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Citation: Rebelo, P. (2023). Legal Tools for Overcoming Perceived Risks in Green Shipping. In: Basu Bal, A., Rajput, T., Argüello, G. & Langlet, D. (Eds.), Regulation of Risk Transport, Trade and Environment in Perspective. (pp. 646-684). Leiden, Netherlands: Brill | Nijhoff. ISBN 9789004518667 doi: 10.1163/9789004518681

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Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/33221/>

Link to published version: <https://doi.org/10.1163/9789004518681>

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Regulation of Risk

Transport, Trade and Environment in Perspective

Edited by

Abhinayan Basu Bal, Trisha Rajput,
Gabriela Argüello, David Langlet



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Contents

List of Figures and Tables XI

Table of Cases XII

Table of Legislation XIX

Notes on Contributors XXIX

Introduction to Regulation of Risk 1

*Gabriela Argüello, Abhinayan Basu Bal, David Langlet and
Trisha Rajput*

The UN Arms Trade Treaty: A Multilateral Trade and Security Treaty Not
Regulated by International Trade Law? 28

Abdulmalik M. Altamimi

Ice Management Research and the Arctic Marine Environment 63

Gabriela Argüello and Julia Johansson

Divide and Conquer or Unite to Trade: Trade Facilitation along the China-
Europe Railway Corridors 98

Abhinayan Basu Bal, Trisha Rajput and Yongmei Chen

The Meaning of “Accident” under the Montreal Convention in Light of
CJEU Jurisprudence 157

Olena Bokareva

Admissibility of Air and Marine Accident Investigation Records in
Arbitration and Litigation 185

Jason Chuah

When Economic Sanctions Lead to Conflict of Laws and Real Risks for
Businesses 211

Carolina Dackö

Risks Posed by the COVID-19 Pandemic regarding the Carriage of Goods
and Passengers by Sea: Considerations on Seafarers’ Rights and Health
Protection 236

Jonatan Echebarria Fernández

- International Shipping: Who Levels the Playing Field? 282
Ellen J. Eftestøl and Emilie Ylihelfjo
- Risk in Transporting Dangerous Goods via RoRo and RoPax Shipping 315
Jonas Flodén and Johan Woxenius
- Scrubber Technology: Bad News for the Marine Environment 353
Ida-Maja Hassellöv
- Autonomous Wrecks 369
Jhonnie Mikael Kern
- High Seas Marine Protected Areas: Impact on Shipping and the IMO 392
Niels Krabbe
- Shipping and the Ecosystem Approach 418
David Langlet
- Autonomous Shipping: Some Reflections on Navigational Rights and Rescue at Sea 451
Martin R. Leopardi
- Maritime and Aviation Law: A Relational Retrospect and Prospect on Unmanned Ships and Aircraft 471
Huiru Liu
- Some Perils of Turning Small Ships into Big Boats: On the Relevance of Addressing the Real Issues in Law 500
Claes Martinson
- The International Regulatory Framework of MASS Disruption 522
Maximo Q. Mejia Jr.
- Salvage Agreement and Contract Salvage: Risk Dynamics in Salvage Law 551
Proshanto K. Mukherjee
- (Smart) Contractual Networks in the Carriage of Goods by Sea 573
Livashnee Naidoo

Restricting International Trade through Export Control Laws: National
Security in Perspective 603

Trisha Rajput

Legal Tools for Overcoming Perceived Risks in Green Shipping 646

Pia Rebelo

Third Party Direct Rights of Action against Insurers under UK Law and
International Maritime Liability Conventions 685

Rhidian Thomas

Index 719

Legal Tools for Overcoming Perceived Risks in Green Shipping

Pia Rebelo

1 Introduction

In 2018, the IMO set out its vision to reduce greenhouse gas (GHG) emissions from international shipping and to phase them out as soon as possible as the first step in its Roadmap for developing a comprehensive IMO Strategy on Reduction of GHG emissions (the Roadmap).¹ This initial strategy by the IMO is a composite part of its commitment to the United Nation's 2030 Sustainable Development Goals (SDG), in particular SDG 13 and SDG 14 encompassing climate action and conserving the world's oceans and seas, respectively.² Under identified 'levels of ambition', the goal is to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008.³ Achieving this is a mammoth task for the shipping sector, which needs to find solutions, support, and capital from a number of sources. The IMO recognises that a number of short-term, medium-term, and long-term actions are required to support GHG reductions in shipping, including 'incentives for first movers to develop and take up new technologies'.⁴ To encourage design and innovation, the IMO has endeavoured to leave the choice of technical measures and technologies up to industry to achieve energy efficiency.⁵ However, the multitude of potential green technologies face significant economic, scientific and infrastructural concerns.⁶ Green vessels or eco-vessels are considered high-risk vessels with substantial initial

1 MEPC 72 adopted resolution MEPC.304(72) on Initial IMO Strategy on reduction of GHG emissions from ships; the Roadmap was approved earlier at MEPC 70.

2 UN A/RES/70/1 (21 October 2015) Transforming our world: the 2030 Agenda for Sustainable Development.

3 Resolution MEPC.304(72) Annex 11.

4 *ibid* 4.7, although, these incentives are not expanded upon with market-based measures (MBMs) only discussed as medium to long term actions.

5 The main energy efficiency tool mandated by the IMO is the Energy Efficiency Design Index (EEDI) mandated for new ships and the Ship energy efficiency management plan (SEEMP) for existing vessels – as long as a level of energy efficiency is achieved, the design choice is left to the shipowner.

6 Patrizia Serra & Gianfranco Fancello, 'Towards the IMO's GHG Goals: A Critical Overview of the Perspectives and Challenges of the Main Options for Decarbonizing International Shipping' (2020) 12(8) Sustainability 3220.

investment costs to catalyse development and commercialisation.⁷ Therefore, de-risking these technologies is a fundamental step towards achieving the IMO's GHG reduction goals.

To incentivise decarbonisation efforts through technology uptake, the IMO recognised as early as 2013, that its concept of a 'Sustainable Maritime Transport System' (SMTS), 'should be supported with available, *sound financing* for construction of new ships or conversion or modification of existing ships in order to meet requirements for safety and the environment, bearing in mind the cyclical nature of the shipping sector'(emphasis added).⁸ An SMTS was conceptualised to provide Member States and stakeholders with the opportunity to reflect on sustainability issues and is defined as, '*a seamless and reliable service in the most efficient manner; the Maritime Transportation System must deliver safe, secure, efficient and reliable transport of goods across the world, while minimizing pollution, maximizing energy efficiency and ensuring resource conservation*'.⁹ An SMTS envisions a significant commitment from governments, industry, the United Nations Conference on Trade and Development (UNCTAD), and its partner financial sectors to create financial mechanisms and avenues to ensure regulatory compliance and to achieve green innovation. There is thus a strong call for financial institutions (State and non-state) to assist the sector in meeting climate change targets and to drastically reduce emissions.

Despite this early recognition, green financial frameworks that focus on the shipping sector are in their nascent stages.¹⁰ 'Green finance' is a concept defined by the International Trade Centre as 'all the initiatives taken by private and public agents (e.g. businesses, banks, governments, international organizations, etc.) in developing, promoting, implementing and supporting projects with sustainable impacts through financial instruments'.¹¹ Green finance

7 Taehee Lee and Hyunjeong Nam, 'A Study on Green Shipping in Major Countries: In the View of Shipyards, Shipping Companies, Ports, and Policies' (2017) 33(4) The Asian Journal of Shipping and Logistics 253–262.

8 IMO, *Concept of a Sustainable Maritime Transport System* (Symposium on Sustainable Maritime Transportation System, World Maritime Day on 26 September 2013) <<https://sustainabledevelopment.un.org/content/documents/1163CONCEPT%20OF%20%20SUSTAINABLE%20MARITIME%20TRANSPORT%20SYSTEM.pdf>> accessed 2 August 2022.

9 *ibid* 9, This definition is centred on providing coordination for maritime sustainable development, enrolling a number of actors along the value chain.

10 Pia Rebelo, 'Green Finance for a Sustainable Maritime Transport System: Developing a Universal Vernacular for Green Shipping' (2020) 34 A&NZ Mar LJ 1.

11 ITC, 'What is Green Finance?' <[//stage.intracen.org/What-is-green-finance/](https://stage.intracen.org/What-is-green-finance/)> accessed 2 August 2022.

frameworks are key policy tools in regulating green finance (whether public or private), consisting of minimum standards, taxonomies, and disclosure requirements.¹² They are also key in defining the objectives of ‘green finance’ – a broad concept that must be circumscribed by a set of definitions of ‘green’ activities and eligibility criteria for projects, initiatives, and assets.¹³

This Chapter is concerned with how green finance frameworks can de-risk low-carbon (i.e. alternative) shipping technologies and overcome uncertainty in an inherently risk-adverse maritime sector; one that is still recovering from the 2008 global recession coupled with the COVID-19 pandemic. The need for a fundamental partnership between policy makers and financiers to encourage first-user uptake and the adoption of green technologies in shipping has been neglected. Although not entirely unique to a shipping paradigm, there are few schemes which actively direct funds to green shipping activities.¹⁴ The legal question arises as to how green finance frameworks can de-risk low-carbon green technologies by providing clarity and legal certainty on technology selection and criteria. The implementation of such frameworks is important for two reasons: 1) to allow the financial sector to enhance its ‘green’ product offerings to shipowners and channel funds accordingly; and 2) to provide for a clear set of contractual clauses between lender and borrower that would allow for enforcement and to avoid ‘greenwashing’ of activities and assets. In this context, the institutions involved will primarily consist of banks, who maintain their dominance in ship financing despite recent trends in diversifying capital sources.¹⁵ It is recognised that financial institutions, in particular the private banking sector, can benefit from green finance schemes and participation in environmental sustainability.¹⁶ There exists a real opportunity for collaborative

12 European Banking Federation, *Towards a Green Finance Framework* (2017, Brussels) <www.ebf.eu/wp-content/uploads/2017/09/Geen-finance-complete.pdf> accessed 2 August 2022.

13 Jason Chuah, ‘Legal Aspects of Green Shipping Finance – Insights from the European Investment Bank’s Schemes’ in Mukherjee PK and others. (eds) *Maritime Law in Motion. WMU Studies in Maritime Affairs*, vol 8 (Springer Cham 2020) 131–152.

14 Examples include the European Investment Bank’s green shipping schemes; see EIB, ‘Green Shipping Guarantee Scheme’ (2016) <www.eib.org/en/projects/pipelines/all/20150334> accessed 2 August 2022.

15 Fotis Giannakoulis, ‘Chapter 3: Overview of ship finance’, in Kavussanos and Visvikis (eds), *The International Handbook of Shipping Finance* (Palgrave Macmillan 2016).

16 ‘Environmental sustainability’ is a term used in this Chapter to refer to the environmental component of the sustainable development triage comprising social, economic and environmental factors. Sustainable Development is a broad principle of international environmental law with varying interpretations, whilst its environmental pillar has come to include a multitude of objectives from climate alignment and environmental protection

environmental governance between policy makers and the financial sector to address issues stemming from the infancy of the 'green finance' market. These are: a lack of clear direction on what constitutes green activities or assets; the issues surrounding environmental obligations in contractual agreements; and creating green products which are tailored to the needs of the shipping sector.

In terms of structure, this Chapter first identifies and systemises the prevailing challenges that are hindering progress in meeting carbon neutral goals. There are a number of risks associated with low-carbon technologies that can be categorised according to a conceptual framework for energy transition barriers. The second part (Section 3) of this Chapter is concerned with the financial sector's contribution to overcoming the aforementioned challenges. This section aims to identify legal tools which would assist financiers in responding to the present challenges. Section 3.1 deals specifically with the importance of adopting green finance frameworks and how these tools can de-risk alternative technologies. Section 3.2 addresses contractual mechanisms as key enforcement tools of green finance frameworks. An analysis of available contractual tools enabled by green finance frameworks will be considered against a backdrop of English law doctrine, as English law remains the prevailing legal system of the international maritime sector; whilst the majority of shipping loan agreements are governed by English law.¹⁷ Finally, Section 3.3 addresses the need for specific green financial products for the shipping sector to streamline administrative procedures and provide shipowners with access to capital more readily.

2 Risks Associated with Low-Carbon Technologies

Energy transitions have varying theoretical frameworks with a common recognition that environmental problems brought about by unsustainable practices cannot be addressed in incremental improvements and technological fixes – radical shifts to new socio-technical regimes are required.¹⁸ Transformative energy transitions, as opposed to interim or deliberate energy transitions, require that relevant actors understand the benefits of adopting new

to biodiversity and pollution management. The term 'green' is used accordingly to refer to those activities and assets which achieve environmental sustainability objectives.

17 Lucy French, 'Introduction' in Stephenson Harwood (ed) *Shipping Finance 3rd Ed* (Euromoney 2006).

18 Jonathan Köhler and others, 'An agenda for sustainability transitions research: State of the art and future directions' (2019) 31 *Environmental Innovation and Societal Transitions* 1–32.

technologies and practices.¹⁹ Whereas interim transitions arise from policy-driven initiatives without public acceptance, and deliberate energy transitions result from citizen-driven change without supporting regulations; transformative energy transitions occur where both policy (top-down) and citizen-driven (bottom-up) change are present.²⁰ Current IMO regulations are not accompanied by an understanding of how green technologies can benefit shipowners as many of these newer technologies are still considered niche.²¹

Geels et al note that low-carbon energy transitions are complex due to: 1) uncertainties (in respect of the performance of new innovations as well as the regulatory landscape), 2) disagreements (about optimal solutions, costs, and benefits), and 3) the distribution of power (the reliance of policy-makers on actor buy-in).²² This section employs these categories of factors to systemise the risks associated with green technologies for shipping. There are a range of challenges for emerging green technologies such as wide-scale industry acceptance, licensing, regulation, and financing. Carbon-neutral shipping that will meet future IMO targets could require fleet-wide retrofitting with new technologies and the emergence on an entirely new global market; one that incorporates new ways of shipping construction and sale with the transportation of goods, the recycling of vessels, and advanced port infrastructure – all of which would require new policy and regulatory standards.²³ Widespread technological uptake also requires specialised and extensive knowledge across a range of industry actors. If niche technologies are to emerge at an unprecedented rate, then incentivising actors who are willing to adopt these technologies early is crucial in a risk-adverse sector.²⁴ Financing for such retrofitting and technological development is crucial but sharing the risk between various actors in the sector could also incentivise changes to the existing paradigm. Ultimately, a SMTs that is carbon neutral with minimal environmental impacts will appear radically different from the system of today.

19 Norbert Edomah and others, 'Sociotechnical typologies for national energy transitions' (2020) *Environ. Res. Lett.* 15.

20 *ibid.*

21 For niche technologies to become the dominant design, see Frank W. Geels & Johan Schot, 'Typology of sociotechnical transition pathways' (2007) 36 *Res. Policy* 399–417.

22 Frank W Geels and others, 'The Socio-Technical Dynamics of Low-Carbon Transitions' (2017) 1(3) *Joule* 463–479.

23 Conor Walsha and others, 'Charting a low carbon future for shipping: A UK perspective' (2017) 82 *Marine Policy* 32.

24 *ibid* 39.

2.1 *Uncertainty: Regulatory and Technical*

Langlet (in this volume) examines in depth the relationship between shipping and the ecosystem approach. Technological innovation can certainly contribute to the protection and preservation of marine ecosystems. Nonetheless, the uncertainty regarding the performance of green shipping technology is two-fold: there exists a proliferation of technologies coupled with no policy nor regulatory guidance on how to obtain the desired low-carbon outcome. In respect of greenhouse gases, MARPOL Annex VI on air pollution from ships does not cap carbon emissions, which are currently tackled by voluntary or unilaterally prescribed mitigation targets set by States based on international conventions. Despite promoting the necessity of an international uniform standard, the IMO has yet to implement one and seems presently satisfied that its energy efficiency design standards for new ships will steadily contribute to a reduction in emissions from the industry. The present and continuing method endorsed by the IMO in meeting carbon reduction goals remains EEDI – a performance-based mechanism aimed at reducing carbon emissions from fuel usage which leaves the choice of technologies and ship design to industry. Provided that the energy efficiency level is attained, shipowners and operators have free reign in sourcing the most cost-efficient solutions in order to comply with the regulations. The only guidelines given by the IMO in respect of energy efficiency are aimed at assisting verifiers of the EEDI (namely State Administrations or authorised organisations) in conducting the surveys and certification of the EEDI in accordance with MARPOL Annex VI. At the end of 2022, two new energy efficiency requirements will come into force – the Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII).²⁵ The EEXI employs the same methodology as its predecessor, the EEDI, yet is applicable to existing ships presently falling outside the EEDI regulations. The CII measures energy efficiency in grams of CO₂ emitted per cargo-carrying capacity and nautical mile to determine a ship's annual rating ranging from A to E. Neither the EEXI nor the CII will mandate technology selection with parameters set to get more stringent towards 2030. Although this approach is intended to drive innovation and creativity, low-carbon or zero-carbon technologies are not enjoying the rapid uptake necessary to meet climate change targets due to scientific uncertainty and a lack of reliable data regarding the environmental and fuel-savings performance of these newer technologies. There exists a proliferation of available technologies, yet no conclusive verdict on how these

25 MEPC.339(76) (adopted 17 June 2021) 2021 Guidelines on the Operational Carbon Intensity Rating of Ships (CII Rating Guidelines, G4).

technologies will perform or whether they are essentially 'green' within a wider climate change context.

Studies in real options for decarbonisation reveal that regulatory uncertainty is a major factor in deterring actors from investing in new technologies.²⁶ Reinelt and Keith note that regulatory uncertainty increases the social cost of CO₂ abatement, whilst Blyth et al recommends that regulators should reduce long-term policy uncertainty if they seek to encourage investment in energy efficiency.²⁷ To date, there are no comparable IMO studies and investigations dealing with low-carbon or carbon neutral technologies for the sector, as seen with the technical guidance for scrubbers and ballast water management systems.²⁸ However, as Hassellöv discusses (in this volume) scrubber technology continues to be controversial due to discharges that exacerbate marine pollution resulting in the transformation of one type of pollution into another. Furthermore, the IMO seems reluctant to introduce measures beyond the 2023 EEXI and CII and has shown a preference for softer measures such as capacity building and data collection.²⁹ The lack of guidance provided by the IMO is reflective of the broader problems concerning green technologies more generally. There is a lack of decision-making structures when it comes to green technology selection in many sectors, including shipping.³⁰ This is linked to a greater supply-chain management context which requires greening decisions to happen from top management private actors in determining green practices within their companies.³¹ Technological uncertainty and a lack of guidance

26 Christian Haehl & Stefan Spinler, 'Technology Choice under Emission Regulation Uncertainty in International Container Shipping' (2020) 284 *European Journal of Operational Research* 383–396.

27 Peter S Reinelt & David W Keith, 'Carbon Capture Retrofits and the Cost of Regulatory Uncertainty' (2007) 28(4) *The Energy Journal* 101–127; William Blyth and others, 'Investment risks under uncertain climate change policy' (2007) 35 (11) *Energy Policy* 5766–5773.

28 MEPC 67/2/6 on Measures to be taken to facilitate entry into force of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004. Various Associations, including ICS, IUMI, BIMCO, INTERTANKO, CLIA, INTER-CARGO, InterManager, IPTA, IMCA, INTERFERRY, ITF, the Nautical Institute and WSC submitted, *inter alia*, that there was a lack of guidance on the BWM systems.

29 In 2016 the MEPC adopted Resolution MEPC.278(70), which prescribes the guidelines on how vessels are to report their oil consumption by fuel type.

30 De Xia and others, 'Developing a framework to identify barriers of green technology adoption for enterprises Resources' (2019) 143 *Resources, Conservation and Recycling* 99.

31 Studies have been conducted on supply chain management in Asian shipping companies which suggest that sustainability needs to be integrated into overall corporate strategic planning to overcome barriers in green practices and multi-jurisdictional challenges; see Muhamad Fairuz Ahmad Jasmia and Yudi Fernando, 'Drivers of maritime green

has a knock-on effect that creates further problems. These are: 1) the significant cost implications for shipbuilding and retrofitting, along with additional operational costs, and 2) risk-adverse behavioural tendencies in a recovering market.

The Organisation for Economic Co-operation and Development (OECD) recognises that certain conditions prevent firms from making optimal choices and identifies ‘imperfect, insufficient or incorrect information’ as a market failure and barrier for decarbonising shipping.³² This information deficiency can cause suboptimal investments in energy efficiency and prevents the uptake of greener technologies. Research and development (R&D) is vital for attaining the quality of knowledge and expertise required for the diffusion of new technologies.³³ However, R&D focusing on green shipping is fairly recent and there exists a shortage of detailed and audited data of various technological options with a low market maturity.³⁴ The insufficiency of dependable information obtained from tested technologies in actual operating conditions presents a ‘chicken-and-egg’ problem – actors are reluctant to adopt the technology and financiers are disinclined to finance such projects with no proof of efficiency and commercial viability.³⁵ Data collection in shipping is also highly variable as a number of external factors influence the fuel consumption of ships, resulting in seemingly inconsistent data for a single ship. The quality of data collection systems and methods can also vary, with continuous monitoring systems potentially misrepresenting data.³⁶ The lack of available scientific data and conclusions regarding the energy performance of green vessel technologies is part of a greater market failure to allocate optimal resources to research and

supply chain management’ (2018) 43 *Sustainable Cities and Societies* 366 <<https://doi.org/10.1016/j.scs.2018.09.001>> accessed 2 August 2022; see also C Yang, ‘An analysis of institutional pressures, green supply chain management, and green performance in the container shipping context’ (2017) *T. Research Part D: Transport and Environment* 61 (Part B) 246.

32 International Transport Forum, ‘Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035’ (2018) <www.itf-oecd.org/decarbonising-maritime-transport> accessed 2 August 2022.

33 Valeria Costantini and others, ‘Demand-pull and technology-push public support for eco-innovation: The case of the biofuels sector’ (2014) 44 *Research Policy* 577.

34 International Transport Forum, ‘Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035’ (n 32) 57.

35 *ibid.*

36 Nishatabbas Rehmatulla and others, ‘Wind technologies: Opportunities and barriers to a low carbon shipping industry’ (2015) 75 *Marine Policy* 217 <https://doi.org/10.1016/j.marpol.2015.12.021> accessed 2 August 2022.

knowledge.³⁷ This uncertainty deters first-user uptake from both top-down and bottom-up factors. From a bottom-up perspective, shipowners are reluctant to invest in technologies which cannot guarantee that regulatory targets are met, that environmental performance is enhanced for corporate responsibility, and that costs can be recuperated through energy savings. From a top-down perspective, flag State administrations are unable to provide clear technical guidance on how to align the industry with climate change objectives.

The issue of technological uncertainty as a barrier to the uptake of green technologies is perhaps best illustrated by the example of wind technologies which have the potential to propel vessels and diminish energy costs. Although meteorological data exists to illustrate that there is sufficient wind within major sea routes, the viability of the technology depends mainly on quantifying the amount of fuel savings that can be achieved.³⁸ This will require an immense amount of data collection for varying ship models and will have to consider a number of factors such as routes taken, operating speeds and ordinary fuel consumption. Although the potential for energy savings could be huge, not to mention a significant reduction in emissions, this remains the 'most feared' technology by shipowners. In a survey conducted amongst Norwegian shipping companies, it was found that wind propulsion scored the worst in most barrier categories compared to other abatement technologies.³⁹ Most participants in the survey were unfamiliar with available wind technologies, perceived them as less reliable and believed them to be unsafe, inconsistent, and ineffective.⁴⁰ It has also been suggested that the key barrier to implementing wind technologies is a lack of primary practical knowledge and a lack of research and sea trials to test the technology.⁴¹ There is a risk-adverse attitude amongst industry, which means that no one wants to be the first-user of these technologies, coupled with the significant financial investments required to implement wind technology.⁴²

Technical uncertainty is also interrelated to significant cost implications. Niche technologies with unproven benefits are expensive, whilst shipowners

37 International Transport Forum, 'Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035' (n 32) 57.

38 Nishatabbas Rehmatulla and others, 'Wind technologies: Opportunities and barriers to a low carbon shipping industry' (n 36).

39 Michele Acciaro, Peter Hoffmann, Magnus Eide, 'The energy efficiency gap in maritime transport' (2013) 3(12) *J. Shipp. Ocean Eng* 1.

40 *ibid.*

41 Isabelle Rojon & Carel Dieperink, 'Blowin' in the wind? Drivers and barriers for the uptake of wind propulsion in international shipping' (2014) 67 *Energy Policy* 394.

42 *ibid.*

have no incentive to take out substantial loans to test them. In the joint study by Lloyds Register and UMAS, a survey was conducted amongst shipowners to effectively understand what would be needed to make zero-emission vessels a reality and to identify what thresholds shipowners believe need to be passed in order to do so.⁴³ These survey results indicated that shipowners did not desire vessel costs being increased by more than 10% due to zero-emission shipping. The study then analysed the capital cost increases for seven types of zero-emission technologies and, more specifically, the capital cost increase per type of vessel in accordance with each technology. These technologies included Electric, Hybrid hydrogen, Hydrogen fuel cell, Hydrogen + ICE, Ammonia fuel cell, Ammonia + ICE, and Biofuel. Their cost implications were considered for bulk carriers, containerships, tankers, cruise ships and RoPax vessels. The results indicated that biofuel vessels stayed within the 10% margin as almost near-zero extra capital costs are required; ammonia internal combustion and ammonia fuel cells were roughly around the threshold of 10%; whilst electric vessels proved to be the most expensive vessels with additional capital costs ranging from USD 170 million to USD 8500 million depending on the type of vessel, with an estimated 10000% capital cost increase for containerships. Given that electric vessels are probably the least contentious in terms of transferring the environmental costs elsewhere (granted that power sources are renewable), carbon neutrality seems very far away.

2.2 *Disagreements*

Disagreements as to optimal solutions for low carbon shipping are inextricably linked to uncertainty, but also reflect the fragmentation of interests among shipping actors. The main relationship of focus for writers concerned with market barriers for energy efficiency in shipping has been the principal-agent problem between shipowner and charterer.⁴⁴ A market barrier is something which inhibits investment in low-carbon shipping, contributes to slow diffusion and adoption of newer technologies and prevents the implementation of energy efficiency even though it may be more cost effective for actors in the long term.⁴⁵ On the other hand, a 'market failure' occurs where neoclassical

43 Lloyd's Register Group Limited and UMAS, 'Zero-Emission Vessels 2030: How do we get there?' (Part of the Low Carbon Pathways 2050 Series 2017) <www.lrs.or.jp/news/pdf/LR_Zero_Emission_Vessels_2030.pdf> accessed 2 August 2022.

44 Ángeles Longarela-Ares, 'The Influence of Economic Barriers and Drivers on Energy Efficiency Investments in Maritime Shipping from the Perspective of the Principal-Agent Problem' (2020) 12 Sustainability 7943 <<https://doi.org/10.3390/sui2197943>> accessed 2 August 2022.

45 *ibid* 4 of 42.

assumptions that define an ideal market are violated and conditions for efficiency are not met. Consequently, the market does not function properly, and imperfect competition and asymmetric information can arise, resulting in a conflict of interest.⁴⁶ Here, this conflict has been described as one of split incentives. The shipowner is tasked with investing in energy efficiency or low carbon technology, with an objective of assuming the lowest possible costs as the owner will not generally be able to benefit from the energy savings and therefore recover the investment through them.⁴⁷ The charterer assumes the role of the principal and benefits from the energy efficiency decisions of the owner, yet the charterer does not assume any of the costs of investment.

Although overcoming split incentives from a chartering perspective falls outside of the scope of this inquiry, workable contractual mechanisms can assist in proposing energy efficiency investment sharing schemes. Economic game theory has provided modelling for achieving the optimum reward for energy efficiency which determines a fair payment and resolves the level of contribution between the contracting parties.⁴⁸ Parties can enhance their position through disclosing optimal information. Clauses are included to reflect the parties' asymmetric information of a variety of issues including costs, performance and environmental attributes. Thus, an owner who has an honest reputation of disclosing accurate information related to high levels of energy efficiency offers a competitive advantage and might have a higher reservation price. It also becomes important to specify fiduciary obligations in the sharing scheme.

In addition to split incentives, there are also controversies surrounding the actual effectiveness of various low-carbon or emission reduction technologies and practices. There are noteworthy disputes surrounding speed reduction, the EEDI, market-based measures, and liquefied natural gas (LNG).⁴⁹ Operational measures such as speed reduction and the EEDI carry significant safety and commercial risks, whilst market-based measures are politically laden and met with opposition from developing nations. As a proposed alternative fuel, LNG fuel raises significant questions as to whether such fuels can actually achieve

46 Marilyn A Brown, 'Market failures and barriers as a basis for clean energy policies' (2001) 29 *Energy Policy* 1197–1207.

47 Paolo Agnolucci and others, 'Energy efficiency and time charter rates: Energy efficiency savings recovered by ship owners in the Panamax market (2014) 66 *Transp. Res. Part Policy Pract* 173–184.

48 George Adamantios Psarros, *Energy Efficiency Clauses in Charter Party Agreements: Legal and Economic Perspectives and their Application to Ocean Grain Transport* (Springer, 2016).

49 Patrizia Serra & Gianfranco Fancello, 'Towards the IMO's GHG Goals' (n 6) 15 of 32.

reductions in GHG emissions. LNG presents a package of environmental concerns including destructive extraction practices and the potential for methane slip – factors which may even outweigh the benefits of a reduction in sulphur oxides and fractionally less carbon emissions.⁵⁰ However, LNG has been touted as a ‘green fuel’ since the American shale gas boom, which made LNG fuels more readily available in the western hemisphere. LNG is also generally cheaper than heavy fuel oil, whilst marine diesel oil is ordinarily 50% more expensive than heavy fuel oil – a further incentive for LNG usage.⁵¹ The LNG debates speak to the fact that environmental sustainability requires a wider perspective on supply chain management and how ‘green’ technologies, fuel options, and practices are sourced and implemented. Concerns surrounding the sustainability of alternative fuel sources are prevalent throughout many industries, not only within shipping. For example, biofuels have many advantages, the most beneficial of which is their availability in significant quantities.⁵² In some cases, biofuels can be used as “drop-in” fuels which require little to no adjustments to existing engines. However, large-scale production of biofuel comes with its own environmental concerns and is thus restricted internationally.⁵³ The agricultural processes and variability of biofuel sources, means that the supply chain would require strict environmental monitoring in order to avoid deforestation and biodiversity loss.

2.3 *Distribution of Power*

Solutions that view the IMO, its Member States, national governments, and regional bodies as the main enablers of green shipping, fail to acknowledge the inherent nature of a transnational maritime sector. Shipping is closely intertwined with retail and the global economy with growing consumer concerns

50 Siyuan Wang and Theo Notteboom, ‘The adoption of liquefied natural gas as a ship fuel: a systematic review of perspectives and challenges’ (2014) 34 *Transp Rev* 749.

51 Paul Balcombe and others, ‘How to decarbonise international shipping: Options for fuels, technologies and policies’ (2019) *Energy Conversion and Management* 182, 76.

52 First generation biofuels include straight vegetable oil, hydrotreated vegetable oil, fatty acid methyl ester and bio-ethanol.

53 In order to address these concerns, the European Parliament and the Council of Ministers of the European Union adopted a revised renewable energy directive in 2018, which establishes an overall policy for the promotion and use of energy from renewable sources in the European Union. The new directive reinforces the sustainability criteria of bio-energy and includes a provision restricting the negative direct impact that the production of biofuels may have; see Provision 80 of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources).

about the environment.⁵⁴ Environmentally sustainable shipping will rely heavily on the decisions of private actors as environmental governance requires both public and private authority. Private initiatives for sustainable shipping are pivotal in comparison to terrestrial sectors as the principles of transboundary harm pose immense impracticalities when non-state actors are involved in the ownership and management of marine vessels. In addition, customary laws are often inadequate in addressing circumstances where ‘flags of convenience’ are used to evade liability under the jurisdiction of the State enforcing customary responsibility.⁵⁵ Although there is a consumer-driven pressure for private actors to adopt greener technologies, shipowners (as well as port operators) are reported to be conservative, resist innovation, and express reluctance to new solutions.⁵⁶ There is a scepticism surrounding new technology implementation as well as concerns about the huge capital costs necessitated, thus running the risk of being ‘locked-in’ to unsuccessful technologies.⁵⁷ The perception of risk, whether perceived or real has three aspects – technical, business, and external.⁵⁸ Technical concerns have been discussed above while business concerns refer mostly to financing risk; and external concerns refer to the economic climate, fuel prices, regulation and changing policy. A changing regulatory landscape with no clear guidance for GHG emission reduction has contributed to a ‘wait-and-see’ attitude amongst owners and operators as it remains too risky to adopt green technologies where future emission standards are unknown.⁵⁹

Although hesitancy fuelled by perceived risks are dominant, many shipping companies are taking first steps in driving innovation. Multiple shipping companies have invested in technological and research solutions, such as: Aquarius Marine Renewable Energy (Japan),⁶⁰ NYK Super Eco Ship 2030 (Japan), Volvo Penta-led Swedish EcoShip (Sweden), FellowSHIP Programme: DNV (Norway), Post-Panamax ships – S-class: Evergreen (Taiwan), Rotor Sails: Greenwave Wind Engines (UK), Air Cavity System (ACS): DK Group (The Netherlands), Ecospec Global Technology (Singapore), Sea Water Scrubbing System: Hamworthy

54 Jane Lister, ‘Green Shipping: Governing Sustainable Maritime Transport’ (2014) 6(2) Global Policy 118 – 129 <<https://doi.org/10.1111/1758-5899.12180>> accessed 2 August 2022.

55 Robin R Churchill & Vaughan Lowe, *The Law of The Sea* (3 ed Manchester University Press 1999) 333.

56 Patrizia Serra & Gianfranco Fancello, ‘Towards the IMO’s GHG Goals’ (n 6) 19 of 32.

57 Jane Lister, ‘Green Shipping: Governing Sustainable Maritime Transport’ (n 54).

58 Patrizia Serra & Gianfranco Fancello (n 6) 19 of 32.

59 *ibid.*

60 Eco Marine Power, ‘Marine Eco-Ship’ (2018) <www.ecomarinepower.com/en/aquarius-eco-ship> accessed 2 August 2022.

Krystallon (UK).⁶¹ These projects have engineered and patented ship designs which are focused on low fuel and emission reduction systems consisting of solar panels, energy storage modules, computer control systems and advanced rigid sail designs. Further developments are said to include fuel cell technology, optimised hull designs, advanced electrical propulsion system, waste heat recovery technologies, low power LED lighting, air lubrication and navigation improvements. Automated shipping has also presented the possibility of replacing a human crew with autonomous technology. This removes the cost of salaries and increases ship capacity, whilst the margin for human error is minimised due to the supply chain being automated through advanced algorithms. This also means that ships can be at sea for longer periods of time as crew safety is no longer a concern. Speed reduction thus becomes more economically viable and fuel costs and emissions are reduced. Port automation technology has already improved operational energy usage as well as minimised the space and land needed within port complexes.⁶² The energy and cost savings of automated systems could play a fundamental role in reducing the overall environmental impact of the global goods movement system. For now, automated and electrical shipping is largely being considered in respect of short voyages aimed at reducing land transport.

3 Legal Tools for Accelerating Green Finance for Shipping

Overall, low-carbon technology in shipping presents a problem of ‘too many alternatives and not one viable solution’, with scarce market and financial incentives.⁶³ Encouraging the uptake of green technology requires de-risking these alternative solutions through providing a means to both overcome the initial capital costs and providing guidance on technology selection. Financiers are obviously crucial in providing the former, however, green finance frameworks can fulfil the latter. From a financier’s (i.e. banker) perspective, incentivisation is also required to participate in a green economy, implement green frameworks, and create green product offerings. These incentives are vast and

61 Adam Weintrit & Tomasz Neumann, *Safety of Sea Transportation* (London: CRC Press, 2017) 127 <<https://doi.org/10.1201/9781315099088>> accessed 2 August 2022.

62 Ana María Martín-Soberón and others, ‘Automation in Port Container Terminals’ (2014) 160 *Procedia – Social and Behavioral Sciences* 195, 202.

63 Shell & Deloitte, ‘Decarbonising Shipping: All Hands on Deck’ (2020) <www.shell.com/energy-and-innovation/the-energy-future/decarbonising-shipping.html> accessed 2 August 2022.

steadily increasing as Environmental and Social Governance (ESG) investing has gained huge momentum in 2020 with competitive returns in comparison to ordinary or 'brown' investments.⁶⁴ A full exposition of the success of the green bond market, the acceleration of the sustainable finance agenda due to the COVID-19 pandemic, and tightening financial regulations regarding environmental reporting and disclosure are beyond the purview of the Chapter. Rather, the focus is on how banks should adopt frameworks that will de-risk the sector, whilst using the appropriate contractual mechanisms to effectively enforce such frameworks to truly achieve environmental sustainability, avoid greenwashing, and reap the benefits of participation in green finance more generally.

This section is therefore concerned with legal tools for assisting financiers and stakeholders in de-risking the sector, incentivising first-user uptake, and advancing funds on a broad scale to a new range of emerging technologies which must necessarily become the 'new norm'. The risks associated with energy efficiency or 'green' technologies have been identified, therefore potential solutions should seek to provide clarity, a cohesive set of criteria, technical guidance, and ways of mobilising investment. First, it is argued that a feasible set of framework criteria for green assets will assist financial institutions in channelling investment towards green shipping. Second, this Section argues that contractual methods of incorporation for green obligations will be necessary to implement such frameworks effectively. Finally, green shipping financial products are necessary for both the transitioning of the shipping sector and for the sustainability of long-term banking approaches that must necessarily consider a set of sustainable development ideals.

3.1 *Green Frameworks for Ship Finance*

A lack of workable language and criteria in classifying green assets is not unique to shipping. Green finance is an emerging market which has been plagued with issues of taxonomy and definitions since its inception. The G20 Synthesis Report in 2016, recognised that, '[i]n many countries and markets, the lack of clarity as to what constitutes green finance activities and products (such as green loans and green bonds) can be an obstacle for investors, companies and

64 Green Finance Platform, 'Undeterred by Pandemic: Four trends in global climate action to watch in the coming decade' (4 January 2021) <www.greenfinanceplatform.org/blog/undeterred-pandemic-four-trends-global-climate-action-watch-coming-decade> accessed 2 August 2022.

banks seeking to identify opportunities for green investing'.⁶⁵ Financial institutions require a 'green' basis upon which to justify their decisions, taking into account environmental risks and alignment with overall policy ambitions. In order to do so, they need to be able to assure investors that the proceeds of their investments – whether through the green bond market, funds or shares – will be used for green activities with clear, transparent and proven benefits for the environment. Through the adoption of framework criteria, trust is fostered amongst investors and accountability is achieved through a set of contractual obligations placed on the issuer of bonds to use the proceeds strictly for certain green activities.

A universal framework for green finance with common definitions and criteria is also favourable given the international nature of the financial markets. A 'common language' for green finance has thus been called for in a joint research report by the EIB and the Green Finance Committee of China Society for Finance and Banking.⁶⁶ The report highlights that a diversity of taxonomies and standards threatens accountability, comparability cannot be achieved, and market participants cannot measure alignment with policy objectives.⁶⁷ Both the OECD and the High-Level Expert Group on Sustainable Finance have provided empirical evidence that a fragmented and inconsistent set of 'green' definitions is a major barrier to green investing.⁶⁸ In the data collected by the OECD and the High-Level Expert Group, it was found that a wide range of definitions not only poses challenges for selecting green projects and activities, but hampers transparency and can result in 'greenwashing' – a misleading form of marketing which aims to persuade the public that certain practices and products are in fact green.⁶⁹

The Green Bond market has perhaps seen the greatest development in terms of the classification of green projects or green assets. The People's Bank of China (PBoC) has significantly grown its green bond market through

65 G20 Green Finance Study Group, *G20 Green Finance Synthesis Report* (5 September 2016) 10 <unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf> accessed 2 August 2022.

66 European Investment Bank & Green Finance Committee of China Society for Finance and Banking, *The need for a common language in Green Finance: Towards a standard-neutral taxonomy for the environmental use of proceeds*, White Paper Phase I Report (2017).

67 *ibid.*

68 OECD, *Defining and Measuring Green Investments: Implications for Institutional Investors' Asset Allocations* (2012); High-Level Expert Group on Sustainable Finance, *Financing a sustainable European economy. Interim Report* (2017).

69 *ibid.*

publishing its 'Green Bonds Endorsed Project Catalogue'.⁷⁰ Similarly, the Loan Market Association's Green Loan Principles and the Sustainability Linked Loan Principles have also developed classification systems for green activities.⁷¹ These Principles require that the issuer will undertake to use the capital raised for projects and purposes which have undergone a Process for Project Evaluation and Selection.⁷² The Common Principles for Climate Change Adaptation Finance Tracking have also been developed by a number of Multilateral Development Banks and the International Finance Development Finance Club.⁷³ These include a set of common definitions and guidelines, listing activities and due diligence processes, which should be prioritised by financial institutions.⁷⁴ Possibly the most well-known green banking initiative has been the Equator Principles, which launched a framework initiative in 2003 for determining, assessing and managing environmental and social risk.⁷⁵ In respect of shipping, a group of banks led by Citi, Société Générale and Danske Bank noted the pivotal enabling role that financing plays for the shipping sector and therefore implemented the Poseidon Principles framework to integrate climate considerations into lending decisions with the objective of achieving decarbonisation in the industry. However, the framework does not use a taxonomy as a tool to mobilise funds but rather requires signatories to abide by disclosure requirements on whether their shipping portfolios

70 Announcement No. 39 of 2015 of the People's Bank of China.

71 The Loan Market Association's Green Loan Principles have very recently been applied to container shipping in respect of a transaction by Hapag-Lloyd for six ultra-large 23,500 TEU container ships; see Marc Allen, 'DNV supports Hapag-Lloyd's milestone green financing' (Maritime Direct, 4 March 2021) <maritime.direct/en/2021/03/04/dnv-supports-hapag-loyds-milestone-green-financing/?utm_source=rss&utm_medium=rss&utm_campaign=dnv-supports-hapag-loyds-milestone-green-financing> accessed 2 August 2022.

72 LMA, Green Loan Principles: Supporting environmentally sustainable economic activity (December 2018) <www.lma.eu.com/application/files/9115/4452/5458/741_LM_Green_Loan_Principles_Booklet_V8.pdf> accessed 2 August 2022.

73 Consisting of the African Development Bank (AfDB); the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD); the European Investment Bank (EIB); the Inter-American Development Bank (IDB); and the International Finance Corporation (IFC) and World Bank (IDA/IBRD) from the World Bank Group (WBG).

74 Common Principles for Climate Mitigation Finance Tracking (Version 2 – 15th June 2015) <www.eib.org/attachments/documents/mdb_idfc_mitigation_common_principles_en.pdf> accessed 2 August 2022.

75 Equator Principles at <<http://equator-principles.com./about/>> accessed 2 August 2022. The Equator Principles (EP) apply to four financial products; 1) Project Finance Advisory Services 2) Project Finance 3) Project-Related Corporate Loans and 4) Bridge Loans.

are aligned with the Poseidon Principles, meaning that ‘bank liquidity will be prioritised for those clients supporting IMO target levels’.⁷⁶ Despite this proliferation of taxonomy and framework initiatives, International Shipping has only very recently been considered within major green finance frameworks.⁷⁷ Key frameworks that have included green shipping in 2020 are the Chinese Green Bond Catalogue, the EU Taxonomy Regulation, and the Climate Bonds Initiative – each discussed in turn below.

3.1.1 Chinese Green Bonds

Prior to 2020, green shipping was somewhat alluded to in the Chinese Green Bond Catalogue, yet the range of shipping activities seemed limited to mere regulatory compliance and alignment with outdated policy objectives to phase out older vessels.⁷⁸ There was some hope when shipping was included in the Peoples’ Republic of China’s more recent Green Industry Guidance Catalogue (2019 edition), which included a range of ‘new energy ships’, however the Industry Catalogue is aimed more at policy makers than financial institutions and serves to guide relevant authorities in establishing policies surrounding investment, pricing, finance and tax to facilitate green industry development.⁷⁹ Fortunately, in 2020, the PBoC, China’s central bank, the China Securities & Regulatory Commission (CSRC) and the National Development & Reform Commission (NDRC) announced the release of an updated Green Bonds Endorsed Projects Catalogue that will govern the green bond market.⁸⁰ Green bonds are defined in the Catalogue as:⁸¹

76 Barry Parker, ‘The Poseidon Principles and a ‘green transformation’ of shipping’ (Seatrade Maritime Review, 20 June 2019) <www.seatrade-maritime.com/americas/poseidon-principles-and-green-transformation-shipping> accessed 2 August 2022.

77 Pia Rebelo, ‘Green Finance for a Sustainable Maritime Transport System: Developing a Universal Vernacular for Green Shipping’ (n 10).

78 *ibid.*

79 Climate Bonds Initiative, ‘Comparing China’s Green Bond Endorsed Project Catalogue and the Green Industry Guiding Catalogue with the EU Sustainable Finance Taxonomy (Part 1)’ (September 2019) <www.climatebonds.net/files/reports/comparing_chinas_green_definitions_with_the_eu_sustainable_finance_taxonomy_part_1_en_final.pdf> accessed 2 August 2022.

80 An unofficial English translation of the update Catalogue is available courtesy of the Climate Bonds Initiative, available at <www.climatebonds.net/china/catalogue-2020> accessed 2 August 2022.

81 *Green Bond Endorsed Projects Catalogue (2020 Edition)*. The Catalogue was updated again in May 2021, but the parts pertaining to green shipping have remained identical, see *Green Bond Endorsed Projects Catalogue (2021 Edition)* <www.climatebonds.net/market/country/china/green-bond-endorsed-project-catalogue> accessed 2 August 2022.

marketable securities that use raised funds specifically to support green industries, green projects, or green economic activities that meet specified conditions, and are issued in accordance with legal procedures and repay principal and interest according to agreements, including but not limited to green financial bonds, green corporate bonds, green enterprise bonds, green debt financing tools and green asset-backed securities.

The new Catalogue will allow for the funds mobilised by green bonds to be used for shipping related activities under two sub-categorical programs: 'Program 1.3.2.4 Ship and Port Pollution Prevention and Treatment', and 'Program 1.6.1.3 Green Shipbuilding'. The former includes port construction for the purposes of preventing pollution of ships, namely facilities construction, onshore power supply, and technical upgrading of ships with pollution control equipment. The latter Program is more specific to green operational technology and includes, '[m]anufacturing and trading of green ships including natural gas-powered ships, electric power ships, solar/wind energy ships, and energy-saving and new energy construction ships'. This sub-sectoral category at least broadly encompasses alternative technology types for green shipping. Further clarification on the types of projects eligible for green finance requires some analysis of those shipping projects already financed and the objectives of domestic policies on emission reductions in ports and territorial waters.⁸² To encourage international investor participation in China's green bond market, more concrete eligibility criteria for green shipping activities is preferable as many of China's internal policies are not easily accessible, particularly English translations. Although the 2020 edition of the Green Bonds Endorsed Projects Catalogue has achieved much in the way of consolidating the catalogue with international standards and has removed coal-related projects, it has been generally criticised for not going far enough.⁸³ There are also major concerns

82 The People's Republic of China has already advanced a number of on-shore power facilities, LNG fuelled vessels, and "new energy" vessels. For further information on China's green shipping efforts, see Barbara Finamore, 'Taking Stock of China's Actions to Steer Green Shipping' (Natural Resources Defense Council, 9 April 2020) <www.nrdc.org/experts/barbara-finamore/taking-stock-chinas-actions-steer-green-shipping> accessed 2 August 2022.

83 Gao Baiyu, 'China's new green bond catalogue could be greener' (China Dialogue, 19 June 2020) <<https://chinadialogue.net/en/business/chinas-new-green-bond-catalogue-could-be-greener/>> accessed 2 August 2022.

about the fragmentation of oversight bodies and the lack of transparency in reporting how the funds from green bonds are utilised.⁸⁴

3.1.2 EU Taxonomy Regulation

As part of its realisation that green finance frameworks including appropriate definitions are necessary to ‘create security for investors, protect private investors from greenwashing, help companies to plan the transition, mitigate market fragmentation and eventually help shift investments where they are most needed’;⁸⁵ the EU has applied its Framework to Facilitate Sustainable Investment (the ‘Taxonomy Regulation’) since 1 January 2022 to further clarify an EU-wide classification system in identifying environmentally sustainable economic activities and providing technical screening criteria.⁸⁶ This is part of the European Commission’s Action Plan on Financing Sustainable Growth, which envisions a unified classification system which will prevent fragmentation of different EU bodies and Member States, reorient capital flows to achieve sustainable and inclusive growth, and avoid ‘greenwashing’.⁸⁷

The Taxonomy Regulation is to be supplemented by delegated acts, informed by the recommendations of the Technical Working Group on Sustainable Finance, containing technical screening criteria that will be developed in two phases.⁸⁸ The first Delegated Act was adopted in June 2021 but has only applied from 1 January 2022 and covers activities that contribute to climate change mitigation or adaptation (the first two objectives listed in Article 9 of the Taxonomy Regulation).⁸⁹ The second delegated act is to be adopted in 2022 and will include technical screening criteria encompassing activities aimed at the four remaining Article 9 objectives: sustainable use and protection of water

84 Donovan Escalante and June Choi, ‘China Green Bonds: the state and effectiveness of the market’ (Climate Policy Initiative, 3 August 2020) <www.climatepolicyinitiative.org/china-green-bonds-the-state-and-effectiveness-of-the-market/> accessed 2 August 2022.

85 European Commission, ‘What is the EU Taxonomy’ <https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en> accessed 2 August 2022.

86 Proposal for a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment COM/2018/353 final; The Taxonomy Regulation came into force on 12 July 2020.

87 The Action Plan also initiated an amendment to the Benchmarks Regulation on law carbon and positive carbon impact benchmarks (Regulation (EU) 2019/2089 of the European Parliament and of the Council of 27 November 2019).

88 The EIB is the first issuer to have aligned its Climate Awareness Bonds and Sustainability Awareness Bonds with the EU Taxonomy in order to extend loan eligibilities in line with adapting legislation.

89 Delegated Regulation (EU) 2021/2800 final supplementing Regulation (EU) 2020/852.

and marine resources, transition to a circular economy, pollution prevention and control and protection of healthy ecosystems.⁹⁰ The first Delegated Act includes maritime transport and related infrastructure in various categories such as:

- Manufacture of low carbon technologies for transport;
- Sea and coastal freight water transport, vessels for port operations and auxiliary activities;
- Sea and coastal passenger water transport; and
- Retrofitting of sea and coastal freight and passenger water transport.

Sea and coastal freight water transport activities include ‘purchase, financing, chartering (with or without crew) and operation of vessels’ as well as ‘purchase, financing, renting and operation of vessels required for port operations and auxiliary activities’. These activities will make a substantial contribution to climate change mitigation if, *inter alia*, the vessel has zero direct (tailpipe) CO₂ emissions or derives at least 25% of its energy from zero direct (tailpipe) CO₂ emission fuels or plug-in power for their normal operation at sea and in ports until 31 December 2025.

Furthermore, vessels may not be dedicated to the transport of fossil fuels to have a substantial contribution to mitigation targets. This will effectively disincentivise investments in tonnage and infrastructure based on the transportation of fossil fuels and serves as a blanket disqualifier which has been criticised as ‘problematic for the transitional period’.⁹¹ This will be particularly challenging for fossil fuel types that have been advanced to meet the 2020 sulphur cap, and transitional fossil fuels (generally those with lower CO₂ emissions) coupled with carbon capture technologies, such as LNG fuel and carbon-capture systems.⁹²

3.1.3 Climate Bonds Certification Standard

A notable inclusion of shipping in a green finance framework is the Climate Bonds Initiative (CBI) certification standard. In addition to working on market

90 On 2 February 2022, the Commission approved in principle a Complementary Climate Delegated Act which applies to specific nuclear and gas energy activities in the list of economic activities covered by the EU taxonomy.

91 Hellenic Shipping News, ‘The EU Taxonomy for Sustainable Investments – Transport’ (12 February 2021) <www.hellenicshippingnews.com/the-eu-taxonomy-for-sustainable-investments-transport/> accessed 9 2 August 2022

92 Royal Ministry of Finance, Norway, ‘Taxonomy – Norway’s response to the consultation on the draft delegated regulation’ (17 December 2020) <www.regjeringen.no/contentassets/ffd845da24fd4dfbbo806af5dd5ef2d4/taxonomy_norways_comments.pdf> accessed 2 August 2022.

intelligence and the dissemination of information and data, the CBI's core work is focused on developing a trusted standard and providing policy models and advice.⁹³ Its trusted standard has been the development of a Climate Bonds Taxonomy which clearly defines what projects are climate aligned and will drive a low carbon economy. Due to the 2020 sulphur cap and IMO targets for carbon reduction, the CBI announced early in 2019 that its Shipping Technical Working Group (TWG) and Industry Working Group (IWG) would develop framework criteria for shipping investments. The Shipping Criteria forms part of the CB Standard and provides concise decision rules for determining the compatibility of shipping projects and assets with a low carbon, climate resilient economy, and are therefore eligible for certification under the Climate Bonds Standard. The TWG and IWG received input from a number of representatives from 'academia, civil society, ship owners, operators, investors and international policy bodies from around the world'.⁹⁴ The CBI Shipping Criteria can also be used to certify related infrastructure dedicated to recharging and refuelling zero emissions (e.g. charging stations and fuel bunkering for eligible fuels).⁹⁵

These framework definitions and criteria provide a 'first-step' to channeling green finance to the maritime sector. More detailed policy information based on scientific research and development is required to guide shipowners and operators on the technology selection options for meeting these criteria. Here, the IMO and policymakers can play an instrumental role in collaborating with financial market regulators and market participants in developing a universal vernacular for green shipping. It will also contribute to the stark challenge of technological uncertainty as the industry is guided on technology choice as a prerequisite for obtaining capital. These frameworks and the definitions they provide become increasingly important for the subsequent legal tools which financiers must employ to achieve 'greenness' in commercial relationships. Contractual arrangements need clear wording in describing the activities for which a loan disbursement is to be used. This will assist with the clear allocation of duties and obligations between lenders (shipping banks) and borrowers (i.e. shipowners), thus protecting Lenders in managing a range of risks. This leads to the next Section of this Chapter which discusses methods

93 See CBI Climate Bonds Taxonomy (October 2021) <www.climatebonds.net/> accessed 2 August 2022.

94 CBI Shipping <www.climatebonds.net/standard/shipping> accessed 2 August 2022.

95 CBI, 'Shipping Criteria Document' (2020) <www.climatebonds.net/standard/shipping> accessed 2 August 2022.

of contractual integration of green principles and green frameworks into loan agreements.

3.2 *Contractual Incorporation of Green Finance Frameworks*

Once a green finance framework consisting of uniform and clear criteria for the international maritime sector has been established, the next question becomes one of enforcement. How do lenders hold borrowers accountable to these standards – an extremely important consideration in managing the Bank's reputational, legal, and credit risk.⁹⁶ Generally, there are problems with construing environmentalism in contracts, as green objectives are worded according to prevailing environmental law, which often lacks the clarity required for contractual obligations. It is already common practice for environmental compliance clauses to find their way into loan agreements; these involve a promise by the borrower to comply with prevailing environmental legislation, regulations or standards;⁹⁷ or to undertake periodic reporting on environmental performance and management.⁹⁸ However, once a bank has committed itself to a green framework, certain aspirations beyond mere compliance and regulatory reporting might need to be achieved. The implementation of green frameworks is becoming increasingly important for all institutions who commit themselves to certain green objectives insofar as unfair competition or false advertising is concerned.⁹⁹ To avoid claims of 'greenwashing' or misleading information to obtain an unfair advantage, a financial institution advancing green funds must do so meticulously and with careful consideration of how it negotiates its contractual relationships.

Despite the proliferation of capital sources following the 2008 Financial Crisis, mortgage-backed loans in the traditional sense prevail as the dominant method for advancing funds to shipowners.¹⁰⁰ Thus, bank loans will need to

96 Mohammed A Bekhechi, 'Some observations regarding environmental covenants and conditionalities in World Bank lending activities' in Av Bogdandy & R Wolfrum (eds), *Max Planck yearbook of United Nations law*, (Kluwer Law International Ltd, Leiden 1999 3) 287–314.

97 *ibid* 301.

98 Yinshuo Xu and others, 'The Impacts of Environmental Risks on Bank Loan Covenants and the Cost of Bank Loans: an Australian Case Study and the Implications for China' in Proceedings of the 2018 International Conference on E-Business and Applications (ICEBA 2018). Association for Computing Machinery, New York, NY, USA, 36–40.

99 Unilever, Sustainability cooperations between competitors & Art. 101 TFEU, Unilever submission to DG COMP (2020) <www.climatebonds.net/files/reports/comparing_chinas_green_definitions_with_the_eu_sustainable_finance_taxonomy_part_1_en_final.pdf> accessed 2 August 2022.

100 Fotis Giannakoulis, 'Overview of ship finance' (n 15).

implement a set of controls pertaining to the borrower's environmental behaviour in accordance with a chosen or prescriptive green finance framework. Loan agreements for vessel financing consist of certain contractual mechanisms that govern the arrangements between shipowners and banks. These include, inter alia, Conditions Precedent, Representations and Warranties, Covenants or Undertakings, and Events of Default.¹⁰¹ These types of clauses are not inherently unique and can be classified according to an understanding of English contract law; whereby the terms of a contract can be classified as either conditions, warranties or intermediate/innominate terms.¹⁰² These distinctions become relevant in determining the available remedy upon the breach of a term – i.e. the stronger the obligation imposed by the term, the stronger the remedy.

Whilst conditions 'go to the root of the contract' and a breach thereof entitles an aggrieved party to repudiate the contract and claim damages;¹⁰³ a warranty is merely a statement or promise that a current or future condition is true and only affords damages as a remedy upon breach.¹⁰⁴ A third species of terms, known as intermediate or innominate terms, sits somewhere on the spectrum between condition and warranty. A breach of such an innominate term can result in termination of the entire contract or damages only.¹⁰⁵ This will depend on whether the breach of the innominate term has deprived the aggrieved party 'substantially of the whole benefit' that would be obtained under the contract.¹⁰⁶ If so, then the aggrieved party is reasonably entitled to termination. This classification of terms is usually unnecessary in light of commercial contracts including express termination rights upon the breach of various clauses. However, providing an express termination clause for the breach of certain clauses will not transform the nature of those clauses – a warranty cannot be transformed into a condition because the contract States that a breach of the warranty will result in termination.¹⁰⁷

101 Stefan Otto & Thilo Scholl, 'Legal Treatment of Ship Finance Loans: Analysis of the Ship Loan Contract' in Orestis Schinas, Carsten Grau, Max Johns. (eds) *HSBA Handbook on Ship Finance* (Springer, Berlin, Heidelberg 2015).

102 For more on contractual terms, see Paul S Davies & and JC Smith, *JC Smith's the Law of Contract* (Oxford University Press 2018); see also LexisNexis' Practical Guidance, 'Contract interpretation—conditions, warranties and intermediate terms', *Practice Note: Commercial, Dispute Resolution* (2020, LexisNexis, UK).

103 *Poussard v. Spiers and Pond*, (1876) 1 QBD 410.

104 *United Scientific Holdings Ltd. v. Burnley Borough Council*, [1978] AC 904 (HL).

105 *Hong Kong Fir Shipping Co. Ltd. v. Kawasaki Kisen Kaisha Ltd.*, [1961] 2 Lloyd's Rep 478 (CA).

106 *ibid* 495.

107 Furthermore, exercising the express termination right under a contract will not deprive an innocent party of the common law remedies available where there has been a

Bank loan covenants are also subject to this classification system of contractual terms under English law. A loan covenant is essentially an express undertaking for future action or inaction, which although it may seem similar to a warranty, can in effect be material enough to afford more than damages by way of remedy if breached. It therefore seems to fall within the scope of innominate terms and may also entitle an aggrieved party to remedies such as injunctive relief or specific performance.

“Events of default” are also not clearly defined under English law but are effectively used to allow for express termination rights. In the context of ship mortgages, “default” refers to a failure to abide by the contract on the part of the shipowner.¹⁰⁸ In common commercial practice, “default” is understood as applying to a clearly defined set of “events of default” listed in a facility agreement, whereby the lender acts contrarily to the terms of the agreement.¹⁰⁹ An event of default in respect of a covenant can occur when a borrower/mortgagor breaches the covenant, after which a default will occur if the borrower has not remedied the default within a stipulated time period.¹¹⁰ Loan agreements in respect of ship financing and ship mortgage documentation are drafted to expressly include that upon the occurrence of an event of default, the lender/mortgagee’s rights to stipulated remedies become available.

If a bank were to implement a green finance framework in a manner that reduces the most possibility of risk, it would necessarily consider the full range of contractual terms available to impose environmental obligations on the shipowner. These would most likely involve the use of environmental covenants, but the loan agreement would be able to dictate the ‘seriousness’ of a covenant breach and provide for breach thereof as an ‘event of default’ with resultant remedies. Given the commercial nature of a loan agreement, it seems unlikely that an express environmental undertaking will be interpreted as ‘going to the root of the contract’. Therefore, the seriousness of an environmental covenant should not be left open-ended but should afford adequate remedy to protect the bank’s interests. Where green finance frameworks are taxonomical in nature and prescriptive as to technology selection, the loan agreement should absolutely dictate the technical specifications of the technology for

repudiatory breach; see *Spar Shipping AS v. Grand China Logistics Holding (Group) Co Ltd.*, [2016] EWCA Civ 982, [2016] 2 Lloyd’s Rep 447.

108 *Doe ex dem. Gertrude Baroness Dacre v. Mary Jane Roper Dowager Lady Dacre*, 126 ER 887 (CCP), (1798) 1 Bos & P 250, 258.

109 David Osborne and others, *The Law of Ship Mortgages* (Informa law from Routledge, Milton Park 2017) 221.

110 *ibid* 223.

which the loan disbursements should be used as a condition. On the other hand, more normative frameworks which are less concerned with taxonomies and definitions but illustrate broad commitments to climate alignment and mere regulatory compliance, may pragmatically call for a phased approach.

By way of example, the Poseidon Principles framework agreement has provided signatory banks with a standardised covenant clause (SCC) which will be continuously updated in the annual review process.¹¹¹ The SCC for relevant vessel financing documents between Signatories and Borrowers, makes direct reference to Annex VI of MARPOL and mandates compliance with Regulation 22A for Collection and reporting of ship fuel oil consumption data for a ship's SEEMP. However, the SCC is "recommended" but not "compulsory" for signatories, without relevant guidance providing that an equivalent clause or term should be included. The Technical Guidance on Accountability provides little in the way of contractual guidance, except to say, 'Signatories will agree to work with Clients and Partners to covenant the provision of necessary information to calculate carbon intensity and carbon alignment'.¹¹²

The Poseidon Principles framework therefore likely envisions a phased approach to the strength of contractual clauses and remedies. A bank may initially include a set of green clauses as commitments or a convergence of objectives which serve as interpretive statements as opposed to clearly defined obligations.¹¹³ Further steps may involve integrating environmental obligations into every component of the loan agreement: Conditions Precedent, Representations and Warranties, Covenants or Undertakings, and Events of Default. This sort of "belt-and-braces" approach has been adopted by the Equator Principles, which have provided Guidance for the Equator Principles Financial Institutions (EPFIs) in incorporating environmental and social considerations into loan documentation.¹¹⁴ The EP Guidance does not require the EP's Action Plan to be included as an Annex to relevant loan agreements,

111 Poseidon Principles, *Technical Guidance* (Version 3.0 September 2020) <www.poseidonprinciples.org/wp-content/uploads/2019/07/Poseidon_Principles.pdf> accessed 2 August 2022.

112 Poseidon Principles, 'Technical Guidance on Accountability and Enforcement' <www.poseidonprinciples.org/wp-content/uploads/2019/07/Poseidon_Principles.pdf> accessed 2 August 2022.

113 As was done in the seventies with the earliest forms of environmental covenants; see Ibrahim F Shihata, 'The World Bank and the Environment: A Legal Perspective' (1992) 16 Md. J. Int'l L. 1.

114 Equator Principles, Guidance Note (2014) <https://equator-principles.com/wp-content/uploads/2017/03/ep_guidance_for_epfis_on_loan_documentation_march_2014.pdf> accessed 2 August 2022.

but does suggest that the EPs be included as key components with suggested template clauses. The EPs place a strong emphasis on reporting requirements, including as a Condition Precedent, that the borrower furnish the lender with a compliance certificate which evidences that the project covered by the loan meets all relevant environmental laws and provides a completeness status for the actions referenced in the Principles Action Plan. Events of Default are extended to breaches of any environmental or social covenants, as well as circumstances where it is found that a representation has been incorrect or misleading. An event of default can also include legal claims brought against the borrower which can reasonably be expected to result in 'material adverse effect' on implementing or operating the project in accordance with applicable requirements.

Ship financing might eventually come to include all of these types of terms which will impose stringent environmental requirements on shipowners seeking to access capital. However, at this stage, financiers pushing the green shipping agenda can provide incentives by way of advancing capital on the basis of a green commitment which might be more goal-oriented than strictly premised on compliance – albeit, compliance and enforcement becomes imperative in respect of protecting the bank from risk. There is also an emerging opportunity for financing agreements to contribute more generally to a normative system of pervasive 'green principles' throughout contract law.

3.3 *Green Financial Products for Shipping*

The adoption and implementation of green finance frameworks which include shipping, or are specifically targeted at IMO decarbonisation targets, should be supplemented by specific products for the shipping sector. The inclusion of shipping activities in a green finance framework is a step in the right direction, however, it might be administratively cumbersome for shipowners to undertake some of the environmental assessments which are uniformly applied to all activities in such a framework – terrestrial and non-terrestrial. Green shipping products could assist shipowners in accessing capital in an administratively tailored manner, thus saving time and making green finance accessible to smaller to medium owners. In a 2020 Shell and Deloitte Study, relevant stakeholders called for the lowering of the cost of capital and an improvement of terms for ship-owners 'who make decarbonisation investments through

Guidance is given to EPFIS on how to apply the EPs for four financial products: Project Finance Advisory Services, Project Finance, Project-Related Corporate Loans, and Bridge Loans.

dedicated green financing products'.¹¹⁵ This was identified as one of the ways to make decarbonising shipping a reality. Unfortunately, very few green finance products are focused on energy efficiency in shipping.

The most well-known initiatives are undoubtedly the European Investment Bank's lending and blending products for green shipping. The EIB most notably partnered with Dutch bank, ING, to contribute EUR 150m to a facility available projects with a green innovation element involving the construction of newer cleaner vessels or retrofitting of existing vessels, and applies to both inland shipping and seagoing operators.¹¹⁶ At present, the EIB provides products to finance green shipping in the following ways:¹¹⁷

- 1) Under its traditional lending programme with large shipping corporates
- 2) Under the umbrella of the European Fund for Strategic Investments (EFSI): Green Shipping Loan Programme
- 3) Under the umbrella of the Connecting Europe Facility (CEF): new financial instruments to further support Green Shipping investments, including the Green Shipping Guarantee Programme (GSGP)

Generally, these projects need to be aligned with IMO and regional regulations for vessel-source pollution, safety, and EU policy objectives – i.e. the EU Transport White Paper 2011,¹¹⁸ Trans-European Transport Network (TEN-T),¹¹⁹ and the EIB transport lending policy.¹²⁰ Although considered the pioneering 'golden standard' of green ship finance, the EIB products have a long way to go in terms of eligibility clarity and user accessibility. The TEN-T Guidelines are heavily focused on developing EU transport networks through infrastructure

115 Shell & Deloitte, *Decarbonising Shipping: All Hands on Deck* (2020) 29 <www.shell.com/energy-and-innovation/the-energy-future/decarbonising-shipping.html> accessed 2 August 2022.

116 EIB, 'Netherlands: ING and EIB provide EUR 300m to finance green shipping' (2018) <www.eib.org/en/press/all/2018-036-ing-and-eib-provide-eur-300m-to-finance-green-shipping> accessed 2 August 2022.

117 See Pia Rebelo, 'Green Finance for a Sustainable Maritime Transport System: Developing a Universal Vernacular for Green Shipping' (n 10); see also Jason Chuah, 'Legal Aspects of Green Shipping Finance – Insights from the European Investment Bank's Schemes' (n 13).

118 European Commission, *White Paper, Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*. COM(2011) 144 final, Brussels (referred to as EU Transport White Paper 2011).

119 The TEN-T project <<https://ec.europa.eu/inea/en/ten-t/ten-t-projects>> accessed 2 August 2022; based on Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU Text with EEA relevance.

120 EIB Transport Lending Policy (13 December 2011) <www.eib.org/attachments/strategies/transport_lending_policy_en.pdf> accessed 2 August 2022.

expansion – activities that seemingly contrast efforts to reduce CO₂ emissions.¹²¹ Activities which are presently enjoying EIB funding under green shipping products are hard to categorise with no apparent framework for degrees of ‘greenness’ in shipping.¹²² It is well known that retrofitting a vessel to meet strengthening sulphur requirements, does not necessarily mean that the vessel has reduced its greenhouse gas outputs in terms of carbon compounds, nor does it guarantee that low-sulphur fuels are sustainable in the greater supply-chain context.

Along with the ambiguities surrounding framework criteria, the environmental standards imposed on borrowers by the EIB have been criticised as ‘too demanding’ for those intending to access capital.¹²³ Shipowners need to evidence significant experience, be well-established, and have a number of competencies to gain access to the available products.¹²⁴ The administrative complexity of the scheme has also been criticised and denies many shipowners the possibility of support.¹²⁵ Although these issues are also reflective of the overall framework inadequacies of green financing of shipping, they also highlight the need for streamlined products which expeditiously and exclusively channel funds to assisting the shipping sector uptake green technologies for decarbonisation. Thus far, the focus on low-sulphur fuels has taken centre-stage with no equivalent finance efforts in decarbonisation.

Although a full analysis of the benefits of green investing is beyond the purview of this Chapter, it is worth noting that sustainable finance efforts are gaining rapid momentum and are projecting better returns and long-term viability. There are growing incentives for private banks to participate in the mobilisation of funds for sustainable development purposes, despite ESG investing and green investments traditionally having a reputation of not equalling the returns of ordinary investments (i.e. those which do not consider ESG factors).¹²⁶ 2020 was a turning point with the COVID-19 pandemic catalysing a

121 See Pia Rebelo, ‘Green Finance for a Sustainable Maritime Transport System: Developing a Universal Vernacular for Green Shipping’ (n 10).

122 *ibid.*

123 Monitor Deloitte, ‘EU Shipping Competitiveness Study: International benchmark analysis’, Study commissioned by the European Community Shipowners’ Associations (February 2017).

124 *ibid* 46.

125 *ibid*; Other criticisms include that the EIB Transport Lending Policy focuses heavily on supporting inland water transport, ports and logistics, whilst only providing funding to vessels flying an EU state flag.

126 John Hill, *Environmental, Social, and Governance (ESG) Investing* (Academic Press, 2020), 26.

completely different set of interests for relevant stakeholders – one which envisions a sustainable future and focuses on human welfare and sustainability.¹²⁷ Although this is being attributed to a new millennial investor base which is “woke” concerning the impact of climate change, the growth in the market is also becoming attributable to long-term pay-offs and favourable returns.¹²⁸ Investors are looking to ESG investing as an alternative because they believe that the fund in question has a long-term view that will withstand a shifting set of market priorities. Private banks are therefore equally incentivised as State banks (which have obvious environmental policy pressures) to create green products. These will not only direct funds specifically to certain green activities but will strengthen accountability by showing investors how the bank uses its money.

4 Conclusion

This Chapter has aimed to elucidate the problems surrounding green technologies for decarbonising the shipping sector – the fundamental issue being one of technological uncertainty. This uncertainty deters first-user uptake and presents difficulties for financial institutions which are called upon to mobilise investments for these newer technologies that are perceived as riskier than their fossil-fuel counterparts. As an initial step, policymakers, researchers, and financiers are presented with an opportunity to develop framework tools for classifying low-carbon technologies. Transformative energy transitions demand this collaboration between regulatory and actor-driven change. The financial sector has experience in setting criteria for green projects in other industrial sectors; shipping must necessarily be included in some of these taxonomies and tools of comparison. It is very likely that the IMO will be called upon to produce further technical guidance for energy efficiency technologies if a carbon cap is seriously considered for the sector. Stakeholder consultation will be an important part of developing such specifications, taking into account the performance and economic feasibility of various technology

127 Eve Maddock-Jones, ‘2020 has been a watershed year for ESG funds – but what does the future hold?’ (Trustnet, 14 August 2020) <www.trustnet.com/news/7465877/2020-has-been-a-watershed-year-for-esg-funds-but-what-does-the-future-hold> accessed 2 August 2022.

128 Eve Maddock-Jones, ‘Has it been worth holding an ESG fund in 2020?’ (Trustnet, 18 July 2020) <www.trustnet.com/news/7464986/has-it-been-worth-holding-an-esg-fund-in-2020> accessed 2 August 2022.

options. Shipowners require both access to capital and guidance on technology selection. Once such a universal, scientifically endorsed, and technically pragmatic set of criteria is widely recognised, the next step for banks will be to implement such frameworks for the eligibility of shipowner activities. Here, a range of contractual mechanisms must be considered and employed to protect the financier from environmental risk and to truly achieve a set of green objectives.

For a bank to effectively implement green finance frameworks and avoid ‘greenwashing’ as well as its broad range of associated risks (from reputational to litigation risks), it will need to tightly control and monitor the way in which loan disbursements are used. Contractual enforcement is therefore key in ensuring that shipowners uptake approved technologies which meet carbon reduction targets. This Chapter has also recognised that financial projects which are specifically dedicated to driving green shipping need to be available to shipowners. Banks have a pivotal role to play in decarbonising the industry, whilst simultaneously developing sustainable models for long-term returns which are aligned with investor interests.

The pervasiveness of green finance frameworks has immense implications for all of the contractual relationships that a shipowner may undertake throughout a vessel’s lifespan. If a vessel has benefited from green finance offerings, banks can both stipulate the future conduct of the vessel in its chartering and dismantling as well as offer a normative framework upon which to base future contractual agreements with third parties. Green finance for shipping therefore has the potential to significantly contribute to the elevation of sustainability principles in contract law more generally.

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