



WORLD SHIPPING COUNCIL
PARTNERS IN TRADE

The Liner Shipping Industry and Carbon Emissions Policy

September
2009





Dear Reader:

Governments, industries, and consumers around the world are responding to concerns about the effect of carbon dioxide (CO₂) emissions on climate change by determining how to design more efficient energy and environmental practices and regulatory regimes. We have prepared this paper to inform you about the work of the liner shipping industry on this issue.

Maritime shipping produces an estimated 2.7% of the world's CO₂ emissions, while at the same time it provides an essential service to all nations' economies and consumers. The World Shipping Council and its Member liner shipping companies are supporting the efforts of governments at the International Maritime Organization (IMO) to develop a new regulatory regime addressing CO₂ emissions from ships. This work on carbon emissions follows last year's successful IMO agreement on new regulations to reduce ships' NO_x, SO_x, and particulate matter (PM) emissions. CO₂ emissions are now the focus of debate at the IMO, at the United Nations Framework Convention on Climate Change (UNFCCC), and within the capitals of numerous governments.

In this paper you will read about many of the issues, important principles, and challenges in constructing an effective and efficient international carbon emission regime for shipping. Developing that regime is difficult. It is not difficult because the industry opposes it. It is difficult for a variety of reasons, including: political differences between governments on how the resulting economic burdens should be allocated; the fact that the vast majority of ships' emissions occur outside the territory of any government; the absence of effective precedent -- no transportation mode has a comprehensive carbon emission regime that can simply be borrowed and applied; and it is difficult because there are very different approaches under discussion with additional proposals likely to emerge.

The task is also complicated by the fact that maritime shipping is by far the most carbon efficient mode of transporting goods. Despite the very significant efficiencies of marine transportation today, further improvements in efficiency are being regularly made, and even greater improvements will be possible in the future. Consequently, a central challenge lies in developing a regime that not only stimulates even greater improvements in the energy efficiency of the world's fleet, but a regime that does not produce an unintended consequence of shifting the transportation of goods to other transport modes (and their consequent increase in emissions) or otherwise discouraging maritime transportation. In fact, total global CO₂ emissions would be reduced if more goods were transported by maritime commerce instead of the other less energy efficient transportation modes.

This paper has been organized into three sections. Part I provides a brief description of the liner shipping portion of the maritime shipping industry. Part II addresses common questions about the generation of CO₂ emissions from ships. Part III describes the international process for developing new ship emission regulations, the current status of the international discussions, and some of the main issues that make these negotiations challenging.

The liner shipping industry is committed to working with governments and other interested organizations to develop a sound carbon emissions regulatory regime for shipping. We hope this paper will inform interested readers about some of the issues that we will need to address on the road to accomplishing that objective. Please contact us if you have any questions regarding its content.

Thank you for your interest.

Sincerely,

A handwritten signature in cursive script that reads "Christopher Koch".

Christopher L. Koch
President and CEO

I. The Liner Shipping Industry

What is liner shipping?

Liner shipping is the service of transporting goods by means of high-capacity, ocean-going ships that transit regular routes on fixed schedules. Liner vessels, primarily in the form of container ships and roll-on/roll off ships, carry more than 58¹ percent of the goods by value moved internationally by sea each year. The 29 liner shipping companies represented by the World Shipping Council (WSC) carry approximately 90 percent of the world's containerized ocean traffic. WSC members also serve as the principal ocean transporters of cars, trucks and other heavy equipment around the world.²

In addition to the liner shipping sector that moves mostly containerized goods and vehicles, the maritime industry at large encompasses a wider set of ship operations, including tankers for transporting liquids, bulk carriers that haul commodities such as grain, coal and iron ore, passenger ships, cruise ships, tugs and barges, ferries, fishing fleets, and offshore drilling and supply vessels.

The world's seaborne cargo shipping fleet consists of more than 75,000 ships³ that fly the flags of many nations and operate regularly between ports in over 200 countries.⁴

What is the role of the World Shipping Council?

The World Shipping Council's mission is to provide a coordinated voice for the international liner shipping industry in its work with policymakers and industry groups on international transportation issues. WSC works with a broad range of public and private sector stakeholders in support of policies and programs to advance the development of an efficient, secure, and sustainable global transportation network. The WSC and its member companies partner with governments and collaborate with a wide range of government and non-government organizations to formulate solutions to some of the world's most challenging transportation problems. In 2009, the World Shipping Council was granted *consultative status* at the United Nation's International Maritime Organization (IMO), which allows WSC to participate in the process of setting new international regulations that will affect the liner shipping industry.

Why is the liner shipping industry so important economically?

- **It is the conduit of world trade.**

Ocean shipping is the primary conduit of world trade, a key element of international economic development, and a central reason why the world enjoys ready access to a

¹ Lloyd's Maritime Intelligence Unit (LMIU). See : http://www.imsf.info/papers/NewOrleans2009/Wally_Mandryk_LMIU_IMSF09.pdf. Additional information on roll-on/roll-off cargo provided by LMIU presenter via email.

² See: http://www.worldshipping.org/abo_mem.html

³ Clarkson's Research – Total World Fleet – March 2009

⁴ <http://www.worldportsource.com/ports/region.php>

diverse spectrum of low-cost products. Seventy-five percent of internationally traded goods are transported via ocean going vessels.⁵ In 2008, world container ship traffic carried an estimated 1.3 billion metric tons of cargo.⁶ Products shipped via container include a broad spectrum of consumer goods ranging from clothing and shoes to electronics and furniture, as well as perishable goods like produce and seafood. Containers also bring materials like plastic, paper and machinery to manufacturing facilities around the world.

- **It is the most efficient mode of transport for goods.**

In one year, a single large containership could carry over 200,000 containers. While vessels vary in size and carrying capacity, many liner ships can transport up to 8,000 containers⁷ of finished goods and products. Some ships are capable of carrying as many as 14,000 TEUs (twenty-foot equivalent units). It would require hundreds of freight aircraft, many miles of rail cars, and fleets of trucks to carry the goods that can fit on one large container ship. In fact, if all the containers from an 11,000 TEU ship were loaded onto a train, it would need to be 44 miles or 77 kilometers long.

- **It is comparatively low cost.**

Ocean shipping's economies of scale, the mode's comparatively low cost, and its environmental efficiencies enable long distance trade that would not be feasible with costlier, less efficient means of transport. For example, the cost to transport a 20-foot container of medical equipment between Melbourne, Australia and Long Beach, California via container ship is approximately \$2,700. The cost to move the same shipment using airfreight is more than \$20,000.

- **It is a global economic engine.**

As a major global enterprise, the international shipping industry directly employs hundreds of thousands of people and plays a crucial role in stimulating job creation and increasing gross domestic product in countries throughout the world. Moreover, as the lifeblood of global economic vitality, ocean shipping contributes significantly to international stability and security.

Why is the shipping industry so important environmentally?

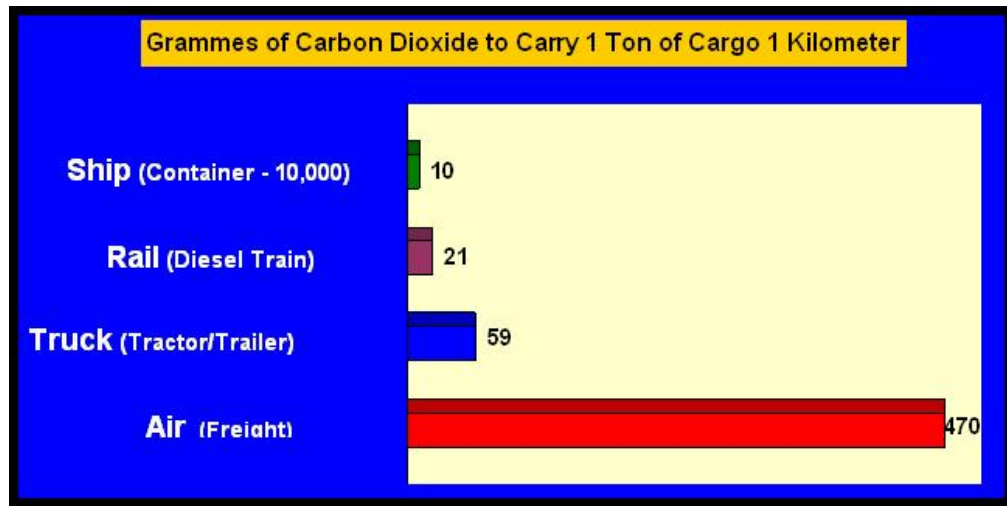
- **It is the most carbon-efficient mode of transportation.**

As illustrated by the graph below, ocean shipping is by far the most carbon-efficient mode of transportation. Because of its inherent advantages, including much greater payloads per trip than ground or air, the industry emits far less carbon dioxide (CO₂) per ton/mile of cargo than any other transportation mode.

⁵ Lloyd's Maritime Intelligence Unit. See : http://www.imsf.info/papers/NewOrleans2009/Wally_Mandryk_LMIU_IMSF09.pdf

⁶ Clarkson's Research – World Seaborne Trade – March 2009

⁷ Containers are intermodal boxes built to international standards and specifications. The same container can be moved by truck, on rail and via ship. The most common sizes are 20-foot containers, which are 20 feet in length and 40-foot containers, which are 40 feet in length. The standard unit measure for all containers is in Twenty-Foot Equivalent Units (TEU). A 40-foot container equals two TEUs.



Source: Data provided by Network for Transport and the Environment

According to the figures in this graph, transporting the 2008 volume of 1.3 billion metric tons of cargo via containership generated approximately 13 billion grams of CO₂ per kilometer. If that same volume had been transported by airfreight instead, carbon dioxide emissions would have increased by 4,700% to some 611 billion grams of CO₂ per kilometer.

II. Carbon Dioxide Emissions (CO₂) from Ships

Ships, like all other mobile sources such as cars, trucks, trains, and planes that are powered by fossil fuels, emit carbon dioxide in their engine exhaust.

How much carbon dioxide does the international shipping industry emit per year?

International maritime shipping accounts for approximately 2.7 percent of annual global greenhouse gas emissions.⁸ Container ships account for approximately 25% of that amount, while moving roughly 52%⁹ of maritime commerce by value.

Does international maritime shipping of goods produce more CO₂ emissions than transporting locally produced goods because of the long transportation distances involved?

Generally, the answer is no. Because maritime shipping is the most carbon efficient form of transportation, shipping goods across the ocean often results in fewer carbon emissions than transporting such goods domestically.

For example, a ton of goods can be shipped from the Port of Melbourne in Australia to the Port of Long Beach in California, a distance of 12,770 kilometers (7,935 miles), while generating fewer

⁸ Second International Maritime Organization Green House Gases Study 2009

⁹ http://www.imsf.info/papers/NewOrleans2009/Wally_Mandryk_LMIU_IMSF09.pdf

CO₂ emissions than are generated when transporting the same cargo in the U.S. by truck from Dallas to Long Beach, a distance of 2,307 kilometers (1,442 miles). Similarly, a ton of goods can be moved from the port of Ho Chi Minh City in Vietnam to Tianjin, China, a distance of 3,327 kilometers (2,067 miles) generating fewer CO₂ emissions than would be generated if the same goods were trucked from Wuhan in Central China to Tianjin, a distance of 988 kilometers (614 miles.)¹⁰ The wine industry recently examined this issue and found that a bottle of French wine served in a New York restaurant will have a lower carbon transportation footprint than a bottle of California wine served in that restaurant.¹¹ A whitepaper released for the Transport Intelligence Europe Conference states that researchers evaluating this issue for the World Economic Forum “found that the entire container voyage from China to Europe is equaled in CO₂ emissions by about 200 kilometers of long-haul trucking in Europe. So, for most freight, which is slow moving, there is not really a green benefit to moving production to Europe.”¹²

In fact, shipping goods by sea to ports adjacent to major retail markets is the most carbon-efficient means of moving most products to market in a global economy.

What efforts are being made by the industry to reduce its carbon footprint?

The liner shipping industry continues its significant efforts to reduce its carbon emissions, through a wide variety of measures.

- **Increasing Efficiency**

A recent study by Lloyd’s Register found that the fuel efficiency of container ships (4500 TEU capacity) has improved 35% between 1985 and 2008.¹³ If one compares today’s largest ships with container vessels of the 1970s, the results are even more pronounced. A 1500 TEU container ship built in 1976 consumed 178 grams of fuel per TEU per mile (or 96 grams per TEU per kilometer) at a speed of 25 knots.

The fuel consumption per TEU per mile for a modern 12,000 TEU vessel, built in 2007, is only 44 grams (or 24 grams per TEU per kilometer). Looking at this example, carbon efficiency on a per mile per cargo volume basis has improved 75% in 30 years as a result of technological improvements and the utilization of larger vessels. This improvement is even greater if one considers that today’s ships are operating at slower speeds that produce even greater reductions in fuel consumption.

- **Advancing Technology**

The industry continues to seek engineering and technological solutions to increase its energy and carbon efficiency. Efforts are underway to engineer better hull and propeller designs, implement waste heat recovery, and reduce onboard power usage to minimize

¹⁰ Comparison is based on the CO₂ emissions by transport mode provided by The Network for Transport and the Environment.

¹¹ American Association of Wine Economists, “Red, White, and Green: The Cost of Carbon in the Global Wine Trade,” AAWE Working Paper #9, Victor Ginsburgh, Oct. 2007. Available at: http://www.wine-economics.org/workingpapers/AAWE_WP09.pdf

¹² http://www.ticonferences.com/gds_europe/whitepapers/Nearshoring_Beat_Simon.pdf

¹³ *Ship Efficiency Trend Analysis*, Report 2008/MCS/ENV/SES/SES08-008, Marine Consultancy Services, Lloyd’s Register, London, October 2008.

emissions. Moreover, the industry is studying opportunities to switch to lower carbon energy sources such as Liquid Natural Gas (LNG) and bio-fuels.

- **Improving Operations**

Industry members are implementing a wide range of operational strategies to reduce energy use. This includes employing advanced information technology to aid in operational decision-making to improve efficiency, including vessel routes, speeds, load factors, and other fleet management strategies that promote conservation.

- **Partnering for Progress**

Many liner shipping companies are members of the Clean Cargo Working Group, and adhere to environmental stewardship guidelines established by Business for Social Responsibility.¹⁴ Members voluntarily track emissions, set efficiency targets, and examine ways to offset emissions through certified international programs. In addition to the wide range of steps the industry is taking on its own accord, the WSC and its members are working through the International Maritime Organization to develop uniform standards for improving the energy efficiency of ship designs and exploring what global legal structure would best serve to reduce carbon emissions from maritime shipping.¹⁵

Why is the shipping industry participating in the effort to reduce carbon emissions and address global warming?

- **To be responsible environmental stewards.**

The liner shipping industry and its customers recognize that environmental stewardship requires their participation in developing an effective way to address their carbon dioxide emissions.

- **To inform the process.**

The process of setting international carbon management policy must be guided by scientific, technical, economic and operational knowledge. Policy solutions must be environmentally effective, realistic, and sustainable. The resulting carbon regime must be global in scale, legally binding, and applicable to all ships. It would also be counter-productive to prejudice ocean transportation vis-à-vis other forms of transportation that are actually more carbon intensive.

- **To ensure an effective international standard is achieved.**

The industry recognizes that an international, environmentally effective regulatory regime is the best way to avoid a confusing and inefficient tangle of carbon emission regimes established by different regional, national or local governments.

- **To achieve lower fuel costs through improved efficiency.**

¹⁴ See: <http://www.bsr.org/consulting/working-groups/clean-cargo.cfm>

¹⁵ See http://www.unctad.org/sections/wcmu/docs/cimem1p09_en.pdf See: IMO Energy Efficiency Design Index and the Energy Efficiency Operational Index, and the Shipboard Efficiency Management Plan.

Reducing carbon emissions by improving ships' energy efficiency will lower fuel consumption while ensuring that the movement of goods by sea remains the most carbon-efficient means of moving goods from their point of production to the marketplace.

What is the expected trend in carbon dioxide emissions from the shipping industry?

Because of its economic and environmental advantages over other transportation modes, the reliance on ocean shipping to transport raw materials and manufactured goods internationally is expected to rise. The U.N.'s International Maritime Organization (IMO) has estimated that without changes in current operating efficiencies and with increasing trade volumes, total ship emissions of CO₂ will increase. However, introduction of new technology, changes to ship and engine design and improvements to operating procedures will ensure a much slower rate of growth for CO₂ emissions. Forecasting exactly how much CO₂ emissions will be attributable to liner shipping in future years is subject to considerable uncertainty due in part to variations in international trade volumes, but more importantly due to continuing improvements in vessel efficiency that have not yet been quantified, and the effect of expected global CO₂ rules to be developed under the IMO.¹⁶

What are the potential methods of reducing carbon emissions from marine shipping?

There are a wide range of efforts underway to increase energy efficiency in the shipping industry and thereby reduce CO₂ emissions. Technical methods include improved ship/hull design to reduce drag, and more efficient propulsion systems, including engines that use low carbon fuel. Operational methods include employing advanced information technology to manage vessel weight, reducing speed, and improved weather routing to maximize fuel efficiency.¹⁷

What incentives currently exist for the industry to lower fuel use and carbon emissions?

Fuel costs are a dominant factor in the bottom-line profitability of shipping companies. Fuel costs account for as much as half of a container ship's operating expenses. Accordingly, market forces already provide a significant incentive for the industry to minimize energy use (and therefore emissions). This incentive will continue to intensify as energy prices resume their expected upward climb due to market conditions, even in the absence of new climate change policies that may or may not increase fuel prices further.¹⁸

¹⁶ See IMO, "Prevention of Air Pollution from Ships," MEPC 59, INFO. 10, April 9, 2009. available at: http://www.imo.org/includes/blastDataOnly.asp/data_id%3D26047/INF-10.pdf

¹⁷ See: OECD, Joint Transport Research Center, Discussion paper No. 2009-11, "Greenhouse Gas Emission Reduction Potential from International Shipping," May 2009, at <http://www.internationaltransportforum.org/jtrc/DiscussionPapers/jtrcpapers.html>

¹⁸ See: http://money.cnn.com/2008/12/17/news/economy/oil_eia_outlook/?postversion=2008121716

III. Air Emission Regulation and the Shipping Industry

Currently, what is the international process for regulating greenhouse gas emissions from ocean going vessels and what are the next steps?

Governments across the globe establish legally-binding international standards through the United Nation's International Maritime Organization (IMO). The IMO is the appropriate forum to create a comprehensive legal regime to address vessel carbon emissions, because ships are mobile assets that are registered in many different flag states and call at many different ports around the world. Ships need a predictable and uniform set of regulations.

Effective carbon emission reduction policy also favors an international regime that applies to ships wherever they may be operating, because that is the approach that truly reduces CO₂ from the shipping sector world-wide. More limited national or regional schemes would only address emissions associated with certain voyages or within certain jurisdictions. Development of an effective climate regime applicable to international shipping should apply to all international ship movements across the globe.

The IMO also possesses unique technological, operational, and legal expertise in the ocean-shipping sector. Through the establishment of binding international regulations, the IMO provides for a consistent and uniform set of standards for ships operating throughout the world, greatly enhancing predictability, compliance, enforcement, and the achievement of shared environmental objectives.

In 2008, the IMO successfully created a rigorous, new regulatory regime for those ship emissions that can adversely affect human health, namely nitrous oxides (NO_x), sulfur oxides (SO_x) and particulate matter (PM). Those rules were established as part of Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL) and are being implemented around the world. Annex VI, however, did not directly address carbon emissions.

Governments at the IMO are now engaged in negotiations to develop a global carbon emissions regime applicable to shipping. The organization is also drafting specific standards concerning ship design and other technical issues aimed at reducing CO₂ emissions.¹⁹ Most stakeholders expect the current negotiations to lead to a final agreement sometime in 2011.

At the same time, governments participating in the United Nations Framework Convention on Climate Change (UNFCCC) are focused on developing a successor to the "Kyoto Protocol", whose provisions are effective through 2012. The Kyoto Protocol does not address greenhouse gas (GHG) emissions associated with international aviation or shipping. Instead, GHG emissions associated with international aviation and marine shipping are expected to be addressed through negotiations at the International Civil Aviation Organization (ICAO) and the International

¹⁹ See: IMO Energy Efficiency Design Index and the Energy Efficiency Operational Index, and the Shipboard Efficiency Management Plan.

Maritime Organization (IMO). Both of these organizations were created to facilitate international agreement on standards applicable to these sectors, which routinely operate across numerous national borders and are subject to unique technology considerations. Nevertheless, some countries have called for maritime and aviation activities to be regulated under the UNFCCC, while other governments have strongly argued that international maritime emissions should be addressed through the IMO and international aviation emissions should be addressed through the ICAO. The next round of comprehensive international talks pursuant to the UNFCCC is scheduled to take place in Copenhagen in December, 2009.

The outcome of these UNFCCC negotiations should help better define the overall direction of climate policy. Developments at the UNFCCC in December will further shape the debate at the IMO as those negotiations continue in the spring of 2010. The next meeting of the IMO Marine Environment Protection Committee to address carbon emissions is scheduled for March 2010.

What are the issues that make reaching agreement challenging? Why is implementation difficult if everyone agrees on the need to reduce CO₂ emissions?

CO₂ regulatory regimes do not yet exist in most countries. It is both technically and politically difficult to create such systems for fixed emission sources (like power plants) in domestic economies. It is even more challenging to address mobile transportation sources, like automobiles, rail, aviation and shipping. The challenge of addressing these mobile sources becomes even more complex when those sources operate under the registries of different nations, call at ports in multiple nations, and generate emissions on the high seas outside any nation's jurisdiction.

The IMO has in fact made substantial progress on developing an energy efficiency design index for new ships to reduce carbon emissions. It is generally accepted, however, that such a design index, if only applied to new ships, is unlikely, by itself, to sufficiently address the issue. Accordingly, the IMO is considering several proposals characterized as "market based instruments" (MBIs) and other hybrid proposals to create a more comprehensive regime. These proposals are novel, and there is little precedent or experience to guide governments. While it appears probable that the IMO will develop a new convention in the foreseeable future, one should recognize that the issues being considered present unique challenges. The following provides a short description of some of those challenges.

Macro-Political Questions in the Climate Debate

The IMO's regulatory regimes are based on the principle that all ships, regardless of who owns them or where they are registered, should comply with the same rules. The World Shipping Council and other industry organizations strongly support this principle. Furthermore, a carbon emission reduction regime would have little positive effect on climate change concerns if a ship operator could avoid it by changing the registration of its ship.

At the same time, however, there is a macro-political disagreement between developed and developing nations about appropriate restrictions on carbon emissions. The United Nations Framework Climate Change Convention (UNFCCC) and "Kyoto Protocol"

distinguished between Annex I countries with one set of carbon emission reduction obligations and lesser-developed non-Annex I countries that did not have such obligations.²⁰

Additionally, only a little more than one-third of the world cargo fleet is registered in Annex I countries. Many non-Annex I countries under the existing Kyoto Protocols insist that a new global carbon regime must not impose burdens on their developing economies. Other governments insist that the carbon emissions from non-Annex I countries now and projected in the foreseeable future are so substantial that there can be no meaningful impact on CO₂ emissions or their effect on climate without the participation of these governments and their economies.

This set of political disagreements between governments is beyond the capacity of the shipping industry to resolve, but these issues will need to be addressed before the content of a new regime can be developed.

Market-Based Instrument Options

Market-based instruments (MBI) include a variety of economic or market-oriented incentives and disincentives, such as taxes or tax credits, new fees, or tradable emissions limitations, often referred to as “Cap and Trade.”

Marine Fuel Levy: One MBI concept being given consideration at the IMO is the establishment of an international “levy” on marine fuel, with the revenues being dedicated to a new United Nation’s climate fund. Proponents advocate that the levy approach would be easier to implement and operate than other MBI approaches being considered. This proposal has been made by *Denmark*, and has been set forth in more detail and with more specifics than other MBI proposals.²¹ Issues surrounding it include the following:

1. Will governments be willing to adopt a UN-administered international levy on the sales of fuel?
2. What would be the mechanism for collection and enforcement?
 - What entity should be responsible and accountable for the collection of the revenues associated with the fund?
 - What is the enforcement scheme to ensure the payment of the levy? What is the role of port states in that enforcement scheme? What are the penalties and consequences to buyers and/or sellers who try to evade payment of the fee?
3. What would be the level of the levy to be applied? How would it be set, raised, lowered or suspended?

²⁰ http://unfccc.int/kyoto_protocol/items/2830.php

²¹ Submittal by Denmark to the 59th Session of the International Maritime Organization’s Marine Environment Committee, MEPC 59/4/5, April 2009

4. Assessing fees to a product will make it more expensive and will thus cause users to consume less of it, but predicting precise emission reduction results from a levy is problematic. For that reason, advocates of the concept argue that carbon emissions reductions would also be accomplished from this proposal via the use of the revenues generated from the levy for carbon mitigation projects. Questions about the control and management of such a fund are many, including:
 - Who would control the disbursement of the revenues collected?
 - Is the Clean Development Mechanism of the UNFCCC the most appropriate and efficient vehicle for ensuring the funds are productively used for CO₂ reduction?
 - Should the funds, or a portion of the funds, be devoted to research and development that is specific to improving fuel economy in the world's shipping fleet, alternative propulsion systems, and other measures to reduce CO₂ emissions – both in the short term and long term? If yes, what entity would be responsible for determining which research institutions and other stakeholders receive the funds and that the work is completed and disseminated?
 - If the funds are to be split between non-maritime CO₂ reduction projects and research and development projects specific to the maritime sector, what should be the relative split in funding?
 - What mechanism should be used to ensure that projects actually result in CO₂ emission reductions as opposed to theoretical or paper reductions?
5. Is the levy a flat, uniform assessment per ton of fuel, or does the amount of the tax vary depending on the efficiency of the vessel in order to create an additional economic incentive for the construction and operation of more efficient vessels? Japan, for example, has proposed that a vessel operator should get a rebate under the levy system if it improves vessel efficiency.²²
6. This concept has been proposed as an alternative market based instrument to emission “cap and trade” type concepts. If this course were pursued, industry would need assurance that other measures are not also adopted so that it faces both a fuel levy plus other market based instruments.

Cap and Trade or Emissions Trading: The *European Commission*, some European governments, and some industry groups have expressed support for the idea of developing an alternative carbon emissions trading system as the most appropriate MBI. Unlike the Danish levy proposal, however, there has been no proposal made that specifically describes how such an emissions trading system would function at an operational level. The absence of a clear proposal has made discussion and assessment of the concept difficult. If this avenue were to be pursued, a significant number of

²² Japanese submittal to the 59th Session of IMO's Marine Environment Protection Committee, MEPC 59/4/34, Consideration of a Market-Based Mechanism to Improve the Energy Efficiency of Ships Based on the International GHG Fund]

questions would need to be addressed, as the design and operation of an emission trading proposal is likely to be more complicated than a levy on marine fuels. The unresolved issues include:

1. How is a “cap” on emissions from shipping established?
 - What is the level of the cap and how much is it lowered over what period of time?
 - What is the baseline year for establishing the cap?
 - Will allowances be allocated in a manner that gives credit to those vessel operators that have implemented fuel-efficiency efforts to date?
2. How are the allocations of the emission allowances within the cap distributed amongst the various sectors of the industry?
 - Are they auctioned? If so, by whom?
 - Are they sold at a fixed price, and if so, who sets that price?
 - If sold or auctioned, who receives the revenues?
 - What are the permissible uses of the revenues raised? (Additional questions similar to those that exist for the marine fuel levy proposal discussed above must also be addressed.)
 - Are the emission allowances allocated at no charge? If so, by whom? According to what criteria?
3. Who is covered by the cap? What vessels? Are there vessels that are not covered?
4. Who must hold the emission allowances? The ship owner? The ship operator?
5. What are the trading characteristics of the allowances? For example:
 - Once allocated, are the emission allowances freely tradable? Are the allowances issued and sold on an annual basis or a multi-year basis?
 - Is there a limit on how many allowances may be purchased or acquired by a particular vessel or company?
 - Is there a restriction on who may purchase allowances?
 - Is there any expiration or “use-by” date on an emission allowance or can they be “banked” indefinitely?
 - Does an emission allowance shrink in size over time at the same rate as the total emission cap is reduced over time?
6. May ship operators purchase and use carbon emission allowances from other industrial sectors?
 - Most stakeholders supporting development of a cap and trade system for maritime emissions have argued that such a system must be “open.” An open system would allow trading of allowances across industrial sectors, but also requires, by definition, establishment of an economy-wide cap and trade system.

- If the countries that have established such cap and trade systems are limited to certain developed countries, how does the system function in the shipping sector, which constantly crosses borders and operates on a global scale?
 - If governments do establish a cap for the economy as a whole, what criteria must govern the regimes establishing such allowances in other sectors to be acceptable for use by the maritime industry under its regime?²³ Who establishes and enforces such criteria?
 - Can such an emission trading system exist in the absence of a comprehensive, international UN agreement and regime coming out of the Copenhagen UNFCCC meetings?
 - How could the IMO, as a specialized maritime regulatory entity, monitor and administer a cross-sectorial trading process?
 - If the emission trading system is not an open system allowing for cross-sectorial trading, but instead the cap and trade regime is a closed system governing only shipping, what would realistic carbon emission caps be and how would the system allow maritime shipping to service the expected increase in global commerce over time?
7. How is the system enforced? (Similar questions may exist for the fuel levy proposal.)
- For example, must emission allowances be surrendered in order to purchase fuel? If so, the similarities to a levy system are significantly increased, although enforcement against fraudulent allowances and allowances generated by non-maritime sources may be more difficult than simply collecting a tax.
 - Does one require that all fuel oil suppliers, whether they are located in a State party to the Treaty or in a non-party State, be registered as proposed in the global levy system?
 - Is a reporting scheme from vessels and/or fuel suppliers necessary? What would that be?
 - Such allowances would need to be registered and monitored in some manner to protect against cheating and counterfeiting. How does the maritime sector administer such a system when allowances are generated from a multitude of sectors and countries where many of the countries are not party to or otherwise part of the system? What is the responsibility of the flag state with respect to enforcement?
 - How would an arriving ship to a given port state demonstrate compliance?
 - What are the consequences of non-compliance?
8. If a ship or ship operator does not possess enough allowances to cover its emissions, what happens? Does it pay a tax or penalty in order to continue to operate? If so, how is the level of the penalty established? If not, must it cease operation until it obtains sufficient emission allowances?

²³ For example: Assume a particular country gives landholders emission allowances for not developing forested property. Can a vessel operator purchase those allowances for use in a maritime emission trading system? If after purchased by the vessel operator the landowner develops the property, what happens to the vessel operator's emission allowances? For example, could a vessel that needs emission allowances to operate a service between Morocco and Germany, purchase and use allowances issued in China?

9. Do all transportation modes have a similar carbon regime applied to them so that maritime commerce is not disadvantaged vis-à-vis other transport modes?

Hybrid Proposals: Other governments at the IMO have made hybrid MBI proposals that offer a variation on the Danish levy concept or that are different from either the marine fuel levy or emission trading systems. More such proposals are likely to emanate from governments after the UNFCCC Copenhagen meeting in December 2009 and prior to the next IMO Marine Environment Protection Committee meeting in March of 2010.

As previously mentioned, *Japan* has proposed that the Danish levy concept be modified to provide a rebate of the levy if a vessel operator improves the efficiency of its vessel.²⁴ Some have noted with favor that this idea seeks to incentivize improved vessel efficiency and thus reduced carbon emissions. Some have noted with disfavor that this idea would provide a greater reward to an operator of an existing, inefficient vessel for marginal improvement than a new, more efficient vessel that has built improved efficiency into it.

Additionally, the *United States* has proposed that all vessels, both existing and new-builds, be subjected to the new energy efficiency design index. In essence, this proposal would establish mandatory efficiency standards for all ships (new and existing) that increase in stringency over time. This system would also facilitate trading of efficiency credits so that ships that operate below the standards may trade credits with less-efficient ships in the existing fleet. This would constitute a type of “cap and trade” of ship energy efficiency rather than a cap and trade of carbon emissions.²⁵ If a ship fell below the energy efficiency standards, it would need to purchase energy efficiency credits from other ship operators that perform above the standards or otherwise face punitive measures. Some stakeholders have noted favorably that such a system would effectively require the world’s vessel fleet to significantly improve its energy efficiency, thereby reducing emissions yet avoid the political and practical complications associated with both an emissions cap and trade system and an international levy on marine fuels. Others have noted that the proposal does not yet provide sufficient detail, particularly with respect to existing ships that fall below the required efficiency standard and cannot find design index credits to purchase from those who operate more efficient ships.

What challenges does the unique and complex nature of the shipping industry pose in crafting effective and responsible climate policy?

▪ **Global complexity.**

The global nature of ocean shipping poses a challenge for the effort to craft coherent and practicable carbon emissions policy. The international fleet is owned, registered, and operated in many different parts of the world. The industry’s mobile, trans-boundary operations pose a much more complex range of political, practical, and administrative

²⁴Japanese submittal to the 59th Session of IMO’s Marine Environment Protection Committee, MEPC 59/4/34, Consideration of a Market-Based Mechanism to Improve the Energy Efficiency of Ships Based on the International GHG Fund]

²⁵ Submittal by the United States of America to the 59th Session of IMO’s Marine Environment Protection Committee, MEPC 59/4/48, Comments on MEPC 59/4/2 and an Additional Approach to Addressing Maritime GHG Emissions.]

difficulties than economic sectors characterized by fixed operations and stationary sources of greenhouse gases. Significant challenges include how to properly account for international emissions, how to enforce rules equitably among diverse jurisdictions, and how to maintain competitive fairness and balance in an inherently global business.²⁶

- **Duplicative Jurisdiction**

While complex and challenging, an international IMO regime would avoid many of the problems that would arise if various nations, regional blocs, and localities were to try to impose their own carbon emission rules, regulations, and regimes. The potential for a multi-jurisdictional patchwork of rules would raise significant concerns about regulatory duplication, inefficiency, and incompatibility. Ocean shipping is a global enterprise with operations that span many different geographic, national, and regulatory jurisdictions. Some container ships call on 20 different ports in 8 different countries per year.

- **Integrated Supply Chain**

Another critical factor that must be considered is that maritime shipping is part of a large, complex, and inter-connected global supply chain. Changes in shipping services can produce effects up and down the chain with significant economic and environmental consequences. For example, carbon rules that raise the cost or limit the availability of certain traded goods may cause consumers to buy alternative products with a greater carbon footprint, in part from increased dependence on carbon-intensive ground transportation. Moreover, irregular or reduced liner services may affect the inventory management practices of producers raising demand for carbon intensive infrastructure and services such as storage, utilities, and ground transportation. A recent study found that the carbon footprint of the seaborne importation of wine to the eastern U.S. is significantly less than the emissions from transporting domestic product by ground, rail, or air. In this instance, economic or regulatory restrictions on ocean shipping could have adverse, unintended consequences resulting in higher net carbon emissions.²⁷

- **Long Lead-time Requirements**

The high cost and long life of cargo ships present challenges that must be factored into climate solutions. A single container ship capable of carrying 8,500 TEU's costs approximately \$100 million and must be ordered three or more years in advance of delivery. It will operate for 20 to 25 years. Additionally, ships are often ordered in a set of four to ten, since multiple ships of a similar size are needed to operate a single liner service. For these reasons, changes in design specifications require ample planning and sufficient lead-time to be smoothly implemented.²⁸

²⁶ To illustrate, consider the example of a liner shipping service comprised of nine liner shipping vessels, registered in four different nations, operating in a four carrier Vessel Sharing Agreement, that provides regular weekly service between ports in four different Asian nations and four different European nations, with an intermediate port call in North Africa, and therefore providing 20 different cargo port pair combinations.

²⁷ American Association of Wine Economists, "Red, White, and Green: The Cost of Carbon in the Global Wine Trade," AAWE Working Paper #9, Victor Ginsburgh, Oct. 2007, available at http://www.wine-economics.org/workingpapers/AAWE_WP09.pdf

²⁸ Daniel Machalaba and Bruce Stanley, Wall Street Journal published by Pittsburgh Post-Gazette. See: <http://www.post-gazette.com/pg/06283/728846-28.stm>

What do these complexities and challenges mean for the likelihood of a carbon emission regime applicable to shipping?

The objective of an environmentally effective agreement to reduce carbon emissions from shipping and the industry's objective of a single, predictable international regulatory regime are highly compatible. Indeed, improved energy efficiency, reduced fuel consumption, and fewer emissions are outcomes that should be strongly supported by all the relevant stakeholders. Many of the stakeholders, including the World Shipping Council and its member companies, are optimistic that a global solution is feasible in the 2011 timeframe. It is too early to predict the precise nature of that regime, as governments and nongovernmental organizations are still in the formative process of developing proposals. The pace of such developments is expected to accelerate in 2010 after the Copenhagen UNFCCC discussions have concluded.

The World Shipping Council and its member companies strive to improve the climate performance of shipping and will continue to strongly support the creation of an effective and practical IMO regime to address these issues. Even in the absence of a new international regime, these companies will continue to pursue reduced carbon emissions through changes in ship design, fuel consumption and ship operations.

IV. Summary

Developing an effective international regulatory regime to reduce carbon emissions from shipping requires governments and industry to address a host of complicated political and technical questions. There is limited precedent to build upon. There is no viable CO₂ emission regulatory system (other than engine or mileage standards) functioning anywhere in the world that is applicable to mobile transportation sources, whether that be automobiles (which emit more CO₂ than ships²⁹), trucks, trains, planes, tugboats, ferries, and other mobile sources. Most nations have not established such regimes for their own domestic economies. There is no functioning regime in place for other transnational industries, such as international aviation.

The IMO is the most appropriate forum to develop this regime for shipping, and the success of the IMO in developing the MARPOL Annex VI regulatory regime for NO_x, SO_x and particulate matter (PM) emissions from ships demonstrates that it is an environmentally and globally effective regulatory body. The World Shipping Council and its member companies are actively engaged in efforts at the IMO to develop an effective global agreement. While the challenges to negotiating a global agreement are significant, the World Shipping Council and numerous other organizations are strongly committed to helping forge agreement of an effective global regime. More specific proposals from participating governments and organizations on both the political and technical aspects of this effort are expected, and many observers are hopeful that significant progress can be made following the UNFCCC climate negotiations scheduled for December 2009 in Copenhagen.

²⁹ International Council on Clean Transport from data supplied by the International Energy Agency, 2008.

In the interim, governments at the IMO have agreed to key principles that must apply to the new regulatory regime for carbon emissions from ships. They require that regulations:

1. Effectively reduce CO₂ emissions.
2. Be binding and include all flag states.
3. Be cost effective.
4. Not distort competition.
5. Be based on sustainable development without restricting trade and growth.
6. Be goal-based and not prescribe particular methods.
7. Stimulate technical research and development in the entire maritime sector.
8. Take into account new technology.
9. Be practical, transparent, free of fraud and easy to administer.

The World Shipping Council and its member companies endorse these principles and will work with governments at the IMO to ensure that these principles are appropriately addressed in new regulations for carbon emissions from ships.

For additional information about the liner shipping industry, please contact the World Shipping Council.

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