



Pacific Marine Management Ltd

Business & Operations Analysts -

Shipping & Ports Sector

Coastal Shipping Investment Approach Report 1 - State-of-Play



For:

Waka Kotahi NZ Transport Agency

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Wellington 6011

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Executive Summary

Coastal shipping is included as an independent activity class in the 2021-24 Government Policy Statement on Land Transport. This report, the State-of-Play of coastal shipping, is the first of three to assist Waka Kotahi on how best to invest the funding that has been allocated and to provide Waka Kotahi with an up-to-date view of the sector's shape and the its key challenges and opportunities.

The Scale and Nature of the Coastal Shipping Sector

Overview

New Zealand's coastal shipping sector consists mainly of the transport of dry and liquid bulks, containerised cargo, and rail and road Roll-on Roll-off cargo and passengers services. Of New Zealand's total freight task of 278.7 million tonnes, coastal shipping carried about 10 million tonnes (3.5%).

Bulk Shipping

Two main bulk commodities are shipped around the New Zealand coast: (i) refined petroleum products (2.7 million tonnes pa) to/ from Marsden Point refinery in Silver Fern Shipping's two tankers; and (ii) cement (1.3 million tonnes pa), imported then transhipped at Auckland and Timaru by Holcim, and from Golden Bay Cement's Portland cement works in Northland.

Containerised cargo

Containerised cargo and empty containers are transported by a domestic shipping service (the Pacifica service) and by international containerships transiting through New Zealand ports. The cargoes consist of domestic cargo, export and import tranships and empty repositioning. In 2019, 418,470 teu were transported; 278,440 teu were domestic cargoes, 140,030 export and import tranships. The domestic service carried 22%, the remainder (78%) by international ships.

Ferry Services

Two operators provide Cook Strait cargo and passenger services; the Interislander (KiwiRail) with three ships, one of which has rail capability, and Bluebridge (StraitNZ) with two.

There are numerous small ferry services around the New Zealand coast. The most significant are those linking Bluff with Stewart Island, and Auckland with Great Barrier and Waiheke Islands.

Level Playing field

Is there a level playing field? To a **domestic operator**, the biggest Impediments are; international ships can marginally cost, levies such as the Emissions Trading Scheme (ETS) seem inequitable and there appear to be subsidies for other modes. Competitive fuel supplies are also difficult to obtain. To an **operator of international ships transiting on the coast**, the biggest impediment is the Maritime Transport Act's restrictions on the carriage of coastal cargo. The Act does not allow carriage of coastal cargo (which includes tranships and empties) other than as incidental cargo carried on a direct coastal route determined by that ship's import/ export cargoes.

Inland ports and the Road/ Rail Interface

Coastal shipping shares the same frustrations with the road and rail interface as international shipping; the road congestion and limited rail capacity. The major inland ports such as Metroport and Wiri (both in Auckland) help to relieve this to some extent.

Dry Docking and Ship Repair

Ship repair facilities are insufficient for larger ships, but the financial and economic benefit of providing them locally needs to be justified.

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Recent Developments in International Shipping affecting Coastal Shipping**Evolution of Mega Shipping**

Several recent influences have given rise to the rapid expansion of world trade and thus the level and nature of the required shipping services and the vessels engaged in them; recovery post Global Financial Crisis of 2008, opportunity to increase ship size afforded by the opening of the new Panama Canal, the consolidation of container ship operators into just three major alliances, and the parallel surge in the building of Ultra Large Container Ships. The implication is that larger ships will want to call at New Zealand ports, which will require large investment in port and harbour infrastructure.

The Focus on Sustainability

The international focus on sustainability is also evident in shipping. The international commitment to lower shipping GHG emissions, to 50% or less of 2008 levels by 2050, can only be fully achieved by changing the fuels and methods for propulsion and it follows that this will mean the timely scrapping of world fleets as they reach the end of their economic life, their replacement by larger, low- to zero-carbon fuelled ships and the greater use of “economies of scale” (bigger vessels).

The Covid 19 Pandemic

World markets initially collapsed then surged when personal expenditure changed from purchases of services to purchases of goods. Ships presented at ports with significantly increased container loads, revealing many weaknesses in the logistic chain no more so than in the container terminals where capacity was already tight. Freight rates rose as a result of the shortage of supply of shipping space and ports lack of capability to handle the surge.

This played out in New Zealand in the same way as overseas, notably at Auckland’s container terminal. That port had to absorb the surge at the very time that it was just starting to transition to automation; a combination that left it short of capacity. The outcomes included; significant delays for vessels berthing at Auckland, reduced productivity and over full container stacks, in turn resulting in a further increase in dwell times of containers in the Terminal further exacerbating congestion.

Delays in Auckland gave rise to issues further along the supply chain; any ship delayed in Auckland was delayed getting to its next destination and may have had to wait for another vessel ahead, ships missed tranship connections, coastal domestic cargoes distributed through Auckland experienced an extension to normal transit times to South Island customers, and to expedite despatch of vessels they often sailed without empty containers contributing to a shortage in supply of containers both in the South Island and in Asia.

Ways in which to increase resilience and efficiency of domestic shipping

Several observations arise out of the current crisis:

- The domestic shipping network needs to be independent of international shipping, and of the terminals that serve them.
- This requires capacity within the domestic fleet; more than the one-quarter that is presently carried by Pacifica.
- It may be beneficial to handle coastal vessels through separate but closely located terminals.
- A hub import/export port may be beneficial. Its location needs investigation; a west coast port has significant financial and GHG emission advantages.

Other factors that will shape the future

In order for larger ships to call at New Zealand ports, most port infrastructure will need to be rebuilt. Berths are too small and increased length, beam and draft poses issues for port entry. A purpose built hub port such as on Manukau Harbour could address these issues from the outset.

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Alternative Fuel Sources Development

Background to GHG reduction in shipping

In 2012, international shipping was estimated to have contributed about 2.2% to the global emissions of CO₂. The International Maritime Organization (IMO)'s Initial Greenhouse Gas (GHG) Strategy sets a GHG reduction pathway of at least 50% by 2050 based on a 2008 baseline, with a strong emphasis on reducing to 100% by 2050.

Methods of reducing GHG emissions

Emission reduction can be achieved by a combination of factors; operational practices, ship design, alternative sources of propulsion such as wind and solar energy, and low- and zero-emission fuels.

To meet the IMO target will require the use of low- and zero-carbon fuels; technology and operational improvements alone are insufficient.

Zero-Carbon Fuel Use

To meet the IMO target, zero-emission vessels need to be entering the world's fleet in 2030. There are several pathways towards decarbonisation although at this point in time, there is too much uncertainty to decide on one route. The key primary energy sources options are:

- renewable energy,
 - hydrogen, (e-H₂)
 - ammonia, (e-NH₃)
 - e-methanol,
 - e-gas oil and
 - electricity for use in batteries.
- bio-energy
 - Bio-diesel
 - Bio-methanol
 - Bio-LNG
- fossil fuels with carbon capture and storage (CCS).
 - hydrogen and ammonia produced from natural gas with CCS

Drivers

Fuel price is the predominant factor that impacts the total cost of operation.

From a **technology readiness** perspective, bio-methanol, bio-LNG and bio-diesel are more mature than hydrogen and ammonia. There are vessels already using these fuels. One of the important barriers for new fuels such as ammonia and hydrogen is the storage and bunkering infrastructure.

Community readiness is an important aspect of readiness for change. Land-use demands loom as a problem for bio-fuels.

World Bank work on decarbonising shipping

The World Bank has just issued (April 2021) two reports on decarbonising shipping in which it concludes that LNG is "likely to play a limited role in decarbonizing the sector and recommends that countries should "avoid new public policy that supports LNG as a bunker fuel, reconsider existing policy support, and continue to regulate methane emissions." It further places ammonia and hydrogen ahead of bio fuels as the most promising zero-carbon bunker fuels, as it sees them as more scalable and cost-competitive than other biofuel or synthetic carbon-based options.

Potential to replace fossil fuels in the NZ coastal shipping sector

New Zealand is high in renewable electricity. Production of green hydrogen or ammonia could be achieved with very low GHG emissions.

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Recent Coastal Shipping Policy Developments in Other Jurisdictions

Government Policy on Domestic Shipping varies throughout the World dependent upon a number of factors and prioritised by criteria often not dictated by the efficiency and needs of the various affected shipping communities but by other more strategic needs.

Cabotage

One common feature is restrictions on cabotage, the transport of goods or passengers between two places in the same country by a transport operator from another country. The purpose is to protect the domestic shipping industry from foreign competition, preserve domestically owned shipping infrastructure for national security purposes, and ensure safety in congested territorial waters.

Developments in other Jurisdictions

The **United Kingdom** Government has recently (2019) issued a Maritime Strategy. Its approach is pitched at international shipping and not strictly domestic shipping however it does point to similar policy drivers as those expounded elsewhere internationally in respect to the nurturing of a domestic fleet. It covers: the UK competitive advantage, Technology, People, Environment, Trade, Infrastructure, Security, Resilience and intermodal choice.

In the **EU**, maritime transport has always been viewed as having been a significant catalyst for economic development and prosperity. Maritime industries are an important source of employment and income for the European economy. Short sea shipping represents one third of intra-EU exchanges in terms of tonne-kilometres and it includes many passenger ferry routes. The European Commission lists the following priorities for the transport sector; Advance work on the European transport network, Decarbonise transport, Invest in transport projects offering high added-value, and in the context of the Action Plan on Military Mobility, adapt sections of the transport network for civilian-military dual-use.

The **USA's** Jones Act of 1920 requires that all goods transported between US ports use USA registered ships carrying US crews and flags and be constructed in the United States. The historic policies were to promote national security, economic growth and domestic employment and to allow the U.S. to better monitor environmental, labour and safety standards. Unfortunately, these laws result in very high-cost vessels that have expensive crews and unaffordable freight rates and hence the law has failed to achieve its objective as evidenced by the sinking size of the US Merchant Fleet.

The **Australian** Coastal Trading (Revitalising Australian Shipping) Act 2012 has the objects of: promoting a viable shipping industry, facilitating the growth of the Australian shipping industry, enhancing the efficiency of Australian shipping, maximising the use of vessels registered in Australia in coastal trading, promoting competition in coastal trading, and ensuring efficient movement of passengers and cargo between Australian ports. The Act appears to have failed in these objectives as the Australian merchant fleet has progressively reduced in size. The Department of Infrastructure, Transport, Regional Development and Communications released a discussion paper in 2020 on reform of the Act, but this has been delayed for about nine months because of the pandemic.

Policy Drivers

Key drivers of the various Governments domestic shipping policies appears to be:

- Economic improvement or necessity – UK, US, Australia, Fiji
- Shipping service integrity – Australia,
- Maintaining shipping standards – UK, EU and Fiji
- Regulating the use of data by such as BlockChain – UK, EU
- Maintaining and developing maritime skills – UK, USA, Australia

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- Oversight of shipboard seafarers and safety – UK, EU, USA
- Security and anti-terrorist oversight – UK, EU, USA, Australia
- Environmental security – UK, EU, USA
- Infrastructure – UK

These Policy Drivers drawn from the international list might be appropriate for developing coastal shipping policy in the New Zealand context.

Key Information Gaps

Gaps exist in the easily available information on New Zealand's transport system. Some are gaps in the availability of data, some in the presentation of that data, and others in what can be derived by planners and users of transport. A list of the most pressing is set out in the main body of the report under the following headings:

- Statistics (Current and historic demand)
- Shipper needs
- Special needs of Cargoes
- Supply of Vessels for the future
- Rail capacity
- Freight rates (sea, rail and truck)
- Container terminal data to help with benchmarking, monitoring and planning:
- Port Charges
- Inland Ports

Future Direction

This project has yet to complete discussions with a range of selected stakeholders. Their inputs will guide the assessment of key challenges and opportunities facing the sector that will be developed in the final stage of the project.

The coastal shipping sector and the overall domestic transport system is robust and functioning well, but chinks appeared as a result of the 2016 Kaikoura earthquake and the 2020 Covid 19 pandemic. Cargo presently moves at a cost that is acceptable. The challenges and opportunities are to increase resilience and reduce emissions without unduly affecting New Zealand's domestic transport and logistics:

- Moving cargo onto the most appropriate mode or modes for transport
- Obtaining a level playing field
- Maintaining New Zealand's competitive position for imports and exports
- Resolving the dry dock question
- Priority berthing at terminals for coastal ships
- Ports capability to cope with increasing size of ships
- Resilience of the domestic transport system
- Sustainability – transfer of cargo to sea transport, and reducing sea transport emissions
- Cabotage - Review application of the current legislation
- Maintaining and developing maritime skills
- Maintaining standards of ship condition and operation, but within the international accepted standards

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1 Introduction

1.1 Background

Coastal shipping is included as an independent activity class in the 2021-24 Government Policy Statement on Land Transport (GPS Land Transport). This report is the first of three commissioned by Waka Kotahi NZ Transport Agency to assist it in delivering advice on how best to invest the \$30 to \$45 million funding that has been allocated for coastal shipping under the GPS Land Transport.

1.2 'State-of-Play': Scope of work

The RFQ for this work describes this first report on the 'State-of-Play' as forming the basis for the next two stages of the work, stakeholder views and final report including recommendations, and also to help government to better understand the current state of the sector. The report provides:

- Key information on the scale and nature of the sector as well as the key routes and services that are operating. It should touch on which infrastructure (in addition to ports) is currently playing an important supporting role – inland ports for example.
- Summary of recent developments in the international shipping industry that have recently affected, or are still affecting, the sector. This should touch on the recent and ongoing congestion issues its impact on domestic freight ships.
- A brief summary of how alternative fuel sources development is progressing and its potential to replace current fossil fuels in the coastal shipping sector over the short-medium term. We are particularly interested in the short-medium impacts of biofuels and hydrogen.
- Information on relevant recent policy developments in other jurisdictions that New Zealand could potentially learn from.
- A summary of key information gaps and views on which of these gaps can be filled through engaging with sector participants.

1.3 Definition of Coastal Shipping

For this work on the Coastal Shipping Investment Approach, Coastal Shipping has been defined as activities conducted by ships carrying coastal cargo, both New Zealand ships and international ships when carrying coastal cargo (domestic and tranships). It includes ships carrying cargo across Cook Strait, i.e. the Interislander and Bluebridge ferries.

Note that this differs from the classification of Coastal Shipping in the National Freight Demand Study, in which Cook Strait ferry traffic is counted as rail or road volumes, and coastal cargo on international ships (import/ export tranships, empty containers or domestic cargo) is not considered.

The work has been carried out by Mark Oxley and Mick Payze of Pacific Marine Management Ltd.

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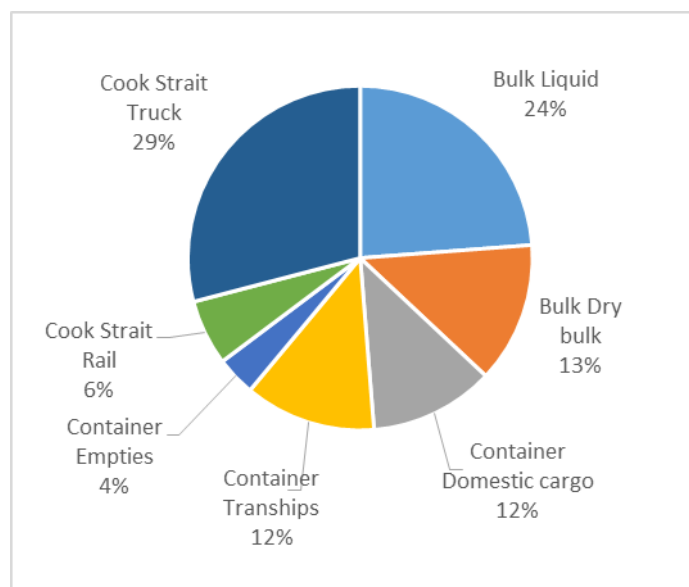
2 The Scale and Nature of the Coastal Shipping Sector

New Zealand's coastal shipping sector consists of the transport of dry and liquid bulks, containerised cargo and some breakbulk cargo, rail and road Roll-on Roll-off cargo and passengers services across Cook Strait, small ferry services to Stewart Island, Great Barrier Island and within Auckland and Wellington Cities, and numerous work boats engaged on non-cargo transport tasks. The container services are operated by both domestic ship operators and international ships transiting the coast. Most of the other transport tasks are operated by New Zealand domiciled operators.

2.1 Overview

The National Freight Demand Study 2017/18 (NFDS)¹ sets out the New Zealand Freight Task. The total task in 2017/18 was 278.7 million tonnes and 30.1 billion tonne-kilometres. The total volume transported by coastal shipping is about 11 million tonnes, i.e. about 4% of the overall volume.

The split of the coastal shipping sector by type of cargo and mode is shown below (percentage of total tonnes pa):



2.2 Bulk Shipping

There are two main bulk commodities shipped around the New Zealand coast:

- Refined petroleum products (2.7 million tonnes pa)
- Cement (1.3 million tonnes pa)

Other bulk cargoes include grain, fertilizer, and aggregate.

¹ *National Freight Demand Study 2017/18*, Richard Paling Consulting and Murray King & Francis Small Consultancy for Ministry of Transport, September 2019, <https://www.transport.govt.nz/assets/Uploads/Report/NFDS3-Final-Report-Oct2019-Rev1.pdf>

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2.2.1 Refined petroleum products

Petroleum products are distributed from the refinery at Marsden Point to port depots at all main ports except Auckland which is supplied by the Marsden Point to Auckland pipeline. The shipping service is provided by Silver Fern Shipping using their two tankers of about 50,000 dwt. These ships also transport products from New Plymouth to the refinery. Up until recently, Z Energy operated a small bunker barge that uplifted fuel from Marsden point to bunker ships at Auckland. In April 2021 Mobil and Silver Fern Shipping introduced a 1400 tonne bunker barge to Tauranga.



In 2019, the tankers transported 2,570,000 tonnes from Marsden Point². 110,000 tonnes was uplifted from New Plymouth, all for Marsden Point.

The future of the refinery is in question, and its operator, New Zealand Refining Co Ltd has considered the potential to move to an import terminal model. This may reduce the demand for coastal tanker distribution, as the overseas ships delivering imports could also call at fuel depot ports around the coast. And further, if a deepwater port were developed on the Manukau Harbour, it is conceivable that Auckland's fuel requirements would be imported directly rather than through the pipeline.

2.2.2 Cement

The NFDS reports that the total cement market is about 1.5 million tonnes pa, two-thirds Golden Bay cement and one-third Holcim. Both companies use coastal ships.

Golden Bay's Aotearoa Chief operates from their Portland (Whangarei) works to Auckland, Tauranga, Napier, Wellington, Picton and New Plymouth. For other South Island destinations Golden Bay use ISO cement tank containers which are carried by Swire services, both coastal (Pacifica) and international, loading at Marsden Point. An estimate provided is that this is some 5000 teu pa (Typically 30t per teu payload totalling about 150,000 tonnes pa by this mode). On this basis, 850,000 tonnes of Golden Bay's 1.0 million tonne market share is carried by Aotearoa Chief.



The NFDS states that **Holcim** lands its 0.5m tonnes of imports at Auckland and Timaru. From Auckland distribution is by road. From Timaru their ship MV Buffalo hauls cement to Lyttelton, Bluff, Dunedin, Nelson, Wellington, and Napier, from where it is further distributed by road. The Auckland and Timaru road distribution might be say, 0.2 million tonnes, leaving 0.3 million tonnes to be transported by sea on Buffalo.

² M Freight Information Gathering System (FIGS), <https://www.transport.govt.nz/statistics-and-insights/freight-and-logistics/>

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2.2.3 Other bulks

Coastal Bulk Shipping operates a small 447 dwt bulker, Anatoki. It transports bulks such as aggregate, fertilizer and grain. Coastal Bulk Shipping have advised that in recent years the ship has transported 35,000t to 40,000t pa.

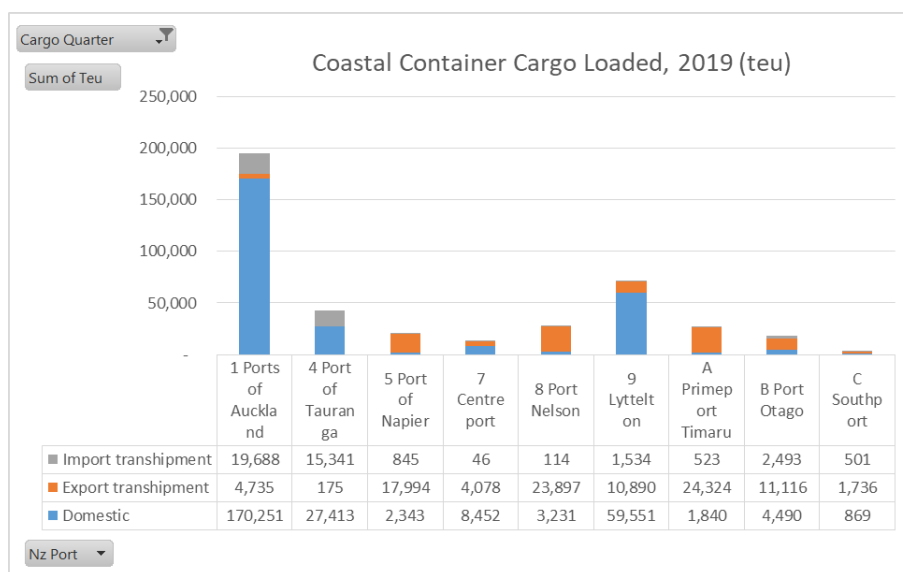


2.3 Containerised Cargo

Containerised cargo and empty containers³ are transported by a domestic shipping service operated by Swire (the Pacifica service) and by international containerhips transiting through New Zealand ports. The cargoes consist of domestic cargo, export and import tranships and empty containers.

2.3.1 Volumes

In 2019, the last steady-state year before Covid-19 disrupted volumes and over a year after the road and rail links through Kaikoura were reinstated, 418,470 teu coastal cargoes were loaded, 251,134 full and 167,336 empty. 278,440 teu were domestic cargoes, 98,945 export tranships and 41,085 import tranships. The majority were loaded at Auckland, with Lyttelton the other significant load port:



³ For the purposes of this report, Containerised Cargo is defined as that which passes through the container terminals that report to MOT’s Freight Information Gathering System (FIGS), i.e. terminals at Auckland, Tauranga, Napier, Wellington, Lyttelton, Timaru, Port Chalmers and Bluff. Note that this excludes containers carried on the Cook Strait ferry services. Nor are Marsden Point container volumes in FIGS, although they are counted in the containerised volumes if they are then loaded or discharged at a New Zealand container terminal.

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2.3.2 Carriers

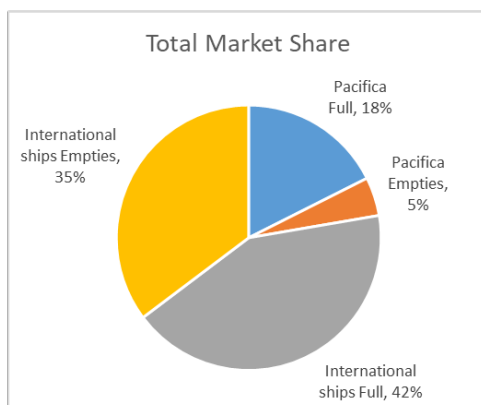
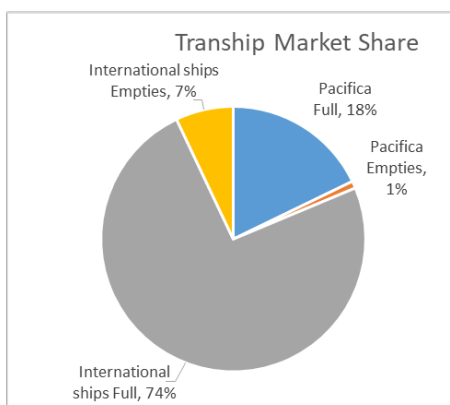
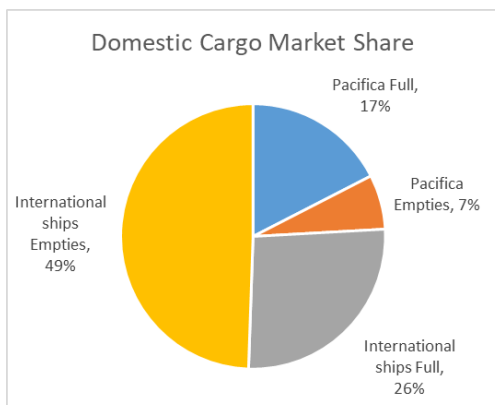
The only **domestic carrier** is Pacifica, a subsidiary of Swires.

There are 6 main **international service operators** carrying coastal cargoes. Anecdotally, one stakeholder estimates that as well as Pacifica, the largest domestic cargo volumes are carried by ANL/CMA CGM. Maersk/Hamburg Sud, Cosco and MSC carry moderate volumes. Very little are carried by OOCL and PIL.

They all move tranship cargoes and empty containers, their own and possible for others. Maersk and ANL/ CMA CGM move the largest volumes, Pacifica and MSC not quite at the same intensity, and COSCO, OOCL and PIL much less.

FIGS data results in the following table and graphs of market share split between the domestic carrier and the international shipping operators by full containers and empties. What shows up is that the greatest domestic volume is empty containers, 56%, mostly on international ships, i.e. being repositioned within New Zealand by the Lines from surplus areas to deficit ports. Of the tranship cargoes 74% are full containers carried by international ships.

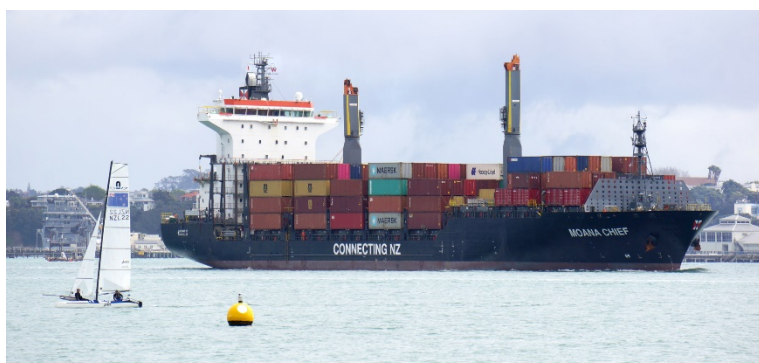
Operator		Domestic Cargo		Tranships		Total Coastal Cargo	
		Domestic Cargo Market Share	Volumes (teu pa)	Tranship Market Share	Volumes (teu pa)	Total Market Share	Volumes (teu pa)
Pacifica	Full	17%	48,640	18%	24,970	18%	73,610
	Empties	7%	18,528	1%	1,220	5%	19,748
	Total	24%	67,168	19%	26,190	22%	93,358
International ships	Full	26%	73,567	74%	103,957	42%	177,524
	Empties	49%	137,705	7%	9,883	35%	147,588
	Total	76%	211,272	81%	113,840	78%	325,112
Total	Full	44%	122,207	92%	128,927	60%	251,134
	Empties	56%	156,233	8%	11,103	40%	167,336
	Total	100%	278,440	100%	140,030	100%	418,470



2.3.3 Pacifica

One anecdotal estimate is that about 35% of Pacifica’s domestic cargo goes on international vessels, 65% on their own ship, Moana Chief. This ship of 1700 teu nominal capacity replaced the smaller Spirit of Canterbury in 2019. It, in turn replaced two smaller 600 -700 teu ships in 2016. Swires purchased Pacifica in 2014.

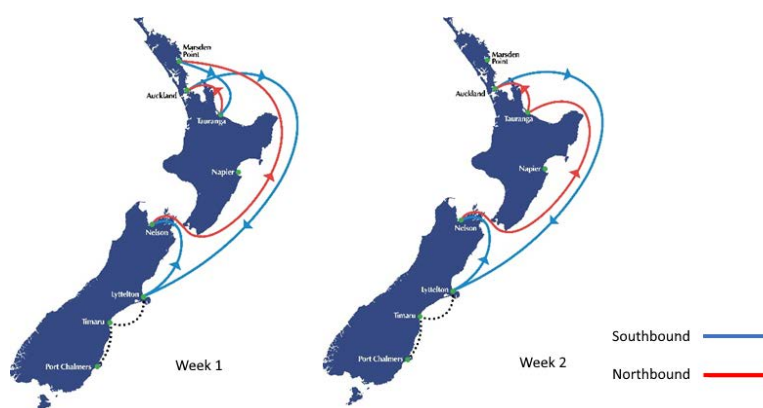
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Pacifica’s dedicated primary weekly service rotations are:

Week 1: Tauranga → Auckland → Lyttelton → Nelson → Tauranga

Week 2: Marsden Point → Tauranga → Auckland → Lyttelton → Nelson



Pacifica’s port pairs are:

Main port pairs	Other significant links	Other links
Auckland - Lyttelton Lyttelton - Auckland	Auckland - Nelson (bottles for wine) Lyttelton - Tauranga (grain) Tauranga - Lyttelton (Oji forestry products) Marsden Point - Lyttelton (cement)	Nelson - Tauranga Lyttelton - Nelson Auckland - Otago Otago - Tauranga

2.4 Breakbulk cargo

The Chatham Islands is serviced by Chatham Islands Shipping Ltd which presently operates a small breakbulk ship, Southern Tiare. This ship also trades to Norfolk Island.

Southern Tiare’s mainland New Zealand ports are Napier and Timaru. The ship undertakes approximately monthly services from each port, providing about fortnightly calls at Waitangi, the main port in the Chathams, and less frequently to Pitt Island. Cargo inbound to the Chathams is general goods and fuel. Outbound cargo includes livestock from the farming communities on Chatham and Pitt.

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2.5 Roll-on Roll-off services

Two operators provide Cook Strait services:

- The Interislander (KiwiRail)
- Bluebridge (StraitNZ)

2.5.1 The Interislander

KiwiRail's Interislander ferry service between Wellington and Picton is marketed as an extension of State Highway 1 and the Main Trunk Line across Cook Strait, linking road and rail networks between New Zealand's North and South islands⁴. They currently operate three ferries – Kaiarahi, Kaitaki and the rail-enabled Aratere - that cross the strait a combined total of 4000 times a year. The Kaitaki can carry up to 1400 passengers, while the Aratere has capacity for 600 and the Kaiarahi 550. Between them they transport about 800,000 passengers and 250,000 cars a year. MOT FIGS data reports that North Island to South Island and South Island to North Island rail movements totalled about 700,000 tonnes in each of 2019 and 2020. No Kiwirail data has been found for cargo volumes carried by road vehicles on Kiwirail's services.



KiwiRail has begun the procurement process for two new, large rail-enabled ferries which they hope to have in operation by 2024. Along with the fleet replacement, KiwiRail is working with stakeholders including Wellington and Marlborough ports on facilities for the new ships.

2.5.2 Bluebridge

StraitNZ operates their Bluebridge Cook Strait ferry service with two roll-on roll-off ferries, Straitsman and Strait Feronia. Straitsman, built 2005 carries 40 trucks, 120 other vehicles and up to 350 passengers. Strait Feronia, built 1997 carries slightly more, 60 trucks, 140 vehicles and 350 passengers⁵.

Their summer service provides four Wellington/Picton trips in each direction every day, except for one round voyage not sailed by Straitsman every Saturday. In the past StraitNZ also called at Nelson from startup in 1992 until 2007, and for a short time operated a coastal service between Wellington, Nelson, Napier and later Lyttelton from 2007 to 2010. No StraitNZ data has been found for cargo volumes or passenger numbers carried on the Bluebridge service.



⁴ <https://www.kiwirail.co.nz/what-we-do/interislander/>

⁵ <https://www.bluebridge.co.nz/our-company#our-fleet>

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2.5.3 Cook Strait Cargo Volumes

The NFDS identifies 3.3 million tonnes of road transported cargo between North and South Islands in 2017/18, 2.0 million tonnes southbound and 1.3 million tonnes northbound. MOT FIGS data identifies 0.7 million tonnes by rail in 2019 and again in 2020, although prior to the 2016 Kaikoura earthquake, the interisland rail volume was 1.1 million tonnes. The total for both Cook Strait ferry services is therefore about 4.0 million tonnes pa.

In comparison, the inter-island coastal movement of full containers through container terminals (domestic cargoes and tranships) was about 190,000 teu in 2020, with an average stow factor of 10.9t/ teu. This represents 2,070,000 tonnes. The rail and road interisland movement of 4.0 million tonnes pa is therefore about twice that of the coastal shipping interisland movement.

2.6 Small Ferry Services & Other Coastal Shipping

There are numerous small ferry services around the New Zealand coast. The most significant are those linking Bluff with Stewart Island, Auckland with Great Barrier Island, and Auckland with Waiheke Island. Auckland has a network of commuter ferries, as does Wellington. Commercial services carry passengers in Queen Charlotte Sound. Many tourist services operate at several locations.

McCallum Bros Ltd operates several landing craft and tug & barges carrying equipment, machinery, aggregate, construction material, and salvage materials, mostly on a charter basis or for their own quarry services business.



Other commercial coastal shipping exists, although not necessarily conveying cargo or passengers. Offshore servicing vessels operate in places such as New Plymouth. Research vessels are based at various ports. Most ports have work boats – tugs, pilot boats, police, coastguard, dredges, etc.

2.7 Level Playing Field

To a **domestic operator**, the biggest impediments to a domestically operated coastal shipping service are cited as:

- International ships can marginally cost, as they are already conducting a voyage around the coast as part of their import/export transportation.
- New Zealand coastal ships have pay rates that are much higher than the international ships they are competing with.
- There appear to be obvious and hidden subsidies, distorting the level playing field
 - Domestic coastal shipping operators pay emissions trading scheme (ETS) levies that are not imposed on competing international carriers
 - Wharfages are charged for coastal cargo whereas there appears to be no equivalent tonnage charge for infrastructure levied for road or rail freight. Note however that according to a Productivity Commission report⁶, this apparent subsidy of road and rail needs to be looked at from a future-looking view rather than the past. It suggests the underlying road infrastructure is paid for by road user charges

⁶ <https://www.productivity.govt.nz/assets/Documents/f53fe759db/Final-report-v7.pdf>

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(mileage- or time-based, not tonnage), although it does not give a clear opinion on Rail.

- Competitive fuel supplies are difficult to obtain for ships that cannot bunker overseas. New Zealand does not have adequate low sulphur fuel oil available. Ships are required to use low sulphur fuels, which means New Zealand ships must burn the more costly diesel. This may be an infrastructure problem - a lack of tank storage at ports and no distribution capability.
- New Zealand does not have a dry dock of sufficient capacity for the largest ships operating on the New Zealand coast, necessitating expensive and time-consuming voyages to overseas dry docks.

To an **operator of international ships transiting on the coast**, the biggest impediment is the Maritime Transport Act's restrictions on carrying coastal cargo. (Section 198 of the Act). This does not allow carriage of coastal cargo (which by the Act's definition includes tranships and empties) other than as incidental cargo carried on a direct coastal route determined by that ship's foreign origin or destination cargoes.

2.8 Road/ rail interface

Coastal shipping shares the same frustrations with the road and rail interface as international shipping; road congestion and limited rail capacity.

The port terminals and inland ports have vehicle booking systems (VBS) which improve the efficiency of the port/road interface. There are however, issues for port users, both coastal and international. For example, the road access to Auckland Container Terminal is on a congested route through Grafton Gully in the central city onto the motorway network.

2.9 Inland ports

The major inland ports such as Metroport and Wiri (both in Auckland) help to relieve this to some extent, although their primary use is for import and export cargo distribution.

2.9.1 MetroPort

Port of Tauranga's MetroPort Auckland is a concept which has gained wide acceptance in the Auckland market, since its inception in June 1999⁷. MetroPort Auckland is New Zealand's inaugural truly integrated intermodal cargo gateway. MetroPort Christchurch has recently opened and is based on this successful model.

MetroPort Auckland is a Customs bonded area and fully licensed Ministry for Primary Industries site. To shippers and consignees, the terminal gate is at MetroPort; the port company looks after the transportation to/ from Tauranga.

2.9.2 Ports of Auckland's Freight Hubs

Ports of Auckland's network of freight hubs allows customers to drop off their exports at their nearest hub and the port does the rest, linking exporters to the rest of the world⁸. Their freight hubs

⁷ <https://www.port-tauranga.co.nz/metroport/>

⁸ <https://www.poal.co.nz/our-story/our-operations/freight-hubs>

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are located at **Wiri** in South Auckland; **Mt Maunganui** in the Bay of Plenty; and **Longburn**, near Palmerston North. A new hub is due to open shortly at **Northgate** in Waikato.

2.9.3 CentrePort

CentrePort (port of Wellington) operates a freight hub system in conjunction with Kiwirail. The CentreRail service is a scheduled daily train service which links key trade areas in the lower North Island and upper South Island. The main hubs are at New Plymouth, Whanganui, Palmerston North, and Blenheim. No physical depots or inland ports have been established, but the service uses rail terminals.

2.10 Dry Docking & Ship Repair

New Zealand's dry dock facilities are size-limited. The new rail ferries for example, will be too large for the biggest dock, Calliope at the Devonport Naval Base.

A proposal has recently been put forward for a floating dock and ship repair facility at Marsden Point⁹. The financial and economic benefits do not appear to have been addressed. The issue is that the local demand for a dock larger than Calliope is limited to a very small number of ships. For all except these few large ships, the existing, smaller slipways and docks can price at a level that a new, capital intensive dock would find unsustainable. The price required to provide income to cover the capital cost would be higher than the operating costs of the existing facilities.

The counter argument is that the larger ships need to transit at present to suitable docks to carry out their docking then return. The NZSF estimates that this costs about \$1 million for a Singapore docking.¹⁰ However, saving this may not be sufficient to offset the cost of constructing a dry dock facility, estimated by one stakeholder at \$350 million.

More work is needed to ascertain the relative costs and benefits of the options and the availability and utilisation of the required skilled workforce.

⁹ <https://www.mbie.govt.nz/dmsdocument/11926-northland-shipyard-floating-drydock-project-development-phase-initial-report-october-2019-pdf>

¹⁰ 2021 03 Submission to the Climate Change Commission on their draft advice to Government.docx.pdf, NZ Shipping Federation, 25 March 2021

3 Recent Developments in International Shipping affecting Coastal Shipping

3.1 Introduction

While the focus of this study is to recommend changes and new initiatives in coastal shipping to implement the measures stated in the GPS Land Transport for Coastal Shipping, it is important to understand the World-wide context in which this must be viewed and which to quite some extent will steer the outcomes required to best respond to the new demands that are emerging. This Section summarises those issues and high-lights those that are most relevant.

The focus will be container, break-bulk and vehicle cargoes, however peripheral benefits may ensue from a rationalisation of the allocation and use of port facilities as they may affect bulk, tanker, and other non-containerised goods.

3.2 Evolution of Mega Shipping

There have been several recent influences on World Shipping that have given rise to the rapid and somewhat fluctuating expansion of World Trade and thus the level and nature of the required shipping services and the vessels engaged in them, these include:

3.2.1 The recovery post GFC (Global Financial Crisis) of 2008

Despite the despondency of the markets at the time, opportunity overcame adversity and World Trade recovered with a continued expansion driven not only by population growth but also by the containerisation of cargoes previously moved as break-bulk, especially grains and timber.

3.2.2 The opportunity afforded by the opening of the new Panama Canal

The planned and eventual opening of the new Panama Canal in 2016 gave rise to operators ordering the construction of many new container vessels that could transit the widened canal and investment in the previous Panamax size of around 5,000 TEU virtually ceased from about 2016. Owners simply preferred to deploy the largest possible vessels on their services. This has seen the evolution of the New Panamax size typically carrying 12,000 to 14,000 TEU.



3.2.3 The consolidation of container ship operators

The massive investment in such larger ships created much space which in turn had to be filled and this resulted in plummeting freight rates as lines tried to optimise results and caused some of the somewhat smaller operators to either collapse or simply sell to their bigger competitors.

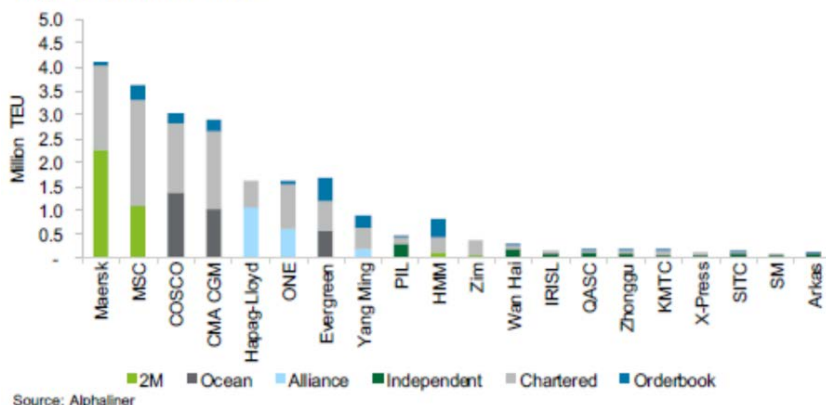
Over the last 7 years takeovers have occurred amongst the top twenty operators. This consolidation driven by the hyper competition at the time, has inevitably removed some service options however those remaining operators have been able to continue to trade with greater economies of scale afforded because of growth.

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3.2.4 The development of major alliances between the major shipping lines

Seven years ago, the Australia/ New Zealand trades had about 17 significant container line operators

Top 20 container lines



including the top 15 in the World, and these offered a variety of services to many destinations but subsequently this has been substantially reduced as the remaining service providers have further cooperated to share the costs of providing a network of services by swapping slots.

The three resulting Alliances now collectively provide over 85% of World Container capacity.

Alliance Name	Partners
"2M"	Maersk
	MSC
	HMM
"Alliance"	COSCO
	CMA CGM
	Yang Ming
	PIL
"OCEAN"	ONE
	Hapag Lloyd
	Evergreen

These three major Alliances now have a major share of the East - West routes following which they have come under considerable legal scrutiny by the European Union. In 2009 the EU allowed shipping companies to operate joint liner services. This regulation was extended in 2014 by five years and when due to expire in 2020 there was a lengthy public consultation and in the end the EU prolonged the Regulation for a further four years to 2024.

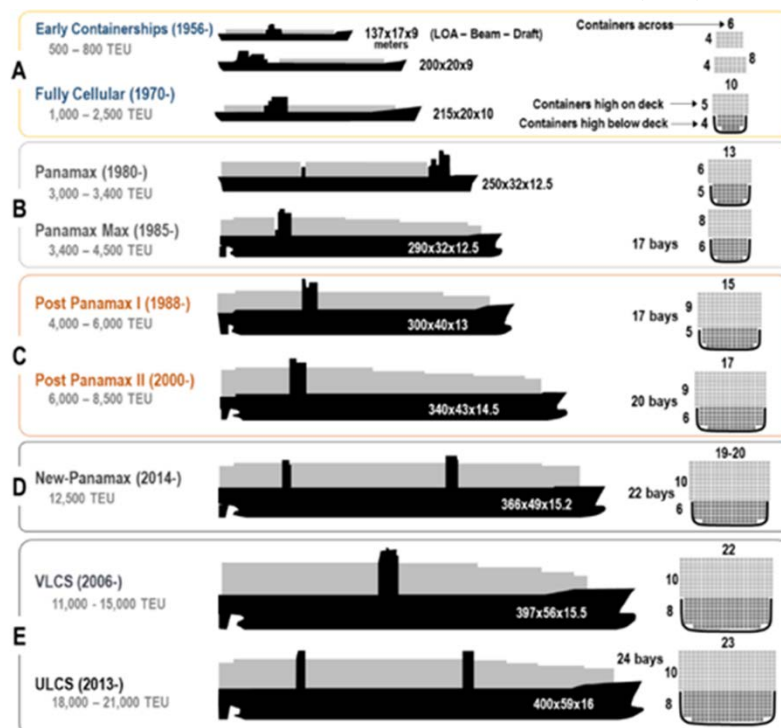
The next step for the oversight of these arrangements is far from clear but the outcome will have significant relevance for Oceania.

3.2.5 The parallel surge in the building of Very Large Container Ships, (VLCs) and then Ultra Large Container Ships (ULCSs)

Ten years ago, the major lines commenced investing in vessels that would exceed the New Panamax size to operate in their East-West services from US East Coast to Europe/Mediterranean - Indian Sub-Continent - Asia - West Coast North America. These vessels were built to the maximum size that could transit the Suez Canal and at the same time transit the draft restricted Malacca Strait.

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These vessels displaced the older smaller ships of around 12,000 TEU capacity that had previously serviced the East-West trades, which the lines have, where possible, introduced into the North - South routes, to South America, Africa and Oceania, (ANZ). However only the first two of these



regions have thus far been able to receive such vessels. The age and configuration of the existing container terminals in Australia and New Zealand, which were constructed for first generation container ships or even converted from prior times, has prevented this.

[Note: New Zealand is also connected to the Pacific by several smaller lines including Swire Shipping, Reef/Matson, Neptune Pacific/Pacific Forum, and Sofrana/ANL all of which need smaller crane fitted vessels].

January 2021 brought forth news of further substantial orders for some 30+ ULCSs of

20-24,000 TEU capacity for a variety of shipping lines.

3.3 The focus on Sustainability

The influence and impact of the commitment of nations to sustainability in shipping is also evident. The commitment to lower Greenhouse Gas (GHG) emissions can only be fully achieved by changing the fuels and methods of propulsion on top of the achievement of better economies of scale and greater engine efficiency and it follows that this will mean the timely scrapping of World fleets as they reach the end of their economic life and certainly there will be less emphasis on life extension than hitherto. Their replacements will be the larger, low- to zero- carbon fuelled ships evolving out of the above Mega Shipping trends.

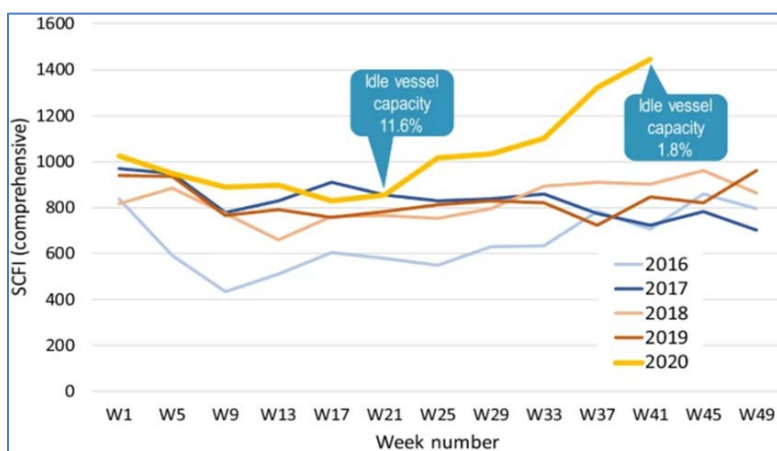
3.4 The Covid 19 pandemic

World markets initially collapsed when the first Covid 19 outbreaks occurred, and countries closed down their domestic communities such that production of many products ceased, purchases of non-essential goods collapsed, and ordering was put on hold.

The prohibition on travel and entertainment expenditure then resulted in what some might call a "buying frenzy" with a sudden surge in the demand for raw materials, parts, and manufactured goods. Personal expenditure changed from purchases of services such as entertainment and travel to purchases of goods. From a dearth in cargo there was a sudden boom and ships previously laid

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up were hurriedly brought back into service as all space filled. Ships presented at ports with significantly increased container loads. Freight rates multiplied (see graph).



Shanghai Containerized Freight Rate Index

The increased demand revealed many weaknesses in the logistic chain no more so than in the container terminals where capacity was already tight and labour forces were under pressure dealing with the increased requirements of working in an essential industry during Covid 19 working restrictions.

3.4.1 Impacts of Covid 19 in New Zealand

Specifically, the most notable results evident in New Zealand were:

- Initially the introduction of “blank sailings” where lines withdrew vessels because of cargo reductions, then their re-introduction causing ship congestion.
- A resulting substantial peak of imports of manufactured goods.
- Sudden rises in freight rates and associated port and handling charges doubling or trebling costs in some cases as space availability diminished.
- Supply chain interruptions leading to unexpected slow-down in turn-over and increasing demand for storage.
- Terminals becoming congested as berth times increased and the space between ships disappeared leaving congestion within the terminal stacking areas as they struggled to deliver landed cargo.
- Covid 19 protocols such as cleaning crane cabs between successive driver shifts was a further complication as it reduced the effective crane rates.
- With compounding queuing or the need to get back on schedule, many ships chose to drop ports of call with cargo being relayed by rail or land transport on to destination via subsequent ports.

3.4.2 The effects of disruption to Auckland’s port automation programme

The Ports of Auckland facilities were always going to be most tested by the Covid 19 challenges as this is New Zealand’s major import hub and thus it was that port that had to absorb the biggest surge at the very time that it was just starting to transition to automation.

The normal allowances for a seasonal peak that occurs in Q4 each year was the base line for the magnified demand and that meant ships would arrive consecutively and inevitably the normal port container dwell times, (the time taken from container arrival in port to delivery to land transport and vice versa), could be expected to be exceeded because:

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- More over-stowing of containers within the stack, meaning there would be more straddle moves to access each such container thus slowing container receipt and delivery times.
- More straddles needed to keep the flow of containers up to the ship-to-shore cranes.
- Reduction in crane rates because of reduced flow from stack to hook and cab cleaning between drivers.
- Reduced availability of qualified and skilled labour following the earlier transition towards automation.
- More truck queuing anyway because of greater throughput.
- Longer truck waiting time for accessing containers required to be delivered because of over-stowing.

The outcomes included:

- Significant delays for vessels berthing at the Auckland Container Terminal.
- Failures of many import and export containers relaying through Auckland to or from the South Island to connect with the planned subsequent carrier.
- This in turn resulting in a further increase in dwell times of containers in the Terminal further exacerbating congestion consequent upon a possible longer stay. (USA ports reported a doubling of dwell times from this problem).

3.4.3 The Impact on New Zealand's domestic coastal shipping

Inevitably delays in one port give rise to issues further along the trade route such as the following.

- Any ship delayed in Auckland will obviously be delayed getting to its next destination and may have to wait for another vessel that arrives on time to transit the next port first.
- Ships that are perhaps carrying tranship containers to connect with other sailings may also miss connections and thereby delay deliveries to their consignees.
- For coastal domestic cargoes distributed through Auckland distribution-centres and delayed in Auckland, this meant an extension to normal transit times to South Island customers.
- To expedite despatch of vessels, it is sometimes necessary to sail them without maximising the movement of empty containers, which then contributes to a shortage in supply of containers both in the South Island and in Asia.

3.5 Ways in which to increase resilience and efficiency of domestic shipping

The above identifies a lack of resilience within the domestic shipping network. Several observations arise out of the current crisis:

- The network needs to be independent of international shipping, and of the terminals that serve them.
- This requires capacity within the domestic fleet to carry the majority of containerised coastal cargoes; more than the one-quarter that is presently carried by Pacifica.
- It may be beneficial to handle coastal vessels through separate but closely located terminals in Auckland (Bledisloe), and Tauranga, (new Southern berth), such that their sailing programmes may be unaffected by the vagaries of the international logistics chains over which there is no effective control in New Zealand.
- Such terminals could be operated outside the normal ISPS and Custom/ Biosecurity controls.

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- A hub import/export port may be beneficial. The system economics seem to favour turning overseas ships at a northern port, and feeding cargoes on smaller ships to the southern ports.
- A hub port's location needs investigation; initially existing port(s) would need to be used, Auckland and (probably) Tauranga. However, a west coast port has significant economic, financial and GHG emission advantages. If Auckland's container terminal were shifted to Manukau, (as proposed by the Sapere Report¹¹), coastal feeder vessel transits from Manukau to southern ports would be only two-thirds the distance of those from the Waitemata.
- Regional ports such as Whanganui, Gisborne, and Oamaru may well play a significant part in such a network.

3.6 Other Factors that will shape the future

3.6.1 Age, structure, and configuration of container terminal infrastructure

Most container terminal berths were constructed for first generation container ships 50 years ago or more and thus never envisaged the berthing of the very much larger vessels that now ply world trades. The New Panamax size vessels that shipping lines might seek to deploy to Australia and New Zealand are perhaps 80% longer than the earlier vessels, 70% wider and 25% deeper draft.

The increase in beam is significant as the greater crane outreach required to load and unload such ships is also expected to handle higher lift weights, (75 tonnes as opposed to perhaps 30-40 tonnes for first generation gantry cranes) and thus the load imposed on the quay-side crane rail is much higher and thus the wharf piles must be able to take extra weight.

Deeper draft requires dredging at the berth. 50 year old wharves did not contemplate such deepening, and thus piles along the fenderline will need replacing at the very least, if not a complete reconstruction of the wharf.

Increased ship length can result in the loss of a berth; a two-berth quayline for first generation ships becomes just one berth if ship lengths increase by 80%.

Crane berths are often not continuous; in Auckland's case the latest berth has been constructed as a single berth. The cranes can only work on their respective quay faces and when one ship sails you cannot simply move the crane to the adjacent ship. This lowers productivity in Auckland compared with a port with a continuous quay line.

In order for larger ships to call at New Zealand ports, port infrastructure will need to be rebuilt. A hub and spoke system would at least restrict this to the hub port, rather than all major New Zealand ports.

3.6.2 Harbour access.

The increased length, beam and draft of the latest ships poses issues for port entry. Many of New Zealand's existing ports, Auckland and Tauranga for example, have narrow, winding channels which have needed dredging and straightening just to meet present-day depth requirements, and it is

¹¹ <https://www.transport.govt.nz/area-of-interest/infrastructure-and-investment/upper-north-island-supply-chain-strategy/>

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possible that several would be unable to meet any significant increase in ship size and safely accept such ships into their current berths.

As with port infrastructure, a hub and spoke system would at least restrict this improvement in harbour access to the hub port, rather than all major New Zealand ports.

3.6.3 Manukau as New Zealand's International and Coastal Service Hub

These lead to the question of which port or ports should be upgraded. The Ministry of Transport commissioned two pieces of work, the Upper North Island Supply Chain Strategy (2019) and the Sapere UNISCS Report (2020).¹² The Sapere Report's main findings included:

- The port's current downtown Auckland location has about 30 years' capacity and there is a 10 to 15 year window for making a final decision on relocation.
- Engineering and consenting could be difficult for all options.
- Manukau Harbour was the highest ranked option, although consenting could be problematic.
- The economic costs would outweigh the economic benefits for all the options, including Manukau¹³.

The further development of the Manukau Harbour as the main hub port for New Zealand would not only be of benefit to the Upper North Island economy but could be significantly important in that it reduces the round trip coastal distance from Auckland to the main South Island ports, by one-third to/from Lyttelton, and would result in significant coastal shipping efficiency and reduction in GHG emissions.

¹² Both available on <https://www.transport.govt.nz/area-of-interest/infrastructure-and-investment/upper-north-island-supply-chain-strategy/>

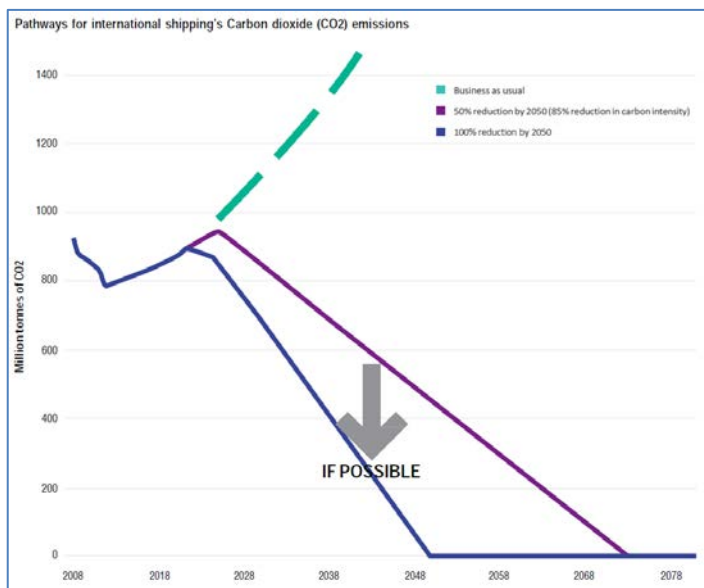
¹³ Some omissions from Sapere's work have been identified by the authors of this Coastal Shipping report which when corrected, raise the economic benefits to equivalence with the assumed benchmark. Note also that that benchmark is an expanded port on the Waitemata achieved by reclaiming on the seabed 800 metres to the east of the existing terminal.

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4 Alternative Fuel Sources Development

4.1 Background to GHG reduction in shipping

In 2012, international shipping was estimated to have contributed about 2.2% to the global emissions of carbon dioxide (CO₂)¹⁴. Although shipping is the most energy efficient mode of mass transport and only a modest contributor to overall CO₂ emissions, its contribution is set to increase



as other sectors decarbonise and the demand for shipping services increases.

The International Maritime Organization (IMO) has been energetically pursuing the limitation and reduction of greenhouse gas (GHG) emissions from international shipping. IMO's Initial GHG Strategy represents a significant ambition for the shipping sector. It sets a GHG reduction pathway of at least 50% by 2050 based on a 2008 baseline, with a strong emphasis on reducing to 100% by 2050 if this can be shown to be possible, as shown in this figure:

4.2 Methods of reducing GHG emissions

Emission reduction can be achieved by a combination of factors:

Alternative routes and scheduling	Operating Practices	Ship Design	Alternative sources of propulsion	Low- and Zero-Emission Fuels
Shorter routes Eg: Manukau to southern ports- round voyage 450nm shorter than Auckland or Tauranga.	Shipping Operations <ul style="list-style-type: none"> Slow steaming for Just in Time Arrival Reduced Operational Speed 	Reduced Hull Resistance <ul style="list-style-type: none"> Hull air lubrication (bubbles) Bow and stern shapes 	Direct forward thrust onto the ship <ul style="list-style-type: none"> Sails or foils Kites Flettner rotors 	Fossil Fuel derived fuels <ul style="list-style-type: none"> LNG and Methanol Hydrogen & Ammonia through steam methane reforming and Carbon Capture & Storage (CCS)
Slow steaming & Weather routing <ul style="list-style-type: none"> Speed for just-in-time arrival Reduced voyage speeds 	Ship maintenance <ul style="list-style-type: none"> Dry Docking Hull and Propeller Cleaning Engine Tuning & Shaft Alignment 	Improved engine efficiency <ul style="list-style-type: none"> Main engine development Exhaust systems 	Application of power onto the propeller shaft <ul style="list-style-type: none"> Wind, through a wind turbine, or 	Bio-derived fuels, for example: <ul style="list-style-type: none"> Bio-diesel from soy or rape Straight vegetable oil from soy or rape Bio-LNG

¹⁴ www.imo.org

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Alternative routes and scheduling	Operating Practices	Ship Design	Alternative sources of propulsion	Low- and Zero-Emission Fuels
<ul style="list-style-type: none"> Avoiding poor weather and extreme sea conditions 			<ul style="list-style-type: none"> Solar energy through photo-voltaic cells 	
Port call coordination Ports and ship operators using berth booking systems	Infrastructure Improvements <ul style="list-style-type: none"> Aids to Navigation (AtoNs) Port entry 	Propeller devices <ul style="list-style-type: none"> Fins Contra-rotating propellers Ducts 	Provision of electrical power to meet the ship's electrical demand <ul style="list-style-type: none"> Wind, through a wind turbine, or Solar energy through photo-voltaic cells. 	Renewable electricity-based marine fuels <ul style="list-style-type: none"> e-Hydrogen e-Ammonia e-methanol, e-gas oil and electricity for use in batteries.

Emissions reduction is combination of all of these. **To meet the IMO target will require the use of low- and zero-carbon fuels;** technology and operational improvements alone are insufficient.

4.3 Zero-Carbon Fuel Use

The following are extracts and precis from: *Zero-Emission Vessels: Transition Pathways*, 2019 January 2019 and *Techno-economic assessment of zero-carbon fuels*, March 2020, both Lloyds Register (LR) & University Maritime Advisory Services (UMAS)¹⁵.

Ships are highly capital-intensive assets with typical operating lives of 20-30 years. At the maximum, therefore, we have just one-and-a-half generations of ships to develop zero-carbon fuels and associated technologies that can fuel our ships safely and efficiently in the future. Zero-emission vessels need to be entering the world's fleet in 2030.

LR and UMAS set out to understand the milestones and enablers over the required timeframe to create the necessary conditions for the evolution of different pathways towards decarbonisation. They have considered how cost, operating profile and policy measures could influence this and identified milestones over time with regards to the safety, technical, social, economic and environmental aspects of the potential zero-emission vessels and the associated supply of the zero-carbon fuel options.

4.3.1 Types of zero-carbon fuels

At this point in time, there is too much uncertainty to decide on one route, one fuel and one technology for the future transition of the shipping industry. So, we need to consider all key primary energy sources that would allow zero-carbon fuels to enter the shipping fuel market:

- renewable energy,
 - hydrogen, (e-H₂)
 - ammonia, (e-NH₃)
 - e-methanol,

¹⁵ www.lr.org/en/insights/global-marine-trends-2030/

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- e-gas oil and
- electricity for use in batteries.
- bio-energy
 - Bio-diesel
 - Bio-methanol
 - Bio-LNG
- fossil fuels with carbon capture and storage (CCS).
 - hydrogen and ammonia produced from natural gas with CCS

Although one of these may look more probable than another, we need to include all potential transition pathways and compare the different conditions to better understand what action may be taken now. These pathways assume that fuels derived from one energy source will become the dominant fuels in 2050.

In the **short term**, biofuels look marginally more competitive than fuels derived from renewable electricity or from natural gas with carbon capture and storage. However, there are significant challenges related to the sustainability and availability of biofuels. Therefore, in the **mid-long term**, any biofuel pathway is uncompetitive and prone to restrictions or higher prices resulting from supply constraints and does not necessarily lead onto more resilient options such as hydrogen or ammonia derived from natural gas or renewable electricity.

4.3.2 What will it take?

With significant investment in research and development in the short-term, technologically all the pathways provide solutions to reach the zero-carbon future as the technology readiness increases and ultimately the costs reduce throughout the transition. Yet action taken in the form of policy, regulations, financial incentives and from shipping's end users is required to incentivise this.

The decade of the 2020s - 2030s is the most significant in terms of action to transition to zero-carbon by 2050. To develop, prove, scale and commercialise the uptake of zero-emission vessels, we must now establish collaborative joint ventures involving not only our own industry participants, but also fuel technology companies, equipment manufacturers and energy developers from other industrial sectors outside of shipping.

In order to meet the IMO target, zero-emission vessels need to be entering service by 2030 and anyone planning to finance, design or build a ship in the 2020s will need to consider how it can switch to a non-fossil fuel later in its operational life.

LR/ UMAS's three pathways are set out in the following table, covering scenarios based on:

- Renewable Fuels
- Bio- Energy
- Equal mix: no-dominating energy source

All these pathway scenarios will achieve the IMO's level of ambition of at least 50% reduction in GHGs by 2050 and go beyond to show that zero is possible. They all lead to a mix of fuels but with different dominant fuels.

4.3.3 Drivers

Fuel price is the predominant factor that impacts the total cost of operation. In anticipation of the impacts of the evolution of the global energy demands, and the associated uncertainty of biofuels being available and sustainable, a fuel which can be produced from natural gas or renewable

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electricity, for example hydrogen or ammonia, may offer longer-term advantages that are not seen in the very short term.

From a **technology and infrastructure readiness** perspective, bio-methanol, bio-liquefied natural gas (LNG) and bio-diesel are more mature than hydrogen and ammonia; rules and regulations currently exist and there are vessels already using these fuels. One of the important barriers for new fuels such as ammonia and hydrogen is the storage and bunkering infrastructure. This means regulatory actors, (the Classification Societies who set ship safety standards and monitor them through survey, and Countries of Register (Flag) who impose the Rules used to set the standards), need to collaborate with original equipment manufacturers (OEMs) to enable the uptake.

In addition to investment and technology readiness, **community readiness** is an important aspect of readiness for change. What may be ready from an investment and technology perspective may not be ready from other stakeholders' perspectives. Future fuels will be expected to meet not only GHG emission criteria, but also other air pollutant standards, (e.g. nitrogen oxides (NOx) and particulates), as well as contribute to broader sustainability criteria at regional and national levels. Land-use demands loom as a problem for bio-fuels.

4.3.4 The next decade up to 2030

Zero-carbon fuel production and supply needs to be clarified rapidly and suppliers must demonstrate emissions and sustainability credentials. Uncertainty around which fuel might be available, in what quantities, at what price and their sustainability credentials, risks delaying important critical path decisions and investments in the world's fleet and infrastructure.

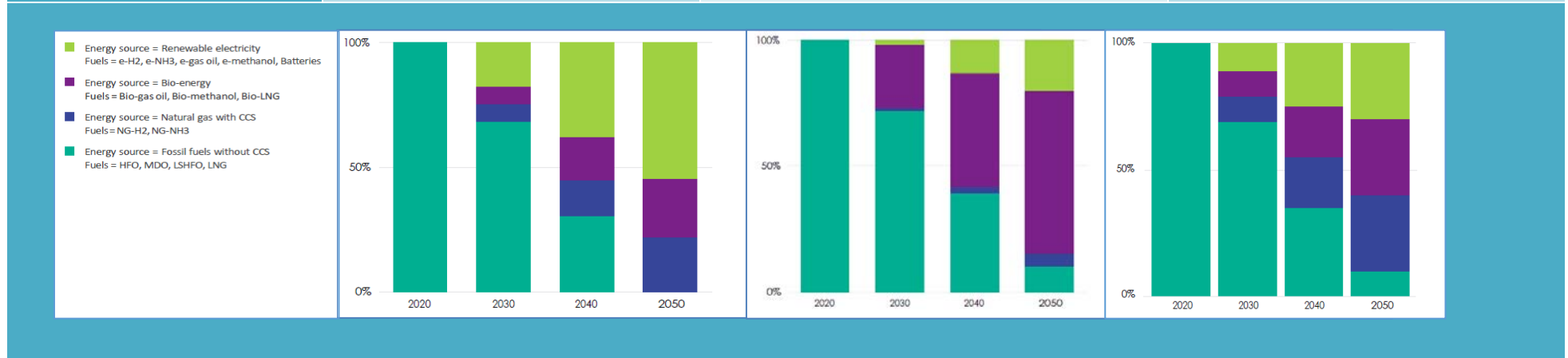
All pathways show a strong link between how the fuel production and supply evolves and which fuel shipping will use. Zero-carbon fuel producers need to start entering the marine market in the early 2020s and grow in scale throughout the decade. By 2030 technology readiness and costs (e.g. electrolysis and CCS), which ultimately affects the price of the end-fuel, will need to lead to zero-carbon fuels being competitive against the conventional marine fossil fuels as the price of fuels is a major driver for the economic case of a zero-emission vessels.

Zero-carbon fuel producers will need to prove that zero-carbon fuels have close-to-zero operational (tank-to-wake) and upstream (well-to-tank) GHG emissions. This may have several implications:

- **LNG** suppliers would shift from promoting LNG as an end fuel to natural gas as a source for producing ammonia and hydrogen with CCS.
- **Biofuels** producers will need to prove that the ways these fuels are produced have the potential to bring real benefits in terms of emissions reduction, whilst simultaneously ensuring all the sustainability issues and risks have been addressed.
- **Electro-fuels** producers will need to prove that the electricity required to produce these fuels is rapidly approaching zero-carbon.

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Pathway:	Renewable Fuels	Bio Energy	Equal mix: no-dominating energy source
Form of fuels	<p>Renewables dominate. This pathway sees a rapid ramp-up of renewable electricity-based marine fuels in the form of:</p> <ul style="list-style-type: none"> hydrogen, (e-H2) ammonia, (e-NH3) e-methanol, e-gas oil and electricity for use in batteries. <p>By 2050 fossil fuels could be phased out.</p>	<p>This pathway assumes bio-energy based fuels to be largely available and gradually taken up in shipping; Bio-diesel, Bio-methanol & Bio-LNG.</p> <p>Electro-fuels also enter the fuel mix but to a lesser extent, as well as hydrogen (H2) and ammonia (NH3) produced from natural gas with Carbon Capture & Storage (CCS).</p> <p>In this scenario, shipping is not a complete zero emissions system in 2050 as conventional marine fuels based on fossil fuels will still be used mainly because they would be blended with biofuels.</p>	<p>This pathway assumes both a ramp-up of renewable electricity-based marine fuels and bio-based fuels.</p> <p>However, alongside these fuels, also hydrogen and ammonia produced from natural gas with CCS gradually enter the fuel mix.</p> <p>Shipping is not a complete zero-emissions system in 2050 as conventional fossil-based marine fuels will still be used mainly because they would be blended with biofuels.</p>



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Pathway:	Renewable Fuels	Bio Energy	Equal mix: no-dominating energy source
World energy capacity requirement (similar to the levels required for IPCC's scenarios in line with a 1.5°C transition)	Capacity of renewable electricity globally grows significantly. Renewable electricity will need to reach approximately 50, 150, 200 exajoule (EJ) respectively in 2030, 2040, 2050	Bio-energy capacity will need to grow significantly, reaching approximately 60, 150, above 300 EJ respectively in 2030, 2040, 2050. Bio-energy will need to extend worldwide, starting from countries with a lot of biomass. <i>This would require a massive change in global land use with large areas dedicated to biomass cultivation</i>	Consistent growth in the capacity of all energy sources , which will need to see the three main energy sources (renewable electricity, bio-energy and natural gas with CCS) increase significantly. Fossil fuels with CCS energy capacity will need to reach approximately 20, 70, 100 EJ respectively in 2030, 2040, 2050
Prerequisites	Development for on board technologies : <ul style="list-style-type: none"> • fuel cells • storage systems • internal combustion engine (ICE) development 	Bio-energy will need to extend worldwide, starting from countries with a lot of biomass.	The availability of very cheap natural gas in a few areas will lead by 2025 to it being used in steam methane reforming to produce hydrogen and/or ammonia for use as a ship fuel.
Issues	Storage space requirements may dictate that hydrogen is the favoured fuel only for small-to-medium sized ships. e-NH3 and e-methanol may be more competitive on longer routes and larger ships.	<i>This would require a massive change in global land use with large areas dedicated to biomass cultivation.</i> A key milestone for this pathway is the reduction in price for bio-based fuels by 2030, a very uncertain factor.	CCS technology will need to be perceived as crucial to address climate change (natural gas will continue to play a longer role in society but CCS needs to develop and be proven and in wide use by 2035)
Actions required			
Civil society	In the early 2020s, civil society actors actively will need to advocate for electro-fuels as these are seen as the most environmentally-friendly and sustainable option	In the early 2020s, biofuels will need to be seen as the most environmentally-friendly and sustainable option for this pathway to evolve.	In the early 2020s, the shift from LNG as an end-fuel to natural gas as a source for alternative zero-carbon fuel options will need to be supported by CCS providers

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Pathway:	Renewable Fuels	Bio Energy	Equal mix: no-dominating energy source
Governments	Governments worldwide will need to continue to promote, incentivise and invest in renewable electricity production. In the late 2020s, countries with surplus capacity and low production costs would begin investing in the production of electro-fuels	Governments worldwide will need to continue to promote, incentivise and invest in biomass production and biofuel generation. In the late 2020s, countries with large availability of biomass would need to invest in the production of marine biofuels	entering the market and successfully testing their technologies. In the late 2020s and early 2030s, gas networks will need to promote natural gas-based fuels and highlight the renewable and bio-energy insecurities. This will need biofuel actors being unable to overcome the perceived sustainability concerns.
Policy-makers	As a result, policy-makers , would see the merits of electro- fuels compared to bio-fuels and to natural gas. In the early 2030s, international policies would emerge on sustainability standards for marine biofuels, regulating the use of natural gas-based fuels as well as of CCS.	Policy-makers would need to become convinced of the merits of bio- and electro-fuels compared to fossil-based fuels	In the 2040s, fossil fuel actors will need to see maritime as one of the last remaining markets and push for natural gas-based fuels.
Financiers	In response to this, financiers in the 2030s would primarily invest in shipping activities related to electro-fuels	In the 2030s financiers will need to commit to primarily invest in shipping activities related to bio - and electro-fuels.	Over the transition period, financiers would have no preference regarding their investments
Likelihood	By 2028, the safety concerns around hydrogen and ammonia will need to be minimised by proven pilot projects.	Environmental concerns around biofuels will need to be addressed. Challenges related to the sustainability and availability of biofuels will need to be resolved politically and socially by 2030. By 2035, safety concerns around bunkering infrastructure for hydrogen and ammonia may increase favourability of biofuels, which can use established HFO/MDO bunkering infrastructure.	Dependent on development of Carbon capture & Storage (CCS) technology, so that natural gas can be used in steam methane reforming to produce hydrogen and/or ammonia.

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4.4 World Bank work on decarbonising shipping

The World Bank has just issued (April 2021) two reports on decarbonising shipping¹⁶ in which it concludes that LNG is “likely to play a limited role in decarbonizing the sector and recommends that countries should “avoid new public policy that supports LNG as a bunker fuel, reconsider existing policy support, and continue to regulate methane emissions.” It further places ammonia and hydrogen ahead of bio fuels as the most promising zero-carbon bunker fuels, as it sees them as more scalable and cost-competitive than other biofuel or synthetic carbon-based options.

4.5 Other non-fuel but GHG reducing strategies

As noted initially, in order to meet the IMO targets, a low- or zero-carbon fuel strategy will need to be adopted. Operational and technology/ design initiatives alone will not be sufficient. However, in addition to zero-carbon fuel adoption, the most effective way of reducing greenhouse gas emissions is to combine all strategies. For example, in the New Zealand coastal shipping context, in addition to fuel technology changes we could change the dynamics of the transport task through operational initiatives by optimising the various links:

- Adopting the operational and technical practices set out in the table in section 4.2 above.
- Reducing the container or tonne kilometres required for cargo movement, for example setting up shipping routes that are shorter, such as Manukau to southern ports.
- Changing to transport modes that travel with fewer emissions per tonne kilometre, that is, off road or rail and onto ship.
- Improve economies of scale when moving freight by using bigger vessels.

4.6 Potential to replace current fossil fuels in the NZ coastal shipping sector

The above work by LR and UMAS suggests that **the industry is not yet ready for large scale change**. Pilot study work is underway, and a large number of new build ships are being fitted with dual fuel engines, mostly so they can burn LNG as well as fuel oils/ diesel.

Wind assisted propulsion is also being developed, but mostly at prototype stage. Wind assistance in the form of Flettner Rotors and foils appear to be the best options, with potential to reduce fuel consumption by up to 20%. But these are large structures fitted onto the deck of ships, so more suited to types such as tankers and car carriers that do not need deck-hatch access for cargo work.

Hydrogen and **ammonia** appear to have the greatest potential provided technical issues associated with safety and supply (bunkering) can be resolved. This is probably the 2030s as a time horizon. They can both be used to power fuel cells (which in turn produce electricity to power an electric motor), and as fuel for internal combustion engines.

Biofuels may have potential in the shorter term. They can be mixed with fossil fuels, and even burnt 100% in internal combustion engines. But their production takes up quite a lot of land use. This needs to be stacked up against other uses for the land used for biomass production.

The **upstream GHG emissions** is a critical factor. Cracking hydrogen from water by electrolysis uses large quantities of electricity. If it is not from a renewable source such as hydro-generation, it has

¹⁶ <https://www.worldbank.org/en/news/feature/2021/04/15/charting-a-course-for-decarbonizing-maritime-transport>

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large GHG emissions. So does steam reforming of natural gas to produce hydrogen unless there is carbon capture. Ammonia has similar issues.

New Zealand is high in **renewable electricity**. Production of green hydrogen or ammonia could be achieved with very low GHG emissions. But to do so on a commercial scale would require very large generation capacity, perhaps taking electricity away from other, more preferable uses.

The **short to medium term potential** for New Zealand coastal shipping may lie with bio-fuels, but with the intention of changing to green hydrogen or ammonia within a decade, i.e. part way through the life of a ship. Ship replacement may need to be considered as part of the plan.

5 Recent Coastal Shipping Policy Developments in Other Jurisdictions

5.1 Introduction

Waka Kotahi are seeking information on relevant recent policy developments in other jurisdictions that New Zealand could potentially learn from.

Government Policy on Domestic Shipping varies throughout the World dependent upon a number of factors and prioritised by criteria often not dictated by the efficiency and needs of the various affected shipping communities but by other more strategic needs.

Getting a clear picture of the current rationales is also difficult because the policies have often been shaped by prior events over very varying time periods and structures have been left dormant or on review and not considered a priority for change.

Demand for Domestic Shipping largely depends on the geography of the territories to be served. In Europe the prime area for coastal shipping incorporates the Baltic, Mediterranean, English Channel/North Sea and the Irish Sea whereas for the USA it focuses on Alaska, Hawaii, limited areas on the East Coast, Great Lakes and major rivers such as the Mississippi.

Australia has directed its attention to the Bass Strait (Victoria - Tasmania), routes linking Western Australia with the Eastern States, and Far North Queensland/ Torres Strait Islands/ Northern Territory.

Pacific Islands many of which have multiple inhabited islands to serve focus almost entirely on flotillas of much smaller vessels that connect to the ports where the international vessels call.

Japan, Indonesia and the Philippines are also complex and somewhat challenged models that would appear to offer little as an example to follow.

We have therefore determined to briefly review EU, USA, and Australian shipping policy documentation to form a view as to the issues considered most relevant to the formation of domestic shipping policy and firstly we overview the various approaches to “Cabotage”.

5.2 Cabotage

Wikipedia defines Cabotage as “the transport of goods or passengers between two places in the same country by a transport operator from another country”. Cabotage laws apply to merchant ships in most countries that have a coastline so as to protect the domestic shipping industry from foreign competition, preserve domestically owned shipping infrastructure for national security purposes, and ensure safety in congested territorial waters.

In the **United States**, the Merchant Marine Act of 1920, (Jones Act), requires that all goods transported by water between U.S. ports be carried on U.S.-flag ships, constructed in the United States, owned by U.S. citizens, and crewed by U.S. citizens and U.S. permanent residents.

Indonesia implemented a cabotage policy in 2005 after previously allowing foreign-owned vessels to operate relatively freely within the country.

In the **Philippines**, the Tariff and Customs Code of the Philippines, (the Cabotage Law) restricts coastwise trade or the transport of passengers and goods within the country, to vessels with Philippine registry which has to secure a coastwise license from the Maritime Industry Authority.

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Foreign vessels with cargo intended to be exported out the country may dock in multiple ports in the country to load and discharge domestic cargo before transiting to a foreign port.

In the EU, rights to cabotage in newly admitted member states, (in particular, Greece, Spain and Portugal), were restricted; but this introductory provision was subsequently abandoned.

In the South Pacific, the Fiji Government has published a Maritime and Land Transport Policy¹⁷. In 2015 Fijian transport regulation required domestic shipping operators to hold Coasting Trade Licences. The policy's intention is in future to remove this requirement for licensing and allow any Fijian registered ship to trade domestically (subject to satisfying safeguards such as normal ship registration and maritime safety requirements, and actions to control congestion at ferry terminals and ships racing for berths). Cabotage by foreign ships is subject to permit which is only issued if no Fijian ship is available, or an existing service is inadequate.

5.3 Developments in other Jurisdictions

5.3.1 United Kingdom's "Maritime 2050 Recommendations"

The UK Government has recently (2019) issued a Maritime Strategy¹⁸ with a series of recommendations covering every aspect of maritime trade some of which may be relevant to New Zealand and worthy of adaption to suit the domestic shipping task. It could be argued that the UK approach is pitched at international shipping and not strictly domestic shipping and thus the focus of their planning has a much wider base however it does point to similar policy drivers as those expounded elsewhere internationally in respect to the nurturing of a domestic fleet.

The UK subject headings in this review which provided for short term, medium term and long term strategies, included:

UK Competitive Advantage	Technology	People	Environment
<ul style="list-style-type: none"> Fiscal competitiveness The UK Maritime Cluster Thought leadership Strong partnership A modern approach to UK regulation Safety UK Flag 	<ul style="list-style-type: none"> Future of shipping Smart ports Digitalisation Communication, navigation and exploration 	<ul style="list-style-type: none"> Maritime workforce Diversity in the maritime workforce Maritime skills and promotion Need for continuous education and training Considering the human in the face of technological change 	<ul style="list-style-type: none"> Towards zero emission shipping New proposals Minimising wider environmental impacts Adapting successfully to climate change Achieving our goals through continued international leadership

¹⁷ <https://www.reinfofiji.com.fj/wp-content/uploads/2017/11/06-26-Maritime-and-Land-Transport-Policy.pdf>

¹⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/877610/maritime-2050-exec-summary-document.pdf

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Trade	Infrastructure	Security and resilience	
<ul style="list-style-type: none"> • Supply and demand • Global rules-based trading framework • Competition in a globalized world • New technology and future modes of transport • Trade promotion 	<ul style="list-style-type: none"> • Ports and harbour infrastructure • Port connectivity, the supply chain and logistics • Sectoral infrastructure • Ship building and boat building • Shipping in the supply chain 	<ul style="list-style-type: none"> • Security of UK waters – including Overseas territories • Security and reliance at ports and on ships • Global shipping route security • Cyber – security of technology • Terrorism • Maritime crime and piracy 	

A similar set of objectives may well help guide the New Zealand Government in its quest to determine a path for the future of Domestic Shipping.

One specific initiative, worthy of reference in New Zealand, introduced as part of the above review, was the Mode Shift Revenue Support, (MSRS (Intermodal),) which provides grants for all traffic carried in standard intermodal units (containers, swap-bodies or piggyback trailers), on railway infrastructure. Similar incentives are available for waterborne traffic.

5.3.2 European Union Maritime Policy Developments

For Europe, maritime transport was viewed as having been a significant catalyst for economic development and prosperity throughout the EU's history as it enabled trade and contacts between all the far flung European Union member states. It provided security for the supply of energy, food and commodities and provides the main vehicle for European imports and exports to the rest of the world. (Almost 90% of the EU's external freight trade is seaborne).

Short sea or domestic shipping represents one third of intra-EU exchanges in terms of tonne-kilometres and it includes many passenger ferry routes. Overall, maritime industries are an important source of employment and income for the European economy.

The European Commission's stated objective is to:

- ***protect Europe with very strict safety rules preventing sub-standard shipping, reducing the risk of serious maritime accidents and minimising the environmental impact of maritime transport.***
- ***safeguard access to the maritime transport market and promote reduction of administrative burden through digitalisation.***
- ***safeguard actively against piracy and terrorism threats.***
- ***looking after working conditions, health and safety issues and regulating the professional qualifications of seafarers.***
- ***protection of citizens as users of maritime transport services, ensuring safe and secure conditions, looking after their rights as passengers and examining the quality of public service connections proposed by Member States.***

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The Commission's strategic goals and recommendations for the EU were set out in 2009 in the Maritime Transport Policy. An "Implementation Report" was published in September 2016, presenting main developments and achievement as identifying areas for further work¹⁹.

Connecting Europe Facility, (CEF)

More recently a further Report entitled Connecting Europe Facility, (CEF), has provided more leads as to EU policy intentions but is somewhat focused on BREXIT and then the Covid 19 response.

In June 2018, the European Commission, as part of proposals for the next long-term budget (2021-2027), proposed adapting the CEF programme to support investment in *Europe's transport, energy and digital infrastructure networks*. Both the Council text and European Parliament text list the following priorities for the transport sector:

- Advance work on the European transport network,
- Decarbonise transport.
- Invest in transport projects offering high added-value.
- In the context of the Action Plan on Military Mobility: adapt sections of the transport network for civilian-military dual-use.

Notwithstanding, given Europe's geography and as indicated by the budget, maritime did not get a particularly high proportion of the budget, (EUR 1.1bn or just 5%), while the majority went to rail which received 71%:

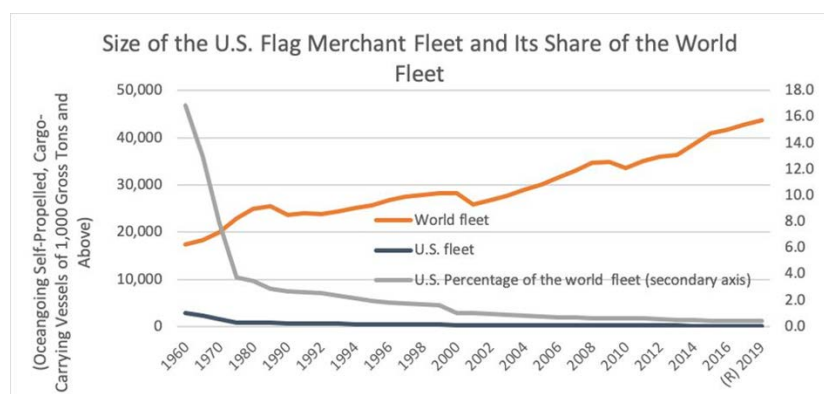
Progress with the allocation of Connecting Europe Funds

The latest plan for allocating funds under the CEF was only announced on 10 Feb 2021²⁰ and thus the precise nature of those proposals and decisions on what will be funded is not yet published.

5.3.3 USA**The Jones Act**

This policy, formally known as the Merchant Marine Act of 1920, requires that all goods transported between US ports use ships registered in USA and carrying US crews and flags and additionally, they must be constructed in the United States. The historic policies were invoked to promote national security, economic growth and domestic employment and to allow the U.S. to better monitor environmental, labour and safety standards.

Unfortunately, these laws result in very high-cost vessels that



¹⁹ https://ec.europa.eu/transport/sites/transport/files/swd2016_326.pdf

²⁰ <https://ec.europa.eu/transport/sites/transport/files/c20210722-cef.pdf>

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have expensive crews and unaffordable freight rates and hence the law has failed to achieve its objective as evidenced by the sinking size of the US Merchant Fleet.

5.3.4 Australia

The object of the Commonwealth Coastal Trading (Revitalising Australian Shipping) Act 2012 is to provide a regulatory framework for coastal trading in Australia that:

- promotes a viable shipping industry that contributes to the broader Australian economy.
- facilitates the long-term growth of the Australian shipping industry.
- enhances the efficiency and reliability of Australian shipping as part of the national transport system.
- maximises the use of vessels registered in the Australian General Shipping Register in coastal trading; and promotes competition in coastal trading.
- ensures efficient movement of passengers and cargo between Australian ports.

The Act aims to achieve its object by ensuring that:

- a vessel that is used to engage in coastal trading under a *general licence* has unrestricted access to Australian waters.
- a vessel that is used to engage in coastal trading under a *temporary licence* has access to Australian waters that is limited in time and to voyages authorised by the licence.
- a vessel that is used to engage in coastal trading under an *emergency licence* has the access to Australian waters required to deal with the emergency to which the licence relates.

The Act appears to have failed by not reaching these objectives. The Australian merchant fleet has progressively reduced in size as successive Liberal coalition governments have opened up the opportunities for foreign flag vessels to carry coastal cargoes. The current Government has again set about conducting a further review with the aim of giving greater clarity to what is allowed and arguably giving even more liberal access to foreign flag ships.

Australian Domestic Maritime Policy Developments

The Department of Infrastructure, Transport, Regional Development and Communications released a discussion paper in 2020 on reform of the way that cargo vessels are regulated under the Act, but this has been delayed for about nine months because of the COVID-19 pandemic. An interesting point of this consultation is that officials have specifically pointed out three options that will not be considered, namely: proposals for a strategic fleet, high- cost options, or opening the coast. Changes were however proposed to the current regulations governing the use of foreign vessels to carry cargo on the coast viz:

1. Separation of licensing for cargo and passenger vessels
2. A cargo and route nomination system for general licence holders
3. Removal of five-voyage minimum for temporary licences
4. Automatic approvals of temporary licence applications
5. Align new matters and authorised matters
6. Voyage notification requirements
7. Tolerance limits
8. Emergency licences

No announcements have been made as to any more firmly proposed changes although one might expect further liberalisation to the cabotage arrangements suggested above.

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The TFES provides financial assistance for cost incurred by shippers of eligible non-bulk domestic goods moved by sea across the Bass Strait. The amount of assistance is based on the difference between the freight costs of moving the goods by sea across Bass Strait and the notional freight costs of moving them by road over an equivalent distance. The objective of TFES is to provide Tasmanian industries with equal opportunities to compete in other mainland domestic markets

Effectively the subsidy currently delivers a contribution of about A\$700 per TEU to the cargo owner for freight caused to be relayed through Melbourne from where it may then be exported. This option is important given the almost total withdrawal of international vessels directly calling at Tasmania. This arrangement has however frustrated some attempts by shipping lines to mount direct international services to Tasmania as the subsidy tips the balance in favour of the Mainland.

5.4 Summary of Policy Priorities for Domestic Shipping

UK	EU	USA	Australia
Competitive Advantage – Regulating support of UK flag and vessel safety	Protect Europe from sub-standard shipping, reducing the risk of environmental incidents.	Promote National Security	Enhance Economic Activity
Technology – supporting digitalisation and other similar developments	Safeguard access to the maritime transport market and reduce administrative burden.	Promote Economic growth	Support Sustainable Domestic Transport
People – nurturing the maritime workforce	Safeguard against piracy and terrorism threats.	Support domestic employment	Protect Maritime skill Base
Environment – responding to the impact of climate change	Protect working conditions, health and safety issues and regulating professional seafarer qualifications.	Enable U.S. to better monitor environmental, labour and safety standards.	Improve National Security
Trade – nurturing World Trade			
Infrastructure – supporting the evolution of port, shipping and logistics services			
Security – responding to the threats of terrorism etc			

The above demonstrates the diverse range of policy drivers for supporting and cultivating domestic shipping, nurtured by quite different needs and priorities.

5.4.1 Policy Drivers

The consolidated list covering all such key drivers of the various Governments domestic shipping policies stated above appears to be as follows:

- Economic improvement or necessity – UK, US, Australia, Fiji
- Shipping service integrity – Australia,
- Maintaining shipping standards – UK, EU and Fiji
- Regulating the use of data by such as BlockChain – UK, EU
- Maintaining and developing maritime skills – UK, USA, Australia

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- Oversight of shipboard seafarers and safety – UK, EU, USA
- Security and anti-terrorist oversight – UK, EU, USA, Australia
- Environmental security – UK, EU, USA
- Infrastructure – UK

5.5 Proposals for adopting various of the Overseas Policies in New Zealand

The Policy Drivers drawn from the international list might be appropriate for developing coastal shipping policy in the New Zealand context:

- Economic reasons:
 - Reducing the cost of inter-regional domestic transport.
 - Improving or maintaining the competitive position of all New Zealand exporters and importers regardless of location, particularly between North and South Island.
- Shipping service integrity:
 - Ensuring that the economics of the domestic shipping services are not compromised by the operations of foreign flag vessels.
 - Examining the merits of financial subsidy to exporters compromised by the rationalisation of vessel and service schedules to ensure that they are not additionally disadvantaged.
- Utilisation of foreign flag vessels to complement above objectives:
 - Use foreign flag vessels
 - to carry coastal cargoes so long as that does not compromise domestic services, or
 - to serve port pairs that have no alternative services.
 - Consider which classes of cargo; tranship cargo, empty containers, domestic cargo; foreign flag vessels are permitted to carry, and the rules and restrictions surrounding that.
 - Review the system of issuing permits for foreign flag vessels to carry coastal cargo to ensure that the rules and regulations are clear, easy to operate and achieve the required outcomes.
- Maintenance of Shipping Standards:
 - Ensure that all vessels operating on the New Zealand coast, i.e. foreign or NZ flag, are operated and maintained according to the required shipping standards.
 - Avoid imposing standards that are higher than international accepted, thereby restricting the replacement of existing ships with second hand tonnage acquired overseas.
- Environmental Protection:
 - Develop policies to encourage uptake of zero-carbon fuels.
 - Provide motivation to minimise the route distances in the network.
- Crew Welfare Enforcement:
 - In respect to the crews of such foreign flag vessels, ensure that:
 - The crew of such ships are receiving New Zealand payrates whilst on the domestic cargo legs
 - Safety standards are adhered to.
 - Training of new seafarers can be undertaken.

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6 Key Information Gaps

Gaps exist in the easily available information on New Zealand's transport system. Some are gaps in the availability of data, some in the presentation of that data, and others in what can be derived by planners and users of transport. The information is needed for a range of reasons; benchmarking and monitoring, improving information to enhance competition, and providing data for planners and strategists. A list of the most pressing is:

- Statistics (Current and historic demand)
 - Import and export origin and destination data (beyond 'next port')
 - Domestic truck volumes on the Cook Strait traffic, or for that matter throughout NZ.
 - Mix of passengers and freight per sailing on the Cook Strait ferries including peaks
 - Potential change in tranship volume if hubbing increases
 - Impact on distribution of freight following introduction of increased rail capacity
 - Some FIGS data is difficult to access and interpret. (The underlying FIGS data can be downloaded, but some of the files created are too large for MS-Excel to handle).
- Shipper needs
 - Importer and Exporter views as to their preferences for domestic transport mode.
 - Key origin - destination data of New Zealand freight.
 - Requirement for driver to accompany truck unit on vessel
- Special needs of Cargoes
 - Commodity data so as to understand special requirements
 - Number of vehicles by type and lane metres
 - Number of accompanied trucks
- Supply of Vessels for the future
 - Current and projected capacity of the KiwiRail current and planned ferries especially the increase in rail wagon capacity
 - Planned changes by Bluebridge
 - Indicative comparisons between the various options for lowering carbon emissions
 - Possible use of different shipping systems including greater use of Mafi trailers and also Rolux bases
 - Economics of various shipping service types
- Rail capacity
 - Check capacity of railway system to carry increased freight in Auckland-Wellington and Picton-Christchurch corridors (bearing in mind single track sections)
 - Check the capacity of the rail yards at each terminus can handle the projected peak rail demands
- Freight rates (sea, rail and truck)
 - Freight rate filing to enable comparisons by users and improve competitiveness
- Container terminal data to help with benchmarking, monitoring and planning:
 - Ship queuing data
 - Dwell times of cargo in stacks
 - Handling charges
- Port Charges
 - Details of port charges for ship calls
- Inland Ports
 - The role and effectiveness of Inland ports in serving international and domestic shipping demands.

7 Future Direction

7.1 Stakeholder Discussions

This project has yet to complete discussions with a range of selected stakeholders. We are talking to:

- Coastal Shipping operators
- International ship operators
- Freight logistics operators
- Trade Unions
- Industry Training providers

Their inputs will guide the assessment of key challenges and opportunities facing the sector and the priorities that should guide the investment decisions that will be developed in the final stage of the project. A second report on this project will summarise the information and views provided by coastal shipping stakeholders.

7.2 Key Challenges Facing the Coastal Shipping Sector

The coastal shipping sector and the overall domestic transport system is robust and functioning well, but chinks appeared as a result of the 2016 Kaikoura earthquake and the 2020 Covid 19 pandemic. Cargo presently moves at a cost that is acceptable. But little has yet been done to move to a system that provides the resilience that has been proven to be necessary, and which improves sustainability, especially in the area of GHG emission reductions.

The challenges are to increase resilience and reduce emissions without unduly affecting New Zealand's domestic transport and logistics.

This first stage of the work has identified the key challenges and some of the opportunities:

- Moving cargo onto the most appropriate mode or modes for transport
- Obtaining a level playing field
 - With international shipping
 - Marginal costing capability for international ships
 - ETS equity
 - Maritime Transport Act s198 adherence
 - Limitations on range of fuel supply in New Zealand
 - With other domestic modes
 - Subsidies (real or imagined) for rail and road
 - Port pricing equity
 - Within the coastal shipping sector
 - Subsidised rail creating distortion to market place with respect to contestable cargoes
- Maintaining New Zealand's competitive position for imports and exports
- Resolving the dry dock question
- Priority berthing at terminals for coastal ships
 - May need independent berth facilities for coastal ships
 - For hub and spoke would need medium term development at both Auckland and Tauranga. Ultimately, their capacity limitations mean a new port would be needed
 - In the long term, a West Coast port (Manukau) would provide the required capacity and reduce costs and GHG emissions
- Ports capability to cope with increasing size of ships

Final Report

- Outdated port infrastructure will need renovation or replacement
- Harbour channels will need deepening, widening and straightening
- Hub and spoke may be a solution so as to minimise the number of ports affected
- Resilience of the domestic transport system
 - Hub and spoke system will assist with this too
 - Increased capacity within the coastal shipping sector
 - Regional ports to remain container- and RoRo-capable
- Sustainability
 - Transfer of cargo off road and rail and onto sea transport
 - Reducing sea transport GHG emissions
 - By reducing the distance between origin and destination (a West Coast port)
 - By introducing low- and zero-carbon fuels
- Cabotage
 - Review application of the current legislation
- Maintaining and developing maritime skills
- Maintaining standards of ship condition and operation, but within the international accepted standards

7.3 Opportunities for the Coastal Shipping Sector

A final report on this project will summarise the information from Reports One and Two and provide information on these key challenges facing the coastal shipping sector, the opportunities the sector has over the next 1 to 2 years, a view on the best medium-long term opportunities, and recommendations on principles and priorities that should guide investment decisions.