

“THE NEXT WAVE: GREEN CORRIDORS”— A CRITIQUE

The Next Wave: Green Corridors. Global Maritime Forum, Mission Possible Partnership (MPP), Energy Transitions Commission and McKinsey & Company. November 10, 2021. 74 Pages.

Ayushi Srivastava

The shipping industry is, of course, the backbone of international trade and the global economy. However, it is also one of the world’s biggest carbon polluters. The sector represents about 2.89 per cent of total CO₂ emissions — an amount that, if unchecked, could rise by as much as 30 per cent of 2008 emissions by 2050, as projected by model-based simulations under business-as-usual scenarios.¹ Recognising the global challenge of climate change and the need for a ‘sustainable transition’ in the shipping sector, the International Maritime Organisation (IMO) declared an ambitious target to reduce GHG emissions from shipping by at least 50 per cent by 2050 compared to 2008 levels.² In order for this lofty goal of rapid decarbonisation to become a reality, increasing numbers of commercially viable ‘zero emission vessels’ (ZEVs) must be introduced into the global fleet by 2030. The commercial initialization of ZEVs can be accelerated through the development of ‘Green Corridors’. The 2021 report produced by the Global Maritime Forum and Mission Possible Partnership (MPP), with analyses from the Energy Transitions Commission and McKinsey & Company, entitled, “*The Next Wave: Green Corridors*” aims to fill knowledge gaps amongst industry stakeholders and policymakers regarding the feasibility, scalability, and replicability of ‘Green Shipping Corridors’. It was co-developed with members of the “Getting to Zero Coalition” and the “Motivating First Movers Leadership” group. The Getting to Zero Coalition is an international alliance of more than 160 companies within the maritime, energy, infrastructure, and finance sectors, supported by key governments and inter-governmental organisations, working towards decarbonising the shipping sector. Through detailed analyses of current and expected developments in the field, the report sets an ambitious tone and provides a roadmap for rapid decarbonisation.

While the shipping industry’s voyage to decarbonisation much traverse much choppy and turbulent water, experts argue that the idea of Green Shipping Corridors could be the guiding principle for the development of eco-maritime solutions. Green Shipping Corridors can be defined as specific trade routes between major port hubs (including intermediate or transient nodes) where zero-emission solutions could be applied all across the supply-chain. They can cut through the complexity and shrink the challenge of coordination between fuel infrastructure and vessels, in the value chain and between the countries, down to a more manageable size. They provide end-to-end solutions for industry to act upon and allow policymakers to create an enabling ecosystem with targeted regulatory measures, financial incentives, and safety regulations that can be replicated globally.

¹ “Fourth IMO Greenhouse Gas Study 2020”, Published in 2021 by the *International Maritime Organization*, London, www.imo.org

² Annex 11 Resolution MEPC.304(72) adopted April 13, 2018, Initial IMO strategy on reduction of GHG emissions from ships, *International Maritime Organization*, www.imo.org

Overview of the Report

The report is mainly divided into eight chapters, the initial chapters provide an introduction to green corridors, their importance, the prevailing challenges, and criteria for corridor selection. The first chapter, entitled “*The challenge*”, describes the challenges being faced by the shipping industry due to its heterogeneous and complex nature. It explains how demand-management levers could reduce the sector’s emissions by between four and five per cent. Yet, a decarbonisation strategy focused on these levers alone would not be sufficient to meet the targets set by the IMO and the “*call to action*” issued by 200 industry leaders in September 2021.³ Chapter 2 emphasises how green corridors could generate strong demand signals to vessel operators, shipyards, and engine manufacturers to scale and catalyse investments in zero-emission shipping.

Selecting an ideal shipping route to establish a green corridor from the vast plethora of shipping routes is, of course, the first critical step that will determine its success. In Chapter 3, the report provides a framework to determine ‘ideal candidates’ for the creation of green shipping corridors, primarily based on an assessment of their ‘impact’ (in terms of the trade volume and carbon emissions) and ‘feasibility’ (in terms of financial, technological and policy readiness). After analysing ten different shortlisted routes, the report identified three as potential first-mover candidates – the *Australia-Japan iron ore route*, the *Asia-Europe container route*, and the *Asia-USA automotive route*. Among the three, the Australia-Japan iron ore route and the Asia-Europe container route have the potential to become high-impact catalysts for the transition to zero-emission shipping globally. In Chapter 4, the report argues that in order to establish a green corridor, four crucial building blocks of zero emission shipping need to be satisfied, namely, cross value-chain collaboration, a viable fuel pathway, customer demand, and commensurate policy and regulations. Each of these is then discussed in further detail. The following chapters provide detailed analyses of each of the three potential green corridors identified earlier.

In 2019, ships along the Australia-Japan Iron Ore Route carrying iron ore between Australia and Japan, both directly and with intermediary stops, burned approximately 550,000 tonnes of fuel oil, contributing around 1.7 million tonnes of CO₂ emissions.⁴ The report highlights that this route could be a potential first-mover corridor. The route is gaining momentum amongst stakeholders for decarbonisation as evidenced by the examples mentioned in the report. For instance, 90 per cent of Australian iron ore exporters to Japan are committed to achieving net-zero emissions⁵ and Australia is expected to achieve 29 GW of green hydrogen production capacity by 2030. Five key stakeholders associated with this trade route, including mining companies, vessel operators, steel mills, fuel producers, and governance organisations, have already set ambitious decarbonisation targets for zero-emission shipping by 2030. Ammonia can also be a potential fuel pathway, as ‘Two-Stroke Ammonia Engines’ for large-scale container ships are expected to be available from 2024 onwards.⁶ Proper selection of a fuel pathway, along with policies to lower costs, can align stakeholder choices and turn the route into a green corridor.

³ “Call to action for shipping decarbonization,” *Global Maritime Forum*, November 2021

<https://www.globalmaritimeforum.org/content/2021/09/Call-to-Action-for-Shipping-Decarbonization.pdf>

⁴ “Fourth Greenhouse Gas Study 2020”, *International Maritime Organisation*, 2020, imo.org

⁵ “The Next Wave: Green Corridors”, *Global Maritime Forum*, Mission Possible Partnership (MPP), Energy Transitions Commission and McKinsey & Company, 10 November 2021

<https://www.globalmaritimeforum.org/content/2021/11/The-Next-Wave-Green-Corridors.pdf>

⁶ Nils Lindstrand, “Unlocking ammonia’s potential for shipping,” *MAN Energy Solutions*
<https://www.man-es.com/discover/two-stroke-ammonia-engine>

The next case study focused upon the Asia-Europe Container Route. Vessels on this route burned approximately 11 million tonnes of fuel in 2019, releasing the equivalent of 35 million tonnes of CO₂, accounting for roughly 3 per cent of global shipping emissions.⁷ The route has significant potential to become a green corridor, as the cargo owners have set Scope 3 reduction targets and green hydrogen projects have been announced to install 62 GW of hydrogen electrolyser capacity, by 2030, in Europe, West Asia and Australia (for bunkering in Asia). For turning this route into a green corridor, a zero-emission fuel pathway with bunkering infrastructure and safety standards needs to be established. Policies to lever the cost-gap will also be required. According to the report, a 45 per cent gap in total cost of ownership is forecasted to remain by 2030.

The third case study was of the Northeast Asia-US car carrier small-volume shipping route. The corridor transports finished vehicles on specialist, pure car carrier (PCC), RoRo vessels from Japan and Korea to the West Coast of the USA. According to a 2019 report, around 60 PCC vessels ply on this corridor,⁸ burning approximately 670,000 tonnes of heavy fuel oil (HFO) each year, generating 2.2 million tonnes of carbon dioxide emissions.⁹ The major challenge in this corridor corresponds to securing bunkering infrastructure and fuel supply. Most of the PCC vessels are not limited to one specific corridor; they have flexible deployments that can add to the challenges. The fuel pathway conversion from Heavy Fuel Oil (HFO) to green fuel will affect the size of the fuel tanks and consecutively affect the cargo carrying capacity of the vessel. The study also draws attention to operational measures — such as ‘slow steaming’ — that can be taken to reduce emissions intensity. A reduction in average speed from 18 knots to 15 knots can reduce the emissions by 30 per cent. This could be achieved by forming partnerships between automotive original equipment manufacturers (OEMs) and vessel operators. The report provides a decision matrix comprising three main metrics, namely, the fuel pathway, policy and regulatory environment, and demand for achieving a credible green corridor till 2030. The matrix is then populated with announced or expected milestones and required activities to achieve this roadmap towards decarbonisation.

The report demonstrates that collaboration amongst stakeholders is crucial to deliver green corridors. Such collaboration can help in building green fuel pathways with shared commitment to zero emissions among cargo owners, fuel producers, and vessel operators. The report concludes by reiterating four major actions required for accelerating the development of green corridors, namely, (1) identifying the credible fuel pathways, (2) establishing the potential value chain, corridor-specific policies that enable immediate or early action, (3) making zero-emission vessels the default choice on specific corridors by 2030, and (4) the development of a compliant verification mechanism to fast-track solutions. It also highlights the need to mobilise customer demand for carbon-neutral supply chains, identifying key success factors when prioritising green corridors, and deploying targeted corridor-specific policies that enable immediate or early action.

A Pathway for Green Future

Decarbonisation is a new term that has been added to shipping parlance with which the entire shipping industry is currently struggling, as this word still contains lots of conceptual voids that need to be filled. Green Shipping Corridors would create favourable conditions for decarbonisation and are expected to align policy makers and stakeholders to create a system with

⁷ “Fourth Greenhouse Gas Study 2020”, *International Maritime Organisation*, 2020, imo.org

⁸ Vessel AIS data and World Fleet Register data from Clarksons (2020)

⁹ “Fourth Greenhouse Gas Study 2020”, *International Maritime Organisation*, 2020, imo.org assumptions on fuel consumption, *International Maritime Organization*, imo.org

targeted regulatory measures, financial incentives, and safety regulations. However, if we want to accept Green Shipping Corridors as a light switch to enlighten the shipping world with decarbonisation, we need greater conceptual clarity, especially as there are several definitions that are being used by different agencies. The Energy Transitions Commission and the Global Maritime Forum refer to them in the report as “*specific trade routes between major port hubs where zero-emission solutions are supported.*”¹⁰ The Clydebank Declaration defines them simply as “*zero-emission maritime routes between 2 (or more) ports.*”¹¹ The Getting to Zero Coalition defines them as “*a shipping route between two major port hubs on which the technological, economic and regulatory feasibility of zero-emissions ships is accelerated by public and private action.*”¹² The Government of USA recently published a framework on green shipping corridors and refers to them as “*maritime routes that showcase low- and zero-emission lifecycle fuels and technologies with the ambition to achieve zero greenhouse gas emissions across all aspects of the corridor in support of sector-wide decarbonization no later than 2050.*”¹³ Creating a Green Shipping Corridor is not just about choosing one route and ‘making it green’. The route and all associated value-chain actors need to be included within an aligned roadmap to develop zero-emission vessels (ZEVs), zero-emission support vessels, green fuel to manoeuvre ZEVs, bunkering infrastructure, and ports.

These challenges notwithstanding, the present move towards Green Shipping Corridors will enable the decarbonisation drive to go from ambition to action. While the analysis done by the Energy Transitions Commission and McKinsey & Company in the report helps to put forward potential future pathways, doubts remain regarding the feasibility of the proposed measures. Most of the studies mention the need for collaboration amongst different stakeholders, with mutual understanding over which approach to follow, which is of course, easier said than done. The initial step in planning a Green Corridor is selecting an ideal route through filtering and then crowning the most suitable one as the best candidate. After the route is selected, the report suggests the selecting the most suitable ‘green fuel’, based on the production efficiency from different States and industries. The report uses hypothetical conditions and expected situations for selecting a green fuel and proposes the use of newly built zero-emission vessels. The expectation of having newly built zero emission vessels within the proposed timeline mentioned in the report seems highly wishful, as most efforts towards building zero emission vessels are still in pilot phases. A major hurdle in this context is the lack of investment in research and development to push the projects to the development stage. A recent report by the International Chamber of Shipping identified 265 projects to kick-start and accelerate zero-carbon emissions but stated that an estimated cost of USD 4.4 billion would need to be incurred to allow “Technology Readiness Levels” (TRLs) to increase from early stages of research and development (TRL 1-6) to demonstration (TRL 7). The latest figures from the International Energy Agency (IEA) on private sector Research and Development (R&D) in

¹⁰ Jesse Fahnestock (Head, Research and Analysis, Global Maritime Forum) and Aparajit Pandey (Associate, Energy Transitions Commission) “How green corridors can enable the transition to zero-emission shipping”, 5 January 2022

<https://www.weforum.org/agenda/2022/01/green-corridors-zero-emission-shipping/>

¹¹ “COP26: Clydebank Declaration for green shipping corridors”, *Department for Transport*, GOV.UK, 13 April 2022 <https://www.gov.uk/government/publications/cop-26-clydebank-declaration-for-green-shipping-corridors/cop-26-clydebank-declaration-for-green-shipping-corridors>

¹² “The Next Wave: Green Corridors”, *Getting to Zero Coalition*, 10 November 2021

<https://www.globalmaritimeforum.org/content/2021/11/The-Next-Wave-Green-Corridors.pdf>

¹³ “Green Shipping Corridors Framework”, *Office of The Spokesperson*, 12 April 2022

<https://www.state.gov/green-shipping-corridors-framework/#:~:text=The%20United%20States%20envisions%20green,decarbonization%20no%20later%20than%202050.>

maritime sector reveals that, in actual fact, R&D spending fell to USD 1.6 billion in 2019 compared to USD 2.7 billion in 2017.¹⁴

Importantly, the report fails to address retrofitting, which could contribute significantly towards a reduction of emissions. In September 2021, the Global Maritime Forum conducted a stakeholder discussion focused on the topic of retrofitting as an opportunity for existing vessels to meet the latest standards and regulations on GHG emissions. The discussion opened a new avenue for shipowners to tailor existing vessels to meet global standards and adapt to newer fuels. A Transition Strategy study, conducted by the University of Maritime Advisory Services (UMAS) and the Getting to Zero Coalition, indicates that by 2046 the number of retrofits will reach around 35,000 vessels, increasing, by 2050 to encompass half of the global fleet to run on scalable zero emission fuels.¹⁵ According to a senior executive of the Retrofit Development Manager for Man Energy Solutions (the company that drives half of the world's trade through its ship propulsion systems), “currently available technologies can improve vessel efficiency and enable a reduction of the total cost of ownership. Adhering to new and adaptive regulations such as the International Maritime Organisation (IMO) Energy Efficiency Existing Ship Index (EEXI) not to mention impending future emission regulations can stimulate the deployment of current and future retrofitting options.”¹⁶ Shipowners could adopt a strategy of ‘fuel optionality’, which would allow them to prepare for multiple future technology scenarios and could reduce the reliance on new-builds of zero emission vessels. For example, low-sulphur heavy fuel oil (LSHFO) engines can be retrofitted to run on ammonia or can be made to run on a second fuel.¹⁷

Conclusion

The concept of Green Corridors is steadily gaining traction around the world, and first mover leaders are already working on the handful of Green Corridors that have been identified. These include the *Port of Los Angeles, CA – Shanghai, China* (announced, in Jan 2022, a partnership with C40 Cities);¹⁸ the *Maersk Mc-Kinney Moller’s European Green Corridors Network* (announced in March 2022, but no specific routes specified);¹⁹ *Maersk Mc-Kinney Moller’s Chilean Green Corridors Network* (announced April 2022, no specific routes specified);²⁰ and the *Australia – East Asia Iron Ore Green Corridor* (announced April 2022).²¹ The report provides a comprehensive overview of

¹⁴ “A zero emission blueprint for shipping”, *International Chamber of shipping* and in collaboration with Ricardo, November 2021

<https://www.ics-shipping.org/wp-content/uploads/2021/11/A-zero-emission-blueprint-for-shipping.pdf>

¹⁵ “A Strategy for Transition to Zero-Emission Shipping”, UMAS (*University of Maritime Advisory Services*) on behalf of the Getting to Zero Coalition

¹⁶ “Alternative Fuels | The future of retrofitting ship engines”, YouTube video, 58:51, “Global Maritime Forum”, 28 September 2021, <https://www.youtube.com/watch?v=EcsPyp6NmTk>

¹⁷ “Alternative fuels: Retrofitting ship engines”, *Global Maritime Forum*, 09 May 2022

<https://www.globalmaritimeforum.org/news/alternative-fuels-retrofitting-ship-engines>

¹⁸ “Port of Los Angeles, Port of Shanghai, and C40 Cities announce partnership to create world’s first transpacific green shipping corridor between ports in the United States and China”, *C40 Cities* press release, 28 January 2022

<https://www.c40.org/news/la-shanghai-green-shipping-corridor/>

¹⁹ Ajsa Habibic, “Zero-carbon shipping centre and partners initiate European Green Corridors Network”, *Offshore Energy*, 30 March 2022

<https://www.offshore-energy.biz/zero-carbon-shipping-centre-and-partners-initiate-european-green-corridors-network/>

²⁰ “Chilean Ministries of Energy, Transport and Telecommunications, and Foreign Affairs, together with the Maersk Mc-Kinney Moller Center for Zero Carbon Shipping launch joint project to establish green shipping corridors in Chile”, Press release, Copenhagen/Palau/Santiago, 13 April 2022

https://cms.zerocarbonsshipping.com/media/uploads/documents/Chilean-Green-Corridors-Network_2022.04.13.pdf

²¹ “BHP signs Letter of Intent for Australia- East Asia iron ore Green Corridor”, *BHP* media release, 06 April 2022 <https://www.bhp.com/news/media-centre/releases/2022/04/australia-east-asia-iron-ore-green-corridor>

Green Corridors, the necessary conditions and steps involved in identifying and establishing them, and recommendations for achieving the ambitious zero-emissions target. The timelines proposed in the report may, however, be unduly optimistic considering that most of the necessary technological advancements are still in their preliminary stages and cannot be implemented at scale yet. Much more needs to be done to bring together the different industry stakeholders and policymakers to accelerate this transition towards sustainable shipping. We must also establish a robust monitoring and evaluation system to assess the efficacy of the green corridors over time and take remedial action as necessary.

About the Author

Ms Ayushi Srivastava is a Research Associate at the National Maritime Foundation (NMF). She holds a BTech degree from the APJ Abdul Kalam Technical University, UP, and an MTech degree in naval architecture and ocean engineering from the Indian Maritime University (IMU), Visakhapatnam Campus. Her current area of research focus is shipping and shipping-technologies, particularly those aspects that support India's ongoing endeavour to transition from a 'brown' model of economic development to a 'blue' one.