Australian Government
Department of Infrastructure, Transport,
Regional Development, Communications and the Arts

MERNAP Issues Paper 4:
Green Shipping Corridors and Partnerships

March 2024

Contents

1. Introduction

The Australian Government has legislated an economy-wide target of reaching net zero greenhouse gas (GHG) emissions by 2050. To deliver on this commitment, the Government is developing a Net Zero Plan, including six sectoral decarbonisation plans covering electricity and energy, transport, industry and waste, agriculture and land, resources and the built environment.[1] For the transport sector, the Government is developing a Transport and Infrastructure Net Zero Roadmap and Action Plan to examine GHG emissions reduction pathways across all transport modes (road, aviation, maritime and rail), including supporting infrastructure.[2] One element of the transport sectoral plan is a Maritime Emissions Reduction National Action Plan (MERNAP).[3]

Development of the MERNAP will seek to identify and prioritise actions to decarbonise our maritime sector, advance the development of green shipping corridors from Australia, and contribute towards reducing international shipping emissions.

The MERNAP is being prepared through a series of thematic issues papers.[4] The first issues paper on regulations and standards was released in September 2023. The second issues paper, released in December 2023, examined potential energy provision and abatement technologies for Australia's maritime sector. The third paper in the series considers the sector's skills and training needs to facilitate the green maritime transition. This fourth paper will explore the opportunities that green shipping corridors and international partnerships provide as mechanisms to support the reduction of maritime emissions.

Through consultation on this fourth paper on green shipping corridors and international partnerships, the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (the Department) would like to better understand industry and community perspectives – specifically how they are engaging with green shipping corridors and international partnerships to promote a decarbonised maritime sector. This understanding will help inform the development of short, medium and long-term approaches in the MERNAP to support Government and private sector initiatives.

Submissions in response to this paper will be used to provide advice to Government about potential future policy settings. Submissions can be made by close of business **5 April 2024** via email to: MERNAP@infrastructure.gov.au

2. Purpose

The MERNAP aims to:

- support Australia's national emissions reduction targets and contribute to global shipping decarbonisation;
- future-proof the Australian maritime sector and avoid a later accelerated, costly and disruptive transition by setting early signals;
- signal to global partners Australia's clear pathway to net zero emission shipping in our waters and ports; and
- promote an equitable transition for the maritime sector, particularly for the maritime workforce.

To support the transition to a decarbonised maritime sector, new international partnerships will be required. Such partnerships will help accelerate the green transition in global shipping and, if managed well, ensure the benefits flow to Australia's domestic maritime sector.
This paper explores the types of partnerships that will drive maritime decarbonisation globally, and how they can support Australia's own maritime transition. This paper does not provide 'answers' as to the best approaches, rather aims to present information as a 'scene-setter' to stimulate feedback from industry and other stakeholders. Throughout the paper, questions are posed to test assumptions on likely approaches to help inform the Department's recommendations to Government in the final MERNAP.

3. Australia and the World – Maritime Decarbonisation Context

GHG emissions from international shipping contribute almost 3% of total global anthropogenic GHG emissions. If it were a country, international shipping would be the fifth largest emitter in the world. As an island nation dependant on shipping, Australia's share of global sea freight is around 14%, and ships carrying our sea freight (irrespective of flag) contribute approximately 4% of global CO2 emissions from international shipping. Australia, therefore has a key role to play in global efforts to decarbonise shipping.

Domestically, Australia has an economy-wide target to reach net zero by 2050 and aims to reduce total emissions by 43% below 2005 levels by 2030. Over the past two decades, Australia's domestic maritime sector has contributed around 2 million tonnes (Mt) of GHG emissions per year, accounting for approximately 0.4% of Australia's total emissions.[5] The maritime sector faces significant short and long-term challenges in emissions reduction, from a technical perspective (as explored in Issues Paper 2), and a skills and training perspective (as explored in Issues Paper 3). International and domestic maritime industries are responding to these challenges by adopting low emissions technologies and energy sources.

In support of these efforts, Australia engages internationally to develop partnerships for a decarbonised maritime sector, including:

The International Maritime Organization

The International Maritime Organization (IMO) is the United Nations specialised agency responsible for setting global regulations for safe, secure and environmentally sound, efficient, and sustainable shipping. One facet of this is the management of pollution from ships. The International Convention for the Prevention of Pollution from Ships (MARPOL) details the standards to prevent ship-sourced pollution, including GHG emissions.

The Government considers the IMO to be the most appropriate international body to establish global policy and regulatory settings in regards to international shipping emissions. Australia is actively engaged at the IMO and plays a part in influencing these standards and measures. This assists in facilitating a global level playing field and helps to avoid unilateral actions, which could result in a tangle of compliance regimes applied to ships trading between different countries. Due to our reliance on international shipping for exports and imports, as well as our long trade routes, ships servicing Australia are a significant contributor to global GHG emissions. Furthermore, Australia's ambitions to be a renewable energy superpower needs to be supported by zero and near-zero emission shipping so that transportation does not contribute to the life cycle emissions of the exported energy. We have a national interest in working collaboratively with our trade partners to drive down shipping emissions through the energy transition in a practical, accelerated and equitable manner.

Green Shipping Corridors

Green shipping corridors are a type of international partnership that can assist in accelerating maritime decarbonisation. They are a zero or near-zero GHG emissions maritime route between two or more domestic or international ports. Both the vessels and port operations that exist within the green corridor must be working towards zero or near-zero GHG emissions. Striving to create these corridors is a method of facilitating the necessary collaborations required to deploy novel fuels and technology at scale. These partnerships include stakeholders across the maritime value chain (ship owners, contractors, shippers, fuel providers, port services, researchers, etc.) as well as government to government (domestically and internationally). Green shipping corridors have gained traction in recent years with growing interest from several nations wishing to accelerate the reduction of emissions from international shipping and provide opportunities for their domestic industries to gain a competitive advantage (see Attachment A). Coordinated efforts by key players along the value chain is required to successfully implement a green shipping corridor. Global policy and regulatory drivers are also needed to accelerate the development. Green shipping corridors can provide a tangible mechanism for Australia to participate and influence decarbonisation efforts in international shipping, whilst also promoting Australian innovation and jobs.

4. International Maritime Organization – Australia's Role

On 1 January 2023, the IMO's mandatory global ship energy efficiency measures (*Energy Efficiency Existing Ship Index and Carbon Intensity Indicator*) came into effect to reduce the carbon intensity of international shipping by 40% below 2008 levels by 2030.[6] Australia legislated these measures through *Marine Order 97 (Marine Pollution Prevention – Air Pollution)*.

In July 2023, Australia actively negotiated and supported the adoption of a more ambitious 2023 IMO Strategy on Reduction of GHG Emissions from Ships. The Strategy aims to reach net zero shipping emissions by, or close to, 2050 and set interim checkpoints that keep the maritime industry aligned with the Paris Agreement temperature goal ($1.5°C \leq \Delta T < 2°C$). The indicative checkpoints are to decrease GHG emissions by at least 20%, striving for 30%, by 2030, and by at least 70%, striving for 80%, by 2040, compared to 2008 levels. For the first time, the IMO also aims to reach 5-10% uptake of zero or near-zero emission fuels or energy sources and technologies by 2030.

To reach these ambitions, the IMO is currently developing various mid-term measures with technical and economic elements for adoption by 2025. Under consideration is a GHG fuel standard and GHG pricing mechanisms, both of which aim to regulate the phased reduction of GHG emissions. Achieving the IMO ambitions will require significant technical change in the global maritime industry.[7]

There is uncertainty as to the energy and technology mixes that will be in place in 2050, as highlighted in the second MERNAP issues paper on energy sources and technology. As ships are typically in service for 25-35 years, long lead times are required for a transition supported by confidence in the safety and reliability of the new maritime technologies.

The IMO and Green Shipping Corridors

The IMO's development of global regulations on decarbonisation reinforce the importance of early establishment of green shipping corridors, which will allow us to harness the lessons and experience gained from demonstrations and proof trials. This will assist in scaling up the wider adoption of low emission marine fuels and technologies. As noted in the first and third MERNAP issues papers, the design of new safety regulations, standards and industry skills for the operation of vessels on zero or near-zero fuels will be premised on risk assessment, defined by practical application, and refined by experience.

Recognising the importance of increasing collaboration among various maritime value chain actors, the IMO has established a number of voluntary route-based initiatives and capacity-building projects to encourage and facilitate a supportive environment for developing green shipping corridors, without favouring any specific bilateral or plurilateral partnerships. These include:

- Resolution MEPC.323(74)
  - Voluntary cooperation between port and shipping sectors to contribute to reducing GHG emissions from ships.
- Resolution MEPC.366(79) - Supersedes MEPC.323(74)
  - Further encourages cooperation through the whole value chain through shipping routes and maritime hubs.[8]
- The IMO-Norway GreenVoyage2050 Project
  - Works with selected developing countries to partner with industry and create an enabling environment for maritime GHG mitigation efforts.
- The IMO-Singapore NextGEN Project
  - Brings stakeholders together to catalyse impactful partnerships and develop a collaborative global ecosystem of maritime transport decarbonisation initiatives.

The above initiatives encourage international collaboration on specific route-based actions and provide a platform for the Government and industry to promote the advantages of green shipping corridors.

Questions for Industry Stakeholders:

- *How does the 2023 IMO Strategy on Reduction of GHG Emissions from Ships shape your organisation's future decarbonisation activities?*
- *What are the key opportunities your organisation sees coming from the Strategy?*
- *How would an IMO-regulated GHG fuel standard impact your organisation? How can the Government support the implementation of this policy to maximise domestic benefits?*

5. Green Shipping Corridors – Australian Approaches

Green shipping corridors present opportunities to build Australia's capability to: supply and utilise a range of zero and near-zero emission fuels; provide seafarer training and experience in handling new fuels; and inform the development of safety standards for alternative marine fuel use. These capabilities can be applied to our domestic maritime sector, providing significant flow-on benefits. Similarly, Australian-developed technologies (including vessel design, standards development etc.) can be promoted globally through their demonstration in green shipping corridors.

Australia has acknowledged the opportunities that green shipping corridors and international partnerships provide as mechanisms to support the reduction of maritime emissions. As a result, we have joined various international agreements to implement green shipping corridors through the Indo-Pacific by the end of the decade.

These agreements include the:

- Clydebank Declaration (COP26)
  - Launched in 2021, the United Kingdom, the United States, Japan, New Zealand, Singapore, and Fiji, amongst others, are working together to establish at least six green shipping corridors by 2025.
- Green Shipping Challenge (COP27)
  - Australia reiterated its pledge with other nations to work towards decarbonising shipping through fostering practical projects.
- Mission Innovation – Zero Emission Shipping
  - An initiative launched in 2021 with aims to enable at least 5% of the global fleet to run on zero emission fuels by 2030.
- Green Economy Agreement with Singapore
  - The Green Economy Agreement was signed by the Australian Minister for Trade and Tourism, Senator the Hon Don Farrell, and the Singaporean Minister for Trade and Industry, Mr Gan Kin Yong, in October 2022. The Agreement combines trade, economic, and climate objectives to promote economic cooperation, boost trade, create business opportunities, and decarbonise key industrial sectors. The Agreement lays the foundations for greater collaboration between Australia and Singapore to drive growth, all whilst reducing emissions.
- Singapore-Australia Green and Digital Shipping Corridor
  - Aligned with the Green Economy Agreement, the Department and the Maritime and Port Authority of Singapore (MPA) are cooperating to establish a Green and Digital Shipping Corridor by the end of 2025 to help decarbonise and digitalise the port and shipping industry. Working closely with port operators, relevant jurisdictions, as well as maritime and energy value chain stakeholders, Australia and Singapore are exploring how both countries can take a global leadership role in optimising their shipping routes to test and trial green and digital solutions.
- Indo-Pacific Economic Framework (IPEF)
  - Through the IPEF Clean Economy Agreement, IPEF Partners commit to actively pursuing their shared climate objectives and respective pathways to net zero emission economies, whilst also ensuring the promotion of sustainable growth and success for all. Under the Agreement, IPEF Partners intend to, inter alia, decarbonise and otherwise reduce the climate impact of the transportation sector, including through efforts related to the establishment of green shipping corridors.
- Quad Green Shipping Taskforce - Japan, India, and the United States
  - Announced at the Quad Leaders Summit in 2021, the Quad cooperates in efforts to decarbonise shipping and port operations, with aims to establish 2-3 green shipping corridors in the Indo-Pacific by 2030.
- Australia-Singapore Low Emissions Maritime Technology Partnership (ASLET)
  - Australia and Singapore have established a $30 million partnership over 5 years to accelerate the development and deployment of low emission fuels and technologies (such as clean hydrogen) that aim to reduce emissions in maritime and port operations.

In addition to international agreements, significant work on partnerships that lay the foundations for green shipping corridors have been driven by industry, ports and state governments, including the:

- Port of Melbourne
  - The Port of Melbourne has signed a Memorandum of Understanding (MoU) with Maersk, ANL, Svitzer, Stolthaven Terminals, HAMR Energy and ABEL Energy to explore the commercial feasibility of establishing a green methanol bunkering hub at the Port of Melbourne. The collaboration will examine a potential project involving the transportation of green methanol from production sites in Bell Bay, Tasmania (ABEL Energy) and Portland, Victoria (HAMR Energy) to the Port of Melbourne for storage and bunkering services.
- H2-Hub Gladstone Project
  - The H2-Hub Gladstone Project aims to establish an industrial-scale complex, producing green hydrogen and green ammonia in Gladstone, Queensland. It is proposed that the complex will have three gigawatts in proposed electrolyser capacity and over 1.7 million tonnes per year of green ammonia production. Strategic collaborations and green ammonia offtake with partners in domestic and export markets have been announced by H2U, the leader for the project, joined by Vopak Terminals Australia, Orica Australia, Mitsubishi Heavy Industries and Korea East-West Power.
- Port of Newcastle
  - In July 2023, the Port of Newcastle reported that 30 supporting partnerships will underpin its advancement towards the enablement of a world-class clean energy economy in the New South Wales Hunter Region.
- Queensland and Korea
  - In September 2022, the Han-Ho Hydrogen Consortium was officially launched, with plans to develop a supply chain to export more than 1 million tonnes of green ammonia per year from Australia to Korea, by 2032. The Consortium, consisting of Australian-based Ark Energy and its parent company Korea Zinc, as well as Korean conglomerates Hanwha Impact and SK Gas, seeks to unlock Queensland's hydrogen potential and build a green energy export corridor connecting North Queensland to North-East Asia. At the heart of the Consortium's plans is the development of Ark Energy's Collinsville Green Energy Hub in Queensland.
- Castor Initiative
  - The Castor Initiative is a global coalition that includes MISC Berhad, Lloyd's Register, Samsung Heavy Industries, MAN Energy Solutions, the Maritime and Port Authority of Singapore, Yara Clean Ammonia, and Jurong Port. The Initiative was established in January 2020 to develop an ammonia-fuelled tanker design, and was motivated by the Partners' shared belief that the maritime sector needs leadership and greater collaboration to decarbonise. The Partners believe that the Castor Initiative will send a clear message that shipping can progress itself to fit times and circumstances, ahead of regulatory action.

Green shipping corridors could also be established in a domestic context to support decarbonised coastal shipping in Australia. Green shipping corridors allow for the acceleration and improved access of zero or near-zero GHG emission fuel production, the creation of green jobs, heightened innovation, as well as increasing national economic diversification. Scaling up green shipping corridors can also lower costs associated with alternative fuels. For the communities in port hinterlands, phasing away from fossil fuel-powered vessels and moving towards zero or near-zero GHG emission fuels has the potential to alleviate health risks, as well as environmental risks such as biodiversity loss.

Singapore-Australia Green and Digital Shipping Corridor

Singapore and Australia have signed a Memorandum of Understanding (MoU) to formalise their cooperation on establishing the Singapore-Australia Green and Digital Shipping Corridor. The signing of this MoU was welcomed by the Prime Ministers of Singapore and Australia during their 9th Annual Leaders' Meeting in Melbourne on 5 March 2024.

The Corridor aligns with the Green Shipping Cooperation initiative outlined in the Singapore-Australia Green Economy Agreement signed in October 2022. Establishing the Corridor will galvanise the action from both countries to accelerate maritime decarbonisation and digitalisation, to meet the IMO Strategy's enhanced targets for international shipping, which includes a target to reach net-zero GHG emissions by or around (i.e. close to), 2050.[9]

Questions for Industry Stakeholders:

- *In what ways can the Government make tangible benefits available from the development of green shipping corridors for ports, maritime workers, domestic commercial vessels, energy providers and other industries?*
- *How should the Government be engaged in brokering green shipping corridors? At what point do you think the Government can add value in establishing new green shipping corridors? Conversely, at what point should the Government step back and let private sector organisations broker these arrangements?*
- *How can green shipping corridors facilitate the two-way exchange of new technologies, capabilities and approaches for the Australian maritime sector?*
- *How can green shipping corridors build Australia's capability to supply and use zero and near-zero emission fuels? Is there a role for the Government to ensure these benefits are shared by the domestic maritime sector?*
- *How can green shipping corridors provide training and experience in low emission fuels and technologies for seafarers? Is there a role for the Government to ensure these benefits are realised?*

6. Future Opportunities

The Government is examining future opportunities for green shipping corridors and international partnerships (as listed in Attachment A). In addition to supporting the reduction of emissions from international and domestic shipping, green shipping corridors enhance Australia's competitiveness in international trade, infrastructure investment, tourism, as well as boosting collaboration with Pacific Island Countries.

International stakeholders are looking at Australia's capability to supply alternative fuels, and whether their production can be scaled and exported to cater to increasing global demand. By leveraging green shipping corridors, Australia can benefit from having tried and tested supply chains as a fuel supplier, and be ideally placed as an energy hub for the region. Further benefits can be seen once a green shipping corridor is established, as it can then be used to establish new corridors, positioning Australia as a hub in an international network of green shipping corridors.

Zero and near-zero GHG emission fuels typically have a lower energy density than the oil-derived fossil fuels currently used by the maritime sector. This means that a greater distribution of bunkering facilities is required and Australia has the opportunity to be a supplier. Australian ports equipped with infrastructure to support green shipping corridors will be at the forefront to benefit from the global maritime transition. Green shipping corridors can attract private and public investments due to their demonstration of the longer-term viability and vision for the infrastructure.

Green shipping corridors can also serve as a springboard for ecotourism. The cruise industry and sustainable tourism operators can use green shipping corridors to not only develop new business opportunities, but also to reduce their own GHG emissions.

Green shipping corridors should aspire to promote an equitable transition for the maritime sector and contribute meaningfully, making sure not to exacerbate existing inequalities. Australia's proximity to Pacific Island Countries provides an opportunity for regional cooperation through green shipping corridors, with benefits being passed on to our Pacific Island neighbours. The relationship between Australia and Pacific Island Countries will improve from knowledge sharing, capacity building, technology and zero or near-zero GHG emission fuels developed from Australia's green shipping corridors. The alternative fuels can be used by ships servicing Pacific Island Countries, supporting their economies and climate change mitigation ambitions, and overall reducing the region's dependence on imported fossil fuels. Green shipping corridors could not only facilitate the reduction of emissions from shipping between Australia and Pacific neighbours, but also strengthen diplomatic ties and stability.

Through the IMO, Australia has the opportunity to influence, contribute to, and accelerate the development of global regulations that enable the use of alternative fuels. Green shipping corridors provide a useful test bed for trialling safety standards under development for the carriage and use of alternative shipping fuels.

Australia has the opportunity to further support the IMO's regulatory development by bringing attention to specific challenges in deploying alternative fuels on shipping routes from Australia and helping to develop the relevant regulations and guidelines to address these challenges. By actively participating in green shipping corridors, Australia showcases its commitment on the international stage and cements its reputation as a responsible player in the maritime sector, and in reducing GHG emissions from shipping.

Questions for Industry Stakeholders:

- *How can Australia use green shipping corridors to promote specific sectors of trade (e.g. ecotourism, energy exports)?*
- *What are the specific conditions that would allow for the benefits to be realised?*
- *What international examples of green shipping corridors should Australia be learning from to ensure broad domestic benefits from these arrangements?*
- *How would Australian maritime industry stakeholders like to engage with the Government on developing a joint vision for future green shipping corridor investments?*

Appendix A – Australian Green Shipping Corridors and Partnerships Under Investigation

The Australian and New Zealand Government have commenced discussions with industry on the potential of establishing green shipping corridors across the Tasman Sea. This includes engagement in a pre-feasibility assessment by the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping to identify both domestic and international routes that could be prioritised for establishing green shipping corridors in, and between, Australia and New Zealand.

Japan and Korea, as major export markets and important maritime routes for Australia, are also future opportunities for establishing green shipping corridors. According to a report by McKinsey[1], 65 million tonnes of iron ore were exported from Australian mines to Japanese steelmakers in 2019, making this the third-largest dry-bulk trade route in the world. However, this route contributed 1.7 million tonnes of CO2 emissions. Moving towards a green shipping corridor is feasible due to the growing consensus amongst stakeholders to decarbonise the route.

A study from the West Australia–East Asia Iron Ore Green Corridor Consortium suggests ships powered by clean ammonia could be deployed on the iron ore routes between West Australia and East Asia by 2028, and reach 5% adoption by 2030. The study indicated that the core elements for implementation for the corridor (deployment of ammonia-powered ships, access to clean ammonia and the availability of bunkering infrastructure) are within reach, provided that the safety case for the use of ammonia as marine fuel is validated and accepted, and the development of key technologies (such as suitable engines) and regulations remain on track. Sufficient clean ammonia will likely be available to meet the corridor's near and long-term requirements. The study also showed that the Pilbara region of Australia would be a viable option for bunkering on the route, with Singapore remaining well-positioned to serve as a bunkering hub.[1]

For example, Australia and Japan have partnered to establish a hydrogen export value chain between the two countries, and have been actively working to develop commensurate safety standards for shipping bulk liquid hydrogen. The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) is the international standard for the safe bulk transport by sea of liquefied gases, such as liquefied natural gas (LNG). However, the IGC Code did not contain provisions for liquid hydrogen transportation by sea prior to the commencement of the pilot phase for the Australia-Japan Hydrogen Energy Supply Chain (HESC) Project. To address this gap, Australia and Japan developed interim carriage requirements for liquid hydrogen transportation in bulk which were adopted by the IMO's Maritime Safety Committee (MSC) in 2016 as Resolution MSC.420(97).[1]

The pilot phase of the HESC project was successfully completed in February 2022 with the delivery of a cargo of liquid hydrogen from the Port of Hastings, Victoria to the Port of Kobe, Japan by the pilot ship, the Suiso Frontier. For the commercial phase of the HESC Project, targeted for the 2030s, Japan is designing a new liquid hydrogen carrier with a larger cargo containment capacity. The interim recommendations in MSC.420(97) do not cover the technical specifications required for the larger liquid hydrogen carrier. In 2021, Australia and Japan proposed a new work output for the IMO's Sub-Committee on Carriage of Cargoes and Containers (CCC) to develop revised interim recommendations for the carriage of liquid hydrogen in bulk, which would enable Japan to operate a larger liquid hydrogen carrier. In September 2023, the 9th session of the CCC finalised the revised interim recommendations for the carriage of liquid hydrogen in bulk, which will be submitted to MSC for approval at its 108th meeting in May 2024. In parallel, the CCC has also been working on interim guidelines for the safety of ships using ammonia as fuel, which is expected to be finalised in 2024.[1]

[1] Net Zero - DCCEEW
[2] Transport and Infrastructure Net Zero Roadmap and Action Plan | Department of Infrastructure, Transport, Regional Development, Communications and the Arts
[3] Charting course towards zero maritime emissions for Australia | Ministers for the Department of Infrastructure
[4] Charting Australia's Maritime Emissions Reductions | Department of Infrastructure, Transport, Regional Development, Communications and the Arts
[5] National inventory by economic sector | ANGA (climatechange.gov.au)
[6] Improving the energy efficiency of ships (imo.org)
[7] IMO's work to cut GHG emissions from ships
[8] MEPC 366 79 (imo.org).
[9] Singapore and Australia Green and Digital Shipping Corridor | Australian Government Department of Foreign Affairs and Trade (dfat.gov.au)