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CONSIDERATION OF CONCRETE PROPOSALS FOR MID- AND LONG-TERM MEASURES AND ASSOCIATED IMPACT ASSESSMENTS IN THE CONTEXT OF PHASE I OF THE WORK PLAN AS WELL AS THE PROPOSAL TO ESTABLISH AN INTERNATIONAL MARITIME RESEARCH BOARD

Initial impact assessment on States of a carbon levy for international shipping

Submitted by ICS

SUMMARY

Executive summary:	As requested by ISWG-GHG 10, this document contains an initial impact assessment on States of the proposal set out in document ISWG-GHG 10/5/2 (ICS and INTERCARGO) for a mandatory levy per tonne of CO_2 emitted. This assessment, prepared with the assistance of Clarksons Research, explores the impact of various levy quanta ranging from $25 to $400 per tonne of CO_2, including a levy of $100 per tonne of CO_2 as proposed in documents MEPC 76/7/12 and MEPC 77/7/4 (Marshall Islands and Solomon Islands). The conduct of this assessment demonstrates that one of the advantages of a levy system is that it makes it easier for the Committee to assess the economic impact on States, compared to assessing proposals for alternative MBMs under which the cost of emission allowances is variable or which use complex metrics such as transport work.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 14
Related documents:	MEPC 77/7/4, MEPC 77/7/16, MEPC 77/7/23, MEPC 76/7/12; ISWG-GHG 10/5/2 and MEPC.1/Circ.885

Introduction

1 ISWG-GHG 12 will continue consideration of possible mid-term measures including market-based measures (MBMs). At ISWG-GHG 10, in response to the proposal for a levy-based MBM set out in document MEPC 76/7/12 (Marshall Islands and Solomon Islands), ICS

and INTERCARGO set out, in document ISWG-GHG 10/5/2, a comprehensive regulatory package including draft amendments to MARPOL Annex VI, to demonstrate how a mandatory levy, based on contributions by ships per tonne of CO_2 emitted, could be brought into effect globally to help close the price gap between conventional and alternative fuels. The proposal also included the establishment of an IMO Climate Fund so as to use the funds collected to expedite the uptake and deployment of zero-carbon technologies and fuels, with particular regard to the needs of developing countries, including LDCs and SIDS. Document ISWG-GHG 10/5/2 also explained the current preference of the majority of the world's ship operators for a levy-based system, whilst remaining open to consideration of other proposals.

2 ISWG-GHG 10 invited the proponents of various mid-term measures to submit initial impact assessments on States to ISWG-GHG 12. Accordingly, with the assistance of Clarksons Research, ICS has prepared a detailed initial impact assessment on States of applying a range of different levy quanta per tonne of CO_2 emitted, as set out in the annex to this document.

3 This initial impact assessment explores the potential impact on States of a range of levy quanta from $25 per tonne of CO_2 emitted to $400 per tonne of CO_2. The range of quanta explored in this assessment also includes a possible levy of $100 per tonne of CO_2, which the Marshall Islands and Solomon Islands have suggested as a potentially appropriate starting point when a levy is first applied, although ICS currently takes no view on what the quantum of the levy should be.

Discussion

4 ICS recognizes that before any MBM can be adopted by the Committee, the Organization would need to conduct a comprehensive impact assessment on States, potentially in co-operation with a body such as UNCTAD. Nevertheless, it is intended that this initial assessment will provide States with a general appreciation of the likely impact on maritime transport costs for a variety of different voyages and cargoes, and the price of these cargoes on delivery, depending on the quantum of the levy per tonne of CO_2 which might be adopted by the Committee.

5 This initial impact assessment might also help understanding of the impact of alternative MBMs such as a cap-and-trade system, as proposed in document MEPC 77/7/16 (Norway), which would require ships to pay for emission allowances. However, one of the main advantages of a levy system is that the Committee would have complete control over the quantum of the levy which applied to international shipping (which document ISWG-GHG 10/5/2 proposes should be fixed for an agreed period of time) and the timing of any subsequent increases, providing far greater certainty about the likely economic impact on States. The cost of emission allowances under a cap-and-trade system would be variable, and presumably determined by a market that could be subject to considerable volatility outside the full control of the Organization. For example, the cost of allowances for a tonne of CO_2 under the EU emissions trading system (ETS) as of 7 March 2022 was about 66€, having peaked at over 96€on 7 February 2022, compared to a price of under 40€on 7 March 2021.

6 A simple levy per tonne of CO_2 emitted will also provide greater certainty about the amount of money that will be generated to help expedite the transition by international shipping, such as supporting the rollout of bunkering infrastructure and other maritime GHG reduction projects in developing countries, providing assistance to developing countries, in particular LDCs and SIDS, with regard to climate adaptation, and/or any other purposes for which the funds generated might be used as may be decided by the Committee.

7 ICS emphasizes the importance of developing an MBM which is as simple as possible to implement and administer, and which avoids unintended consequences such as the creation of perverse incentives and/or market distortion. ICS therefore strongly cautions against the development by the Organization of any MBM which uses 'transport work' to determine the contributions that should be made by ships rather than the amount of CO_2 emitted. Whilst carbon intensity indicators (CIIs) may be an appropriate tool to encourage the reduction of emissions by individual ships, they do not accurately measure actual emissions by ships and require complicated adjustments and exemptions to be applied to different ship types and trades. Apart from the complexity this would add to the design and implementation of any MBM – in contrast to the levy system proposed in document ISWG-GHG 10/5/2 which would simply utilize the existing IMO Ship Fuel Oil Consumption Data Collection System (IMO DCS) – the use of transport work within an MBM will make it far more difficult to conduct a meaningful assessment of the impact on States, compared to assessing the economic impact of a levy per tonne of CO_2 emitted.

8 The proposal in document ISWG-GHG 10/5/2 takes no position on what the quantum of a levy per tonne of CO_2 emitted should be, other than to suggest that when the levy is first established the quantum should take account of current Technology Readiness Levels (TRLs) and the current worldwide availability of low- and zero-carbon fuels to which the industry can transition. ISWG-GHG 10/5/2 also suggests (as have the Marshall Islands and Solomon Islands in their proposal) that the initial quantum agreed by the Committee should be fixed for a set period and subject to a five-year 'ratchet' which could take account of future developments with respect to TRLs and the worldwide availability of low and zero-carbon fuels.

9 ICS supports the development of a levy-based MBM but emphasizes that in the absence of the availability of the necessary zero-carbon technologies and fuels by 2030, or any further delay in the approval of the establishment of the IMRB/IMRF which is urgently required to increase TRLs by accelerating R&D of zero-carbon technologies and fuels, the introduction of an MBM risks becoming solely a revenue-raising exercise. This point is important. As shown by the following impact assessment, the application of a carbon price could, depending on the levy quantum adopted, have significant negative impacts on maritime trade, whilst failing to achieve the purpose of helping the industry to deliver the agreed level of ambition for 2050.

Conclusions

10 The conduct of this initial impact assessment confirms that one of the key advantages of a levy-based system is that it will be much easier to assess the impacts on States of a simple levy per tonne of CO_2 emitted than to assess the impact on States of alternative proposals that feature a variable carbon price and/or which might use complex metrics such as transport work.

11 ICS does not draw firm conclusions as to whether any of the impacts on States identified for different levy quanta should be regarded as disproportionately negative, as this is a matter which will need to be determined by the Committee when weighed against the positive impacts of adopting an MBM in helping to phase-out CO_2 emissions from international shipping.

12 Nevertheless, in line with the view expressed in document ISWG-GHG 10/5/2 that the quantum of any levy should not be disproportionately large until zero-carbon technologies and fuels are available worldwide so as to make the transition to zero emissions possible, the analysis contained in this assessment tentatively suggests that initially setting a levy far in excess of about $100 per tonne of CO_2 emitted might potentially be viewed by some Member States as having disproportionately negative impacts on certain trades, when compared both to average freight rates and bunker costs over the past 10 years and the variation in freight rates and bunker costs seen over same period. But whether or not these impacts are indeed disproportionately negative would need to be determined by a comprehensive impact assessment.

13 When assessed in terms of their impact on the price of delivered cargoes, which is of direct relevance to the economies of States, all of the levy quantum analysed, regardless of the trade and/or cargo type to which they apply, generally seem to fall within the average monthly volatility in the price of delivered cargo during 2021. Nonetheless, provided that the necessary zero-carbon technologies and fuels become available, this does not mean that the levy would have no impact on accelerating the transition. Depending on the levy quantum applied, the price gap between conventional fuel oil and zero-carbon fuels would be reduced whilst, depending on how the funds generated are used – including the extent to which they are utilized in-sector – these funds could have a significant positive impact towards expediting the transition.

Action requested of the Working Group

14 The Group is invited to consider the information and comments set out in this document and the accompanying initial impact assessment on States of a levy per tonne of CO_2 emitted as set out in the annex to this document, and take action as appropriate.

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ANNEX

INITIAL IMPACT ASSESSMENT ON STATES OF DIFFERENT POTENTIAL QUANTA OF CARBON LEVY

Introduction

1 ISWG-GHG 10 began consideration of mid-term GHG reduction measures in the context of Phase I of the workplan for the development of mid- and long-term measures.

2 Among other documents considered, document ISWG-GHG 10/5/2 (ICS and INTERCARGO) contained a comprehensive regulatory proposal to establish a carbon levy to expedite the phase-out of CO_2 emissions from international shipping and the take-up of low and zero-carbon fuels, in response to a proposal set out in document MEPC 76/7/12 (Marshall Islands and Solomon Islands) and then elaborated further in document MEPC 77/7/4 (Marshall Islands and Solomon Islands).

3 ISWG-GHG 10 invited the proponents of concrete proposals for mid-term measures to prepare an initial assessment of impacts on States of their proposal in accordance with the *Procedure for assessing impacts on States of candidate measures* (MEPC.1/Circ.885) for consideration by the Group.

4 ICS has therefore conducted the following initial impact assessment of the carbon levy proposal set out in document ISWG-GHG 10/5/2 which proposes that ships contribute a levy per tonne of CO_2 emitted, with a reduced value and rate for fuels with a lower carbon intensity, and considered conclusions in terms identified in paragraph 4.11 of the Initial IMO Strategy. The assessment has been produced with the assistance of Clarkson Research Services Limited (Clarksons Research).

5 The assessment assumes that the vast majority of ships, at the time when the MBM is first implemented, will be contributing a levy per tonne of CO_2 emitted based on the consumption of conventional fuel oil with a carbon factor of 3.14 tonnes of CO_2 per tonne of fuel oil consumed.

6 The assessment focuses on the impact on States for a range of levy quanta, the value and rate of which would be established by an MEPC resolution, the draft for which is set out in annex 3 of document ISWG-GHG 10/5/2.

7 As the ICS does not currently advocate a precise quantum for the proposed levy, the assessment explores the impact of the following levy quanta:

- $25 per tonne of CO_2 – equivalent to $78.5 per tonne of fuel oil;
- $50 per tonne of CO_2 – equivalent to $157 per tonne of fuel oil;
- $100 per tonne of CO_2 – equivalent to $314 per tonne of fuel oil;
- $200 per tonne of CO_2 – equivalent to $628 per tonne of fuel oil; and
- $400 per tonne of CO_2 – equivalent to $1,256 per tonne of fuel oil.

8 The following impact assessment on States is consistent with the guidance on initial impact assessments contained in MEPC.1/Circ.885. As required by paragraph 8 of this guidance, this assessment pays particular attention to the needs of developing countries, especially SIDS and LDCs, and includes, inter alia, a description of the assumptions and methods used in the analysis and a detailed qualitative and/or quantitative assessment of specific negative impacts on States.

9 The analysis does not arrive at firm conclusions as to whether any of the potential impacts on States identified might be regarded as disproportionately negative, which is a question for the Committee to determine following a comprehensive impact assessment. This initial assessment does not therefore suggest any recommendations on how any such impacts could be addressed.

Clarksons Research

10 Clarkson Research is a leading provider of maritime trade data and intelligence. Its clients include UNCTAD to which Clarksons Research provides shipping data used to help compile the annual *UNCTAD Review of Maritime Transport.* As part of the Clarksons Group which, inter alia, provides shipbroking and financial services to all sectors of the global shipping industry, Clarksons Research has access to authoritative information on all aspects of shipping including extensive trade and commercial data.

11 Whilst Clarksons Research has been contracted to assist with the preparation of data used in this impact assessment, this constitutes neither an endorsement nor recommendation by Clarksons Research of the specific policies or strategies advocated by the ICS with respect to this regulatory proposal. See also Clarksons Research's disclaimer at the Appendix to this annex.

The measure

12 This measure concerns the establishment of a mandatory carbon levy system to expedite the transition to zero-carbon fuels, as set out in document ISWG-GHG 10/5/2, with contributions to be made by ships of 5,000 GT and above to an IMO Climate Fund.

13 The measure, if adopted, would be implemented by a package of instruments to MARPOL Annex VI which, as set out in annexes 1 to 4 of document ISWG-GHG 10/5/2 include:

.1 draft amendments to MARPOL Annex VI to add, inter alia, a new chapter "Establishment of an IMO Climate Fund";

.2 a draft MEPC Resolution and its annex on "Guidelines for the establishment and governance of the IMO Climate Fund"; and

.3 a draft MEPC Resolution and its annex on "IMO climate contribution to the IMO Climate Fund".

The proposals

14 The proposed carbon levy would help to expedite the transition to zero-carbon fuels by closing the price gap between conventional fuels and zero-carbon fuels. A significant proportion of the funds collected by the proposed IMO Climate Fund would be deployed to support the transition, as might be agreed by the Committee, for example by supporting the rollout of the required bunkering infrastructure in developing countries and other maritime GHG reduction projects.

15 LDCs and SIDS are particularly vulnerable to the consequences of dangerous climate change. By helping the international shipping sector to decarbonize as soon as possible, this proposal will be of significant benefit to LDCs and SIDS, contributing to the goal agreed by UNFCCC State Parties of reducing global GHG emissions to the levels required so that average global temperatures do not increase by more than 1.5 degrees Celsius.

16 The proposal seeks to minimize the administrative burden on flag States by linking the levy contribution to be made to the fuel oil data which ships are already required to submit to Administrations for the IMO Ship Fuel Oil Consumption Data Collection System (IMO DCS), and by placing most of the tasks necessary to ensure compliance by ships (with the proposed amendments to MARPOL Annex VI) with the IMO Climate Fund rather than with flag States. Each ship – not the flag State – will be required to provide the IMO Climate Fund with fuel oil consumption data as already reported to the Administration, or any organization duly authorized by it, in accordance with regulation 27.3 of MARPOL Annex VI.

17 The proposal sets out that the IMO Climate Fund will be responsible, inter alia, for determining the levy contribution to be made by each ship, the collection and processing of the levy contribution, and the issuance of an IMO Climate Fund Statement to confirm that the total levy contribution to be made for that ship for the previous calendar year has been made.

18 The only responsibility of the flag State (or other organization to which this responsibility has been delegated) will be to confirm that the annual figure for fuel oil consumed as shown on the IMO Climate Fund Annual Account Statement matches the fuel oil consumption data as reported to the Administration (or any organization duly authorized by it) in accordance with regulation 27.3 of MARPOL Annex VI (IMO DCS) and issuing a statement of compliance to each ship registered with the flag State.

Assumptions and methods used in the analysis

19 To help Member States assess whether or not the impact on States of a range of different quanta for a carbon levy might be disproportionately negative, Clarksons Research used its comprehensive database of time series data related to commercial shipping markets, including bunker prices, freight rates and time charter rates, to test how the impact of different quanta of carbon levies would compare with the recent price variability of marine fuel oil.

20 Geographic remoteness and connectivity to main markets is a subjective topic, as any transoceanic voyage implies that the exporting State is distant from its market. Clarksons Research therefore examined in detail the impact on States of a range of possible levy contributions on a number of different voyages and cargoes. These include:

.1 impact on iron ore freight rates and prices – Australia to China (3,500 miles);

.2 impact on iron ore freight rates and prices – Brazil to China (11,000 miles);

.3 impact on coal freight rates and prices – South Africa to India (5,000 miles);

.4 impact on containerized perishables trade – East Coast South America via South Africa to Asia (liner service with multiple port calls);

.5 impact on crude oil freight rates and prices – Middle East Gulf to China (5,800 miles);

.6 impact on petroleum products freight rates and prices – Singapore to Australia (4,500 miles); and

.7 impact on petroleum products freight rates and prices – Singapore to Fiji (4,700 miles).

21 Clarksons Research then applied the standard ship and voyage assumptions which it uses for its commercial clients to test the potential impact on States of the range of different levy quantum contribution.

22 According to UNCTAD, developing countries, especially in Africa and Oceania, pay 40 to 70% more on average for the international transport of their imports than developed countries.[1] When assessing the impact of a carbon levy on the economies of LDCs and SIDS, it is therefore assumed, as established by UNCTAD, that freight rates are generally higher for LDCs and SIDS, especially those that may be more remote from their markets, due, among other factors, to the higher bunker prices in their ports[2] and the reduced number of maritime services to which they have access.[3] The impact of a levy contribution per tonne of CO_2 emitted on freight rates and the price of cargo on delivery should not therefore be proportionately greater for LDCs and SIDS than the examples of voyages investigated in detail for this initial impact assessment. However, this would need to be investigated further by a comprehensive impact assessment.

23 The proportionate impact of the carbon levy contribution per tonne of CO_2 emitted on the economies of LDCs and SIDS can be assumed not to be greater, compared to the voyages analysed by Clarksons Research in detail, when account is taken of the non-maritime cost component of the cargo movement. As shown by various reports by UNCTAD and the World Bank[4], the costs of land-based transportation are typically higher in LDCs and SIDS. According to UNECE, landlocked LDCs have transport costs which are on average 50% higher than developing countries that have access to the open sea. If containerized imports are considered, landlocked LDCs have costs that are 85% higher than the world average[5]. Many LDCs and SIDS also have higher maritime transportation costs due to higher incidence of non-tariff barriers to maritime trade.[6]

24 An example of a voyage to a Pacific Island State (Singapore to Fiji) has been analysed in this assessment for completeness. Using the assumptions above, however, the other voyage examples analysed by Clarksons Research, where the levy per tonne of CO_2 generated by fuel oil consumption represents a larger proportion of freight rates than is the case for most voyages to and from LDCs and SIDS, are deemed sufficient to assess whether or not the impact on LDCs and SIDS would be disproportionately negative compared to impacts on other States.

Detailed qualitative and/or quantitative assessment of specific negative impacts on States

25 The principal potential negative economic impact on States of this proposal concerns the effect of a mandatory levy contribution per tonne of CO_2 emitted on bunker fuel oil costs, freight rates, the price of shipped cargoes to consumers, and the impact of these on States' economies and GDP.

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1 UNCTAD (2015), *Review of Maritime Transport 2015*, Chapter 3: Freight Rates and Maritime Transport Costs.

2 Oil Monster https://www.oilmonster.com/bunker-fuel-prices/middle-east-and-africa/42;

3 UNCTAD Liner Shipping Connectivity Index (2020)

4 https://unctad.org/meeting/launch-global-transport-costs-database-unctad-and-world-bank

5 https://unece.org/DAM/trans/doc/2019/wp5/id_WP5-19_02e.pdf

6 *Protectionism in Maritime Economies (PRIME Index)* Harvard Kennedy School of Government https://www.ics-shipping.org/wp-content/uploads/2021/02/Protectionism-in-Maritime-Economies-Study-Summary-Report-1.pdf

Price variability of fuel oil costs and delivered cargo prices, including costs to LDCs and SIDS

26 A table produced by Clarksons Research to summarize the potential impact of the different carbon levy quanta on fuel oil costs, freight rates and delivered cargo prices, for the various trades and cargoes analysed, is contained in Figure 1.

Figure 1 – Carbon Levy Scenarios: Impact Summary

Carbon Levy Scenarios: Impact Summary

Impact of levy quanta variable but generally within average monthly volatility in delivered cargo prices

Carbon Levy Scenarios: Bunker Price, Freight Rate & Delivered Cargo Price Impacts

Impact	Basis	2021 Avg	Avg Monthly Change In 2021	Scenario 1 $25/t CO2	Scenario 2 $50/t CO2	Scenario 3 $100/t CO2	Scenario 4 $200/t CO2	Scenario 5 $400/t CO2
Bunker Price	$/t, VLSFO Singapore	$535	$26	$78.5	$157	$314	$628	$1,256
Capesize Iron Ore Freight Rate	$/t, Brazil-China	$26	$4	$1.5	$3.0	$6.0	$12.0	$24.0
Delivered Chinese Iron Ore Price	%, from Brazil, basis 2021 Avg	$162	$17	+1%	+2%	+4%	+8%	+16%
Panamax Coal Freight Rate	$/t, S.Africa-India	$25	$3	$0.9	$1.9	$3.7	$7.5	$15.0
Delivered Indian Coal Price	%, from S.Africa, basis 2021 Avg	$142	$18	+1%	+2%	+3%	+6%	+12%
VLCC Crude Freight Rate	$/tonne, MEG-China	$6	$0.5	$0.8	$1.5	$3.1	$6.2	$12.4
	$/bbl, MEG-China	$0.9	$0.07	$0.1	$0.2	$0.4	$0.8	$1.7
Delivered Chinese Crude Oil Price	%, from MEG, basis 2021 Avg	$70/bbl	$4/bbl	+0.2%	+0.3%	+0.6%	+1.2%	+2.4%
MR Products Freight Rate	$/tonne, Singapore-Australia	$24	$3	$1.9	$3.9	$7.7	$15.4	$30.9
	$/bbl, Singapore-Australia	$2.8	$0.3	$0.2	$0.5	$0.9	$1.8	$3.6
Delivered Australia Gasoline Price	%, from Singapore, basis 2021	$83/bbl	$5/bbl	+0.3%	+0.5%	+1.1%	+2.2%	+4.4%
Container Freight Rate	$/TEU, basis Latin Am-Asia (via S.Afr)			$77	$155	$310	$620	$1,240
	$/t, basis Latin Am-Asia (via S.Afr)			$6	$13	$26	$52	$103

Source: Clarksons Research

Clarksons Research

27 Clarksons Research suggest, through quantitative analysis, that the cost of the range of levy contributions explored, up to and including $400 per tonne of CO_2, would in most trades be similar to the typical monthly variability of delivered cargo prices.

28 The impact of different levy quanta on delivered cargo prices in various trade segments is explored in more detail later on in this impact assessment.

29 Based on bunker prices in January 2022 for Very Low Sulphur Fuel Oil (VLSFO) bunkered in Singapore, the impacts would range, for the potential quanta analysed, from a 12% increase in fuel costs for a levy of $25 per tonne of CO_2 to a 186% increase for a $400 levy. A levy of $100 per tonne of CO_2 ($314 per tonne of fuel) would represent a cost increase of about 47% compared to January 2022. It should be noted, however (mainly as a consequence of the impact of the conflict in Ukraine on global oil prices), that the cost of VLSFO in Singapore in March 2022 had increased by about 50% compared to January 2022, exceeding the previous 10 year maximum by more than $200 per tonne of fuel.

30 To help determine whether the impacts of a carbon levy might be regarded as disproportionately negative on shipping companies' customers, Clarksons Research has analysed changes in fuel costs over the previous ten-year period. Clarksons Research has determined that, over the past ten years, average bunker prices based on HSFO, use of which was prevalent before implementation of the IMO 2020 global 0.5% sulphur cap, have varied by around $600 per tonne of fuel during the previous 10 years, while the cost of VLSFO, the use of which has become far more prevalent since 2020, varied by over $400 per tonne during the period between 2020 and 2021. This suggests that a levy initially set at around $100 per tonne of CO_2 ($314 per tonne of fuel oil) would fall within the variability of the cost of fuel oil experienced over the past two years and the previous decade. It should be noted, however, that the high level of volatility during past two years was affected significantly by the impact of the COVID-19 pandemic and the introduction of the IMO global sulphur cap on 1 January 2020.

31 Given that a levy initially set below or at around $100 per tonne of CO_2 ($314 per tonne of fuel oil) would fall (prior to the Ukraine conflict) within the recent variability of the cost of marine fuel oil, it could be argued that the impact on States, including LDCs and SIDS, would not be disproportionately negative. Moreover, a 50% increase in fuel costs would be similar to that anticipated in 2017 when the MEPC took the decision to implement the global sulphur cap in 2020. However, Member States might arrive at a different conclusion should the levy initially be set at a higher level than $100 per tonne of CO_2, depending on for how long the impact on bunker prices of the conflict in Ukraine continues.

32 As the cost impact of a carbon levy would be permanent, if the levy was initially set much above $100 per tonne of CO_2 (equivalent to $314 per tonne of marine fuel oil) the cost to economies and consumers of goods and products carried by sea would probably be perceptible to a greater extent. However, whether or not the impacts on States of a higher levy should be regarded as disproportionately negative has to weighed against the positive impacts of accelerating the transition to zero-carbon fuels.

33 Graphics produced by Clarksons Research illustrating marine fuel oil price volatility (short term and longer-term) are shown in Figure 2 and Figure 3 respectively.

34 Graphics produced by Clarksons Research illustrating significant historical volatility in prices across key bunker grades and port locations are shown in Figure 4.

Figure 2 – Bunker Price Volatility: Short Term View

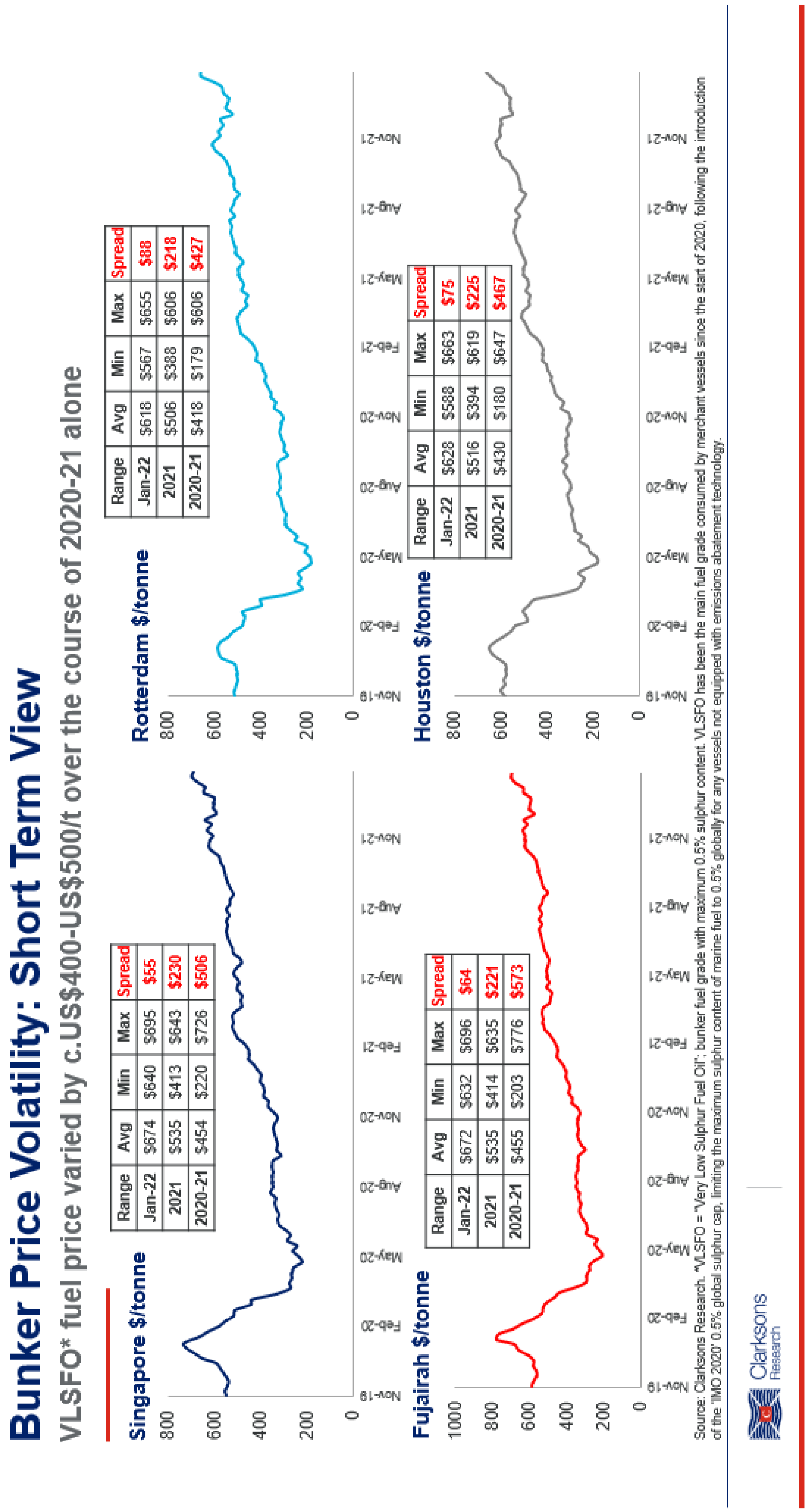


Figure 3 – Bunker Price Volatility: Longer-Term View

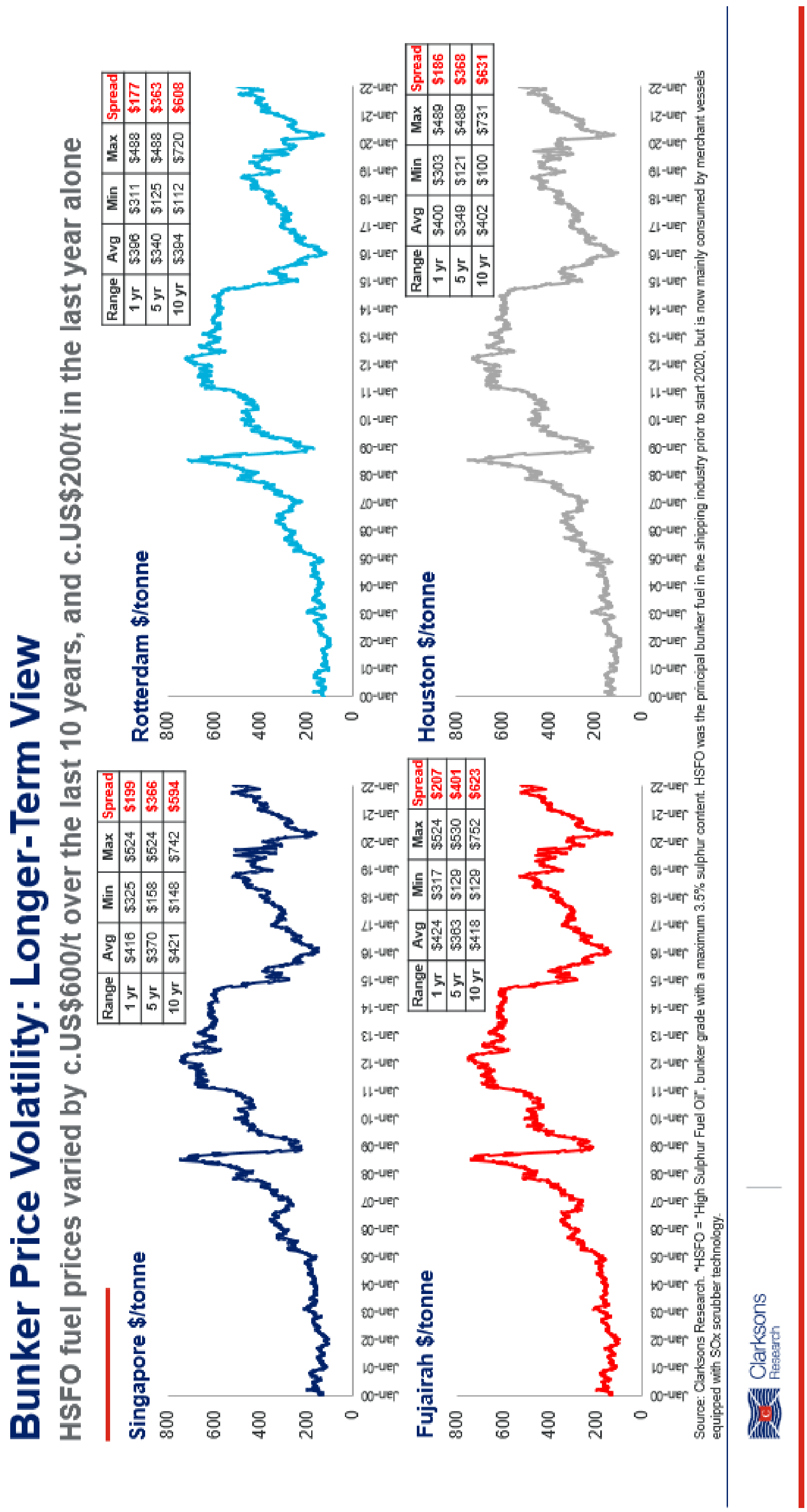


Figure 4 – Bunker Price Volatility: Summary

Bunker Price Volatility: Summary

Significant historical volatility across key bunker grades and port locations

Bunker Price, US$/tonne

Port	Fuel	2020-21 Min	2020-21 Max	2020-21 Avg	5yr Avg	10yr Avg	20yr Avg
Singapore	HSFO	158	524	344	370	421	383
	VLSFO	220	726	454			
	MGO	232	728	487	541	634	595
Rotterdam	HSFO	125	488	322	340	394	358
	VLSFO	179	606	418			
	MGO	212	711	468	518	612	587
Fujairah	HSFO	129	524	341	363	418	381
	VLSFO	203	776	455			
	MGO	329	796	566	624	730	666
Houston	HSFO	121	489	330	349	402	366
	VLSFO	180	647	430			
	MGO	225	758	501	555	673	702

Source: Clarksons Research. HSFO = "High Sulphur Fuel Oil", bunker grade with a maximum 3.5% sulphur content. HSFO was the principal bunker fuel in the shipping industry prior to start 2020, but is now mainly consumed by merchant vessels equipped with SOx scrubber technology. VLSFO = "Very Low Sulphur Fuel Oil"; bunker fuel grade with maximum 0.5% sulphur content. VLSFO has been the main fuel grade consumed by merchant vessels since the start of 2020, following the introduction of the 'IMO 2020' 0.5% global sulphur cap, limiting the maximum sulphur content of marine fuel to 0.5% globally for any vessels not equipped with emissions abatement technology. MGO = Marine Gas Oil.

Clarksons Research

Impact on iron ore trades

35 Clarksons Research has conducted a detailed analysis of the impact of a range of levy contributions on iron ore trades.

36 This includes analysis of the impacts on States whose iron ore production industries are more geographically remote from their key markets than their competitors, comparing the impacts on the iron ore trades between Brazil and China (voyage length about 11,000 miles) and Australia and China (voyage length about 3,500 miles).

37 To conduct this analysis, Clarksons Research used its standard ship and voyage assumptions for a Capesize bulk carrier built in 2010, consuming 43 tonnes of fuel oil per day at 12 knots laden, 13 knots ballast. The figures used include estimates for consumption in port and on the ballast leg (round voyage assumed on both routes).

38 The calculations used for Brazil-China are based on an iron ore cargo of 177,000 tonnes from Tubarao to Qingdao, and for Australia-China are based on iron ore cargo of 172,000 tonnes from Dampier to Qingdao.

39 Based on the average price of iron ore delivered in China and average freight rates during 2021, with respect to the Brazil-China route, Clarksons Research calculates that the additional cost of the voyage (round trip) arising from the levy contributions explored would be as follows;

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $1.5 per tonne of iron ore shipped, with an impact of a 1% increase in the price of iron ore delivered in China when shipped from Brazil;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $3 per tonne of iron ore shipped, with an impact of a 2% increase in the price of iron ore delivered in China when shipped from Brazil;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $6 per tonne of iron ore shipped, with an impact of a 4% increase in the price of iron ore delivered in China when shipped from Brazil;

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $12 per tonne of iron ore shipped, with an impact of a 7.9% increase in the price of iron ore delivered in China when shipped from Brazil;

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $24 per tonne of iron ore shipped, with an impact of a 15.8% increase in the price of iron ore delivered in China when shipped from Brazil.

40 Based on the average price of iron ore delivered in China and average freight rates during 2021 with respect to the Australia-China route, Clarksons Research calculates that the additional cost of the voyage (round trip) arising from the levy contributions explored would be as follows;

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $0.5 per tonne of iron ore shipped, with an impact of a 0.3% increase in the price of iron ore delivered in China when shipped from Australia;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $1 per tonne of iron ore shipped, with an impact of a 0.7% increase in the price of iron ore delivered in China when shipped from Australia;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $2 per tonne of iron ore shipped, with an impact of a 1.3% increase in the price of iron ore delivered in China when shipped from Australia;

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $4.1 per tonne of iron ore shipped, with an impact of a 2.7% increase in the price of iron ore delivered in China when shipped from Australia;

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $8.2 per tonne of iron ore shipped, with an impact of a 5.4 % increase in the price of iron ore delivered in China when shipped from Australia.

41 This analysis suggests that the impact of a levy of $400 per tonne of CO_2 (based on the average freight rate for 2021) would likely result with freight rates for both the Brazil-China and Australia-China trades that were similar to their respective peak freight rates during the previous ten years ($50 per tonne of iron ore shipped compared to a 10 year peak of $47 for Brazil-China, and $20 per tonne of iron ore shipped compared to a 10 year peak of $22 for Australia-China).

42 However (based on the average freight rate for 2021), a levy initially set at $100 per tonne of CO_2 would result with freight rates for both the Brazil-China and Australia-China trades which were significantly less their 10 year peaks and roughly double their respective average freight rates during the previous ten year period ($32 per tonne of iron ore shipped compared to a 10 year average of $18 for Brazil-China, and $14 per tonne of iron ore shipped compared to a 10 year average of $7 for Australia-China). If the levy was set at less than $100 per tonne of CO_2, the freight rates for both routes would still be close to double their respective average freight rates during the past 10 years for both the Brazil-China and Australia-China trades. This suggests that, for these price sensitive iron ore trades, a levy set at $100 per tonne of CO_2 or lower would be less likely to have disproportionately negative impacts on States than a higher levy amount, but would not have significantly less impacts on States than a levy which was set at a quantum lower than $100 per tonne of CO_2.

43 The cost of iron ore delivered in China is typically volatile with the spread between the highest and lowest cost at different times during 2021 amounting to $118 (with an average annual spread of $156 and $172 respectively during the previous five year and ten-year periods). The impact of a levy on the cost of iron ore delivered in China (which depending on the voyage and the levy quantum applied would range from between $1 to $24) would

therefore be within the typical range of cost variability of iron ore delivered in China if the levy was set at any of the levels explored, both for iron ore shipped from Brazil and for iron ore shipped from Australia.

44 However, with a levy of $100 per tonne of CO_2, the difference between the additional cost of shipping iron ore to China from Brazil compared to the additional cost of shipping it from Australia would be less (a difference in the additional cost between the two trades of $4 per tonne of iron ore shipped) compared to the potential impact of a $200 or $400 levy (a difference in the additional cost between the two trades of $8 or $16 per tonne of iron ore shipped).

45 The difference between the additional cost of shipping iron ore to China from Brazil compared to shipping it from Australia would of course be smaller for a levy set at less than $100 per tonne of CO_2 but not significantly so. For those Member States concerned about the potential impact on these competitive and cost-sensitive trades, the impact of a $100 levy (a difference between the two trades of $4 per tonne of iron ore shipped) would be substantially less than that for a levy with a higher quantum (a difference between the two trades of $8 or US16 per tonne of iron ore shipped for a levy of $200 or $400) but not significantly different to a levy set at less than $100 per tonne of CO_2 (a difference in the additional cost between the two trades of $3 per tonne of iron ore shipped for a levy set at $50 per tonne of CO_2).

46 During 2021, the price of iron ore delivered in China averaged at $162 per tonne. Based on this price, this means that the difference in the additional cost of a $100 levy for iron ore shipped to China from Australia, compared to that shipped from Brazil, would (at around $4) amount to about 2.4% of the price of the iron ore delivered in China. However, whether this might be regarded as a significant impact has to be seen in the context of the considerable volatility in freight rates in iron ore trades.

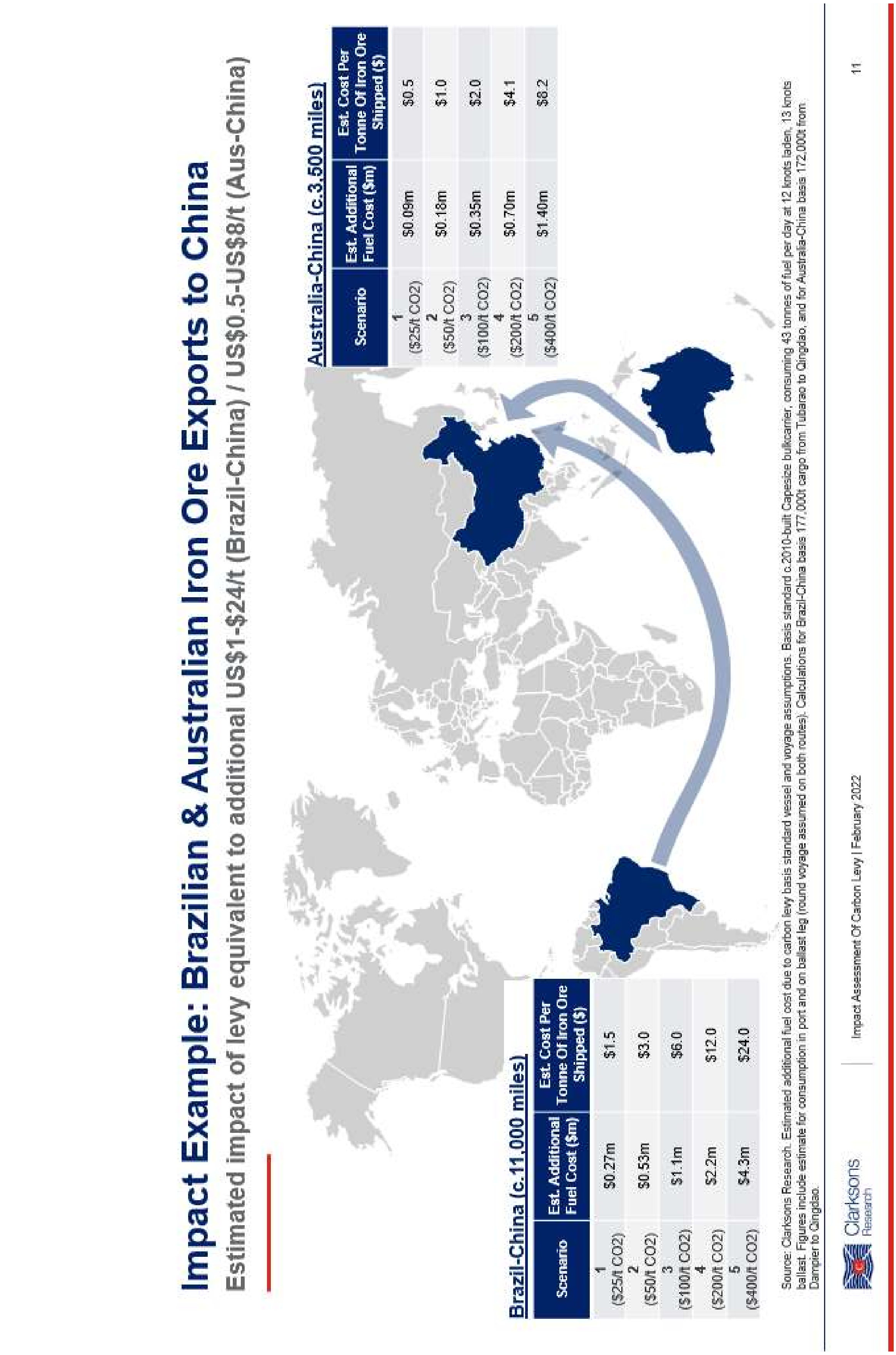
47 If the levy was set at either $200 or $400 per tonne of CO_2 with a difference in the additional cost for the Brazil-China trade, compared to the additional cost for the Australia-China trade, of $8 or $16 per tonne of iron ore shipped, this would amount respectively to 4.8% and 9.6% of the price of iron ore delivered in China (based on the 2021 average) which some Member States might regard as a significant impact on competition between these two trades.

48 However, if the levy was set at $25 or $50 per tonne of CO_2, the impact on the competition between these trades would be smaller, with the difference between the additional cost for iron ore shipped from Brazil compared to that shipped from Australia amounting to about 0.6% or 1.2% respectively of the price of iron ore delivered in China (based on the 2021 average).

49 Freight rates in iron ore trades are generally volatile. According to the analysis by Clarksons Research, over the past 10 years the spread between the highest and lowest freight rates for Brazil-China and Australia-China has, respectively, been $42 and $19 per tonne of iron ore shipped (the maximum/minimum being $47 and $5 for Brazil-China, and $22 and $3 for Australia-China) In contrast, the additional cost of any of the levy quanta examined would range from between $2 and $24 per tonne of iron ore shipped from Brazil to China, and from between $1 and $8 from Australia to China.

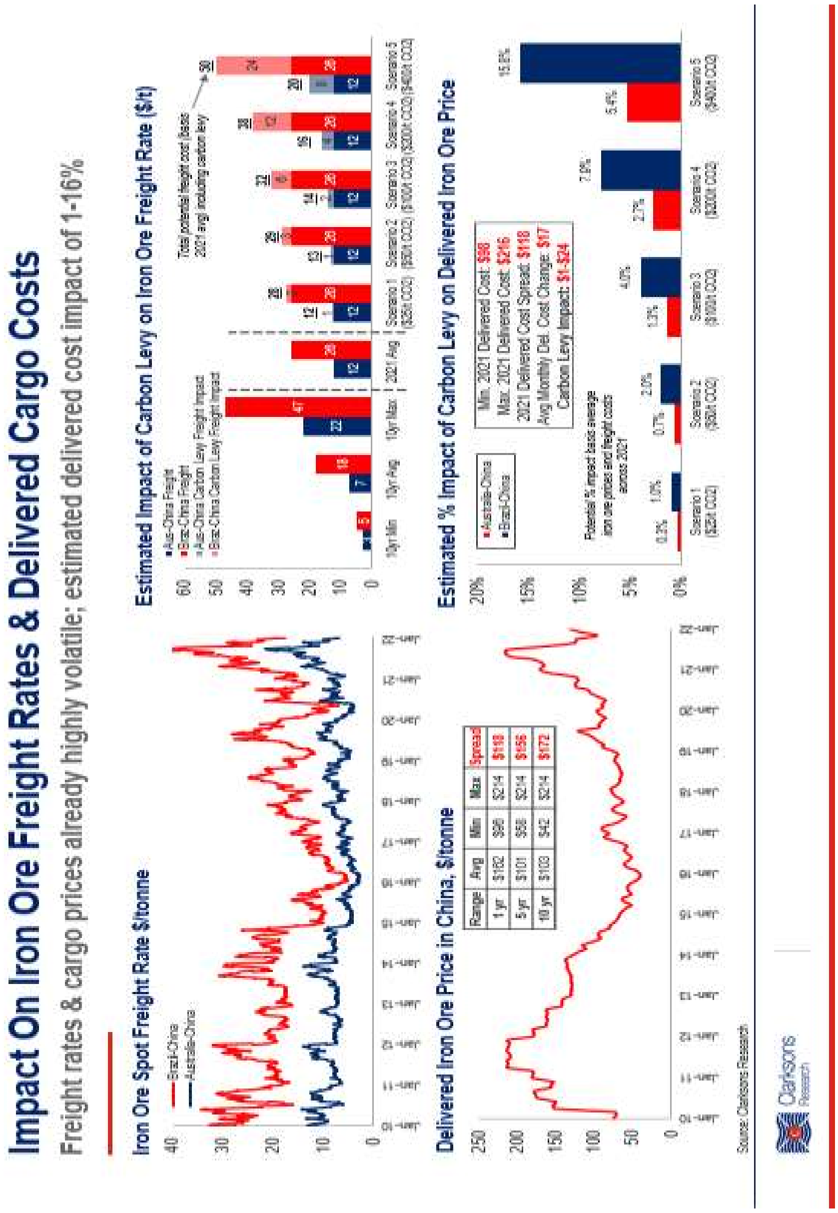
50 Graphics produced by Clarksons Research illustrating data concerning Brazilian and Australian iron ore exports to China are shown at Figure 5.

Figure 5 – Impact Example: Brazilian and Australian Iron Ore Exports to China



51 Graphics produced by Clarksons Research illustrating the impact on iron ore freight rates and delivered cargo costs are shown at Figure 6.

Figure 6 – Impact on Iron Ore Freight Rates and Delivered Cargo Costs



52 Clarksons Research has conducted a detailed analysis of the impact of a range of levy contributions on coal trades, analysing freight rates for dry bulk carriers trading between South Africa and India (voyage length about 5,000 miles).

53 To conduct this analysis, Clarksons Research used its standard ship and voyage assumptions for a 2010-built Panamax bulk carrier, consuming 23.5 tonnes of fuel oil per day at 12 knots laden, and 23 tonnes per day at 12.5 knots ballast. The figures include estimates for fuel consumption in port and on the ballast leg (round trip voyage assumed), and the calculations are based on 72,000 tonnes of coal being carried from Richards Bay (East Coast South Africa) to Mundra (West Coast India).

54 Based on average spot market rates in 2021, with respect to the Richards Bay to Mundra route, Clarksons Research calculates that the additional cost arising from a levy contribution would be as follows:

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $1 per tonne of coal shipped (a 4% increase) with an impact of a 0.7% increase on the price coal delivered in India;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $2 per tonne of coal shipped (an 8% increase) with an impact of a 1.5% increase in the price of coal delivered in India;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to $4 per tonne of coal shipped (a 15% increase) with an impact of a 3.0% increase in the price of coal delivered in India;

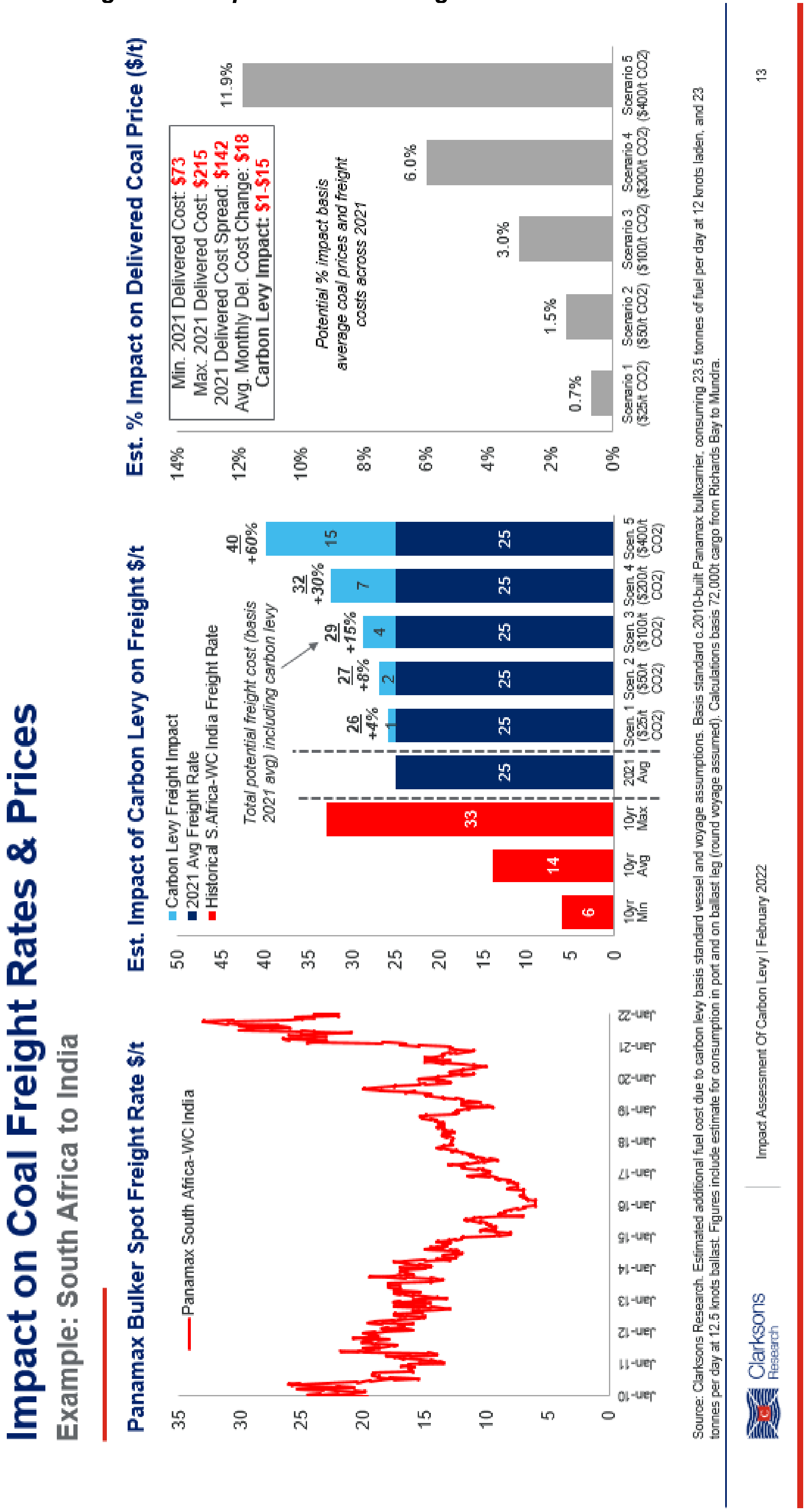
.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $7 per tonne of coal shipped (a 30% increase) with an impact of a 6.0% increase in the price of coal delivered in India;

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $15 per tonne of coal shipped (a 60% increase) with an impact of an 11.9% increase in the price of coal delivered in India.

55 The impact of a levy, as a percentage of the price of tonne of coal delivered in India (based on the average price and freight rates in 2021) would be 3.0% for a levy of $100 per tonne of CO_2 and 11.9% for a levy of $400 per tonne of CO_2. However, based on analysis of spot market freight rates for this voyage over the previous 10 year period, the additional costs from a levy ($1 to $15 per tonne of coal shipped depending on the levy quantum analysed, and $4 for a levy of $100 per tonne of CO_2) should be compared to the freight rate spread during this 10 year period of about $27 per tonne of coal transported and a variation of $142 in the price of a tonne of coal delivered in India during 2021. In 2021, the average monthly variation in the delivered price of a tonne of coal in India, at $18, was greater than the impact of applying any of the levy quantum analysed to this trade, including a levy of $400 per tonne of CO_2.

56 Graphics produced by Clarkson Research illustrating data on the impact on coal freight rates and prices for a voyage between South Africa and India are shown at Figure 7.

Figure 7 – Impact on Coal Freight Rates and Prices



Impact on container cargo (perishables)

57 Clarksons Research has conducted an analysis of the impact of different levy quanta on container liner services. To address questions about the impact on States geographically remote from their markets, Clarksons focused its detailed analysis on the East Coast South America (ECSA) via South Africa to Asia perishables trade (a liner trade with multiple port calls).

58 Given that the value by weight and volume of most cargoes carried by containership is higher than that for most perishable cargoes, the impact of a levy contribution on the price of these containerized cargoes, for consumers and States, would be less than that indicated below.

59 To conduct this analysis, Clarksons Research used the following assumptions: 8,500 TEU modern, c.2010 built containership ship (homogenous @14t: 6,330 TEU) with a speed of 16 knots at sea, 32.3. days at sea (one-way voyage), 8.1 days in port (one-way voyage). Clarksons Research assumed 50% utilization of homogenous capacity (based on the estimated imbalance of cargo vs the return Asia-South America leg). The total fuel consumption for the one-way voyage including reefer consumption (assuming this comprised 10% of the cargo) was estimated to be 3,124 tonnes.

60 Based on an estimated indicative global reefer cargo freight rate of around $1,500 per TEU on this trade, Clarksons Research calculates that the impact of the levy quanta examined would be as follows:

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $ 78.5 per tonne of fuel oil), the additional cost for the one-way voyage of about $77 per TEU of cargo would equate to an additional freight rate of about $6 per tonne of perishable cargo. This would increase the freight rate by about 5%.

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the one-way voyage of about $155 per TEU of cargo would equate to an additional freight rate of about $13 per tonne of perishable cargo. This would increase the freight rate by about 10%.

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the one-way voyage of about $310 per TEU of cargo would equate to an additional freight rate of about $26 per tonne of perishable cargo. This would increase the freight rate by about 21%.

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the one-way voyage of about $620 per TEU of cargo would equate to an additional freight rate of about $52 per tonne of perishable cargo. This would increase the freight rate by about 41%.

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the one-way voyage of about $1.240 per TEU of cargo would equate to an additional freight rate of about $103 per tonne of perishable cargo. This would increase the freight rate by about 83%.

61 These estimates assume that cost of the levy is spread evenly across the cargo. However, if capacity utilization was more than 50% (which is the case for many containerized liner trades) the cost impact of the levy contribution per TEU would be lower.

62 Based on an estimated indicative global reefer cargo freight rate of around $1,500 per TEU, the additional carbon levy, depending on the quantum, would increase the freight rate for this voyage from between about 5% to about 83%. If the freight rate on this liner voyage at the time when the levy applied is lower or higher than $1,500 per TEU then the impact of a levy on the freight rate would of course be proportionately larger or smaller. If the freight rate per TEU of perishable cargo was $1,000 the impact on the freight rate would range from between about 8% to about 124% depending on the levy quantum applied. If the freight was $3.000 (closer to the rate which applied in March 2022) the impact on the freight rate per TEU would range from between about 3% to about 41%.

63 In order to determine whether these impacts might be regarded as disproportionately negative, it should be recognized that freight rates have been extremely volatile throughout the pandemic and generally far higher than pre-pandemic levels, with freight rates typically increasing by around ten times per TEU in some containerized trades between July 2020 and July 2021 due to serious and multiple supply chain bottlenecks, directly caused by the pandemic, and an acute shortage of containership capacity available worldwide.

64 Prior to the sudden increase in bunker fuel costs which occurred in February/March 2022 (as a response to the conflict in Ukraine) it had generally been assumed that freight rates in the liner sector might return to something closer to pre-pandemic levels by 2023. As a generalisation, a levy in the order of $100 per tonne of CO_2 would appear to have an impact on States that was significantly less than that resulting from the recent high freight rates experienced in most liner trades (and the same might be considered to be the case if a higher levy quantum was applied). However, more detailed analysis will be required as part of a comprehensive impact assessment when the impact of the conflict in the Ukraine should be clearer.

65 Given that West Coast South America is a similar distance/voyage time from its Asian markets than East Coast South America, the impact of levy contribution would, *ceteris paribus,* be similar. While it is the case that the West Coast of South America is more geographically distant from markets in Western Europe than the East Coast of South America, the difference is virtually the same as that between these two coasts and their markets in the West Coast of the United States, to which the West Coast of South America is geographically closer.

66 A graphic produced by Clarksons Research highlighting data on the impact of different levy quanta on perishable container cargo on the East Coast South America to Asia liner trade is included at Figure 8.

Figure 8 – Impact of Carbon Levy on Container Cargo

Impact of Carbon Levy on Container Cargo

Example: South America to Asia perishables trade

- Basis containership operating on ECSA via South Africa to Asia liner service
- 8,500 TEU (modern, c.2010 blt) ship (homogenous @14t: 6,330 TEU), 16 knots at sea
- 32.3. days at sea (one way), 8.1 days in port (one way)
- 50% utilization of homogenous capacity (basis estimated imbalance of cargo vs Asia-S.Am leg)
- Total fuel consumption including reefer consumption (basis c.10% of cargo) = 3,124 tonnes
- Potential impact of carbon levy on fuel costs and freight rates:

Scenario	Est. Additional Fuel Cost ($m)	Est. Cost Per TEU of Cargo[1] ($)	Est. Cost Per Tonne Of Perishable Cargo[2] ($)	% Of Ocean Freight Rate[3]
1 ($25/t CO2)	$0.25m	$77	$6	c.5%
2 ($50/t CO2)	$0.50m	$155	$13	c.10%
3 ($100/t CO2)	$0.98m	$310	$26	c.21%
4 ($200/t CO2)	$1.96m	$620	$52	c.41%
5 ($400/t CO2)	$3.92m	$1,240	$103	c.83%

- *Note: At higher levels of capacity utilization the impact of fuel levy per TEU would be reduced.*

Data source: Clarksons Research standard vessel and voyage assumptions

Notes: 1: Assuming levy spread equally across cargo. 2: Assuming 12t of cargo per box. 3: Basis estimated indicative global reefer cargo freight rate of around $1,500/TEU. At a freight rate of $1,000/TEU, levy would equate to ~8% / ~124% of the ocean freight rate (Scenario 1 / 5 respectively). At a freight rate of $3,000/TEU, levy would equate to ~3% / ~41% of the ocean freight rates (Scenario 1 / 5 respectively).

Clarksons Research

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Impact on Crude Oil Trades

67 Clarksons Research has conducted an analysis of the impact of a different levy quantum on crude oil freight rates and prices.

68 Clarksons Research analysed in detail freight rates for VLCCs trading between the Middle East Gulf to Asia (voyage length about 5,800 miles).

69 To conduct this analysis, Clarksons Research used its standard ship and voyage assumptions for a standard VLCC built in 2010, consuming 67 tonnes of fuel per day at 12.5 knots laden, and 51 tonnes per day at 12 knots ballast. The calculations include estimates for fuel oil consumption in port and on the ballast leg (round voyage assumed). The calculations are based on 270,000 tonnes of cargo being shipped from Ras Tanura to Ningbo. Freight rate data prior to August 2018 is based on Ras Tanura-Chiba.

70 Based on average spot market rates in 2021 of $6 per tonne of crude oil shipped from the Middle East Gulf to China, Clarksons Research calculates that the additional cost arising from the levy quanta analysed would be as follows:

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $1 per tonne of crude shipped (a 12% increase) with an impact of a 0.2% increase on the price of a barrel of crude oil delivered in China;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $2 per tonne of crude shipped (a 24% increase) with an impact of a 0.3% increase in the price of barrel of crude oil delivered in China;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $ 314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $3 per tonne of crude shipped (a 48% increase) with an impact of a 0.6% increase in the price of barrel of crude oil delivered in China;

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $ 628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $6 per tonne of crude shipped (a 96% increase) with an impact of a 1.2% increase in the price of barrel of crude oil delivered in China;

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $12 per tonne of crude shipped (a 193% increase) with an impact of a 2.4% increase in the price of barrel of crude oil delivered in China.

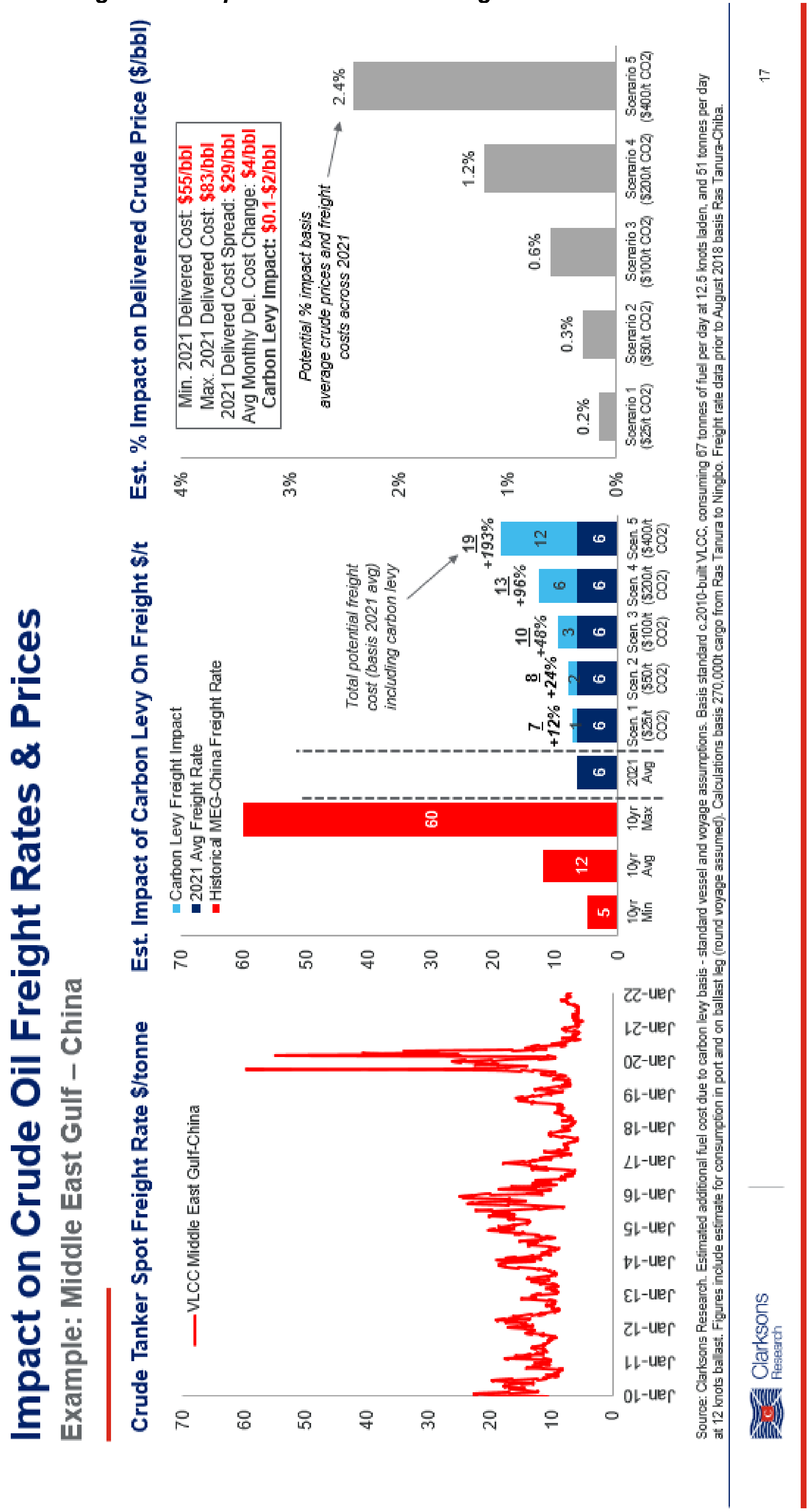
71 Based on analysis of spot market freight rates for this voyage, the additional freight rates ($1 to $12) that would result from a carbon levy compare over a ten-year period (2011 - 2021) to a freight rate spread of about $55 per tonne of crude oil transported. The average freight rate in 2021 at just $6 per tonne of crude shipped was close to the ten-year low. Based on this freight rate, the impact of a levy set at $100 per tonne of CO_2 (with an additional cost of $3 per tonne of crude shipped) would therefore be smaller than a return to the average freight rate for this voyage ($12 per tonne of crude shipped) over the past 10 years. However, a levy set at $400 per tonne of CO_2 would have an impact which would double the average freight rate for this voyage during the past 10 years.

72 An assessment of whether or not the impact of a levy on the cost of crude oil delivered in China should be regarded as disproportionately negative has to be seen in the context of the significant volatility in the price of a barrel of crude oil.

73 Based on typical freight rates for this voyage in 2021, a 0.6% increase in the delivered price of crude in China resulting from a levy of $100 per tonne of CO_2 might just about be perceptible, though significantly less so than for a levy of $200 of $400 per tonne of CO_2 which would increase the delivered price by 1.2% or 2.4%. But if freight rates for this voyage return to a level approaching their ten-year peak, then the impact of any of the levy quanta examined on delivered crude oil prices would be virtually imperceptible, especially if the price of crude persists at levels over $100 a barrel as was the case in February/March 2022 (compared to about $50 a barrel in January 2021).

74 Graphics produced by Clarksons Research highlighting data on the impact on crude oil freight rates and prices of different levy quanta is included at Figure 9.

Figure 9 – Impact on Crude Oil Freight Rates & Prices



Impact on Petroleum Product Trades

75 Clarksons Research has conducted an analysis of the impact of various levy contributions on petroleum product freight rates and prices. Clarksons Research analysed freight rates for mid-range (MR) product tankers trading between Singapore and Sydney (voyage length about 4,500 miles).

76 To conduct this analysis, Clarksons Research used its standard ship and voyage assumptions for a standard MR tanker built in 2010, consuming 27 tonnes of fuel per day at 12.5 knots laden, and 25 tonnes per day at 12 knots ballast. Figures include estimates for fuel oil consumption in port and on the ballast leg (round voyage assumed). Calculations are based on 35,000 tonnes of petroleum cargo.

77 Based on average spot market rates in 2021 of $24 per tonne of petroleum product shipped from the Singapore to Sydney, Clarksons Research calculates that the additional cost arising from the levy quanta analysed would be as follows:

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $ 78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $2 per tonne of petroleum product shipped (an 8% increase) with an impact of a 0.3% increase on the price of a barrel of gasoline delivered in Australia;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $4 per tonne of petroleum product shipped (a 16% increase) with an impact of a 0.5% increase in the price of barrel of gasoline delivered in Australia;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $8 per tonne of petroleum product shipped (a 32% increase) with an impact of a 1.1% increase in the price of barrel of gasoline delivered in Australia;

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $15 per tonne of petroleum product shipped (a 65% increase) with an impact of a 2.2% increase in the price of barrel of gasoline delivered in Australia.

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $31 per tonne of petroleum product shipped (a 130% increase) with an impact of a 4.4% increase in the price of barrel of gasoline delivered in Australia.

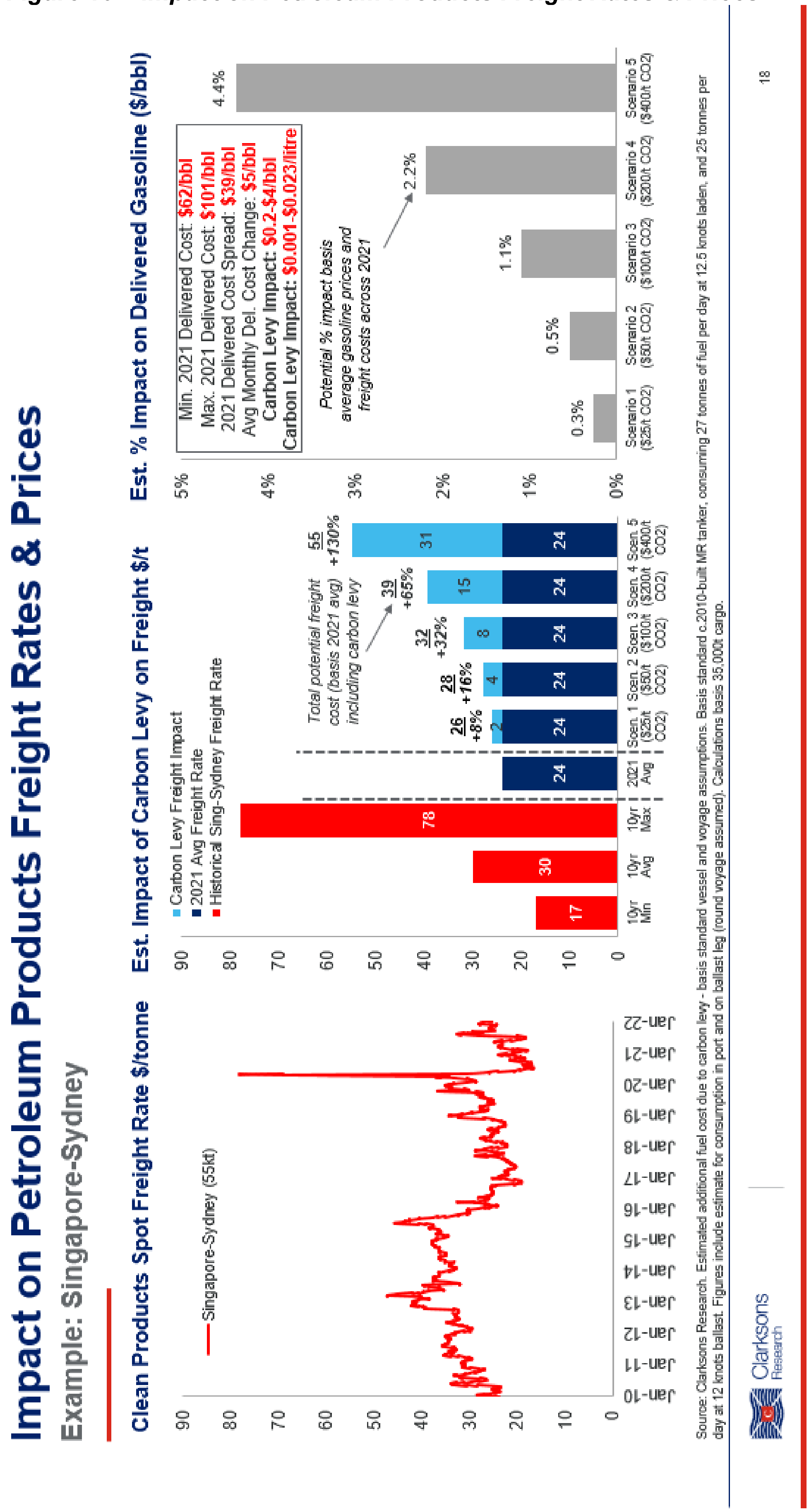
78 Based on analysis of spot market freight rates for this voyage, the additional freight rate that would arise due to carbon levy ($2 to $31 per tonne of clean product shipped depending on the quantum of the levy applied) compares over a ten-year period (2011 -2021) to a freight rate variation of about $61 per tonne of clean product transported, although much of this spread was due to a temporary rate spike in 2020. Based on the average freight rate for this voyage in 2021, a levy of $100 per tonne of CO_2 would increase the cost of transporting a tonne of clean product to a level that was similar to the average freight rate for this voyage during the previous ten-year period. A levy of $200 or $400 per tonne of CO_2 would increase the freight rate to a level greater than the ten-year average, with the latter almost doubling the average freight rate for this voyage.

79 Based on average gasoline prices and freight rates in 2021, Clarksons Research calculates that the impact of a levy contribution on the price of gasoline shipped from Singapore to Australia would, depending on the levy quantum, equate to $0.2 to $4 per barrel, with a levy set at $100 per tonne of CO_2 increasing the price of delivered clean product by about 1.1% whereas a levy of $400 would increase the price by about 4.4%.

80 Clarksons Research also calculates that the potential impact on the price a litre of gasoline delivered in Australia from Singapore would range, according to the levy quanta applied, from $0.001 to $0.23. In view of recent volatility in the cost of gasoline experienced by consumers in most economies, this suggests that the impact of a carbon levy being applied would be unlikely to have any disproportionately negative impacts (although the impacts of a levy on the delivered cost of crude oil worldwide will also have a small impact on the delivered price of petroleum products).

81 A graphic produced by Clarkson Research highlighting data concerning the impact on petroleum products freight and prices is included at Figure 10.

Figure 10 – Impact on Petroleum Products Freight Rates & Prices



Impact on Petroleum Product Trades (Pacific Island States)

82 In order to demonstrate the impact of a levy on SIDS, Clarksons Research has also conducted an analysis of the impact of a range of carbon levy contributions on petroleum product freight rates and delivery prices for mid-range (MR) product tankers trading between Singapore and Fiji (voyage length, one-way, about 4,700 miles), noting that 60 MR tanker callings were recorded in Fijian national waters in 2020.

83 To conduct this analysis of a round trip voyage, Clarksons Research used its standard ship and voyage assumptions for a 2010-built 50,000 dwt ship, consuming 27 tonnes of fuel oil per day at 12.5 knots laden, 25 tonnes of fuel oil per day at 12 knots ballast, plus an estimate for in port consumption. The cargo estimate for this example is 35,000 tonnes of clean product.

84 Based on average spot market rates in 2021 for transporting petroleum product from Singapore to Sydney, Clarksons Research calculates that for a voyage from Singapore to Fiji the additional cost arising from the levy quanta analysed would be as follows:

.1 **For a levy of $25 per tonne of CO_2** (equivalent to $ 78.5 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $2 per tonne of petroleum product shipped with an impact of a 0.3% increase on the price of a barrel of gasoline delivered in Fiji, equivalent to $0.001 per litre of gasoline;

.2 **For a levy of $50 per tonne of CO_2** (equivalent to $157 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $4 per tonne of petroleum product shipped with an impact of a 0.6% increase in the price of barrel of gasoline delivered in Fiji, equivalent to $0.003 per litre of gasoline;

.3 **For a levy of $100 per tonne of CO_2** (equivalent to $314 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $8.1 per tonne of petroleum product shipped with an impact of a 1.1% increase in the price of barrel of gasoline delivered in Fiji, equivalent to $0.006 per litre of gasoline;

.4 **For a levy of $200 per tonne of CO_2** (equivalent to $628 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $16.2 per tonne of petroleum product shipped with an impact of a 2.3% increase in the price of barrel of gasoline delivered in Fiji, equivalent to $0.012 per litre of gasoline;

.5 **For a levy of $400 per tonne of CO_2** (equivalent to $1,256 per tonne of fuel oil), the additional cost of the voyage (round trip) would equate to about $32.3 per tonne of petroleum product shipped with an impact of a 4.5% increase in the price of barrel of gasoline delivered in Fiji, equivalent to $0.024 per litre of gasoline.

85 A slide produced by Clarksons Research highlighting data on the impact on petroleum products freight and prices (with respect to Singapore – Fiji) is included at Figure 11.

Figure 11 – Impact on Petroleum Products Freight Rates & Prices (Singapore - Fiji)

Impact on Petroleum Products Freight Rates & Prices

Example: Singapore-Fiji

- Basis MR products tanker on a round voyage from Singapore to Fiji
- c.2010-built standard 50,000 dwt vessel, consuming 27 tpd at 12.5 knots laden, 25 tpd at 12 knots ballast, plus estimate for in port consumption
- Basis 35,000t cargo from Singapore to Fiji, one way distance c.4,700miles:

Scenario	Est. Additional Fuel Cost ($m)	Est. Cost Per Tonne Of Refined Oil Products Shipped ($)	Est. Cost Per Litre Of Refined Oil Products Shipped ($)	Est. Impact On Delivered Gasoline Cost (basis 2021 avg)
1 ($25/t CO2)	$0.07m	$2.0	$0.001	+0.3%
2 ($50/t CO2)	$0.14m	$4.0	$0.003	+0.6%
3 ($100/t CO2)	$0.28m	$8.1	$0.006	+1.1%
4 ($200/t CO2)	$0.57m	$16.2	$0.012	+2.3%
5 ($400/t CO2)	$1.13m	$32.3	$0.024	+4.5%

- Estimated impact of carbon levy on delivered cargo cost of $2-$32/t (for comparison estimated freight costs on the Singapore-Sydney route have varied in a range of $61/t in the last ten years, with the average monthly variation in delivered cargo costs through 2021 standing at $43/t)

Data source: Clarksons Research standard vessel and voyage assumptions

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Conclusions

86 These conclusions follow the subheadings for initial impact assessments based on the guidance contained in MEPC.1/Circ.885.

87 As this initial impact assessment does not firmly identify any disproportionately negative impacts on States, which have to be balanced against the positive impacts of applying this measure plus other developments in shipping markets (including the impact of the conflict in Ukraine), this assessment does not suggest any recommendations on how any such impacts could be addressed. These would need to be determined following a comprehensive impact assessment.

88 Nevertheless, this assessment tentatively suggests that, for some trades and cargoes, the initial application of a levy much in excess of $100 per tonne of CO_2 emitted might be more likely to viewed by some Member States as being disproportionately negative when compared both to average freight rates and bunker fuel costs over the past 10 years and the variation in freight rates and bunker fuel costs seen over same period.

89 However, when assessed in terms of their impact on the price of delivered cargoes, which is of direct relevance to the economies of States, all of the levy quantum analysed, regardless of the trade and/or cargo type to which they apply, generally seem to fall within the average monthly volatility in the price of delivered cargo during 2021. Nonetheless, provided that the necessary zero-carbon technologies and fuels become available, this does not mean that the levy would have no impact on accelerating the transition. Depending on the levy quantum applied, the price gap between conventional fuel oil and zero-carbon fuels would be reduced whilst, depending on how the funds generated are used – including the extent to which they are utilized in-sector – these funds could have a significant positive impact towards expediting the transition.

90 Another conclusion drawn from conducting this initial assessment is that, notwithstanding the need to address the impacts on different ship types, voyages and cargoes, it is relatively straight forward to analyse the potential impact on freight rates and the price of delivered cargo of a simple fixed levy per tonne of CO_2 emitted. However, an assessment of the impact of any market-based measure which used a variable carbon price or metrics such as transport work instead of CO_2 emitted (which is directly related to fuel costs and freight rates) would be far more difficult to undertake meaningfully.

Geographic remoteness and connectivity to main markets

91 The analysis above and the examples of voyages assessed are intended to provide Member States with a better understanding of the potential impact of a levy per tonne of CO_2 emitted due to the increase of marine fuel oil and voyage costs that would result. The impact on States which are geographically remote from their main markets will of course depend on the quantum of any carbon levy which is adopted.

92 For example – as expanded upon above – for a bulk carrier transporting iron ore from Brazil to China (a voyage of about 11,000 miles) a levy of $100 per tonne of CO_2 (equivalent to $314 per tonne of fuel oil) would increase the price of iron ore delivered in China by about 4%, compared to the average delivered price and freight rate for this voyage in 2021. If the levy was set at $400 per tonne of CO_2, this would increase the delivered price by about 15.8%.

93 By comparison, for a less geographically remote State in terms of connectivity to main markets, in this case Australia transporting iron ore to China (a voyage of about 3,500 miles), a levy of $100 per tonne of CO_2 would only increase the price of iron ore delivered in China from Australia by about 1.3%, whilst a levy set at $400 would only increase the delivered price by about 5.4%.

94 This initial impact assessment therefore suggests that, for cost sensitive iron ore trades, a levy initially set at $100 per tonne of CO_2 or lower might be less likely to be viewed as having disproportionately negative impacts on States that are geographically remote from their markets than a higher levy amount, but arguably would not have significantly less impacts on geographically remote States than a levy which was set at a lower quantum than $100 per tonne of CO_2.

95 This assessment, inter alia, also looks at the impact of a levy on the price of delivered foodstuffs from another remote market, in this case the East Coast South America (ECSA) via South Africa to Asia perishables trade. This suggests, inter alia, that a levy of $100 per tonne of CO_2 would increase the freight rate by about 21%, while a levy of $200 or $400 would increase the freight rate by about 41% and 83% respectively based on an indicative global reefer cargo freight rate of about $1,500 per TEU. However, these potential impacts need to be seen in the context of the much higher freight rates recently experienced in liner trades, which would make the cost impacts of a carbon levy, expressed as percentage of the delivered price of cargo, substantially less.

96 While geographical remoteness is subjective, the voyage distance of about 5.800 miles between the Middle East Gulf and China is not insignificant. This assessment, inter alia, also looks at the impact of a levy on the price of crude oil delivered in China when shipped from the Middle East. This suggests, inter alia, that a levy of $100 per tonne of CO_2 would increase the delivered price of crude oil in China by about 0.6% based on the average price and freight rate for this voyage in 2021, while a levy set at $200 or $400 would increase the delivered price by about 1.2% and 2.4%. However, due to the conflict in the Ukraine, the price of a barrel of crude increased significantly in February/March 2022 meaning that in terms of a percentage increase in the delivered price of crude, the impacts of a levy (if this high price was sustained) would be less significant.

Cargo value and type

97 The impact on States will of course depend on the quantum of any carbon levy which is adopted. As the proposed measure would apply to all ships (of at least 5,000GT and above) it would not discriminate between different cargoes.

98 The analysis provided above provides examples of cargoes of a variety of values and types so as to demonstrate the additional cost of fuel oil depending on the quantum of the levy adopted.

99 Given that the prices on delivery of all the cargoes examined are volatile, generally speaking the impact on the price of these cargoes on delivery of any of the levy quantum examined, up to and including $400 per tonne of CO_2, fell within the average monthly volatility of delivered cargo prices the during 2021.

100 Based on 2021 cargo delivery prices and freight rates, the impact of any of levy quantum examined on delivery prices would be small in comparison to the volatility in delivery prices experienced over the past ten years. However (other than for container trades for which freight rates were exceptionally high during 2021) the impact of a levy of $100 per tonne of CO_2 on most trades would be to bring freight rates in these trades in the vicinity of their 10-year average, whilst a levy of $400 per tonne of CO_2 would bring freight rates in the vicinity of their 10-year peak.

Transport dependency

101 The impact on States will depend on the quantum of any carbon levy which is adopted. As demonstrated by the analysis above, the proposed measure should not disproportionately impact States which are dependent on maritime transport and – by expediting the use of zero-carbon fuels that will make decarbonisation of the sector possible – it will allow these States to continue to enjoy access to low cost and efficient maritime transport whilst meeting the levels of ambition set by the Initial IMO Strategy (due to be revised by 2023) which will be particularly important for LDCs and SIDS.

Transport costs

102 The impact on States will depend on the quantum of any carbon levy which is adopted. As demonstrated by the analysis above, which includes data on the impact of various levy quanta on freight rates, the proposed measure should not significantly impact transport costs to an extent beyond those impacts in most trades which already result from significant volatility of fuel oil prices and variations in freight rates due to changes in supply and demand (plus unexpected developments such as the COVID-19 pandemic and the conflict in Ukraine). Moreover, programmes to be supported by the proposed IMO Climate Fund could be designed to identify potential mechanisms for reducing the cost of transportation to LDCs and SIDS, and other geographically remote locations, whilst complying with existing and future regulations that require a reduction in carbon intensity.

Food security

103 The impact on States will depend on the quantum of any carbon levy which is adopted as demonstrated by the analysis above, the proposed measure should have no adverse impact on food security. The analysis above with respect to the impact on freight rates in dry bulk trades (iron ore and coal), which suggests that the impacts of the levy quanta examined generally fall within the average monthly volatility of delivered cargo prices, is equally applicable to bulk carriers which are used to move key food stuffs in bulk.

104 With respect to the transport of containerized perishable cargoes, this assessment suggests that whilst a levy initially set much above $100 per tonne of CO_2 might be seen as having large impacts on the price of delivered perishable foodstuffs, when seen as a proportion of the delivered cargo price the impact will be significantly less in the context of the much higher freight rates experienced in liner trades since the middle of 2021.

105 The proposed measure, by facilitating the transition to zero-carbon shipping and contributing to the mitigation of dangerous climate change, will also contribute to the long-term food security of all Member States.

Disaster response

106 The proposed measure will have no adverse impact on disaster response.

Cost-effectiveness

107 As demonstrated by the analysis above, a carbon levy would impose an additional cost on marine fuel oil with implications for freight rates, the cost of delivered cargoes, prices paid by consumers as well impacts on States. However, an essential purpose of the measure is to close the price gap between conventional fuel oil and zero-carbon fuels.

108 The proposed measure will create an IMO Climate Fund to help expedite the transition to zero-carbon emissions without any direct financial cost to States and with minimal administrative burden. The proposed levy-based MBM is therefore considered to be an extremely cost effective measure which will help facilitate successful delivery of the 2050 levels of ambition set out in the Initial IMO Strategy.

Socio-economic progress and development

109 The proposal should have no adverse impacts on socio-economic progress and development. To the contrary, by assisting global decarbonization efforts it will contribute to socio-economic progress and development, consistent with the UN SDGs for 2030.

Justification

110 The proposed carbon levy would help to expedite the transition to zero-carbon fuels by closing the price gap between conventional fuels and zero-carbon fuels. A significant proportion of the funds collected by the proposed IMO Climate Fund would be deployed to support the transition, as might be agreed by the Committee, for example by supporting the rollout of the required bunkering infrastructure in developing countries and other maritime GHG reduction projects.

111 LDCs and SIDS are particularly vulnerable to the consequences of dangerous climate change, whilst all Member States will be affected negatively by the consequences of climate change. By helping the international shipping sector to decarbonize as soon as possible, this proposal will be of significant benefit to all Member States, including LDCs and SIDS, contributing to the goal agreed by UNFCCC State Parties of reducing global GHG emissions to levels required so that average global temperatures do not increase by more than 1.5 degrees Celsius.

112 Any impacts on States arising from this proposal also need to be considered against the substantial benefit that the proposal will provide by a collaborative pooling of resources, to be paid for by ships registered with all Member States. This would generate a scale of funding to expedite the decarbonisation of maritime transport that most individual countries, especially LDCs and SIDS, would be unable to provide working on their own.

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Appendix

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