polluter, shipping currently contributes ≈3% of anthropocentric emissions (see 4th IMO GHG Study, 2020) but pays no penalty.

⁴² It can be argued that as ship owners are not well suited to conducting RD&D, the investment cost should target uptake of new technologies by ship owners once developed.

⁴³ Research cannot be priced in advance. The technical adaptation or prototype development might be estimated for specific technologies, but it is difficult to determine in advance to cost of a new technology.

⁴⁴ Energy Transitions Commission and UMAS (2020) <https://www.globalmaritimeforum.org/news/the-scale-of-investment-needed-to-decarbonize-international-shipping>

is needed to develop alternative fuels before 2030 and presumably a portion of this could come from an RD&D subsidy.

The necessity for such subsidy needs to be carefully considered. A subsidy was not raised to cover the RD&D investment needed by the industry to reduce the incidence of oil spill or ballast water or high sulfur fuel pollution for example. There is increasing evidence that some emission reduction R&D costs are already being considered or invested by industry and national sources in developed economies, including pandemic related relief or stimulus funds. Norway, Denmark, UK, Japan and Korea, are actively considering or already deploying government support, in order to establish initial market advantage for national industry interest.

An alternative view is that it is clear that a substantive investment is needed in RD&D, particularly in alternative fuels, to prove the viability of such technological change and this level of investment is unlikely to accrue from the industry acting under market imperatives. The industry's core function is moving cargoes within an integrated logistics chain and not innovative RD&D, especially of as yet unproven technologies. As transformative change is required at speed and scale then investment of comparable scale needs to be made immediately and a levy is the easiest, possibly only, means to provide this stimulus. Strengh et al consider that the basic premise for the shipping sector is that revenues "remain in the sector", contributing to greening and speed of innovation. This line of argument can be taken further to read that any revenue raised that is not re-invested in sector will delay the speed and scale of change and therefore delay or impede shipping's ability to contribute to a 1.5°C agenda.

In the event some portion of revenue is returned to the industry as a subsidy, the RD&D needs of all ships in the global fleet need to be addressed for transition to be equitable, and in particular the needs of shipping for poorest States and the Climate Most Vulnerable. While shipping servicing such States is unlikely to be the largest vessels or the greatest share of global cargoes or global shipping emissions, such ships are likely to be the most inefficient and in the greatest need for upgrading.

The portion of revenue diverted to an RD&D subsidy should be managed under a mechanism mandated and governed by IMO and the oil pollution response fund instruments provide a precedent for this. With revision to the governance structure of the ICS et al designed architecture, as suggested by Solomon Islands⁴⁵, this process presents as a potentially available candidate.

There will also be administration and transaction costs. All literature to date indicates these costs are lower for a tax than other mechanisms and that costs for taxes and levies are lower than other MBMs. One of the advantages of a tax over other MBMs is that it is collected in one place.

Price level summary:

The initial price then can be determined by the **pollution tax⁴⁶ + the RD&D subsidy⁴⁷ + the administration cost⁴⁸**.

We recommend an initial entry price of \$250 per tonne of fuel oil. An initial floor of \$250 per tonne of bunker is likely insufficient to deliver the objective and so an ambitious review ratchet will be

⁴⁵ MEPC 75/7/13 (7 February 2020) *Commenting Paper on the Proposal to establish an International Maritime Research and Development Board (IMRB)*

⁴⁶ At least 51% would be the minimum allocation if the "majority" of revenue raised is allocated to climate change adaptation/mitigation

⁴⁷ If 51% is allocated to GCF, and 16% to administration costs (see footnote below), this leaves up to 33% available to subsidize RD&D. If a higher percentage is allocated to GCF, then less would be available for shipping industry RD&D.

⁴⁸ GCF's Audited Financial Statements for the year ended 31 December 2019 show 16% administration expenses (US\$67 million) to administer project funding of \$6,076 million under this UNFCCC established fund.
<https://www.greenclimate.fund/sites/default/files/decision/bbm-2020/decision-bbm-2020-09-annex-i-bbm-2020-09-audited-financial-statements-gcf.pdf>

required to achieve a level of tax sufficient to catalyze irreversible transition by 2030. It is recommended here that a 5-yearly review be instigated with an assumption that an increased rate will be required each time and the level of increase pegged to the global level of emissions from the sector.

Tax collection, admin and disbursement:

Figure 2 below provides a schematic based on the ICS et al proposal for collecting their proposed industry RD&D subsidy, showing how an initial tax rate of \$250/tonne on fuel oil could be allocated and administered with the three components: pollution tax, RD&D subsidy and administration costs.

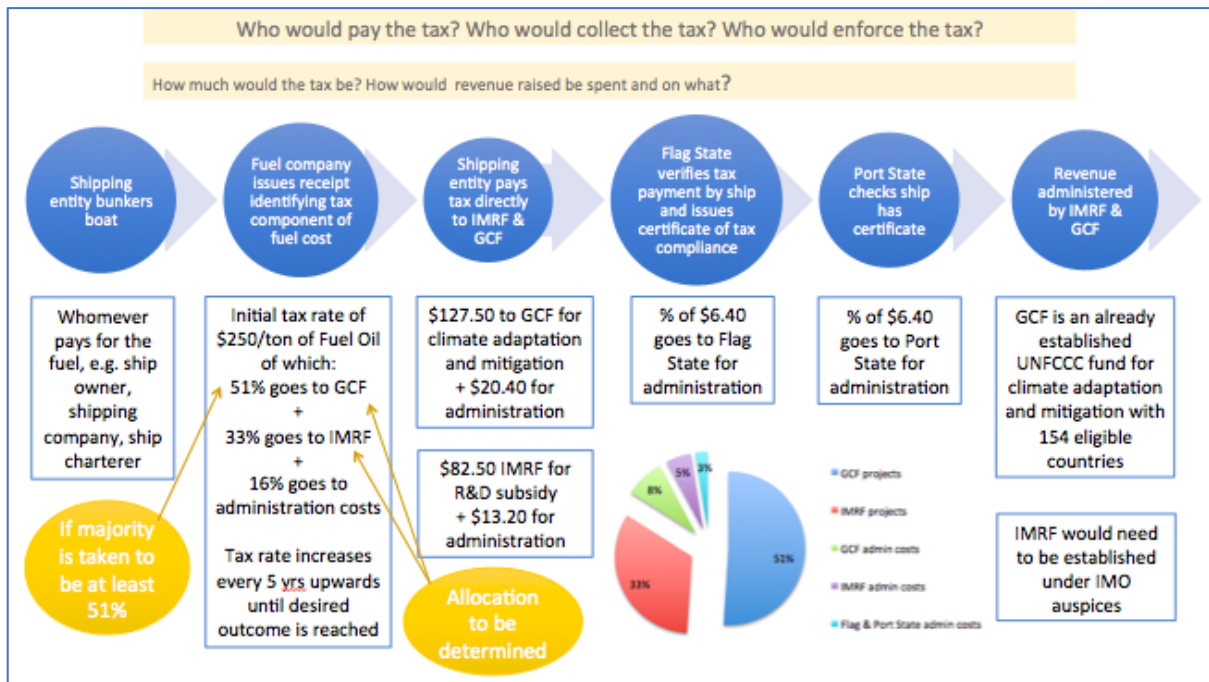


Figure 2. What a Carbon Tax process might look like and How Revenue might be allocated

7. Impacts on States

The Initial Strategy requires that members are cognizant of the impact of measures on States. Guidance is provided in the Initial Strategy as to how these impacts might be considered under an assessment procedure. However, this process has been shown to be flawed. Pacific delegations have offered both clarification of how this issue affects their States, options to assist sponsors of measures to address the issue of impact and suggestion for improvement of the procedure via submission⁴⁹ and commenting papers⁴⁵.

In considering the now visible shortcomings of the impact assessment guidance established as part of the follow up actions for the Initial Strategy, MCST has developed an additional framework in considering impacts on Pacific Island member States under a hierarchy of potential impacts as set out in **Figure 3** below.

⁴⁹ See for example Mexico, Solomon Islands and Tonga (ISWG GHG 7/2/10) *Defining the needs of Pacific SIDS* and Solomon Islands and Tonga (ISWG-GHG 7/2/11) *A proposal to addressing impact assessment uncertainties when considering proposed measures to reduce GHG emissions from ships* available to IMO members on IMODOCs.

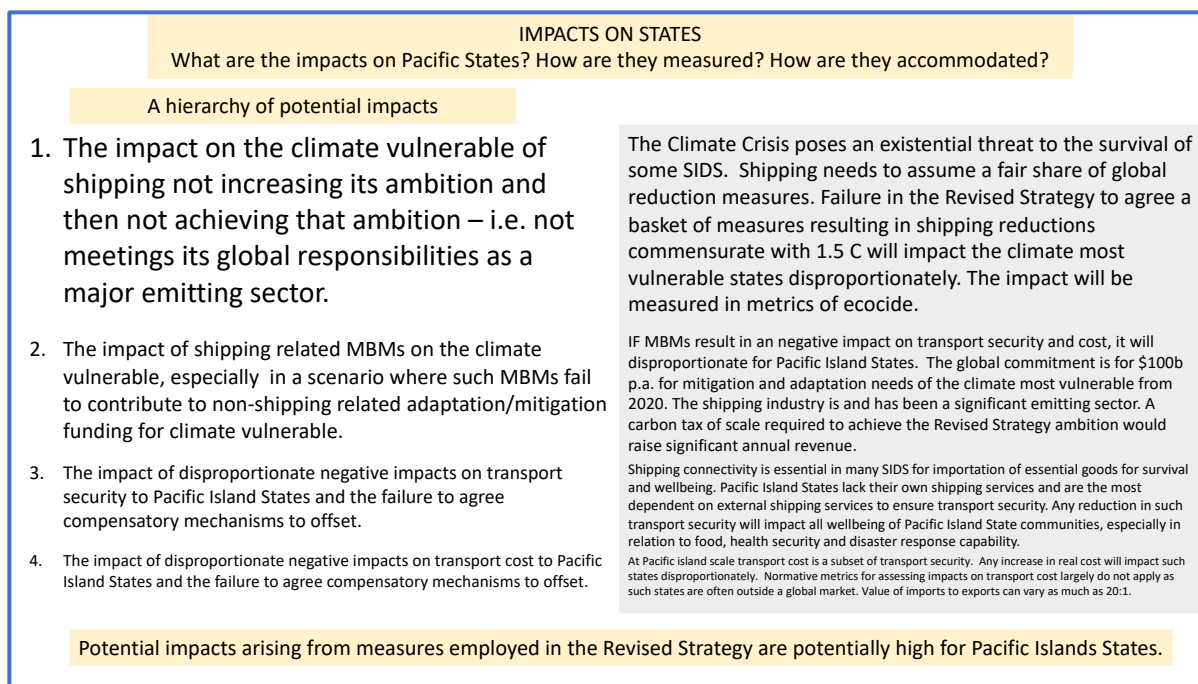


Figure 3. Hierarchy of Impacts on Pacific States

The greatest threat of impact to Pacific States comes from shipping not decarbonizing commensurate with 1.5°C, resulting in greatly increased risk, and shortened timeline, of ecocide for at least some of the most vulnerable States and enormous, likely irreparable, harm to all global society. Calling for implementation of a carbon tax as a ‘now’ priority for shipping is predicated on the assumption that it is a required measure for a 1.5°C agenda and failure to implement will generate a higher impact than implementation.

In the long term, it is assumed the tax considered here will result in an at least partial transition to decarbonized shipping and reduction in GHG emissions for the sector, thereby reducing overall impact of the effect of shipping GHG pollution on States. In this regard, the overall impact of the tax will be positive.

It is possible that the operational costs of shipping will be lower given the reduction in fossil fuel cost incurred and that this will ultimately translate generally into overall decreased transport costs for shipping.

Various modelling presented in regard to other measures predicts any negative impacts on transport security and transport costs to member States, in the large majority of cases, to be no more than minor and to have no or only marginal impacts on existing trade scenarios. Where disproportionate effects are potentially possible, these will likely affect Climate Most Vulnerable States.

The literature review likewise suggests the impact of a carbon tax to also have no more than minor impact on the cost of cargoes being delivered in the vast majority of instances. Where a disproportionate impact is possible it is generally held to be the situation for a small number of routes and associated with Climate Most Vulnerable States.

While monitoring, evaluation and reporting processes will need to be developed around this carbon tax, it is not possible to do more than model the potential results and impacts. This is particularly true for secondary results, such as incentivizing RD&D. Full knowledge of actual impacts will only be identifiable after the event. However, in the event that there are negative impacts, the nature of the tax being considered, i.e. one that imposes the lowest penalty on the

most efficient ships, means impacts will not be equitable and that poorer and smaller States will be more affected, with the poorest and smallest most negatively impacted.

Such disparity cannot be **avoided** if the tax is to achieve its objective. It may be possible the impacts could be **remedied**, for example by means of exemptions, however such remedies could only be temporary or short term and would create additional and potentially greater impacts e.g. by increasing or locking in dependency on fossil fuel dependent old ships for domestic use. This leaves only the option of **mitigation**, which in this instance is achieved through offsetting any increased transport cost against enhanced access to climate mitigation and adaptation financing through mechanisms such as the GCF and apportionment of some of the RD&D subsidy to addressing the needs of SIDS/LDCs shipping.

8. Equity in decision-making

The question of whether to adopt a tax on shipping emissions will be considered under the emissions reduction Roadmap process of the IMO. Ultimately its adoption or otherwise is a political decision for the IMO member States. The decision to adopt or not, and at what scale, has potentially far-reaching consequences for member States beyond the ambit of purely shipping related matters. At stake is not only the adoption of MBMs but also the allocation of tens and potentially hundreds of billions of dollars of revenue raised. On both counts, it is argued the Climate Most Vulnerable States, such as those in the Pacific, bear greatest risk in the event of IMO member States not making the correct decision.

This raises the question of the equity involved in the UN decision-making opportunity now before the IMO and, as a corollary, the durability of the result if it is not reached equitably. While a consensual outcome is always to be preferred, the decision will ultimately be made by a majority of those member States participating in the decision-making process, i.e. the plenary sessions of MEPC and the resultant ratification of its outcomes by IMO Council. Given the heightened and in many cases existential level of risk now faced by SIDS/LDCs, which it is assumed is not denied by any member, it would be prudent to consider whether the Climate Most Vulnerable States will be proportionately and equitably represented in this decision.

Analysis of the attendance register of member States actively participating in recent IMO GHG negotiations under the current Roadmap process (**Figure 4**) shows that SIDS/LDCs, whilst making up more than a third of IMO membership, are significantly under-represented in the GHG reduction negotiations under the auspices of MEPC which is heavily dominated in roughly equal numbers by States defined by IMO as 'developed' or 'developing'. Moreover, Climate Most Vulnerable States are only marginally represented at IMO's Council. This strongly suggests that the impending decision-making process on whether to adopt a carbon tax of the nature considered in this paper is unlikely to be equitable.

There is repeated reference in IMO proceedings to the importance of maintaining 'the level playing field'. The concept is usually applied in the context of the commercial marketplace in which shipping operates.

However, it is disputed on the evidence as to whether this concept is applied to the relevant IMO decision-making processes in matters such as this. Clearly SIDS/LDCs have not been equitably represented in the negotiations to date and there are systemic institutional and structural issues with IMO that will continue to restrict their participation. It is unlikely that such States will be equitably represented in the MBM aspect of the Strategy negotiations. Such issues are complex and capacity, cost, IMO constitutional arrangements, and the NMFT convention are all contributing factors. Pacific high ambition States have previously submitted to Council⁵⁰ requesting IMO

⁵⁰ C 122/9/1 (14 June 2019) *Possible future working arrangements to support the follow-up actions of the IMO Strategy on Reduction of GHG Emissions from Ships*. Submitted by Belgium, Chile, Marshall Islands, Solomon Islands and Tuvalu.

consideration and making proactive suggestions⁵¹. It is noted that many other UN bodies and forums have already provided mechanisms to resolve similar representation and equity concerns.

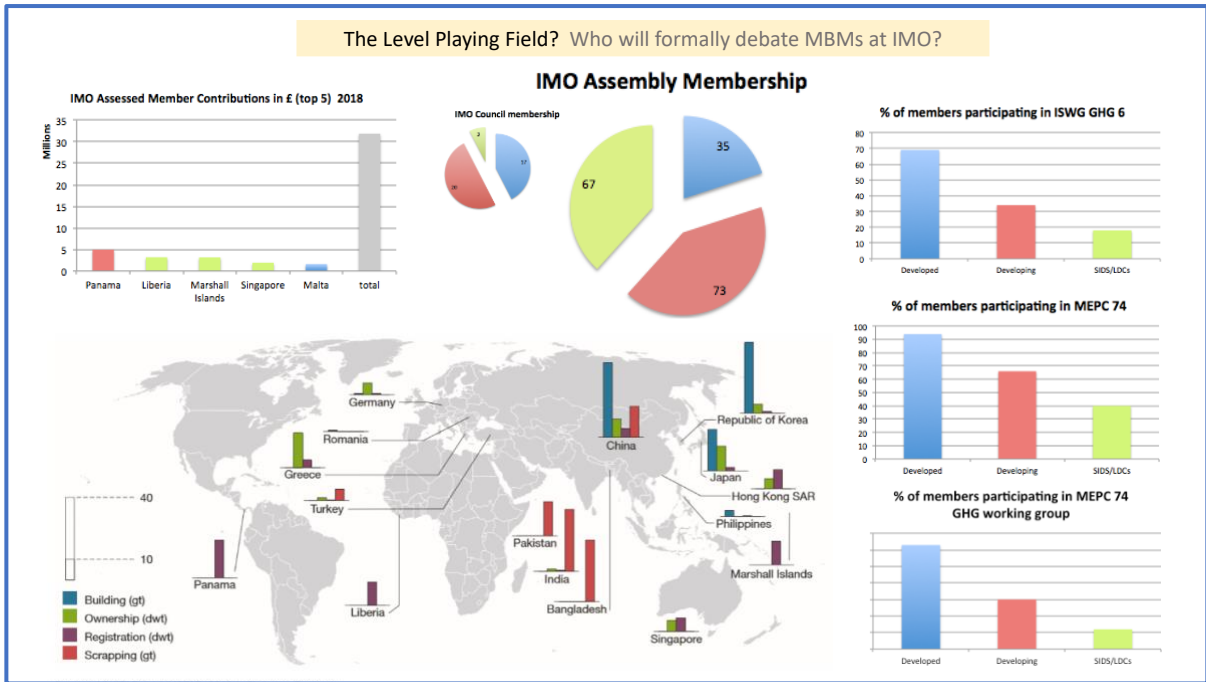


Figure 4. The Level Playing Field

⁵¹ For example, establishment of a specific voluntary trust fund under IMO auspices to provide financial resources to support representatives to attend and participate in GHG emissions meetings, especially from SIDS and LDCs.