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SHIPPING

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In a world of extreme disruption, ocean shipping is resilient

Pictured: ships being berthed in a seaport. Container ports are the supply chain nodes most susceptible to disruption. Photo credit: William William via Unsplash.



By Capt. MELWYN NORONHA,
CEO Shipping Australia

After six months as Shipping Australia's Chief Executive Officer the view from the bridge has been both exciting and challenging.

COVID-19 continues to harrow, burden and torment the peoples of the world. Human activity is greatly disrupted. But, ocean shipping remains resilient and continues to deliver the goods.

One unforeseen side-effect of COVID is a massive surge in the demand for shipping, which is attributed to consumers turning to retail therapy in reaction to a loss of socialising and travel. Consequently, the shipping industry has swung from handling low cargo volumes to high cargo volumes. Inevitably, such a huge swing causes its own complications.

As demand for shipping services has increased, it has soaked up the supply of ships and boxes. Meanwhile, **ship operators have been exposed to massive cost increases.** The average cost of one tonne of Intermediate Fuel Oil 180 (Singapore) is at the time of writing about USD\$423 a tonne. It was USD\$155 per tonne in April 2020. That's a 173% increase! Box ship charter rates have rocketed. Charter rates for a 1,100 TEU ship in July 2020 were US\$5,555 a day. Today, it's US\$22,000 a day. That's a 296% increase!

With huge cost hikes and a complete utilisation of supply, **it should be no surprise that freight rates have risen.** In early 2000 the China Containerised (Export from China) Freight Index stood

at about 875 points while the Import to China Index stood at roughly 950 points. At the time of writing, the Export Index is just under 2,700 points and the Import Index is at 1,426 points.

Shipping industry critics have commented negatively on the capacity shortage and the increase in freight rates. But these are normal in a tight market and will likely be resolved by the ocean shipping industry, which is investing in extra boxes and ships. These temporary issues brought about by a tight market are just that: temporary. They will resolve.

But how long, exactly, will these temporary conditions last? No-one can tell. Analysts at respected maritime consultancy Sea-Intelligence commented "we are so far into "black swan" territory, that we have no models that can adequately predict how long the current demand boom will last".

Shipping is inherently adaptable to such huge disruptions. The sector has put a huge, idled, containership fleet back to work. There was about three million TEU of idle containership capacity at the beginning of the pandemic. That fleet has mostly been re-hired now. The demolition market for container ships has almost evaporated – in March hardly any container ships were scrapped. Non-specific tonnage (e.g. multi-purpose ships) have been hired to cope with surging demand. Even some bulk carriers have been known to carry containers. Shipping lines have placed giant orders

for new containers and new ships. Ocean shipping is adapting.

Self-interested and biased commentators have criticised shipping companies because ships are arriving off-schedule. This is a problem, but it is not a shipping-created problem. **Ships are arriving off-schedule because of port congestion around the world** and because of government-imposed measures to combat COVID. In Australia specifically, industrial action at ports is also a problem.

The port-bottleneck is one of the biggest challenges in the logistics chain. Sea-Intelligence reports that port congestion is so bad that it is having an effect equivalent to removing the entire world fleet of Ultra Large Container Ships. Industry sources have reported that the transit time from cargo being ready for loading in Shanghai to delivery at warehouses in Chicago has risen from 35 days prior to the COVID-19 pandemic to 73 days now.

Among all these issues, **we must be mindful of maritime crew**. International trade works because seafarers continue to maintain the viability of our maritime supply chains.

Honoured on the Day of the Seafarer (25 June), ship crews have been patient and steadfast in the face of **unreasonable, arbitrary and discriminatory action by governments and officials**. Seafarers deserve better than what has been served up to them by governments. They have a right to healthcare.

Seafarers should not be left in agony with broken ankles or bad teeth. And when there happens to be a COVID case aboard, **crew should not be unduly exposed to the risk of death**. It is morally bankrupt for the authorities to turn a ship away because of fear of COVID (which is a manageable condition) when there is a patient aboard who needs medical care. The Western Australian political leadership has been particularly disappointing in this regard. They appear to have no compassion or regard for seafarer suffering.

It was, however, good to learn that sixteen states in **the United States of America and some European countries have begun vaccination programmes for foreign seafarers** in their ports. Shipping Australia hopes that other countries, and Australia in particular, will follow suit.

In non-COVID matters, there have been many disappointing developments. The Western Australian government continues to implement policies that are detrimental to shipping. Three days before Christmas, **WA government's Pilbara Port Authority introduced – without proper industry consultation – a new charge at Port Hedland**. The purpose of the charge is to fund the purchase of properties that are coated in iron ore dust from the port. The charge took effect from 1 March 2021 and has no end date. Charging a fee to ships because of pollution created by third parties is indefensible and bizarre. Then, having obtained a taste for shipping-money, the McGowan government decided to gorge upon the industry by imposing a 25% increase on tonnage charges at Port Hedland.



Pictured: COVID vaccines. Seafarers are vital to keeping our economy running. Vaccination is vital to keeping seafarers healthy. Australia's governments should be vaccinating seafarers. Photo credit: Daniel Schludi

On a more favourable note, after consultation with Shipping Australia and affected port users, **Maritime Safety Queensland has delayed the introduction of its new towage arrangements at Port Alma**. MSQ is addressing marine pilots' complaints that they lack enough experience to pilot ships at Port Alma by developing a port-and-ship digital model and then by training pilots with the simulation.

Meanwhile, after a four-week consultation period and submissions from

industry, **Victoria's Essential Services Commission was not required to decide on the Port of Melbourne's tariff re-balancing application**. The port withdrew its application citing further opportunities for port users and other stakeholders to provide their views. The port has deferred a proposed tariff adjustment from 1 July 2021 to a later date.

A big development was the **Productivity Commission's interim report on supply chain vulnerabilities**. It got some commentators unduly excited. There were false allegations that overseas-origin shipping presents a risk and there were calls for an Australian national fleet. However, in risk management circles, it is well known that diversification and redundancy reduces risk. The existing international seaborne fleet is far superior to any national fleet because the international fleet features massive diversification and redundancy. A national fleet is the exact opposite: it is a single-point-of-failure fleet. You can imagine the vulnerability of a national single-point-of-failure fleet to militant industrial action by trade unions.

Moving on, there has been extensive evidence from a variety of respected bodies, such as UNCTAD and the Reserve Bank of Australia, that demonstrates the resilience of shipping. Their data shows the same sort of fact in different ways – namely that shipping decreased just after the onset of the pandemic and then increased thereafter to a state greater than pre-pandemic. **This is conclusive proof that shipping is resilient to supply chain disruption**.

Shipping Australia argued that the nation's box ports are finding it difficult to rebound from supply chain shocks. Shortly after voicing such concerns, as if on cue, a round of Protected Industrial Action notices were served at Australian ports in June. Port disruption increased costs for carriers, shippers and consignees. Port disruption has led to congestion which, in turn, has led to fewer port calls and a reduced frequency of shipping services.

It seems that **Australia's waterfront is either in, or nearly in, a continuous state of industrial relations-induced disruption**. Disruption to trade at our ports causes harm to Australian businesses, Australian exporters, importers, consumers and our economy.



Pictured: a containership underway. There has been a huge increase in demand for container shipping services. Photo credit: Thomas B from Pixabay

Our industrial relations system requires an overhaul so that trade is not disrupted at the nation's ports.

But let's go back to the bigger point: blockages of monopoly port infrastructure, which are the supply chain nodes that are most susceptible to disruption, should be an area of concern to government. **An exploration of the resilience of the country's ports is something that Australian governments really should examine.**

Staying with ports, the **inaugural edition of the Container Port Performance Index (CPPI 2020)** was published by the Transport Global Practice of the World Bank in collaboration with IHS Markit. New technologies and increased digitisation have created the opportunity to measure and compare container port performance in a reliable manner. A comparable performance report serves as a benchmark and will stimulate dialogue among key stakeholders in the global economy, including national governments, port authorities and operators. Such reports should be part of a nationally coordinated approach to measure the performance of regulatory and port governance frameworks.

The findings in the World Bank report were a revelation, as some **Australian box ports were not shown in a favourable light.** These findings should attract the attention of government and political officials responsible for monitoring the performance and productivity of ports.

Australia's accession to the **Nairobi International Convention on the Removal of Wrecks (the Convention)** has progressed with work underway on a Regulatory Impact Statement. A uniform wreck removal regime applying to Australia's EEZ and territorial sea without any reservations being made by governments is seen as beneficial to the shipping industry.

Sadly, in late May, we saw the loss of a much-liked shipping industry figure,

Frank Needs. A former ANL employee and manager, Frank was closely associated with Shipping Australia during his career, serving as the NSW State Chairman and an active player in the affairs of the various Liner Conference Committees. For many years after his retirement from ANL, Frank played an active voluntary role in the production of the Shipping Australia's magazine.

Among the many issues facing ocean shipping, **one of the most important matters is decarbonisation.** Ship operators are faced with a hard decision on choice of fuel, whether that's liquefied natural gas, methanol, ammonia, biodiesel, or hydrogen. The shipping industry is facing uncertainty and no owner wants to build a ship powered by a fuel that proves to be the wrong choice 5-10 years later.

The IMO's Maritime Environment Protection Committee met in June this year, and adopted rules requiring all ships to calculate their Energy Efficiency Existing Ship Index (EEXI) and to establish an annual operational carbon intensity indicator (CII) and CII rating. Carbon intensity links greenhouse gas emissions to maritime transport work. Ships will be rated A (best) to E (worst) on energy efficiency. Administrations, port authorities and other stakeholders are encouraged to provide incentives to ships rated as A or B. If a ship is rated D or E for three consecutive years then it will have to submit a corrective action plan to show how a C (or above) rating will be achieved.

Amendments to MARPOL Annex VI are expected to enter into force on 1 November 2022 with the requirements for EEXI and CII certification to take effect from 1 January 2023. The first annual reporting will be completed in 2023, with the first rating given in 2024.

IMO will review the effectiveness of the implementation of the CII and EEXI requirements by 1 January 2026 and will, if necessary, adopt further amendments.

As we go to print with this edition, the Federal Government is attempting to cut red tape and simplify border processes. It has announced a **new Simplified Trade System Implementation Taskforce** which will review international trade regulations and modernise outdated information and communications systems.

The Taskforce will work with the Simplified Trade System Industry Advisory Council, the Deregulation Taskforce, border agencies, and Australian businesses to review and improve regulations and trade systems.

Aimed at **creating a simpler "tell us once" framework**, the devil will be in the detail and implementation. Today, ships visiting multiple ports in Australia are often required to provide a variety of data to a range of federal and state authorities for each port entry. We can only hope that duplication will be cut down by the Federal reform.

The Australian Government has also committed to establish a **National Freight Data Hub** to enhance the collection and access to freight data across all modes.

Meanwhile, Transport for **NSW has begun work on a digitised Freight Community System** that enables freight supply chain participants to rapidly and securely exchange information. Furthermore, the Port Authority of NSW is reviewing its reporting system for shipping and port-related data exchange.

We hope these systems will be capable of talking to each other and that a simpler "tell-us-once" framework really will be created.

And, finally, **the Federal Court dismissed the Australian Competition and Consumer Commission's lawsuit against NSW Ports.** The ACCC tried to have part of the New South Wales port privatisations declared as contrary to competition law. It's too complex to go into detail here, but, in summary, the State of NSW must pay compensation to the operator of Port Botany for each container handled at the Port of Newcastle above a certain volume threshold. There is a similar obligation on the operators of the Port of Newcastle to then reimburse NSW.

A redacted version of the Federal Court's judgement has been released and the ACCC has recently lodged an appeal against the decision. ▲

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Pictured: Flinders Street Railway Station in Melbourne. Photo credit: Wayne Yew via Usplash.

Port price hike plan opposed

By SHIPPING AUSTRALIA

Shipping Australia objected to a price hike plan by the private operators of the Port of Melbourne which had been filed with the independent regulator, the Victorian Essential Services Commission (ESC). The Melbourne port operator had proposed upping prices to fund an infrastructure upgrade.

Port upgrades are needed

Shipping Australia has previously expressed concerns that the Port of Melbourne finds it difficult to accommodate the larger vessels that need to use the port. Large ships can wait for many hours to enter the port due to lack of suitable berths. The situation will worsen if further improvements are not made.

Shipping Australia agrees that more cargo and bigger ships are coming and that the port will need to upgrade to handle a bigger trade. If not, it seems likely that the port will experience congestion in the not-too-distant future.

However, Shipping Australia argued that allowing the port to hike prices to fund those infrastructure upgrades is unreasonable.

Open wider...

The opening of the widened Panama Canal in mid-2016 changed vessel design. Previously, the width of the Canal imposed a hard limit on ship width. For ships to get bigger, they had to get longer. Longer ships that were likely to

call in Australia in the future may have been too long for Melbourne to handle. The width of, and the bend in, the Yarra River imposes hard limits on vessel length.

Australian ports of call typically run in a Brisbane-Sydney-Melbourne-Adelaide-Fremantle rotation. If Melbourne could not handle ships in that rotation then it would be at a severe disadvantage and could possibly be vulnerable to being skipped or finding itself at the end of a spoke on a hub-and-spoke model. However, a wider Panama Canal means that future ships will both be wider and, crucially, perhaps not as long as originally forecast.

Canal expansion happened before the final sale of Melbourne. Due diligence conducted by a potential purchaser should have identified the need for an upgrade and it should have factored the necessary investment costs into their purchase bid. The need for an upgrade to cope with the change was both predictable, and predicted, at the time of privatisation.

Who should bear the risk?

A business which decides to invest in expansion should itself bear the risks of not recovering its capital or not generating a desired return on investment. That investment, it would be hoped, would increase product sales and thereby increase revenues and profits. For example, if an ocean shipping company decides to build a new fleet of ships, then the ocean shipping company, its suppliers, and its customers would reasonably expect that the ocean shipping company itself would bear the risks of that investment. The ocean shipping company would pay for its order either directly from its balance sheet or by borrowing money from banks to do so. The company would also expect to benefit from increased revenues and profits.

Similarly, the Port of Melbourne should use its own resources, or borrow money to fund investment in its own assets, bear its own investment costs and risks, and thereby benefit through increased throughput, revenues and profits.

Private port operator will face strong incentives to upgrade

Shipping Australia also takes issue with any argument that a private port operator (being a monopoly, or near-monopoly, actor) has no incentive to

fund an upgrade without being heavily subsidised by the ocean shipping industry. Apart from the opportunity to increase revenues and profits, the biggest benefit to the private operator is perhaps not quite so evident. And it's this: upgrading now will massively obviate future severe disbenefits that will otherwise inevitably occur.

These disbenefits include:

- a chronically and severely congested port
- possible future regulatory or legislative intervention by public officials
- shipping lines taking action, such as skipping port calls, to manage the effects of congestion
- the possible creation of strong competitors located in the Port of Melbourne's hinterland

These disbenefits could potentially lead to a loss of monopoly status and market share at the Port of Melbourne in the future.

In the event that a price hike is authorised...

Should the Port of Melbourne be allowed to charge an enhanced fee to pay upgrades, a proposition to which the ocean shipping industry objects, Shipping Australia calls for:

- a prohibition on any price increase, tariff, surcharge or other price increase of any shape, form, or kind being introduced to fund infrastructure until such time as the extra infrastructure is actually ready for use
- any funding mechanism to be clearly-labelled, discrete, invoiced on a line-item basis with a statement explaining what the charge is, who introduced it and why it is being charged
- any price increase, surcharge etc should be specifically and publicly limited in amount, scope and duration with a specific prohibition on that mechanism being rolled over, absorbed into other charges, continued or extended in any shape, form, or in any way whatsoever
- any surcharge should be given a specific name, with specific spelling, that cannot in future be changed or amended
- a clear and unambiguous explanation in plain English to be prominently displayed on the Port of Melbourne's website explaining what the charge is, how it is calculated and applied, how much it costs and when it will end. ▲



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IA-CEPA

A new chapter in Australian-Indonesian trade

By SHIPPING AUSTRALIA

Underweight, underperforming and due for an overhaul. That's one way to describe the Australia-Indonesia economic relationship.

At least, until now.

Entering into force on Sunday 5 July 2020 was the Indonesia Australia Comprehensive Partnership Agreement. Also known as IA-CEPA (typically pronounced 'Eye-Ay-Seppa'), it is hoped that the new free trade agreement will revolutionise the Indonesia-Australia partnership. Especially as Indonesia had (prior to COVID at least) one of the fastest-growing economies in the world.

Some two-way trade – but there could be so much more

A new economic chapter between Indonesia and Australia does need starting.

At the time of writing, Australia ranks a mere 13th on Indonesia's list of merchandise trade principal export destinations (1.6% of all exports) and 8th on its list of import sources (3.1% of all imports). On the other side of the ledger, Indonesia is 11th on the list of merchandise trade export destinations from Australia (2.0% of all exports) and 15th on the list of import sources (1.6% of all merchandise trade imports).

The total two-way trade is worth about A\$11.81 billion a year (A\$6.8 billion of exports to Indonesia and just under A\$5.0 billion of imports from Indonesia).

So, while there is trade between the two nations, given the proximity, potential complementarity and vast economies of the two nations, it could be argued that there is potential for so much more.

Indonesia's economy

The potential freight opportunity presented by Indonesia's economy

is vast. As explained by Dr Martin Stopford in his seminal work, "Maritime Economics", there is a simple and well-known relationship between the size of an economy and its seaborne trade. The bigger the economy, the greater the potential for seaborne trade.

The archipelagic nation's economy has a gross domestic product in excess of US\$1.1 trillion (GDP (US\$ bn) nominal prices), according to the Australian Department of Foreign Affairs and Trade. Unfortunately, the advent of COVID-19 has caused a slump in the Indonesian economy. In more normal times, the economy grew on average by about 4.6% over the last five years. That five-year average hides some quite phenomenal figures with 8.5% growth or more in the years of 2016, 2017 and 2019. The down, and the flat, years of 2015 and 2018 appear to have been caused by global macro-economic factors.

Indonesia's GDP per capita on a parity of purchasing power basis (GDP PPP per capita) is very compelling. For the last five years GDP PPP per capita has grown between 4.5% to 6.6% with an average growth of 5.8%. GDP PPP per capita stood at about US\$10,700 in 2014 and by the end of 2019 it stood at just under US\$14,000, according to DFAT data.

By way of comparison, given that World Bank data puts Australian GDP PPP per capita at about US\$53,000, it's clear that there is plenty of room for growth in Indonesia's economy.

Indonesia's population

While an increase in terms of a few thousand dollars per head may not sound much, the size and composition of the Indonesian population should be remembered. There are over 267 million Indonesians according to the World

Bank. Poverty has been slashed by more than half between 1999 to 2019 to about 9.4% of the population. Over the same timeframe, Indonesia's middle class (defined by the World Bank as "economically secure") has grown from about 7% of the population to about 20% of the population. That's about 52 million Indonesians, which is more than twice the entire population of Australia. A further 45% of the Indonesian population – 115 million people – are free of poverty and are aspiring to achieve economic security.

"Demand from the middle class can drive growth. They are the source of almost half of the total household expenditure of Indonesia," said Rolande Pryce, acting World Bank Country Director for Indonesia.

About IA-CEPA

IA-CEPA covers both goods and services. In relation to goods, it covers tariffs and it also tackles such issues as rules of origin, customs procedures and trade facilitation, technical barriers to trade, sanitation and phytosanitary measures. In relation to trade in services it includes employment, finance, telecommunications, professional services, investment, electronic commerce, power policy, competitiveness, and economic cooperation, together with institutional arrangements and frameworks.

Benefits for Indonesia

For Indonesia, IA-CEPA will eliminate virtually all tariffs and Australian import duties so that nearly all Indonesian products will be tariff or duty free. Indonesia's Ministry of Trade hopes that a variety Indonesian exports will increase in volume. These include automotive, wood products and their derivatives (such as paper and cardboard), furniture, textiles and textile products,

tools, communication and electronic equipment. Indonesia is also hoping for a boost in exports of aluminium, processed meat and fish, tobacco, cocoa, various manufactured goods, house lighting, plastics and plastic goods, fish and shrimp.

Benefits for Australian exporters

On the Australian side, nearly all Australian exports to Indonesia will similarly be tariff- and duty-free under IA-CEPA. Canberra is hoping for a boost for its farm exports such as an increase in volumes of grains. According to Senator Birmingham, Australian growers will be able to export 500,000 tonnes of feed grains, including wheat and barley tariff-free into Indonesia under IA-CEPA. Other Australian exports that may benefit include live cattle, meat, dairy products, horticultural products (as distinct from grain) such as potatoes and carrots. Australian manufacturers may also benefit as, according to the Australian Embassy in Indonesia, “the vast majority of Australian goods exports to Indonesia are used in Indonesia’s manufacturing sector”. Indonesia will also guarantee the automatic import of import permits for a variety of products.

Increased demand for imports and exports of these kinds of goods, along with a growing middle class, a rise in disposable income, and a mutually beneficial free trade agreement would tend to point towards long-term growth in the demand for the carriage of containerised freight to and from Australia and Indonesia.

As may be expected, a wide range of advocacy and trade groups have enthusiastically welcomed the entry into

force of IA-CEPA. But there are signs that the hoped-for take off might not, well, take off.

A mutual lack of interest?

An increase in trade would presume a knowledge of, and interest in, the trading partner. There is apparently a low level of Australian interest in Indonesia and a low level of Indonesian interest in Australia.

The Australia-Indonesia Centre carried out an attitude study in 2016 and surveyed over 2,000 people. The Australia-Indonesia Perceptions report showed that 47% of Australians have little-to-no understanding of Indonesia in terms of its people and culture. A further 34% have a “moderate” understanding. About 26% of Indonesians had little-to-no understanding of Australia and 31% had a “moderate” understanding.

Kyle Springer of the think-tank, “Perth USAsia Centre”, at University of Western Australia pointed out back in 2017 that the difficulties of doing business in Indonesia did not explain a lack of Australian interest in doing business in Indonesia. The difficulties and challenges of doing business in Indonesia were found to be about the same as doing business in China according to the World Bank’s Ease of Doing Business Index (64.28 index points for China in 2017 and 61.52 for Indonesia). But the amount of Australian business being done in China far outweighed the business being done in Indonesia.

But why?

One word explains why. And that word is “narrative”.

“What Australia does have is a narrative

of China’s economic rise and how it [Australia] has benefited directly from it... Rather than perception of risk and uncertainty, [a] working group explained that Australia simply has yet to see Indonesia as an opportunity. There is yet [to be] a narrative of Indonesia’s rise and what it could mean for Australian businesses,” Springer wrote.

Springer later argued that: “stronger ties between boardrooms are needed... exchanges of influential business people will pave the way to successful partnerships. In this context, it’s hard to overstate the importance of IA-CEPA”.

Hyping it up

Some commentators have argued that the IA-CEPA hype of a boost in trade is just that: hype.

Colin Brown, Adjunct Professor in the Griffith Asia Institute at Griffith University, noted a variety of problems in an article for the Australian Institute of International Affairs. He observed that Australian exporters will still have to deal with unreliable infrastructure, bureaucracy, and corruption. Furthermore, pre-existing trade deals before IA-CEPA mean that trade between Indonesia and Australia already enjoys low, or zero tariffs. He further argues that many Indonesian manufacturers do not want to export at all and, of those that do, Australia may simply be too small a market. They would likely be looking at China or the United States instead.

“We should not expect a major turn-around in the trade and investment relationship between Australia and Indonesia, at least not in the short or medium term,” he wrote. ▲

Indonesia: a growing economy

Year	GDP (US\$b) (Current Prices)	% Change	Year	GDP per Capita PPP (Int'l \$)	% Change
2014	891.1		2014	10,690	
2015	860.7	-3.4	2015	11,176	4.5
2016	932.1	8.3	2016	11,727	4.9
2017	1,015.30	8.9	2017	12,416	5.9
2018	1,022.50	0.7	2018	13,234	6.6
2019	1,111.70	8.7	2019	13,998	5.8
	Average	4.6		Average	5.5

Khapra Beetle

Tiny bug, big pest, giant agri-threat

By SHIPPING AUSTRALIA



Khapra Beetle (*Trogoderma granarium*) is a tiny bug. But it's a big destroyer of grains and oilseeds. A tiny little hairy larva and, as an adult, it is a reddish-brown oval beetle. It also infests a huge range of edible commodities - over 100 different commodities - such as rice, wheat, seeds and other grains.

It particularly likes hot climates and it's also very tolerant of dry conditions. Unfortunately, as readers have probably realised, that environment well describes large parts of the agricultural-producing regions of Australia. So much so, that Khapra is Australia's number two National Priority Plant Pest.

Worse, owing to a quirk of Khapra's biology, the larvae can enter into "diapause". That means it can lay dormant for literally years (between two to eight years) before re-activating when the time is right. And that's when there is food available, such as when there are grains or grain residues in the shipping container, and when the temperatures are warm. Khapra then infests and destroys agri-products. The dormancy period also means that there's

no definite "Khapra season" - the bug potentially poses a threat every day, of every month, of every year.

These characteristics make Khapra Beetle an excellent and opportunistic hitchhiker. It can, and has, popped up around the world. A native of India, originally, it has spread, particularly to the Middle East and Africa.

Unfortunately, populations of Khapra can also infest and survive in ocean shipping containers, which has been noted by the Food and Agriculture Organization of the United Nations. Khapra has been detected lurking under container floorboards (especially in the corners). Anyone carrying out a quick cleanliness check of a container might not notice the presence of the Khapra Beetle. Infestations are usually discovered when someone spots the cast of larval skins.

Because it's a hidden hitchhiker, it is raising alarm in agriculture departments around the world and it is possible that counter-measures may need to be global measures.

So what's the damage?

Australia's Department of Agriculture, Water and the Environment (DAWE) estimates that the cost of eradicating a "widespread incursion could cost Australia about \$15.5 billion over 20 years".

However, we don't know exactly how the DAWE has calculated that figure or what assumptions they have used, so it's hard to analyse or comment on that figure. Meanwhile, astute readers may have noticed the weasel-word "could". What, exactly, are the conditions that would need to come true to reach the \$15.5 billion figure? Is the \$15.5 billion a top-of-the-range figure?

Meanwhile, as far as we can tell, no one has discussed the cost to the shipping industry. It's basic good policy development to consider a range of consequences before making a decision. The cost of countering Khapra should be important to Australian policy makers because our economy is fundamentally based on seaborne transport of freight.

About 99.92% of all freight by volume and 84% by value leaves or enters

Australia by sea. Australia's international trade directly accounts for about 45.7% of Australia's GDP. If the cost of freight increases unreasonably then it is, ultimately, everyday Australians who will bear the cost.

Khaphra-countering costs

Figures from the World Shipping Council suggest that there were about 217 million ocean shipping container trips around the world in 2018 (131 million full boxes and about 86 million empty boxes). The World Shipping Council suggests that if there is a US\$100 cost of obtaining a container cleanliness certificate (which it notes may be a conservative estimate) then the global cost to the container shipping industry would be US\$20 billion a year.

That's not do-able.

Meanwhile, the DAWE estimates that we receive about three million ocean shipping containers a year. We're not entirely sure how they arrive at that figure. But let's take it at face value.

Assuming all three million boxes need to have some kind of certification at AUD \$131 (which is the value of US\$100 at the time of writing) then that's a cost of \$393 million a year. If those boxes need to be brought up to, say, food grade standard (which includes cleaning and fumigation) at say, \$300 each, then that's another \$900 million a year. But, in all likelihood, it would be even more expensive as any fumigation provider is going to charge a lift-fee for moving a box in its yard, there's likely to be pack and unpack fees (fumigation sometimes requires partial unpacking) and probably other fees too.

So if we add the \$393 million to the \$900 million and then multiply the result by the DAWE's estimate of 20 years (being the period needed to eradicate Khaphra Beetle if it gets settled here) then the total cost to container shipping is A\$25.86 billion!

The cost of eradicating Khaphra is \$15.5 billion and the cost of keeping Khaphra out is \$25.86 billion... so, from a purely financial perspective, it would be far cheaper to let Khaphra get established and let trade flow unhindered!

Ok, so we wrote that last line with a bit of tongue-in-cheek. We're not actually suggesting it as a course of action – outraged farmers and environmentalists don't need to write to us to complain.



But that simple back-of-the-envelope calculation shows that careful policy consideration is necessary to protect agriculture and to also avoid unduly burdening the shipping industry. Remember: hindering shipping ultimately drives up costs for ordinary Australian families.

"Biosecurity is important," commented Shipping Australia CEO Melwyn Noronha. He added, "everyone has a moral duty to minimise their impact on the agricultural sector and to protect Australia's unique ecosystems. The global shipping industry accepts that, under certain circumstances and based on a proper risk analysis, specific pest risks may warrant a carefully-thought-out and evidence-based counter-pest programme that is proportionate to the risk involved and which does not unduly impose an unreasonable burden on trade and industry".

DAWE response to Khaphra

Following beetle detections in the baby chairs and refrigerators, DAWE has implemented some bans – one on high-risk plant products inside unaccompanied personal effects and low value freight and the other on high-risk plant products within international passenger baggage and international mail.

A variety of work programmes – revised plant-safety certification for plants and seeds in a variety of products and pathways – have been put on hold while "higher priority work on sea containers is completed".

At the time of writing, there are two sets of new measures: Phase 6A, starting in mid-April 2021, and Phase 6B, which will be imposed at some point late in 2021.

Sea container measures: phase 6A in force now

DAWE is targeting "high-risk" containers which are full container load / container consolidated loads where "high-risk" plant products (rice, chickpeas, cumin seed, soybean, wheat etc) have been packed in a "high-risk" country (any one of 40 countries in south-east Europe, Western Asia and Africa). Also targeted are any containers (regardless of the nature of goods inside) that are packed in a high-risk country and are destined for rural grain-growing regions of Australia.

Offshore treatment

DAWE now requires containers – not the goods – to be treated 21 days prior to export. It is important to note that, quite rightly, the treatment requirement lies with the shipper of the consignment and not with the container-operator or the container ship-operator. This policy also ensures that the bugs are not in the goods or containers prior to shipping.

Treatment in Australia is not allowed unless goods are being imported for the purpose of delivering emergency services. In-Australia treatments will only be considered on a case-by-case basis.

There are several treatment methods: either with a contact insecticide containing the active constituent deltamethrin (although this is potentially subject to change); heat treatment at 60 degrees Celsius for three hours; or fumigation with methyl bromide (an extremely toxic chemical that's largely banned around the world except for pre-shipment fumigation purposes).

These treatments must be carried out in a particular way to ensure 100% kill-rates and to comply with DAWE's requirements.

There are a variety of rules relating to treatment (such as rules approved providers and certification requirements). Shippers would be well-advised to follow the rules as non-compliant containers will be exported on arrival.

Future developments

We can deal summarily with the 6B measures: at the time of writing nobody knows what they are, or what they will be, other than that they will take effect at some point this year!

There are a number of concerns.

Shipping Australia considers that, just as mandatory Verified Gross Mass declarations are a pre-requisite of loading, a similar approach should be developed in which overseas exporters or their agents should provide documentation to the shipping line as a pre-requisite to loading a container onto a ship for carriage to Australia. If appropriate certification is not provided to the ocean shipping carrier, then the carrier should be entitled to decline to load the container. This approach would prevent undue delays and costs to ships.

The risk from Khapra is (currently) geographically-focused. Shipping Australia is opposed to any suggestions that data should be collected showing where shipping containers have been in recent years. No one has been collecting this data, there is no central database, and there is no data.

Looking forward, the global shipping industry is opposed to any suggestion that the data should be collected by shipping lines as this would impose an

intolerable burden on shipping lines as data gatherers and controllers.

Clearly, when there is good reason to believe that Khapra may be present then it should be tackled at that point in time. But the shipping industry is opposed to the idea that there should be inspections of all empty containers moving in, around or out of Australia. This would spread finite resources thinly across the country and would likely have no effect in terms of reducing pest contamination risk. It would present at a huge cost and would likely result in unenforceable bureaucratic procedures.

But there is a way of checking that containers in circulation, which may have been in a high-risk country at some point in the past, are now free of Khapra.

Apply the Safe Container Convention

Australia is a signatory to the IMO's 1972 Convention for Safe Containers (CSC 1972) which is incorporated into Australian law by AMSA's Marine Order 44 (Safe Containers).

The law requires the maintenance and inspection of containers. There are two approved inspection schemes. The first is the "Periodic Scheme" which requires a box to be examined on the 5th anniversary of manufacture and thereafter at intervals not exceeding 30 months.

"If a container must be taken out of service for a pest-inspection, then it is sensible and appropriate that the box is inspected for pests as part of the existing safety inspection regime. That's just an efficient and less disruptive way to ensure boxes are inspected," Noronha said.

DAWE must up its game; shipping must not be delayed

Given the importance of trade and shipping to Australia, it is vital that there is no undue or unreasonable delay. Unfortunately, as the Brown Marmorated Stink Bug experience has shown, there is cause for concern.

In BMSB seasons gone by, inspections of car carriers for BMSB took two to four hours. If any bugs were found (alive or dead) they were sent to entomologists (insect experts) for their consideration. It takes time for a sample of bugs to get from the wharf to the entomologist and for a response. The entomologists

initially only worked office hours. There was a later change to an 18:00 to 22:00 weekday roster and a 09:00 to 17:00 weekend roster.

If entomologists work the same weekend hours to deal with Khapra, then there is a still a huge 16 hour gap overnight from finish time on a Saturday to starting time on a Sunday.

The non-sailing cost of a container ship of the kind that typically calls in Australia is, at the time of writing, just over AUD\$52,000 a day (* see note below). That's just over AUD\$2,167 an HOUR at the current rates.

A 16-hour Saturday-to-Sunday delay would, at the time / cost rates given above, set the ship back by at least AUD\$34.6k. And that's almost certainly an underestimate because it doesn't take into account lost freight-earning opportunities or other wasted costs. In the BMSB seasons, there were also delays because there simply weren't enough entomologists to handle the workload. As can now be appreciated, any delays waiting for entomologists would have then, and would now, cost a fortune.

During the previous BMSB seasons there was also a litany of other problems with software, staffing levels, changing policies, delays in the release of cargo and many, many, more issues. A wide variety of supply chain stakeholders were adversely affected, including importers, customs brokers, freight forwarders and consignees among others.

Shipping works 24/7 to the benefit of Australian business, industry and ordinary families. Biosecurity must work 24/7 and to the same standard too.

There must be no repeat of the problems seen in BMSB seasons past. ▲

**Editor's Note: many variables make up this figure; figure derived from publicly available data sources; data changes with the passage of time; an approximate estimation.*



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An international fleet is THE strategic fleet!

By SHIPPING AUSTRALIA

An existing international seaborne fleet is far superior in risk management terms to any national single-point-of-failure fleet. The existing international fleet is strategically robust. It is strategically resilient. It is strategically diverse. It is THE strategic fleet.

The existing international ocean shipping fleet is already resilient to supply chain risks because of its massive systemic redundancy and massive diversification. We can think of global ocean shipping as being an industry of “multiple differences”. There are multiple different ships, ship-types, owners, operators, nationalities (whether that’s the nationality of the owner, operator, crew, ship or port), seaports, flag states, regulators, cargoes, sailing routes and commercial sectors among many others.

Let’s see how these differences might look in practice. For example, there could be two different ship owners, one German and the other Greek. They hire Singaporean and Isle of Man ship-managers to operate their mixed fleets of containerhips and dry bulkers. The ships are registered under the flags of Panama, the Marshall Islands and the Bahamas and so the vessels are subject to three different sets of flag-state control. The managers hire mixed crews from eastern Europe, India and the Philippines.

Container ships carry a diverse range of freight from a wide range of manufacturers. Box ships follow a loop originating from southeast Asia and they call at several different ports in a variety of Asian countries. In Australia, they call at the main capital city ports on the east coast plus Adelaide and Fremantle. Box ships have the ability to vary their routes at any time.

Dry bulkers typically carry homogenous cargoes, such as iron ore (but it could be grain or some other commodity) from any one of a group of different Australian producers.

Bulkers run from the north-west shelf of Australia to different iron ore import terminals in Asia. Although dry bulkers sail fairly set routes, if their standard route through the Sunda Strait is not available, then bulkers can instead sail other routes such as the Lombok Strait.

Such a system, with its massive redundancy and diversification, is resistant to supply chain disruption.

The existing global shipping fleet is the strategic fleet.

A national fleet is a single-point-of-failure fleet

Meanwhile, several commentators have called for the creation of an Australian-controlled fleet.

Having a national fleet eliminates the benefits of having a sector of “multiple differences”. There would be just one owner, one flag, one manager, one crew and one union.

A national fleet would reduce diversification and redundancy.

Because of the vital nature of shipping, and its fundamental supporting role in Australia’s economy, control over a national fleet would provide huge leverage to any trade union over the various state and federal governments of the day.

Restructuring or downsizing the national fleet would be an epic nightmare of Herculean proportions as it would inevitably result in a major industrial relations conflict with those same trade unions.

This is all indicative of increased risk. Why? Because a national fleet is a single-point-of-failure fleet.

A national fleet is a conflicted fleet

Nationalised industries can become bogged down in domestic political

issues. Governments may, for instance, be tempted to reduce unemployment figures by encouraging workers to work in a national fleet. Consider, for instance, the old shipyards in Malta (now closed). They were nationally-owned and, at one point, a considerable portion of the national population was employed by the shipyards.

Another example of a likely political conflict of interest would be the need of the national fleet to get empty boxes back to the manufacturing centres of the world (e.g. Asia) for the purpose of loading cargo for import back to Australia. However, Australian exporters would likely demand of Australian politicians that certain volumes of the national fleet’s empty boxes should be reserved for their use.

That would pit importers against exporters and would increase costs at the national single-point-of-failure fleet, thereby helping (along with all the other conflicts of interest) to render the national fleet uncompetitive. The conflict between a single-point-of-failure fleet and shippers would have to be resolved through political intervention.

In the current free-market set-up, this conflict is managed by pricing and sound commercial management. If exporters want to export at times of high demand for containers, then they can secure their freight by paying the market rate. They can manage the risk of having to pay high rates by booking in advance, negotiating for returning customer discounts and by using other financial tools where appropriate.

A national fleet is a conflicted fleet. A national fleet is a single-point-of-failure fleet.

The existing global shipping fleet is THE strategic fleet.

Any other suggestions just don’t stand up to scrutiny. ▲

How to switch a 200 year old company from being operationally-lead to being customer-lead

By SIMONE CLINGAN, business manager, Port Phillip Sea Pilots

Becoming customer focussed

When a company operates 24/7, 365 days of the year, it's easy to become operationally focussed. When the weather is bad or a pilot launch vessel breaks down, the pilots and launch crew at Port Phillip Sea Pilots (PPSP) rise to the occasion. What they aren't so good at is being customer-focussed, something they will freely admit. That's where I came in.

I joined PPSP in 2020, as a Pilot Dispatch Officer. I had previously worked in high level corporate roles at the Spirit of Tasmania, Telstra and global packaging giant, Amcor. I decided to retrain at the Australian Maritime College so I could make a sea change to the Bellarine Peninsula, south west of Melbourne.

After joining PPSP, my business skills were recognised, and I was quickly moved into the role of Business Manager. I was tasked with turning the company from being operationally-lead to being customer-lead. But in practical terms, what did this mean?

Listening

The first thing we did was meet with customers to hear their feedback on our services and what they needed. It was important to listen. Really listen. Ask questions – even the difficult ones that we didn't want to hear the answers to.

We learnt that customers loved our service. No surprise there – given our operational focus. But they thought our pricing was too complicated. It was almost impossible to work out how much it would cost for a vessel to visit Melbourne. Our pricing was not easily accessible either. They had to request quotes from us, and this consumed time – both theirs and ours.

Customers also didn't like paying for things that were out of their control. They often didn't find out about additional costs until

they received the invoice. If bad weather hit and they had to go to anchorage this added cost. If they were instructed to move berths this added cost. If they had to go to anchorage and then detention this added even more cost. Shipping agents had to break the bad news to their customers if this happened, or operators found the additional charges on their invoices. It impacted their budgets and generally made life difficult.

Making it easy to do business with us

Simplifying our pricing was one of our first steps. We are lucky enough to have a fantastic IT system that captures data from pilots, all vessel details, all movements, and years' worth of billing data. An export from this system allowed us to make decisions based on actual data, not just hunches.

We drilled deep into the data and came up with a flat pricing structure that divided vessels into weight ranges. For those customers that wanted it, we could offer one flat fee to get a vessel from sea to port – no matter what happened in between. Easy to understand and easy to prepare budgets based on these numbers. This had the added advantage of allowing customers to figure out for themselves how much a visit to Melbourne, Geelong or Westernport would cost. It freed up our Accounts staff as they no longer had to prepare quotes.

Focussing on what's important to our customers

We knew that our customers loved being able to contact us 24/7 – important in an industry that never stops. We also knew that customers valued our reliable and timely service, but we'd never put any service level agreements in place.

As most operators will tell you – having a vessel delayed in port costs a lot. They want their vessels to depart on time, both to avoid additional costs and to make sure they get to

their next port on time. Thankfully, we are immune from industrial action, as our pilots own the company and can do any operational role. We needed to take advantage of this fact and our large on-demand operational capabilities.

After devising the new pricing structure, we met with customers to offer them agreements that delivered both volume discounts as well as a guarantee of service. "90 minutes or it's free" became our mantra. Our operations are so well honed we can guarantee to have a pilot on board within 90 minutes of the scheduled service time or the movement will be made at no charge.

Adding value

Piloting is and will remain the key part of our business, but we have a wealth of knowledge and experience to share and assets that can do more than just transport pilots.

We are planning to expand our service offering. Services such as: Training for agents to ensure they have the skills and knowledge to give us the right information at the right time. Transporting bunker samples using our launch vessels and consulting to companies and government bodies who are wanting to implement new systems or improve existing ones. It all adds value for our stakeholders and ensures we keep listening.



Greedy WA government grasps even more industry cash

By SHIPPING AUSTRALIA

Earlier this year, the Pilbara Ports Authority (PPA) introduced a new cash grab, or, port charge at the Port of Port Hedland.

Effective from 1 March 2021, the PPA decreed that vessels exporting iron ore which use the inner harbour of Port Hedland must pay a “Port Hedland Voluntary Buy-Back Scheme” charge.

Sliding scale

There is a sliding scale of charges based on a combination of a vessel’s gross registered tonnage and its movements. Charge-liable ships will be slugged once on the way into the port and once again on the way out. Movements inside the harbour are not charged. The cash grab starts at AUD\$1,250 for a 40,000 GRT ship and rises to AUD\$6,725 for ships over 80,000 GRT.

The overwhelming majority of iron ore carriers will fall into the highest bracket

as the port predominately loads capesize bulkers. So that will likely cost each iron ore carrying ship AUD\$13,450 to enter and leave the port.

According to the PPA Annual Report 2020, there were 6,346 vessel movements at Port Hedland in the 2019/2020 financial year. Multiplying vessel movements by the likely charge gives a total indicative revenue-raising figure of about AUD\$85.4 million.

Dusty, dusty, dusty

Handling of commodities like iron ore is a dusty business even if dust suppression systems of various kinds are used.

The ABC has extensively documented the dust pollution problems around Port Hedland. Breathing in dust of various kinds is not good for health. One way to mitigate risk is to encourage people not to live near sources of dust pollution. The state government is trying to buy the

houses of residents near the Port of Port Hedland through a voluntary buy-back scheme.

There’s nothing inherently wrong with that. The kicker, as ever, is in the detail.

“The voluntary scheme will be funded by industry, with work under way to finalise the funding mechanism,” the state government said.

And that’s why the Port Hedland Voluntary Buy-Back Scheme has been unfairly imposed on the shipping industry.

Whatever happened to the “polluter must pay” principle?

It’s a widely-accepted principle around the world that the “polluter must pay”. You do the dirty, you pay to clean up the mess.

Port Hedland has a dry and windy climate. Iron ore is stockpiled by the

port. Wind blows dust off the stockpiles and over the town. So the polluter is the port. The port is owned by the state government. So the polluter is also the state government.

In a breathtaking breach of the “polluter must pay” principle, the Pilbara Port Authority has shifted the economic burden from where it correctly belongs – on the joint polluters – to a random innocent third party, namely, the ocean shipping industry.

By way of analogy, imagine that the state government owned a supermarket. Trucks call at the loading dock at the back of the supermarket. Imagine further that the supermarket allows lots of plastic waste to blow out of the back of the loading dock and into the empty street. Everyone would quite reasonably point the finger of blame at the supermarket and would hold both the supermarket and the state government responsible for cleaning up the mess. No one would charge a fee on the truck driver to pay for cleaning up the mess made by the supermarket!

But that’s what’s happening at Port Hedland.

A temporary measure?

Documents supplied by the PPA appear to be silent as to the end date of the charge. The PPA was keen to tell the industry when it was going to start extracting cash and was less keen to say when it will stop.

We can try to figure out when any charge should end (bearing in mind that the polluter – the state government or the PPA – should pay). The ABC reckons that the cost of the buy-back is about AUD\$200 million. With potential revenues from the new charge of about AUD\$85.4 million a year, that figure should be paid off in about two years and a few months.

However, governments are slow to turn off a free-money tap. Income tax was originally introduced as a temporary measure by the UK to fight the French Revolutionary War back in 1799. About 222 years later and we still have income tax. So much for it being a “temporary measure”.

Let’s go back to port pricing. There are examples where a port charge has been introduced and has continued

for some time. Then – having outlived its original purpose – the charge has become a permanent fixture on the pricing schedule. Then, some time after that, the cost of the charge is melded into some other fee. The charge never really goes away.

Shipping Australia is concerned that, without an end date, this new charge will simply become a charge that ships are forced to pay even though the original reason for levying it has long been forgotten.



It seems that the ship is just an easy target for this breathtakingly outrageous charge. What can we say? It’s greedy, unfair and unjust... and it’s just another day in WA.

Melwyn Noronha
Shipping Australia CEO

No pass-through

Although remembering that shipping companies should not be paying this charge in the first place, it is highly unlikely that shipping companies will be able to pass on the cost.

Iron ore carrying ships are engaged by the operators of steel mills in other countries and it is those steel makers who have a commercial relationship with the iron ore miners in Australia. Accordingly, ship operators cannot pass the cost of the charge to iron ore miners.

Ships, meanwhile, have no choice as to whether or not they go to Port Hedland – they have to go to the port to pick up the cargo.

Who should pay? The state government!

It should be remembered that the WA government owns the Pilbara Port Authority. Ultimately, it’s really the state government that is causing the iron ore dust pollution. And the buy-back charge really originates from the state government.

Meanwhile, there are massive benefits from the iron ore trade for the state.

Firstly, there is the multi-billion dollar economic benefit generated from generally increased economic activity.

Secondly, the state government directly takes a massive cut through the imposition of mineral royalties. In 2019-2020 the iron ore royalty collections in WA stood at AUD\$5.43 billion.

Finally, there’s profit generated by the PPA itself. In 2019/2020 the PPA generated profits of AUD\$188.1 million and returned a dividend of AUD\$111.9 million for the state government.

The state government can afford to compensate the people whose lives it has polluted. It should pay.

Letters of objection

Shipping Australia wrote letters of objection to Premier Mark McGowan and others. We objected to the charge being levied on ocean shipping companies, the lack of consultation (our members were only informed of the charge a mere three days before Christmas), the blatant breach of the polluter must pay principle, and the fact that there does not appear to be an end date to the charge.

The state government basically responded that it expects industry to pay the charge to fund the buy-back scheme.

“As you note, there are considerable profits being made by the iron ore industry and I consider it appropriate that industry funds the PHVBS,” Premier Mark McGowan wrote.

Such a comment either utterly misses the point or betrays an astonishing ignorance of, or indifference to, the fact that putting a charge on ocean-going ships means that the iron ore industry does not pay any of the PHVBS Charge at all!

It also demonstrates a complete indifference to the intersection of two of the most important industries in the Western Australian economy: specifically the industry that transports iron ore overseas and the industry that digs up and exports iron ore. The Premier’s statement is also shocking in that it implies considerable government support for polluters and it is a fundamental breach of the “polluter must pay principle”. ▲

Why the inventory of empty shipping containers built-up in Australia

By SHIPPING AUSTRALIA

Why did the inventory of empty shipping containers build up in Australia?

Unfortunately, empty container parks and empty container holding spaces in New South Wales were chock-a-block with empty boxes. Even port precincts became extra busy and the port operator, NSW Ports, imposed control measures to preserve safety.

What is at the heart of the problem?

COVID-19 is at heart of the problem. Deprived of holidays, socialising with friends and nights out, consumers around Australia (and indeed, around the world) have gone on a massive and frenzied retail therapy bender.

Because the demand for goods went into orbit, the demand for shipping services and for containers, likewise, went into orbit. To give you an insight into just how much demand has increased, at the beginning of 2020, the world's inactive container ship fleet was about three million TEU. By the beginning of 2021, that inactive fleet had pretty much returned to work; ocean shipping companies were chartering multi-purpose ships; shippers were having difficulty booking space and equipment and the demolition market for container ships almost evaporated. Blank sailing numbers slumped too.

So why all the problems?

Booming business causes its own problems. Demand for goods (and therefore cargo) is dynamic. Demand rises and falls. But the infrastructure to handle the flow of goods, in the form of shipping containers, ports, terminals, ships, underwater access channels and turning basins, cranes, hard stand and so on, is static. Yes, more equipment and infrastructure can be built, but it takes

a lot of time and money to do so. Just think about how much time, effort and cost would be needed to build another Port Botany, for instance.

A massive follow-on issue is the management of empty shipping containers. All around the world, empty shipping containers were in the wrong place. They were in the countries that receive cargo, like Australia, when they needed to be in the places that send cargo, like China.

Why is empty container management a problem? Surely if someone brought in a ship with say, 2,000 containers full of goods, then the same ship could take out 2,000 empty containers, right?

No, that's wrong.

An imbalanced trade

Lots of full containers enter Australia and lots of empty containers go out. Not all export containers are empty though. For instance, about 61% of containers exported at Port Botany in 2018 were empty and 39% were full.

Australia's box trade basically doesn't balance; just because a box full of goods is brought into Australia does not mean that an empty box (or even a full box) immediately goes out.

We have an imbalanced trade because many of the consumer goods we buy, such as retail goods in supermarkets or in general department stores, are made in part or full overseas but are sold here. About 6% of the Australian economy is based in manufacturing, according to the Reserve Bank of Australia, and comparatively few containerised products are exported. Australia therefore tends to end up with more empty containers than we need to help export goods.

Imbalanced container trade. Got it. But why do empty boxes build-up in Australia?

Well, in and of themselves, they normally don't. Although, between import and export, empty shipping containers can stay for quite some time in Australia before they are "evacuated" (i.e. exported) back to the world centres of manufacturing for re-filling with goods. This is normal for Australia. For the vast majority of the time, Australia's logistics chains handle a massive flow of full and empty containers so efficiently and quietly that huge volumes of boxes pass by largely unnoticed. Empty box volumes do build up from time-to-time however, and there are a wide variety of reasons why.

Full vs empty? Full first!

Full boxes often take priority over empty boxes. There are good reasons for this. Trade accounts for just under 46% of Australia's Gross Domestic Product. Trade is utterly essential to our nation's economic vitality. Because of the central role of trade in the economy, full boxes often come first. Think about it – would you want our supermarkets, retail and department stores to short out of stock? We saw in the first half of 2020 what happened when it was perceived that goods might fall into short supply. The consequences weren't good.

We should also remember that boxes full of cargo are somebody's products for export and are somebody else's valued stock for sale. Business survival, growth and jobs depend on these goods getting to their destination on time and at the least cost. That's why full boxes take priority.

Limited working hours of trucking companies

This is one of the bigger, day-to-day, all-

year-round factors that hinders the smooth movement of empty boxes. After ships deliver full boxes to a terminal, trucks take the boxes to their ultimate destination and either return empty boxes back to port or deliver them to an empty container park.

Yet there is a basic mismatch in working hours. Ocean shipping works 24 hours a day, everyday. Trucks work from six or seven in the morning to about three or four in the afternoon and they usually don't work on Sundays. That's not true in every case – there are some trucking operators who work into the evenings and weekends. But most don't.

So, if ships are importing large volumes of boxes all the time but trucking operators do not match the same working times as ocean shipping operators then, inevitably, there is an imbalance in the movement of boxes.

This leads to long queues of trucks at the gate to the empty container park or the seaport. A surge in volume can

lead to parks being congested. Trucking companies complain about being re-directed from one park to another. If trucking companies spread the load over longer hours then it would help alleviate the problem.

However, we know from experience that trucking companies generally refuse to deliver empty boxes to empty container parks in the evening. Empty container parks have trialled late evening opening but trucking operators did not avail themselves of the longer hours and so empty container parks no longer offer these later hours.

Boxes are sometimes transported large distances over land

In Australia, some consignees (the people to whom a shipper sends cargo) live and work many hundreds of kilometres away from the nearest port. Just getting boxes to and from remote communities takes time. If there are large

volumes of boxes being sent to remote communities then it can take a long time to get the boxes back. Remember that the transport of boxes is not necessarily distributed in an even volume each month... at different times of the year there can be large volumes being moved to different places which can lead to bunching and backlogs of empty boxes.

Container free time

Ocean shipping containers normally (but not always) belong to ocean shipping companies. Shipping lines grant shippers and consignees a certain amount of free time (time without charge) to take possession of the shipping containers for the purpose of unloading. Although the granting of free time is considered to be a necessary part of the supply chain, it nonetheless delays the return of empty boxes and can contribute to a build-up of empty container volumes in Australia. We're not calling for reform in this area – we're just explaining that

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free time can be a factor in how an empty box backlog can form.

Random events – bad weather, industrial action and the like

Unfortunately, there are some aspects of life that are near-random and just cannot be controlled. Bad weather such as heavy rain, heatwaves, strong winds and high swell can all hinder maritime and cargo operations. Extensive industrial action in 2020 also contributed to a backlog of empty containers in Australia.

Some empty box inventory is necessary

Shipping companies will generally keep a stock of empty boxes available, even in destination countries like Australia, to service a backhaul export trade. Shipping companies even import small volumes of empty containers for the purpose of making sure there are enough on-specification boxes available to Australian exporters.

Boxes need to be taken out of circulation for essential works

Containers need to be cleaned, upgraded (e.g. converted into food-grade containers at the customer's request), maintained and repaired. Taking boxes out of circulation for essential works may also help increase the volume of containers in Australia.

Small disruptions to big numbers equal big backlogs

It should also be realised that we're talking large volumes of containers. Australia currently handles at least eight million TEU a year. With this kind of box volume, and boxes being transported over large distances, then even small disruptions or surges in demand can have large consequences for the build-up of empty containers.

COVID's container calamity

The massive demand for goods (and therefore shipping containers) that was induced by the pandemic threw everything into disruption. A key pinch point has been the hard constraints imposed by infrastructure capacity limits.

Ports and terminals are key infrastructure and they're inherently

limited by how fast their cranes can move boxes, by the number of ships that need berthing, by the available berth space, and by the hours of the day. At the end of the day, a terminal only has the capacity to do so much in any given time. That's not a criticism, we're just pointing out the fact that everyone and everything is subject to the constraints imposed by infrastructure capacity limits.

One of our ocean carrier members told us that the company wanted to bring in an extra loader, which is a huge cost, only to be told that there was no space/time/slot to berth the extra vessel. The company had to wait weeks.

Pro-forma container exchange

Meanwhile, ships and stevedores agree to what's called a "pro-forma" for container exchange. The shipping company agrees it will send a ship with a given number of containers onboard. The stevedore agrees to unload a certain number of import boxes from the ship and then to load a certain number of export boxes back onto the ship in a set time. Unloading and discharge has to be done in, and on, time because there are always more ships waiting. Remember, Australia has an imbalanced container trade and full boxes / ships tend to get the highest priority. Empty boxes, and ships carrying empty boxes, don't.

During the peak of the congested period last year, the pro-forma exchange severely hindered the ability of ships to export empty boxes.

Stevedores reported that, where they could, they tried to work above pro-forma and to not limit container exchange. There's little that can be done to boost this – terminals have their capacity limits like everyone and everything else. Although, since this article was written, we have since learned that container port performance could be better than it is.

Futile: calling for more sweepers and loaders

Ocean shipping companies have been bringing more sweepers and empty loaders. However, Shipping Australia cautioned, and continues to caution, against giving undue attention to

arguments that all the problems can be solved by the shipping industry simply by putting on more empty loaders. If there are no, or few, berth slots available then extra loaders and sweepers physically cannot be brought into port to evacuate empty boxes. Calling for extra sweepers and loaders is futile as, and until, berth slots become available.

Late container hire charges

Likewise, there have been a lot of calls for a blanket suspension on late container hire charges. A blanket suspension would not solve any empty container management issues and, without a financial incentive to return boxes, could make empty box congestion worse.

Ocean carriers are reasonable and are willing to discuss and take reasonable steps in relation to container hire charges. Anyone affected can discuss late container hire charges with the carrier in question. And remember, it's a free market. Meanwhile, businesses that are potentially subject to late container hire charges can take various steps to protect themselves such as passing on charges to their customers.

Ultimately, many of these problems will resolve when demand declines and that's likely to happen when the pandemic starts to decline. The pandemic is likely to decline when the roll-out of the vaccine is substantially complete. At the time of editing of this article, that is, alas, some time off. ▲

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Local container logistics, world container logistics: delay and disruption

By SHIPPING AUSTRALIA

World ocean container shipping has been subject to great disruption over the last 12 to 18 months.

Global delays, local troubles

Ocean shipping is a global industry. Ships sail in a loop – they call first at various other countries, then at seaports in Australia, and they then call at those other countries again. Delays in one country throw vessels off-schedule right around the loop. So what happens on the other side of the ocean may have profound effects here in Australia.

Astonishing delays were reported around the world. Who can forget the astonishing video of hordes of box-ships anchored off Los Angeles in the early part of 2021? Ships were also delayed in South East Asia and in New Zealand. There was a particularly severe problem on the other side of the Tasman – there were delays of about 20 days in New Zealand. This caused knock-on effects here in Australia. If there is no berthing window available when the ship arrives, then the ship must wait until it can be berthed.

Delays vs waiting

Incidentally, it is an important point to note the careful choice of terminology. When the container terminal operators say there is no delay in berthing, they mean that if a ship arrives on-window then there is no delay in getting the ship berthed.

If the ship arrives off-window because of nearly three weeks of delay in New Zealand then the ship likely won't be berthed immediately. It will have to wait. But, apparently, that's not a "delay", it's a "wait". Readers will, we are sure,

appreciate the subtle difference between "waiting" days for a berth and being "delayed" for days for a berth.

Ships are likely to slow down to save on fuel costs if there is extensive delays or wait-times ahead of them. So while there might not be queues of ships lining up off the coast waiting to go into a given port or to a given container terminal, it does not mean that the congestion does not exist.

Costs of delay, coping with delay

It is clear that the cost of delay for a ship is massive. Based on Q1 publicly-available figures, a benchmark one-week cost of a 4,000 to 5,000 TEU ship would have been in excess of AU\$440,000.

Ocean shipping companies have been observed to cope with the challenge of delays in different ways.

Some have, in the past, opted for surcharges. Some have opted to skip a port or have opted to reduce the frequency of calling at that port (e.g. call every other week instead of weekly). Some have opted to change port rotations.

Such adaptations to difficult circumstances by shipping lines has boosted the resilience of the Australian supply chain. Ultimately, this means goods continue to be delivered to supermarkets and remain available for everyday Australian families to buy.

Container logistics doesn't work without containers

Without containers there is no carriage of containerised freight. The rapid processing, unpacking and return of containers therefore needs to be prioritised. If there were to be little to no cost for consignees to remain in

possession of containers, then there would be little incentive for containers to be returned to ocean shipping lines.

Containers would therefore not likely be returned to ocean shipping companies in good time.

If containers are not returned to ocean shipping companies, then the whole logistics system will quickly grind to a halt.

Container hire

We must always remember that the shipping container is usually (but not always) the asset of the ocean shipping company. It represents tied-up capital that could otherwise be put to different, and perhaps, higher value use.

Shipping companies are entitled to decide for themselves if they want to charge, or if they do not want to charge, for the use of that asset. They are also entitled to charge daily hire fees to a third party who has possession of their container. Or not, if they don't want to. It's up to them.

Hire of containers is a commercial matter between the shipper and the carrier. It makes up part of their carriage contract, so therefore shippers should consider the full cost of transport when choosing a carrier.

If there are any problems, individual users of ocean shipping services can also, if they want, talk to their carrier to discuss any particular term or aspect of the carriage services offered to them or which they have bought.

It should also be noted that shipping lines are not in the business of container farming. They are in the business of freight transport. Container rental income is a sign that containers need to be put back into circulation. ▲

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Why was there a shortage of food grade containers around the world?

By SHIPPING AUSTRALIA



*Pictured: a large box ship underway.
Photo credit: Maritime Filming UK via Pixabay.*

Producers of all kinds of agricultural produce around the world may be finding it difficult to obtain a food grade container to ship their goods to export markets.

Unfortunately, this is a complex problem and, alas, it is one we have seen before. This time around though, it is also aggravated by the COVID-19 crisis.

What is a food grade container?

Let us tell you what it is not: it is not a “clean” container. A “clean” container is an ocean shipping box that is merely in good repair, clean and without infestation by pests. A “food grade” container is a box that is in a much greater state of cleanliness and repair. Shipping Australia has a fact sheet available on our website.

Shippers and consignees need to remember that “clean” containers are not “food grade” containers. If someone needs a “food grade” container they must specifically ask the shipping line for a “food grade” container.

Zen and the art of empty container inventory management

The owners of ocean shipping containers are, in the vast majority of cases, ocean shipping companies and they manage the inventory of boxes. As any manager of any kind of business which stocks any kind of inventory will tell you, inventory control is a vital function of that business. Get it wrong and *Very Bad Things* will ensue.

There are hundreds of millions of containers floating around the world at any given time (about 215 million to 220 million each year, approximately). A good percentage of those are empty at any given time. A percentage of those are “clean” containers and a much smaller, tiny percentage of those at any given time are “food grade” containers.

Shuffling boxes around the world to meet demand for the containerised carriage of grains is a major logistical task.

For the vast majority of time, in the vast majority of situations, the system works well.

But every now and then there is a demand vs supply crunch.

Crunchy: the demand side of supply and demand

Demand for boxes is not even. At different times of the year, and in different parts of the year, demand for boxes will vary. For instance, in the run up to Christmas on the China-Australia trade, there is a higher demand for boxes. But that demand falls away at other times of the year.

We live on a four-season planet so there are different seasons around the world for the growing, harvest and transport of agri-products. Wheat in Australia is generally harvested October to February. On the other side of the planet, Mexican wheat is harvested April to July. Remember too, that there are different harvest seasons for different types of

grain. Australian soybean is harvested between March and May, Mexican soybean between October and February. Seasonality makes for uneven demand.

Sometimes though, farming being farming, there is a massive production of a given crop. Look at this headline from 1 December 2020: “ABARES tips monster grain harvest of 51.5 million tonnes”, and also this one from 22 December 2020: “Grain harvest exceeds expectations in Australia”.

So the volume of crops in any given year is uncertain. The potential volume of grain crops for any near-future season is best estimated and forecast by growers, shippers and exporters. They are, after all, the experts in their businesses. So it is incumbent upon them to forecast their likely production, to estimate their likely transport demand, and to book “food grade” shipping containers in good time.

Producers booking boxes in advance is particularly important when they know that there will be a big harvest. Regardless of the exact nature of the product in question, it is well-known that if there is a huge surge in demand, and if supply might not be able to keep up, then there could be a demand-induced crunch.

Crunchy: the supply side of supply and demand

Shipping lines only keep small volumes of “food grade” containers in stock at any given place at any given time. They generally tend to gear up for “food grade” containers in response to customer orders.

There are a few reasons why.

Firstly, it's the inventory management aspect. A box costs money in terms of the up-front purchase cost, along with costs for repair and maintenance. Non-moving boxes cost freight-earning opportunities. So carriers don't keep large volumes of “food grade” boxes in stock at any given place. Unused boxes tend to be evacuated to where they are needed.

Meanwhile, other customers in other parts of the world at a variety of times will have a high demand for “food grade” boxes, or “clean” boxes that can be upgraded to “food grade” quality.

Thirdly, getting the right boxes to the right place at the right time so that they can be emptied, repaired, cleaned and upgraded



to “food” quality takes time, effort and money. It costs about AUD\$150 to \$250 to upgrade a “clean” container into a “food grade” container and that's not taking into account the cost of moving a box from one side of the planet to the other. That's a big inventory cost when we're talking about a fraction of hundreds of millions of containers in the world fleet.

Pinchy: quality standards and hard capacity limits

In this area of business, as in so many other areas of business, there are pinch-points. The standards for “food grade” containers are set in Australia by the Department of Agriculture, Water and the Environment. They are not voluntary or customisable standards – they have to be met. So that, again, imposes cost and delay pressures. This is not an argument to reduce standards – we're just explaining why there's a pinch-point.

Another serious pinch-point is the limit imposed by infrastructure capacity. Building infrastructure is time consuming and very, very, costly. So businesses tend to build only as much infrastructure as they need. Key infrastructure in this case is the container depot. Again, just like any other piece of infrastructure, it can only handle and process so many containers in a given duration of time. So if there is a surge in orders, even with the very best and sustained optimal efforts, the depot will only be able to process a given number of “clean” containers into “food grade” containers per day.

Infrastructure imposes a hard capacity limit and there's little wiggle room to get around such limits during a temporary surge in demand.

These last 18 months

Industry executives and regular readers of Shipping Australia media will be familiar with the many COVID-related issues in the

international logistics industry.

In a nutshell, there were heaps of empty boxes stuck in places in Australia where people mostly did not want them to be. This adversely affected availability of “food grade” containers because (a) general container inventory management issues and (b) because “food” grade containers are created by upgrading some of the general container stock. If the general containers aren't in the right place to be upgraded, then a shortage of “food grade” containers will ensue.

Ship safety issues

Containerised grain is a very heavy cargo, which can present ship stability and safety issues.

Consider individual grains of, say, wheat. Those grains will settle closely to each other and although each individual grain is very light, together they are very heavy. In comparison, consider, say, children's toys. There is a lot of empty space inside a single package containing a child's toy. So a container full of children's toys is quite light compared to a container full of grain.

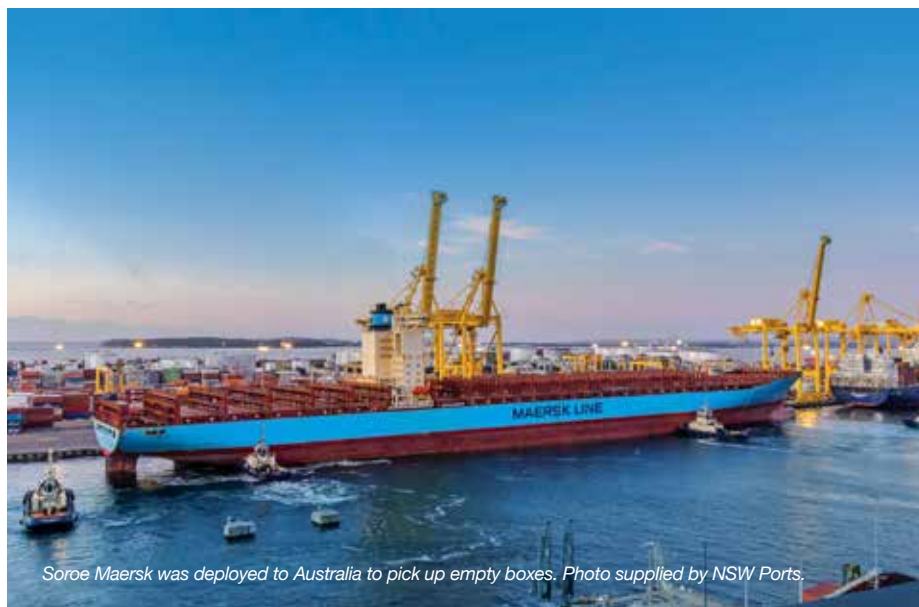
This is relevant for the safety of a ship. A container ship can only safely carry a given weight of cargo. If the cargo is too heavy, the ship settles down too low in the water which makes the ship vulnerable to being sunk or overturned by big waves. Such safety concerns limit capacity.

Because agri-product containing containers are so heavy, a given ship can only carry a limited amount of that containerised product. And, because grain cargoes are so heavy, they tend to be exported in twenty foot rather than forty foot containers. So if there are hordes of forty foot containers being imported, but twenty foot boxes are needed for agri-exports, that will also create or exacerbate a food container shortage. ▲

Q&A:

Ocean shipping companies led the fight against the empty container build-up!

By SHIPPING AUSTRALIA



Ocean shipping lines deployed extra-loader vessels to Australia, at a high financial cost, to help clear the empty container build-up. The willingness of shipping lines to make direct cost outlays and forego revenue to reduce the empty container backlog showed the incredible support that has been given by ocean carriers to keeping Australia's supply chain functioning.

Empty container congestion was a problem at major ports all around the world and began to become particularly serious at Port Botany from about March 2020 onwards.

Drivers of empty container congestion

Empty box congestion was driven by unprecedented consumer demand for goods. That was, in turn, driven by a COVID-induced shift from spending on services (such as going out for dinner or on international holidays). At Port Botany,

the problem was particularly exacerbated by weather events and industrial action.

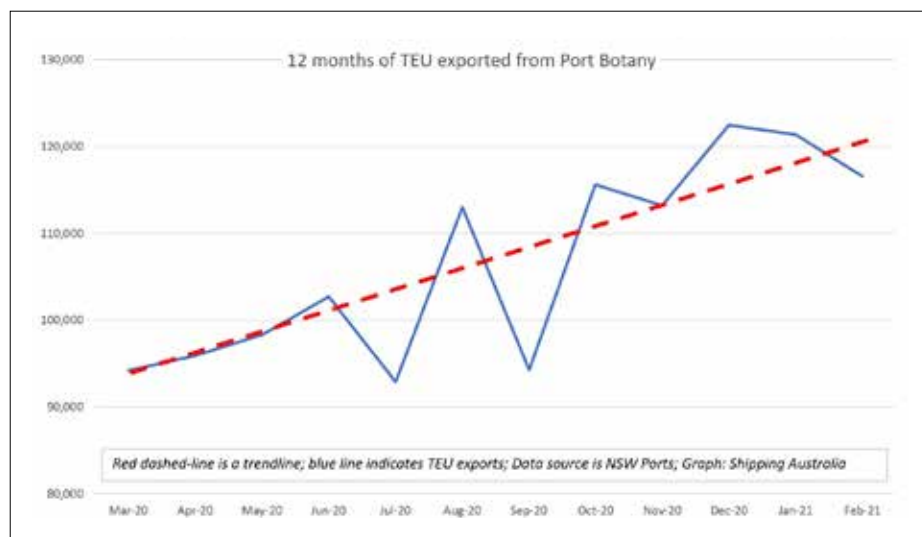
Carriers were also limited to their contracted container exchanges. So, for instance, if a ship had two thousand TEU

of imports and was only allowed 2,500 exchanges, then only 500 TEU of boxes could be exported.

Owing to the surge in demand for merchandise trade goods, container congestion was inevitable unless additional calls were made just to pick up exports. Our members deployed extra ships and made extra port calls to alleviate the problem. This, of course, came at a cost (see box "Action: shipping lines evacuated boxes!").

NSW Transport Minister recognised record empties evacuation

NSW Transport and Roads Minister, Andrew Constance pointed out in a publicly-released letter that it is important to recognise that the international supply chain is not within the State Government's control. He added that it is necessary to ensure that any intervention in one part of the supply chain does not result in a long term impact on overall supply chain costs or have unintended outcomes.



Minister Constance also noted that record numbers of empty containers were exported. He explained that, in October 2020, more than 78,000 empty TEU were exported and in November 2020, more than 75,000 empty TEU were exported. That compared to a low of about 51,000 empty container exports in February 2020 and a monthly average of about 64,000 empty TEU in the preceding 12 months.

Shipping Australia's ocean carrier members undertook a heavy financial burden to help ease Australia's supply chain woes. To illustrate the scale of the commitment of the shipping lines, we can put some rough figures to at least one of these examples. For the avoidance of doubt or confusion, in the following example we obtained figures from publicly-accessible sources. The example below does not contain actual data from any shipping line. It should be noted that there are many variables, one of which is the passage of time. Accordingly, the numbers given in the example below are only valid at the time of writing.

Expensive: deviating a ship from the Singapore-Fremantle run

For the purpose of this example we will assume that a vessel deviated from the Singapore-Fremantle run is about 4,250 TEU in size. Incidentally, the cost wouldn't be much less for a smaller ship, but it would likely be substantially greater for a bigger vessel. As ships get bigger and go faster, they consume a disproportionately greater and greater volume of fuel to overcome water resistance and to propel the vessel. The more fuel consumed, the greater the cost.

A return journey Singapore to Sydney is more than 9,500 nautical miles. At a speed of 24 knots, that's at least a 16-day sailing time (not counting time in port). The actual sailing time may be a little greater, taking into account weather, currents, routing and other such variables. With crew wages, fuel, daily insurance costs, lubricants, stores, crew provisions, daily charter rate, towage, pilotage, mooring fees, port charges and so on, that's easily an AUD \$1.5 million voyage.

And remember: the shipping line in question has already deviated that vessel

Action: shipping lines evacuated boxes!

Member shipping lines have reported a variety of actions that they took to combat congestion. Lines curtailed laden exports and even diverted ships to pick-up empties. This of course, costs a lot of money in direct costs and foregone revenues. Some (but not all) of the actions taken by shipping lines were as follows:

- a line successfully reduced its empty inventory from 13,000 to 5,000 TEUs
- another line reduced its empty inventory from 25,000 to 16,000 TEUs
- a third line completely emptied its empty container stock out of NSW
- a vessel on the North East Asia to New Zealand service was diverted to Sydney to evacuate empties
- two vessels omitted Melbourne and only called at Sydney and Brisbane, for a period of time, so as to fill up with empties
- Maersk Line diverted a plus 8,000 TEU ship as an empty loader from Thailand to Botany and Melbourne then to Vietnam
- a vessel normally deployed on the Singapore-Fremantle run was taken out of service to run a Singapore-Sydney-Singapore voyage to load empties that vessel had already been re-directed to pick up empties twice before
- a shipping line introduced two vessels as peak season extra loaders – one of about 2,200 TEU and another of about 2,800 TEU to pick up empties
- yet another shipping line evacuated over 12,000 empty forty footers and over 9,000 twenty footers, equalling about 33,555 TEU over a four month period. About 75 per cent of that, about 25,166 TEU, was evacuated from Sydney and Melbourne
- a same shipping line ran an ad-hoc loader (included in the volume figures immediately above) which took out 2,114 empty TEU
- a shipping line ran an empty loader in November to take out 1,384 empty TEU – but it had to wait SEVEN days for a berth.

from regular service to pick up empties in Sydney at least twice.

Foregone freight

We also have consider the opportunity cost of the forgone freight because the voyage is completely empty with no freight revenue at all.

Shipping Australia understands from the Freightos Global Container Index that the freight rate for a forty-foot box at the end of 2020 was about USD\$3,143. The FGCI is a composite index of multiple routes and presents an indication of what kind of rate a non-vessel operating common carrier might get on the spot market.

However, the spot freight rate simply cannot be multiplied by the number of boxes to give a rough estimate of revenues. High volume and repeat customers are likely to have negotiated discounts; some boxes will have been booked a long time ago when freight rates were much lower; different cargo may affect different freight according to shipping company policy and so on. But the spot-market rate does illustrate

that there was highly significant revenue being forgone by the shipping company.

Consider also the forgone freight revenues on what would have been the return Fremantle-Singapore journey. According to MizzenIT, the northbound freight rate was about 62% less than southbound in late December 2020.

As about 57% of export boxes from Fremantle are empty, it can be further assumed that the 4,250 TEU box ship would also be 57 per cent empty too. That would potentially give the ship about 1,807 full boxes generating freight rates on the backhaul. Again, a lot of variables, but clearly the shipping company also missed out on a large amount of revenue on the backhaul voyage.

There is no doubt that a shipping line deviating from the Singapore-Fremantle route to pick up boxes from Sydney incurred massive financial costs and missed out on an even greater amount of freight revenue. And all in the service of helping to clear the congestion of empty containers. ▲

Q&A:

Terminal Access Charges

By SHIPPING AUSTRALIA

Why are international maritime freight charges usually so low?

International containerised freight transport is a highly competitive business that has been undergoing a decades-long technology and process-driven evolution.

International ocean container shipping should be thought of as a comprehensive inter-connected system for the movement of freight. It has undergone incredible innovation throughout its history. This includes mechanical innovation, such as twist-locks and container specifications; nautical innovation, such as increasing the size and optimising the design of container ships and container terminals; and technological innovation, such as advanced cargo-management software, whether aboard the ship or ashore.

These developments have improved the levels of service and have reduced the cost of sea freight massively over the past 50 years. Back in 1956, loading of a medium sized break-bulk ship cost US\$5.83 per US ton. Loading of the first true container ship, the Ideal-X, in 1956 was US\$0.16 per US ton. Container shipping was literally 36 times cheaper than the alternative. It was also weeks faster to load and discharge too.

Excluding the effects of the recent boom, international sea freight costs are rising at less than the cost of inflation (which means it's getting cheaper relative to the costs of goods and services). According to a Deloitte report commissioned by the Victorian Government, the nominal cost of importing containers by sea (including all terminal handling and access charges) has only increased by 6% between 2010 and 2019, and the nominal cost of exporting by 13%,

whereas the Consumer Price Index increased by 20%. The Deloitte Report was quoted at a Ministerial briefing to the freight industry at Port of Melbourne on 30 January 2020.

By causing the cost of freight to plummet and by improving the ability of shippers to transport goods over the vast oceans to buyers, containerisation has expanded the range of goods for sale while also causing a huge drop in price of those goods. The efficiency of international sea container freight has changed our world for the better.

What is a "Terminal Handling Charge"?

A Terminal Handling Charge is a charge issued by container terminals and shipping lines to recover a variety of costs involved in the handling of an ocean container at the terminal. Every port and terminal applies its charges in its own way and each shipping line decides for itself what costs are included in its freight rate and what costs are included in its Terminal Handling Charge. A "Terminal Handling Charge" is not the same thing as a "Terminal Access Charge".

What is a "Terminal Access Charge"?

A Terminal Access Charge is a charge for access to a container terminal that is levied by a container terminal operator on its land-based shipping customers. These customers are usually trucking or rail companies. For simplicity and readability, we will refer here to trucking companies. However, what we write here may well apply to rail companies too. Terminal Access Charges are also known by a variety of names such as "Infrastructure Surcharges". For

simplicity and readability, we refer to these access-related charges as "Terminal Access Charges".

Is it fair for companies to charge for access to their premises?

The owner of any asset, such as land, is entitled to charge other people for access to its premises. The operator of a private highway charges tolls for road users to access the road. If you, as a road user, want to use the road then you must pay the toll, which is a form of access charge. Similarly, a container terminal operator is entitled to charge trucking companies a Terminal Access Charge for access to its terminal.

Is it fair for stevedores to charge trucking companies a Terminal Access Charge?

In commerce, if you benefit from using someone else's property, then you have to pay to use it. Container terminal operators provide and maintain land transport-related infrastructure such as roads, roundabouts, weighbridges, ramps, parking, holding points, turnaround facilities, rail links and information systems that enable transport operators to manage their assets more efficiently.

Trucking companies simply could not provide services to their customers if this infrastructure had not been provided by container terminal operators.

Stevedores have not previously charged trucking companies for access to their terminal. However, that has now changed. It is reasonable for container terminal operators to ask trucking companies, which benefit from infrastructure that has been provided for them to use, to pay a financial

contribution to the cost and upkeep of that infrastructure.

Does that mean that trucking companies are now customers of container terminal operators?

Yes. The Merriam-Webster dictionary definition of a “customer” is “one that buys a commodity or service”. To “buy” means to acquire possession of, or the rights to use, goods or services in return for the payment of money.

If a private highway operator allows your car to access its highway on condition that you will provide financial compensation for that access, then you have used a service in return for the payment of money. In that situation you are, by definition, a customer of the private highway operator.

If a container terminal operator allows a truck to access its terminal on the condition that the trucking company will provide financial compensation for that access, then the trucking company has used a service in return for the payment of money. In that situation, the trucking company is, by definition, a customer of the container terminal operator.

But shipping companies are also customers of terminals. Shouldn't shipping companies also pay for truck access?

No, not at all. A container terminal is the interface between the sea and the land, and it exists for the benefit of both ships and trucks.

Ships enter a terminal via the sea, and they pick up and drop off containers. Stevedores and port authorities have provided dedicated ship-specific infrastructure such as ship-to-shore cranes, wharves, and loading/discharge areas. This infrastructure has been provided for the benefit of ships. Shipping companies pay to use that infrastructure through stevedoring and wharfage charges.

Trucks enter a terminal via the land, and they pick up and drop off containers. Stevedores have provided dedicated truck-specific infrastructure such as roads, roundabouts, ramps, parking, weighbridges, turnaround facilities and transport booking systems. This infrastructure and technology has been provided for the benefit of trucks.

Trucking companies pay to use that infrastructure and technology through Terminal Access Charges.

If it is fair for stevedores to charge shipping companies to use ship-related terminal infrastructure because it benefits ships, then it is equally fair for stevedores to charge trucking companies to use trucking-related terminal infrastructure that benefits trucks.

But trucking companies and shipping companies both use the same ports and terminals. Shouldn't ships pay for trucks?

No, not at all. Trucking companies and ocean shipping companies are both service providers to the cargo owner(s). Both sets of companies incur costs for the services they supply to the cargo owner and they may or may not decide to absorb those costs or to issue a charge. For example, a wharfage charge is incurred by the ocean shipping company. It may decide for itself to absorb that cost or to recover that cost. Correspondingly, a Terminal Access Charge is incurred by the trucking company and it is up to that operator to decide whether it wants to absorb that cost or to recover that cost.

It is unfair to expect shipping companies to subsidise the ordinary business costs of trucking companies merely because they both provide services to cargo owners and, in the course of providing those services, merely because they both use the same supplier.

Why have stevedores now issued a Terminal Access Charge after years of letting trucks into their terminals either for free or at low cost?

Stevedores in Australia have had to adapt to increased competition, higher rent, and consolidation of shipping lines. These factors have led to smaller market shares per container terminal operator, increased costs, and lower revenues. State governments and industry associations have also demanded greater efficiencies for transport operators collecting and receiving containers.

Australian container terminal operators have experienced substantial hikes in property-related costs in the lead up to,

and following, port privatisation. While there is some level of price monitoring and control over port charges this does not always extend to control over the amount of rent charged to stevedores.

Container terminal operators are also often required by their landlord to invest in infrastructure to improve the efficiency of cargo throughput on the landside. The result of this investment is intended to directly benefit trucks, with more efficient loading/unloading, less paperwork, less waiting time, and generally lower turnaround times.

Like everyone else, stevedores need to cover their costs, undertake maintenance, invest in the future, and provide a return to their shareholders.

Why is the Terminal Access Charge controversial?

Trucking companies previously had terminal access for free (or at low cost) but now they must pay. No one likes to pay for a service previously provided for free (or at low cost). Like any other cost that trucking companies incur, a Terminal Access Charge may potentially affect cashflow and profitability. Trucking operators also have concerns both about the price of access (up to about \$131 at the time of writing) and the fact that the cost has increased over time.

Container terminal operators have decided to recover the costs of the significant investments made for the benefit of landside transport operators by charging landside transport operators.

The new Terminal Access Charge is just another cost of doing business. All businesses must pay their own costs. That's just a commercial reality. ▲

Geelong Port's Dr Lisa Mills

Glitter mountains, accidental dolphins and a life devoted to nature

By SHIPPING AUSTRALIA

Environmental engineer Dr Lisa Mills was agnostic.

She had just accidentally glittered Africa's tallest and most sacred mountain.

"I was horrified," she confesses.

Mount Kilimanjaro tour guides had been very insistent that trekkers, of which Lisa was one, should not leave behind any trace of their presence on the top of the mountain.

"And here I was, leaving a very sparkly trace!"

Lisa longs to see the most beautiful parts of nature before they are despoiled by humans. One of those environments is the top of Kilimanjaro. Its 11,000 year-old glaciers are forecast to melt by the mid-2030s.

Although only hiking skills are needed to get to the top of Kilimanjaro, it's not casually done. So Lisa prepared for her bucket-list trip with six months of hiking, running with 16kg weights, and three-times-a-week gym workouts.

"I'm not in the special forces, I'm a mother-of-two, but I put in as much effort as I could!" she laughs.

Imagine hiking up a 5,892 metre mountain. Because it's so big, it has many eco-systems: jungle, forest, alpine and arctic. The weather changes. It's hot. It's cold. It's stormy. You get hit from all sides.

The tour is timed so that you reach the top at sunrise. The guides wake you at 11pm and you hike through the freezing night. It's an arduous and miserable slog. But then you arrive at the summit. The sun is rising, the sky is blue and the Earth curves away far below. You marvel at the view.

"There was this sunrise, and the glaciers that I'd come to see. I was really tired. Ohh! I cried! I know that sounds really lame! I was especially sad that this environment wouldn't be there for other people in the future. So I sat and had my little cry. My daughter, only six at the time, had written a letter to me. Her instructions were to not read it until I was at the top.

"And then I pulled myself together to read my happy letter. I pulled it out, but my daughter had filled it with glitter! It flew out and, oh my goodness, there was multi-coloured glitter everywhere! I had to spend ages picking it up!

"I was so tired from the lack of sleep and the effort to reach the summit... and I had to expend more energy picking up after my daughter! It was like I was still at home!" she chuckles.

A proud nerd inspired by nature

Lisa's life has been shaped by a love of nature.

Her whole career likely has its origin in her disgust for pollution near where she grew up.

Pictured: Lisa on top of Mount Kilimanjaro with her daughter's letter. And not a trace of glitter to be seen! Photo supplied by Dr Lisa Mills.

"It's where the forest meets the sea. Beautiful surf, mountains, hiking and biking and it's all centred on nature. I was disgusted that this beautiful little cove where I swam, surfed and fished was subject to pollution. I wanted to look for a solution," she explains.

She loved maths and science, which she saw as having "awesome potential" for a career, and she wanted to help save the planet. Studying chemistry, engineering and science would enable her to do just that. Today, Lisa has a chemistry-focused degree (1993), a degree in environmental engineering (1999), a doctorate focused on environmental remediation (2004), and a Master's degree in Occupational Hygiene and Toxicology (2019).

"I describe myself as a proud nerd," she says.

Baking biosolids

Lisa wanted to get involved with mining so she could help with the remediation of mining-related wastewater. Her doctoral research focused on the use of bio-solids for the removal of toxic heavy metals. And she succeeded although the result was a bit... stinky.

"I found that if you take wastewater sludge, dry it, then grind it up, you can use it to remove heavy metals and cyanide, which decontaminates water at a relatively low cost," she says.

"I caused the evacuation of a building once. I left the material in the oven over the weekend. The lecturers and students came in on the Monday to the most terrible smell!"

She proved that the decontamination process works. Unfortunately, there hasn't been a commercial take-up. It's common for academic work to not make the leap to the commercial world.

"I found it sad. It has a lot of promise and it could be used in a real-world application. It's disappointing not to see it used, but that's the nature of academia," she says philosophically.

Engineering a future

Lisa was fortunate in the early 2000s to land a job with international industrial group Alcoa. She provided occupational hygiene and environmental expertise at industrial plants such as the Point Henry Aluminium Smelter, the Portland

Aluminium Smelter and the Anglesea Power Station.

"I'd always been interested in mining and Alcoa was in mining. They had excellent systems and processes. As an engineer, that's what I was looking for. There were highly skilled workers that I could buddy up with and learn from... I got a really great grounding in robust systems and processes and that was complemented by being able to spend time with highly skilled people," she says.

A new direction

Eventually, Alcoa's old industrial plant just couldn't keep up with new plant built overseas. There was a downsizing and Lisa moved on in 2015. She wanted to work in a greener industry, which led to a short stint in an environmental consultancy. Although it was an interesting role, there was too much of a work-family clash. "There was a lot of travel. It was impacting our family dynamics too much. For me, working is important and I get a lot of satisfaction out of it. But I've got to balance that with the satisfaction of seeing my family everyday".

A perfect role

Lisa entered the maritime world in 2017 with an environmentally-focused role at GeelongPort. It's the premier bulk port in Victoria, handling more than 10 million tonnes of cargo and over 600 ships each year.

"GeelongPort had never had a stand-alone environmental role... but there was an awareness of the increasing importance of the environment. I was dead keen to take it up. Here it was, a major shipping port, in my hometown, on the beautiful shores of Corio Bay. For someone who wants to help protect the planet, I felt that this role was meant for me. I couldn't ask for more".

The maritime sector has its own, odd, terminology though. Early on, an engineer came to Lisa saying there had been an incident with a dolphin. He, of course, meant a mooring dolphin.

"I was thinking 'Oh no! Where am I going to get a wildlife expert from?!?' The panic that I felt! So I went to the wharf. 'Where's the dolphin?' I asked. 'You're looking at it', the engineer said, deadpan".



Pictured: Lisa proudly holds her Master's Degree Certificate in Occupational Hygiene and Toxicology. Photo supplied by Dr Lisa Mills.

50% of the population

As an industry newcomer, it was apparent to Lisa that ports and shipping needs to tackle gender diversity. "We need to increase diversity in our ranks. If we leave it as it is, we are only tapping into 50% of our potential". She urges leaders to make the industry inclusive by making it a place where women want to be and can thrive. Showing successful role models, sharing their stories, and providing a network are ways that could help, she says.

In 2019, Lisa was part of Homeward Bound — a global women's leadership initiative for women working in Science, Technology, Engineering, Maths and Medicine. It was aimed at giving female leaders the skills to sit at the leadership table and to help solve some of the problems that the world is facing.

"It taught me to be courageous and to step out of my comfort zone. And so I've pushed at the boundaries of the environmental programme at GeelongPort which we wouldn't perhaps have otherwise done," she says.

Successes: strategy, carbon emissions, certification

There's a mix of strategy and hands-on work at GeelongPort. For instance,

Lisa carries out water sampling. Bulk commodities like fertilizer can be dusty, so she ensures that impacts are managed, and that product is tracked so it doesn't end-up on roads or in drains. Lisa feels lucky that environmental management is a fairly new discipline, which means she could set up systems at GeelongPort. "It's not often you get to come into a role without extensive pre-established procedures. I can do it my way and set benchmarks. I get a lot of satisfaction from it", she says.

Lisa helped create GeelongPort's 20-year environmental strategy. She carried out wide-ranging consultations and learned that the conservation and protection of Corio Bay was of the utmost importance.

"We designed our enviro-strategy around that. I'm really proud of it as it has enabled us to get buy-in. We listened and we found out what was important. It really provides us with a road-map for decision-making. It is mapped to the UN Sustainable Development Goals. At GeelongPort, we are able to demonstrate that we are contributing to important solutions that the world needs".

The port is also the first port in Australia to make a commitment to a science-based carbon emission target of a 50% reduction by 2030. "To be the first port to do that is really satisfying," Lisa says.

GeelongPort has also achieved "Port Environment Review Systems" certification, which is an international environmental management system specifically for ports. It is the second port in Australasia to be certified to that standard.

"That tells me that the systems and processes we have in place are really world-class. What it means is that we need to have processes in place where we identify all of our enviro-risks and we implement control measures. We provide data to prove we have reduced risks and this can be public or private.

"Public reporting is just kicking off and we're looking forward to it!" she enthuses. ▲

An apparent lacuna

By GREGORY NELL SC, chair, AMTAC, barrister, New Chambers, Sydney.

A striking feature of the Carriage of Goods By Sea Act 1991 (Cth) (COGSA) is s.11 of that Act which contains mandatory provisions relating to the governing law of, and effectiveness of foreign jurisdiction and arbitration clauses in, certain contracts for the carriage of goods by sea. But paradoxically, whilst COGSA regulates such contracts for the carriage of goods by sea into and out of Australia, as well as between Australian States, s.11 is more confined in its application, being limited only to the former types of contracts. As a result, the parties to contracts for the inter-State carriage of goods by sea are free to agree to their contract being governed by foreign law rather than Australian law, and for any claims arising under such inter-State contracts for the carriage of goods by sea to be determined by foreign courts or arbitration overseas. This is notwithstanding that such contracts are otherwise subject to and regulated by both COGSA and the modified Rules which COGSA gives effect to, and that COGSA otherwise renders such agreements in contracts for the carriage

of goods by sea into and out of Australia inoperative and of no effect.

This apparent lacuna in the application of s.11 of COGSA appears to be the result of legislative oversight and/or inertia, rather than a deliberate decision based on policy considerations. That being so and given its potential to prejudice the shippers and consignees of inter-State shipments, especially when compared to Australian importers and exporters, this lacuna should be rectified.

Background

In 1904, as a result of the successful lobbying efforts of disgruntled Australian fruit exporters who complained that shipping companies took no responsibility for the safe carriage of their produce, the Commonwealth Parliament passed the Sea Carriage of Goods Act 1904 (Cth). This was modelled on the US Harter Act and designed to protect Australian shippers by preventing carriers from contracting out of their liability for negligence.

The drafters of the 1904 Act recognised that the protection intended to be

provided by that Act could be avoided by the simple device of the inclusion of an English (or other foreign) choice of law and/or choice of forum clause in the contract of carriage. Accordingly, s.6 of the 1904 Act provided that all parties to any bill of lading or document relating to the carriage of goods from any place in Australia to any place outside Australia shall be deemed to have intended to contract according to the laws in force at the place of shipment and that any stipulation or agreement to the contrary or which purports to oust the jurisdiction of the Australian Courts in respect of that bill of lading or document shall be "illegal, null and void and of no effect".

The 1904 Act was repealed and replaced by the Sea Carriage of Goods Act 1924 (Cth). This gave effect to what was to later become the Hague Rules, which provided a more balanced allocation of risk and liability between carriers and cargo interests. The protection afforded by s.6 of the 1904 Act was retained in s.9(1) of the 1924 Act.

Further, through the addition of a new s.9(2), the 1924 Act also extended



*Pictured: a mid-sized box ship heads out to sea.
Photo credit: Mohamed Aly via Pixabay.*

the protection of the jurisdiction of Australian Courts to cargoes carried into Australia. This protection had not been available under the 1904 Act. However, in doing so, s.9(2) did not replicate s.9(1) completely. Its application was limited to foreign jurisdiction clauses only. Unlike s.9(1), s.9(2) of the 1924 Act did not prevent the parties to inbound shipments from contracting with a system of law other than Australian law or the law at the place of shipment. Nor did s.9(2) deem the parties to an inbound shipment to have contracted in accordance with any specified system of law, including the law at the place of shipment.

The 1924 Act was in turn repealed with the enactment of COGSA in 1991. This was with the object of inter alia replacing the application of the Hague Rules under the 1924 Act with provisions that gave effect to those Rules as amended by the Visby and SDR Protocols (the Hague Visby Rules), as well as possibly in due course the Hamburg Rules (although that never came to fruition). The protections afforded by ss.9(1) and (2) of the 1924 Act were in substance continued and

repeated in ss.11(1) and (2) of COGSA.

In 1997 and 1998, COGSA was amended with the result that a modified version of the Hague Visby Rules (the modified Rules) was to apply to (inter alia) certain contracts for the carriage of goods by sea from Australian ports. These amendments also introduced into s.11 of COGSA a new subs.(3) which provided that any agreement for the resolution of a dispute by arbitration was not made ineffective by s.11(2) of COGSA if under that agreement the arbitration must be conducted in Australia.

Inter-State shipments and choice of law

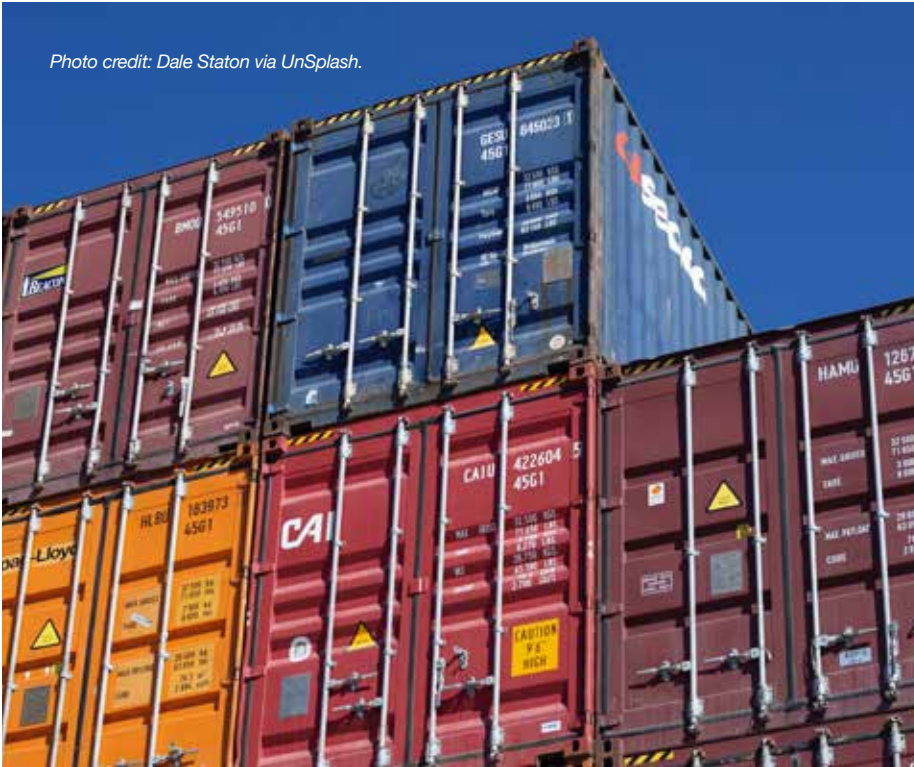
The current provisions of COGSA and its application of the modified Rules regulate not only certain contracts for the carriage of goods by sea into and out of Australia, but also from a port in Australia to a port in another State or Territory of Australia (inter-State shipments). This is pursuant to s.10(1)(b)(ii). The types of contracts to which COGSA and the modified Rules apply are those contained in or

evidenced by a bill of lading, sea waybill, consignment note or similar document falling within the definition of a “sea carriage document” found in Schedule 1A of COGSA.

Section 11(1) of COGSA provides that the parties to such contracts for the carriage of goods by sea from any place in Australia are taken to have intended to contract according to the laws in force at the place of shipment, and thereby Australian law. However, s.11(1) only applies where those goods are to be carried “to any place outside Australia”. It does not apply to any such contracts for the carriage of goods by sea from a port in Australia to any port in another State or Territory of Australia. This is notwithstanding that such contracts are subjected to the modified Rules by the operation of s.10(1)(b)(ii) of COGSA. Nor is there any provision either elsewhere in COGSA or in any other legislation which is to the same effect as s.11(1) and which applies to inter-State shipments.

Further, s.11(2)(a) of COGSA renders inoperative any agreement that purports to preclude or limit the above operation

Photo credit: Dale Staton via Unsplash.



of s.11(1). It is therefore not possible for the parties to a contract of carriage of goods by sea of the type described in s.11(1) to avoid or override the effect of that subsection, for instance by agreeing that their contract is subject to some foreign law. However, s.11(2)(a) is also limited to only those contracts falling within s.11(1), and as such does not apply to contracts for the carriage of goods by sea inter-State. Accordingly, s.11(2)(a) of COGSA does not render a foreign choice of law clause in a contract for the inter-State carriage of goods by sea inoperative or of no effect (even though it does render such a clause in a contract for the carriage of those goods by sea from the same Australian port overseas ineffective).

Where a contract is made in Australia for the inter-State carriage of goods by sea, that contract might ordinarily be expected to be governed by Australian law, and in particular the law of the State or Territory from which those goods are shipped. That is either as the inferred choice of the parties to that contract of carriage having regard to the circumstances in which it was made, or as the system of law with which that contract of carriage has its closest and most real connection. But this is subject to the express agreement of the parties, who in the absence of provisions such as s.11(1) and (2) (a) of COGSA or other public policy considerations, are free to choose the system of law that is to govern the contract of carriage between them. In

particular, the parties are free to agree that their contract of carriage should be governed by a system of law other than that in place at the port of shipment, including any foreign law. Furthermore, in the absence of provisions such as s.11(1) and (2)(a) of COGSA or other public policy considerations, Australian courts will generally give effect to the parties' express choice of the law that is to govern their contract. Moreover, this is so even where that contract otherwise has no connection with the system of law that the parties have chosen.

Accordingly, where COGSA neither deems the parties to a contract for the inter-State carriage of goods by sea to have intended to contract in accordance with the law in force at the place of shipment in Australia, nor precludes or prevents those parties from agreeing that their contract is to be governed by

a system of law other than the law in force at the port of shipment and thereby Australian law, then that choice is both unlikely to be set aside on public policy grounds and therefore likely to be upheld and enforced, even by an Australian Court.

This ability of the parties to a contract for the inter-State carriage of goods by sea of the type regulated by COGSA to agree that their contract of carriage is governed by a system of law other than that in force at the place of shipment, including thereby foreign law, is anomalous. This is especially when compared to contracts for the carriage of goods by sea from that same Australian port overseas. This is even more so for shipments from ports in New South Wales where similar protections to those afforded by s.11 of COGSA also apply to contracts for the carriage of goods by sea wholly within that State, pursuant to s.6 of the Sea-Carriage of Goods (State) Act 1921 (NSW).

Moreover, the policy considerations underlying s.11(1) and (2)(a) of COGSA would seem at the very least to apply equally to contracts for the inter-State carriage of goods by sea. Indeed, one might be forgiven for thinking that the case for the application of these policy considerations to inter-State shipments is stronger and more apt where the intended carriage is from one Australian port to another port in Australia and essentially performed within Australian waters. This is especially where such contracts for the inter-State carriage of goods by sea can be made with foreign ship owners and shipping companies operating on coastal routes within Australia, who are more likely to include



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or insist upon including in the terms upon which they carry those goods inter-State, clauses providing for the application of a foreign system of law to which they are more amenable, in preference to Australian law.

Admittedly, it may be open to an Australian Court to strike down a foreign choice of law clause in a contract for the inter-State carriage of goods by sea by the application of Article 3 rule 8 of the modified Rules. But that is only if (a) that contract of carriage is subject to the modified Rules by operation of s.10(1)(b)(ii) of COGSA and (b) the application of that foreign choice of law clause either (a) relieves the carrier or ship from liability for loss of or damage to the goods carried arising from negligence, fault or failure in their duties and obligations under the modified Rules or (b) lessens the carrier's liability from that otherwise provided for by the modified Rules. In any event, this presupposes that this issue arises in the context of an underlying dispute that is or can be properly brought before an Australian Court. However, for the reasons stated below, there is no guarantee that any claim under such a contract for the carriage of goods by sea inter-State would be able to be pursued in an Australian Court if that contract also contained a foreign jurisdiction or arbitration clause. Further, where that contract of carriage is expressly said to be governed by a system of law other than Australian law, a foreign court or arbitral panel seized with a dispute under that contract may be unlikely to apply any of the provisions of COGSA or the modified Rules under COGSA, to that contract, especially if they are

inconsistent with the foreign law that the parties have expressly chosen as the law governing their contract of carriage.

Inter-State shipments and foreign jurisdiction and arbitration clauses

Further, s.11(2)(b) and (c) of COGSA provides that any clause that purports to preclude or limit the jurisdiction of Australian Courts to entertain a claim in respect of any contract for the carriage of goods by sea into or out of Australia which is of the type regulated by COGSA, such as a foreign jurisdiction clause or foreign arbitration clause, is of no effect. But once again, these provisions do not apply to such contracts for the carriage of goods by sea from a port in Australia to a port in another State or Territory in Australia (i.e. inter-State shipments). Moreover, this is (once again) notwithstanding that COGSA may otherwise apply to the contract of carriage for that inter-State shipment, in particular so as to apply the modified Rules to that shipment. Nor is there any provision elsewhere within COGSA or otherwise in any other legislation which has the same effect as s.11(2)(b) and (c) in relation to inter-State shipments.

In the absence of provisions such as s.11(2)(b) and (c) of COGSA or other public policy considerations, the parties to a contract for the carriage of goods by sea (including one regulated by COGSA in the manner suggested above) are free to agree that disputes arising between them are to be determined exclusively in the courts of a foreign jurisdiction or by alternate dispute resolution, including arbitration overseas.

Moreover, where the parties to such a contract have concluded such an agreement, then in the absence of any provision such as s.11(2)(b) and (c) or other public policy considerations, Australian Courts will give effect to that agreement. This is especially so where the parties have agreed that any disputes between them are to be arbitrated overseas. In those circumstances, provided that the agreement to arbitrate is in writing and not null and void, inoperative or incapable of being performed, an Australian Court must stay any proceedings brought before it contrary to that agreement and refer the dispute to arbitration in accordance with that agreement, if any of the parties to that arbitration agreement seek it. Further, where the parties to a contract of carriage of goods by sea inter-State have agreed that any disputes between them are to be litigated in the exclusive jurisdiction of a foreign court, an Australian Court will generally stay proceedings brought before it contrary to that agreement, if any of the parties seek it. That is unless there is a strong case or substantial grounds for allowing those curial proceedings to continue despite the parties having agreed otherwise. Whilst an Australian Court therefore retains a discretion to refuse to stay proceedings before it that have been brought in breach of a foreign exclusive jurisdiction clause, Australian law nevertheless recognises that the starting point for the exercise of that discretion is the fact that the parties have agreed to litigate their disputes elsewhere and that, in the absence of strong countervailing circumstances, the parties should be held to their bargain. Further, the threat of the commencement of proceedings in an Australian Court, contrary to the parties' agreement to arbitrate or litigate their disputes overseas, may also be restrained by an anti-suit injunction.

Again, the policy underlying s.11(2)(b) and (c) of COGSA would seem to be at the very least equally applicable to contracts for the carriage of goods by sea inter-State, as for shipments into and out of Australia. Indeed, the case for the application of that policy to inter-State shipments would appear to be much stronger. It is anomalous that Australian importers and exporters under contracts of carriage contained in or evidenced by sea carriage documents are guaranteed by s.11(2)(b) and (c) of COGSA to be able to bring any claims they may wish to pursue against the carrier



Pictured: a person signs legal documents. Photo credit: Scott Graham via Unsplash.

Pictured: a figurine representing Lady Justice, the personification of law. Photo credit: Tingey Injury Law Firm via Unsplash.



(including a foreign carrier) before an Australian Court, yet inter-State shippers and consignees are not. It is equally anomalous that foreign carriers are able both to include in their contracts for the inter-State carriage of goods by sea clauses providing that disputes arising under or in relation to such contracts or the goods shipped under them, are to be determined by foreign courts or arbitration overseas, and to insist upon the enforcement of such clauses by anti-suit injunction and/or applying to stay proceedings brought in Australian Courts contrary to such clauses. Yet those same foreign carriers are not able to do so in relation to contracts for the carriage of goods by sea into and out of Australia.

The need for legislative amendment

This failure of ss.11(1) and (2) of COGSA to apply to the inter-State carriage of goods by sea under contracts of carriage that are otherwise subject to and regulated by COGSA can only be due to an oversight in legislative drafting and/or legislative inertia.

That is because there is no good policy reason why the protection afforded to Australian exporters and importers by ss.11(1) and (2) of COGSA is also not available to the shippers and consignees of inter-State shipments. This is especially where COGSA may otherwise apply to those inter-State shipments and the contracts of carriage under which those shipments are effected, including by rendering those contracts and the carriage of those shipments inter-State subject to the modified Rules (in Schedule 1A of COGSA) in the same way that shipments from Australia overseas are subject to those Rules. This existing lacuna in the operation and application of s.11 potentially prejudices Australian shippers and consignees of inter-State shipments. This is especially where such goods are carried on foreign flagged and/or owned and/or operated vessels, which is all the more likely as Australia's blue water fleet diminishes. This is also especially where foreign carriers are more likely to insist on terms within their bill of lading contracts providing for the application of foreign law and any claims against them to be determined by a foreign court or arbitration, and where Australian shippers and consignees are likely to have little or no bargaining power

to renegotiate these terms, in particular so as to provide for the application of Australian law and jurisdiction to their contract.

The potential impact of this lacuna is not just hypothetical. For instance, in *Degroma Trading Inc v Viva Energy Australia Pty Ltd* [2019] FCA 649, proceedings brought by cargo interests in the Federal Court of Australia in relation to a dispute regarding the alleged contamination of a cargo of oil which was to have been shipped under a bill of lading from Geelong to Tasmania were, upon the application of the foreign carrier, stayed by the Court in favour of arbitration in London in reliance upon an alleged agreement to arbitrate disputes arising out of that bill of lading. However, had that dispute arisen in connection with a shipment from Geelong to anywhere in the world outside of Australia, the alleged agreement to arbitrate would have been rendered of no effect by s.11(2) of COGSA and the Federal Court would have been able to continue to hear and determine the underlying substantive claim (as cargo interests presumably intended when they first commenced proceedings in that Court).

It is possible that this lacuna has occurred because, in the past there were no attempts by carriers to include foreign jurisdiction, arbitration or choice of law clauses in their contracts of carriage, and there was therefore not seen to be the same need for protection from such clauses in the context of inter-State shipments, as there was in relation to shipments into and out of Australia. This is especially when Australia's coastal trade was carried on Australian owned and registered ships. This possible explanation is perhaps borne out by the fact that neither s.6 of the 1904 Act nor s.9 of the 1924 Act extended the protections made available in those sections to the carriage of goods by sea inter-State, notwithstanding that both

Acts otherwise applied to inter-State carriage. But with the greater use of foreign shipping on the coastal trade, that may no longer be the position.

This lacuna in both of the aspects of s.11 of COGSA identified above could readily and easily be remedied by a slight short amendment to that section.

In the interim, its impact may also be ameliorated by the parties to contracts for inter-State carriage of goods by sea under bills of lading or other sea carriage documents agreeing to resolve disputes between them by arbitration in Australia. This is especially bearing in mind the protection afforded by s.11(3) of COGSA. Australia has an established and well-regarded system of commercial arbitration, which is strongly supported by both institutions such as ACICA, AMTAC and CIARB, as well as the Australian Courts. But admittedly it may not always be possible to persuade foreign ship owners, operators, and carriers to agree to have any claims against them determined by arbitration in Australia, rather than overseas. In those circumstances, and unless and until s.11 is amended to remove the present lacuna, Australian shippers and consignees of contracts for the inter-State carriage of goods by sea contained in or evidenced by a "sea carriage document" will continue to be treated less favourably than Australian shippers or consignees of any such contract for the carriage of goods into or out of Australia. On the face of it, that is a perverse outcome for which there is and can be no justification on policy grounds and which should therefore be remedied.

Author note: this an abbreviated version of a paper delivered to the Western Australian Branch of the Maritime Association of Australia and New Zealand (MLAANZ) on 24 February 2021, as part of its 2021 Webinar Series. ▲

Containers overboard – some recent developments

By MICHELLE TAYLOR, partner, Sparke Helmore Lawyers



Pictured: a containership sails across the ocean. There has been a notable spike of late in volume of container losses overboard. Photo supplied by Sparke Helmore.

The epidemic of containers overboard is becoming difficult to ignore. Recently there has been a notable spike in such incidents.

Whether containers wash ashore or are lost at sea, the environmental impact is tangible. It has been widely reported that, in 1992, a container holding 29,000 plastic ducks, frogs and turtles was lost in the Pacific, resulting in thousands of items arriving on beaches around world before reaching European destinations some 15 years later. Unlike oil, contents of containers such as plastics do not dissipate into the sea. Plastics are becoming a high-profile threat to the sustainability of our oceans and there is continuing research into the environmental harm caused by plastics breaking down into microplastics. In November 2019, the first global insurance industry study was published on managing risks of plastic pollution and microplastics, in partnership with the United Nations Environment Programme.

The recent report of the World Shipping Council (WSC) “*Containers Lost at Sea – 2020 Update*” stated that in the 12-year period (2008 – 2019) an average of 1,382 containers were lost overboard each year. It is significant to note that these numbers do not take account of large container loss events in 2020 and 2021.

In 2019, the European Commission (EC) convened a *Stakeholders’ Workshop on Lost Containers* (Workshop) to consider how to prevent the loss of containers and mitigate their environmental impact. The Workshop focused on a 2019 incident in which several hundred containers were

lost in the Dutch North Sea, resulting in coastal clean-up costs that exceeded 1 million euro. The Workshop proposals recognised a need for fast payment mechanisms to cover government clean-up costs, as well as effective response systems to identify the polluter. It was noted that it was appropriate to apply the EU and globally recognised “polluter pays” principle, which means the shipowner will bear the primary liability.

At the 103rd session of the International Maritime Organization Maritime Safety Committee (IMO MSC) in 2021, held from 5 to 14 May 2021, it was acknowledged that the loss of containers at sea represents a potential danger to maritime safety and a threat to the environment. The IMO MSC agreed to develop a mandatory system of reporting containers lost at sea. This initiative was supported by WSC and EU. As part of this compulsory system it is proposed that ships will be obligated to:

- report the loss of containers through a standardized procedure;
- identify the cargo carried, particularly dangerous goods or harmful substances;
- state whether the containers may float so as to constitute a risk of safety to navigation.

This is a significant initiative because currently, the declaration of information regarding containerised cargo is regarded as the responsibility of the shipper, not the carrier or shipowner.

By way of example, since 1994 Australian legislation has required

shippers to provide an accurate gross mass on maritime shipping documents. The IMO introduced changes to the International Safety of Life at Sea Convention (SOLAS) on 1 July 2016 requiring verification of container weights (VGM) before containers can be loaded onboard. These international requirements are implemented in Australian law pursuant to subordinate legislation to the *Navigation Act 2012* (Cth) in *Marine Order 42 (Carriage, stowage and securing of cargoes and containers) 2016*. Amongst other things a VGM must be provided on the shipping documents and a container cannot be loaded onto a vessel without it.

According to many P&I Clubs, container losses are the most expensive casualties. In order to mitigate these losses, shipowners are encouraged to constantly revise weather tracking and passage planning; review stowage plans and methods; and examine maintenance of castings, lashing materials and twist-locks.

The container trade now accounts for approximately 18% of the total seaborne task. As vessel sizes increase and container stacks grow higher, the risk of container maritime casualties continues to intensify. This, together with changing global weather patterns and increased pressure on supply chains, has led to a sharpening focus on overboard container events, specifically – the recognition of environmental harm, the identification of the responsible party, prevention measures and liabilities. Legal developments in this evolving area of law are becoming a priority. ▲

100,000 shipping containers coated with NutriSkin™ by Aquio - sustainable solutions shipping

AQUIO™ has helped coat 100,000 shipping containers with our water-based floor coating. This reduces the cost, time and risks involved in maintaining shipping containers for food quality shipments.

Working closely with the shipping container maintenance and repair industry in Australia and New Zealand, AQUIO™ has developed a water-based floor coating that allows shipping container owners to reutilise their boxes for food quality shipments at a fraction of the cost of a chemical washout or floorboard replacement.

“There is now an ever-increasing emphasis on sustainability in the shipping industry, with a large focus on emissions reductions and managing the carbon footprint. By transitioning from traditional solvent coatings to our new, cutting-edge water-based technologies our customers benefit from a whole range of outcomes and gain a real competitive edge in the market” – said Brendan McAuliffe, Managing Director.

This switch also allows shipping container owners to utilise their boxes for food quality shipments, provided the unit is structurally sound and takes significantly less time than existing upgrade processes.

The NutriSkin™ application process

This coating, NutriSkin™ requires only a single coat which takes 10-15 minutes to apply and leaves no residual odours. In contrast, solvent-based products may require up to 3 coats, taking 3 hours to apply in addition to days of airing to remove the solvent's harsh residual odour. In the time it would take to coat one box using a solvent-based product, a good operator could coat 12 boxes using NutriSkin™.

NutriSkin™ is applied with a roller, allowing upgrades to be conducted in

virtually any location in the world with no capital investment in application equipment, reducing the need to ship empty units from the container depot and greatly reducing costs” – said Brendan.

NutriSkin™ is resolving the food industry's key issue

AQUIO™ innovative floor coating is resolving the supply and demand issues of food quality shipping containers. There is currently a high demand for exporting food crops to the world, however, most of the general cargo containers available are not food quality. Traditionally, shipping lines will reposition food quality boxes from other locations to where demand is to help solve the issue, but this approach imposes extra costs on shipping lines and can take too long.

Alternatively, shipping lines can get empty container parks to upgrade cargo containers to food quality, but this is also an expensive process. NutriSkin™ combats these issues by providing a solution that is both cost and time effective. It includes upgrading surplus general cargo containers where the demand for FQ is to food quality. Our approach addresses the logistic challenge of fulfilling the increased demand for sustainable shipping solutions in a low-risk way and avoids the traditional methods of food quality shipping container protection.

Important features and benefits

Our NutriSkin™ process is USFDA food contact approved as well as Assure Quality (NZ) approved. It is applied with

a premeasured kit so no wastage or time is lost pre-measuring, as well as consistently covering transferrable stains to last multiple trips. We have ensured the product meets all necessary guidelines including the shipping Australia guidelines for FQ boxes and the Department of Agriculture, Water and Environment Food and Container Requirements. With our emphasis on cost-effectiveness, the reuse of the general containers includes no additional freight costs of repositioning, as well as no lift and load charges to reposition empty containers.

“Using NutriSkin™ will not only help shipping lines meet their environmental policy targets, but also help to meet consumer preferences for sustainable products and services” - said Brendan.

Sustainable solutions in shipping

We are so excited to work with more companies interested in creating more sustainable and cost-effective solutions in the shipping industry. To learn more about AQUIO™ and how we can help save you time and money, please visit our website: <https://aquio.com.au/>



Please contact

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Pictured: an example pilot cutter underway in a harbour. Photo credit: Simon Hurry via Unsplash.

Misuse of market power – the first outcome for ‘likely effect’

By JOANNE JARY, special counsel, and NATHAN CECIL, partner, Holding Redlich

The Australian Competition and Consumer Commission (ACCC) and Tasmanian Ports Corporation Pty Ltd (Port Corporation) have agreed to consent orders to resolve the ACCC’s first application of the new ‘effects test’ under the misuse of market power provisions (section 46) of the Competition and Consumer Act 2010 (CCA).

In this landmark agreement, the Federal Court has declared by consent that the Port Corporation engaged in conduct that had the ‘likely effect’ of substantially lessening competition in the markets for towage and pilotage services in Northern Tasmania.

Background

In this case, the ACCC alleged that the Port Corporation (a Tasmanian Government-owned corporation) misused its market power in breach of section 46 of the CCA by seeking to deny the entry of a competitor, Engage Marine Tasmania Pty Ltd (Engage), into relevant markets to supply towage and pilot services at Port Latta (whose owner and operator is Grange Resources Limited (Grange)).

The ACCC alleged that the Port Corporation’s conduct:

- was engaged in for the purposes of preventing or hindering Engage from

competing in the supply of towage and pilotage services in relevant markets

- had the effect, or was likely to have the effect, of substantially lessening competition in the relevant markets.

The resolution

The Federal Court made orders by consent on 4 May 2021, dismissing all allegations that the Port Corporation’s conduct had the “purpose” or “actual effect” of substantially lessening competition. It was, however, agreed that the Port Corporation’s conduct had the “likely effect” of substantially lessening competition.

The Federal Court declared that the Port Corporation breached section 46(1) of the CCA by engaging in conduct between 6 November 2017 and 1 July 2019 in response to the entry or attempted entry of Engage as a competitor which had the likely effect of substantially lessening competition in the markets for towage and pilotage services in Northern Tasmania.

Specifically, the Federal Court declared that competition was likely to have been substantially lessened by the Port Corporation maintaining that Grange was required to pay a new 'marine precinct charge' (MPTC) for vessels calling at Port Latta, in circumstances where:

- the Port Corporation first sought the MPTC from Grange after Grange had notified the Port Corporation that it would cease acquiring marine services from the Port Corporation at Port Latta and begin acquiring those services from Engage
- there was a real commercial likelihood if Grange agreed to pay the MPTC that this would have the effect of raising Grange's future costs of acquiring services from Engage compared with if there had been no MPTC
- the Port Corporation did not, without Grange's agreement, have a legal right to require Grange to pay the charge
- the Port Corporation sought to impose the MPTC without having conducted a full assessment of the costs to the Port Corporation of providing the services that the Port Corporation would need to provide at Port Latta in order to perform the responsibilities imposed on the Port Corporation under requirements of the Tasmanian Government's Marine and Safety Authority.

The ACCC agreed to not press for a penalty order but did receive a contribution to its costs of the proceedings as part of the settlement.

The Port Corporation did, however, provide the ACCC with a court enforceable undertaking under section 87B of the CCA regarding the tonnage charges, access to berth space and port communication systems.

Significance of this outcome

Entities with substantial market power have always had a special responsibility in the market when they respond to competitive threats and new entrants. This special responsibility is enforced by section 46 of the CCA.



Pictured: Rod Sims, the chair of the Australian Competition and Consumer Commission, who vowed that enforcement action will be taken against holders of market power who do not act in a competitive way. Photo credit: supplied by the ACCC.

While this matter has been resolved by consent, it does provide businesses with substantial market power with some much needed guidance as to what the ACCC will consider to be conduct that has the "likely effect" of substantially lessening competition.

The decision is also a timely reminder to businesses that have a substantial degree of market power of the importance of not only considering the purpose of their conduct but also the effect or likely effect of that conduct on the competition when exercising such power. Businesses with substantial market power that do not consider their conduct through these two prisms run the risk of falling foul of section 46 and finding themselves in a similar position.

In announcing this outcome, Chairman of the ACCC, Mr Rod Sims, stated:

"Businesses with substantial market power have a special responsibility when deciding how to respond to competitive threats. If they respond in a competitive way, for example, by offering customers better products at better prices, they will

not face the risk of enforcement action. However, when they hinder a competitor from competing on its merits, the ACCC will not hesitate to take enforcement action against them."

The case also offers some insight as to potential terms that can be agreed upon with the ACCC should the ACCC pursue allegations under section 46. In this case, the ACCC was prepared to accept the following outcomes in settlement of the charges:

- consent orders in respect of the "likely effect" case
- dismissing the "purpose" and "actual effect" of substantially lessening competition aspects of the case
- taking a contribution to its costs
- the provision of court enforceable undertakings.

By agreeing with this outcome, the Port Corporation was able to avoid the risk of being imposed a penalty and the significant costs that would otherwise have been spent in court.

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Tasports tried to make customers pay injurious charges if they tried to use a rival provider of towage and pilotage services. Photo credit: Joshua Hoehne via Unsplash.

A “Smart” choice: new court judgment about intercepting freight

By DAVID RICHARDS, director (claims), North Group

The High Court of England has issued an important judgment clarifying that ordinarily an owner is not liable to pay damages to a charterer if it collects freight due under its bills of lading even where no sums are due under a time charterparty.

Background

The case arose in the context of the total loss of the laden capesize “Smart” in August 2013 whilst entered with North (a Protection & Indemnity Club) following a grounding at Richards Bay in South Africa.

Owners had issued bills of lading marked that freight was payable “as per charter party”. At the time, the ship was on time charter on the NYPE form, meaning that Owners had authorised Charterers to collect freight due under bills of lading. Those time charterers had sub-voyage chartered the ship. Following the grounding, Owners issued notices to cargo interests and voyage charterers seeking direct payment of unpaid freight due under those bills of lading. Despite these notices being sent, voyage charterers failed to pay most of the freight outstanding and subsequently became insolvent, leading to the loss of about US\$1.3 million in freight. This judgment concerns liability for that unrecoverable freight.

Although, as the Judge records in his judgment, a London arbitration tribunal found there were shortcomings in the running of the port, Owners’ unsafe port claim did not succeed due to negligence on the part of the Master leading up to the grounding. Charterers argued in the arbitration that they were entitled to damages representing the loss of freight on the basis of an implied term in the charterparty to the effect that Owners would not revoke their authority to collect freight from the voyage charterers unless hire and/or other sums were due under the time charterparty. The Tribunal



Pictured: a large capesize bulk carrier receives assistance from a tug. Photo credit: Daniel Norris via Unsplash.



Pictured: coal, which is a commonly traded seaborne commodity. The “Smart” was carrying a cargo of coal when it ran aground. Photo credit: Klim Musalimov via Unsplash.

upheld that claim even though it also found that there were in fact sums due under the time charterparty at the time the notices were served, namely about US\$ 400,000 in respect of bunkers consumed during the charter service prior to the grounding.

The justification for the Tribunal's decision was a statement of law at paragraphs 30.69-30.70 of the current edition of the textbook "Time Charters," which says that, under the terms of the NYPE form and similar, there is an implied obligation on an owner to allow the charterer to collect freight. Only if the time charterers default does the implied term cease to apply such that an owner is free to collect any freight owed to them. This statement of law is said to be based on non-binding observations made by the Court of Appeal in *The Bulk Chile* in 2013.

After carefully reviewing previous authorities and considering a number of different formulations for the implied term put forward by Charterers, Mr Justice Butcher concluded that an owner has an unfettered right to collect bill of lading freight under its bills of lading. Where that owner has time chartered the ship, the owner retains a right to countermand the authority granted to a time charterer to collect bill of lading freight on the owner's behalf, and this right is not conditional on any default by a charterer. If an owner does intervene to collect bill of lading freight whilst the ship is on time charter, then he will generally have a duty to account to a time charterer for any amount which he receives over and above that which is due under the time charter.

So far this was a restatement of fairly orthodox law. The Judge then went on to conclude, contrary to what is said in the current edition of *Time Charters*, that there is no basis to imply a term of the sort found by the Tribunal or contended for by Charterers. The Judge reached this conclusion by applying the usual test to justify the implication of terms into a contract and because the longstanding "intercept and then account for any surplus" mechanism was sufficient to protect time charterers. The Judge said it was preferable that it be clear to all in the market that a shipowner is ordinarily entitled to collect bill of lading freight under its bills of lading without restriction.

The Judge rejected an argument made by Charterers that, in accordance with

the decision of the Court of Appeal in the 1970s in *The Nanfri*, a restriction on an owner's ability to collect freight was necessary to ensure a time charterer can, relying on Clause 8 of the NYPE form, enjoy the full benefit of the ship's earnings in return for payment of hire. In *The Nanfri*, the time charterer had significantly interfered with the charterer's ability to use the vessel in the grain and steel trade by refusing to sign or authorise freight prepaid bills of lading. However, the unfettered right of a shipowner to collect its own freight under its own bill of lading, coupled with an obligation to account for any surplus collected above sums due under the time charter, does not deprive the charterer of the benefit of the vessel's earning capacity.

The award was set aside insofar as it awarded Charterers damages for breach of an implied term not to collect freight.

Comment

This judgment provides welcome clarity for the industry by confirming that an owner is under no restriction in its ability to collect freight due under its bills of lading, even in the absence of a default by its time charterer, in the absence of an express provision to the contrary. The obligation to account for any sums collected over and above any sums due under a time charter is sufficient

protection to ensure that a rogue owner cannot retain both freight and time charter hire.

An owner's right to collect freight under its own bills of lading, which was the subject of this judgment, should not be confused with the alternative self-help remedy that a shipowner may have in exercising a lien on sub-freights. Although similar in effect, a lien on sub-freight or sub-hire is a very different legal remedy. Nonetheless, there is now an interesting contrast between such lien rights and an owner's right to collect bill of lading freight in that, as observed by Butcher J, there should be no debate in the future as to whether an owner is entitled to collect unpaid freight under an owner's bill of lading, whereas there are often disputes between owners and charterers as to the effectiveness of a lien exercised over sub-freights, meaning that sub-charterers and others often feel they have no choice but to either place the funds into escrow or to interplead. ▲

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Poseidon Sea Pilot's Captain Robert Buck and the unforgiving sea

By SHIPPING AUSTRALIA

Pictured: Captain Robert Buck is the new general manager of Poseidon Sea Pilots. Photo supplied by Poseidon Sea Pilots.

Mariners say the ocean can be unforgiving. During a voyage as a junior officer, Robert Buck found just out how much. Although he didn't know it, he was a little more than four minutes from disaster.

"We knew the cyclone was out there," Robert recalls.

The crew were carrying steel on the Newcastle-Auckland route in a general cargo ship. The voyage takes about five days, but bad weather adds an extra couple of days. One day out from Newcastle and the weather deteriorated.

Technically, they were sailing through a south-moving extra-tropical depression.

"It was a cyclone in all but name," Robert says.

The weather was awful. Visibility was poor because it was overcast and because of the driving rain. Windspeeds were more than 50 knots (93 kilometres per hour).

The sea state was rough and high, about the size of a three storey building. Although the vessel was pitching heavily, it wasn't rolling so much because the ship was headed bow-first into a series of big waves.

"The ship was riding over it quite reasonably. I was on the bridge at the time, about 10-ish. It wasn't anything that the ship couldn't normally handle," Robert recalls.

Then the engines failed.

"The lights went out. The ship's engines went silent. Their vibrations stopped. It was eerily quiet," he says.

With a loss of steerage, the ship turned side-on to the waves.

Seawater weighs a little over a tonne per cubic metre. That's about the same as a 1979 Volkswagen Beetle. The waves were wide, long, up to eight metres tall and were moving fast. "Force" is "mass multiplied by acceleration". The impact of hundreds of cubic metres of seawater repeatedly smashing into the side of the ship would have been enormous.

The vessel was rolling violently. It was in imminent danger of being turned over.

"The inclinometer had a 45 degree maximum scale. It went past that! We were stuck beyond 45 degrees to the vertical. I thought that the next wave would push us over," he says.

Then the steel cargo shifted down in the hold.

Suddenly, the lights came back, the engines restarted, the ship regained power and the bow swung back to face the waves. The vessel could again ride out the storm.

"When the engineer got the engines started, it was such a sense of relief. That was probably the scariest experience I've ever had at sea. In a near-cyclone. Driving wind and rain. Not a pleasant experience. I was glad to get out of it," Robert says.

"One thing I remember was that the time it took for the engineer to get to the engine room and re-start the engines was four minutes".

That short period must have seemed like a lifetime, standing on the bridge, in the dark, on an unnaturally quiet and dangerously rolling ship.

The storm ruptured seals, smashed windows, ripped off a gangway, shorted out hatch motors, bent the bulwarks on the fo'c'sle head, deformed the rails, tore off air vents, and flooded all the storage spaces. The shifted cargo caused permanent list of five degrees.

It was in this sorry state that they limped into Auckland.

"The damage was so severe, it took six weeks to repair," Robert says.

Being by the sea is relaxing

Adelaide-native Robert has always enjoyed being by the sea. His parents owned a small beach shack and a little boat. So he fished a couple of hundred metres off the beach.

"It's quite relaxing to be out on the water, and I enjoyed the lifestyle of being by the beach, swimming and anything to do with the sea," he says.

Going to sea felt like a natural progression, especially as a friend had been taken on as deck apprentice and Robert had some insight into seafaring.

"So I wrote a letter to BHP and six weeks later, I was on a ship! Jobs were easy to come by back then," he says.

Robert joined as a deck apprentice in 1974 at 17 years of age.

From apprentice to bulker officer

Seafarer life was hands-on, chipping off rust, priming, and painting. It's a constant maintenance battle. Robert learned many aspects of seamanship: decks, engines, catering, navigation, seamanship, ship stability, and navigation by celestial bodies – no GPS back then.

"There's been huge advances in electronics. Shipping has always been a bit behind the times – the industry's catching up, but it still has some catching up to do. Some of the equipment is so accurate now, it would have been science fiction back when I was a kid," Robert says.

He stayed on with BHP after his apprenticeship to get his Second Mate's Certificate of Competency.

"I was quite elated! It's always stressful studying for exams. It was the first major achievement of my career".

Robert enjoyed the dry bulk trades. He travelled around Australia and enjoyed the 2,000km Inner Route of the Great Barrier Reef from Cairns to the Torres Strait.

Shipping took Robert to many places overseas: to Japan, the Philippines, Hong Kong, and southeast Asia. His first overseas trip to Yokohama, near Tokyo, was particularly interesting as it was a half a world away, literally, and metaphorically, from home.

"I had grown up in a traditional Australian family as far as food and culture went. So going to Japan and learning about new cultures was interesting! I ate sushi and used chopsticks for the first time. None of those things were available in Australia," he recalls.

It's a gas, gas, gas!

BHP operated an LPG carrier in 1986 and mariners needed special endorsements to sail it. After several years sailing the dry bulk trades, Robert was keen to try out the gas trades because it was new and innovative. There was lots of new technology to use, and Robert was keen to get involved.

"It was continuous professional development. Anything that opened up new thoughts, new ways of doing things. It keeps things interesting, keeps the mind active," he says.

He was notified of his first command while sailing a gas carrier north to Japan in 1991. He was simply sent an email

advising that he should leave ship upon its arrival back in Australia as he was to be promoted to ship master.

"That was it. No fanfare, nothing dramatic. But getting your first command is always a major milestone in your maritime career. So, yeah, I was quite pleased. Knowing that I was getting my command at the end of the voyage was very happy, very pleasing", he says.

Paying it forward

From 1992 until 1996, Robert was a member of the recruitment team for marine trainees in the BHP fleet. Apprenticeships had given way to cadetships. Trainees would study at the Australian Maritime College in Launceston, practical study and sea-time would follow.

"I spent four years interviewing people around the country. I was doing that in my off-time from my ship. I was still sailing as master. I was paid, but I used my holiday time to do the recruitment. I can remember a few candidates. One young guy was working in a country abattoir. He'd worked overnight, driven down, and fell asleep in the interview! We didn't hold it against him, we felt sorry for him and, as he was so keen, we gave him the job. I'm very pleased to say that a very large number of people I interviewed are still in the maritime industry".

Leaving the sea, becoming a pilot

After years of working around the Australian coast, Robert had become a pilot-exempt master in several ports. Then, in 1997, after 23 years of working at sea, he was offered a job with Port Philip Sea Pilots. It was time for the next adventure.

Becoming a pilot is arduous.

There are a huge number of observations to be carried out on ships, on tugs and in harbour control towers. Then there's a three hour oral exam with an expert board. Answers had to be given solely from memory on a wide range of maritime matters.

"It was a very intense exam; they can ask a lot of questions in three hours," Robert chuckles.

Then there's ongoing training with a check-pilot who observes and signs off on pilotages as they are completed on different sizes and types of ships.

"It only took about three years... on top of 23 years at sea! It was master / apprentice training. It was the only way of

doing it. There are better ways of doing it now. With simulators, you can practice repeats and emergencies. You can't practice a blackout on a ship in a channel, but you can in a simulator," he says.

From pilot to managing director

For Robert, being a pilot has all the best parts of being a ship master, such as ship handling, but it has more variety. Pilots could be on a little rig tender one morning, on a large box ship in the afternoon, and on something completely different the day after.

In 2002, Robert became a director as he wanted to broaden his skills and become more involved with the shore-side and with management. In 2005 he became the managing director.

Robert became involved in all aspects of running the company – everything from human resources, finance, customer relations, working with harbour masters and regulators.

"I was there for just under 15 years. I sort of fell into it and stayed there. It was a very busy life," he says.

Revolving doors

After many years it was time to move on and he resigned from Port Philip Sea Pilots in 2021.

He wanted to spend his time fishing and being involved with his small winery in Springton, in the Barossa Valley.

"I had intended to retire," he laughs.

But well-known industry figures Steve Pelecanos and John Watkinson approached Robert and asked if he would be interested in being the General Manager of Poseidon Sea Pilots.

Poseidon presented Robert with the opportunity to do pilotage in a new, technology-focused, way.

"One of the benefits of Poseidon is its association with AMS Group – a cutting-edge maritime technology group of companies. The combination of maritime experience and technology is a very powerful amalgam of two ways of thinking to improve safety in pilotage. Pilotage has been very conservative over the years. Poseidon presents a new opportunity to innovate and the pilotage landscape in Australia is changing. I'm sure it will make some people uncomfortable. There's no need to be scared. Embrace it. We can move forward," he says. ▲



Oldendorff Carriers teams up with BHP in successful biofuel trial

By SHIPPING AUSTRALIA

Australian mining giant BHP and major dry bulk operator, Oldendorff Carriers (a Shipping Australia member) have successfully completed an important biofuel trial.

Advanced and sustainable biofuels provider, GoodFuels, supplied the fuel for the trial, which was held with the assistance of the Maritime & Port Authority of Singapore.

The advanced biofuel reduces carbon dioxide emissions by 80-90% on a well-to-exhaust basis compared with heavy fuel oil and very low sulphur fuel oil. It uses sustainable waste and residue streams as feedstock. The supplied fuel is “drop-in” meaning it can be blended with conventional biofuels.

Oldendorff is thought to be the world's largest operator of dry bulk ships. The company operates 750 ships and carries about 330 million tonnes of per annum of cargo between 120 countries involving 14,000 port calls each year.

The vessel selected for the trial was one of Oldendorff's eco-Kamsarmaxes, the

Kira Oldendorff, an 81,290 deadweight tonnes dry bulk. Oldendorff reports that minor modifications were made to enable efficient combustion of the biofuel blend and that monitoring instruments were installed to capture trial data.

The objectives of the biofuel bunkering trial included developing a further understanding of the behaviour of the fuel, assessing engine and vessel operation performance during the trial and exploring the technical and commercial merits and challenges of biofuel as a marine fuel.

Oldendorff said that, in line with its decarbonisation strategy, the company is committed to working with partners, authorities and stakeholders to find the best ways to reduce greenhouse gas emissions in its shipping operations.

Oldendorff Singapore's Managing Director, Alexander Vajsova-Jones stressed the importance of collaborating with the right partners: “Oldendorff Carriers and BHP's views on a greener future are mutually aligned and being historically close partners, it made

this trial a natural fit. GF are leaders in biofuels and early movers in this segment and felt they were an excellent choice, while MPA are strong supporters of green initiatives and are always instrumental in supporting industry participants in the ‘shipping capital of the world’. We are thrilled to have been selected to participate in this biofuel trial with our close partners, and pleased that the bunkering happened in Singapore. It's a small but necessary step in our common goal to reduce our carbon footprint.” ▲

CMA CGM boosts biofuel production

By SHIPPING AUSTRALIA

Marseille, France, headquartered ocean shipping behemoth CMA CGM, a Shipping Australia member, has announced it is supporting the production of 12,000 tonnes of biomethane.

That's equivalent of two 1,400-TEU LNG-powered ships on an intra-European service (between St Petersburg and Rotterdam) for a whole year, the company said in a statement.

CMA CGM customers will be able to select "biomethane" in CMA CGM's systems which will help reduce customers' environmental impact when shipping goods.

CMA CGM says that selection of this biomethane, when coupled with the company's dual-fuel gas-power technology, can reduce well-to-wake greenhouse gas emissions by 67%. On a tank-to-wake basis, the reduction in greenhouse gas emissions can reach 88%.

A new step

Rodolphe Saadé, Chairman and CEO of the CMA CGM Group, said: "We have crossed a new step with the launch of the first low-carbon shipping offer based on biomethane. We know that there is still a long way to go to meet the commitments of the Paris Agreement. Achieving these goals do not rely on a single solution but on a set of initiatives and new technologies complimentary to each other."

Creation of biomethane begins with the collection of organic waste and agricultural plant residues from European agricultural lands. This organic waste is heated in a "methanizer" which produces biologically-sourced methane. That gas can then be used as an energy source in a range of applications such as cooking, for household appliances and in public transportation.

Increasing interest in biofuels

Ocean shipping companies have shown interest in biofuels of late. Stolt Tankers carried out a trial aboard the 37,000 deadweight tanker Stolt Inspiration. The trial will assess the use of biofuel in engines and boilers and will test the effect on reliability and consumption among other things.

Meanwhile, Ocean Network Express and Mitsui OSK Lines trialled biofuels in the MOL Experience, a 4,800 TEU ship, which undertook a trans-Atlantic crossing. Eastern Pacific's tanker, Pacific Beryl, also trialled biofuels on a trans-Atlantic crossing.

Other shipping companies, such as Stena Bulk and also UECC, have also carried out biofuel tests. ▲



Pictured: a CMA CGM ship at berth. CMA CGM is a supporter of biofuels to reduce the environmental impact of shipping. Photo: Dimitry Anikin via Unsplash.

ONE seeks many big advances in green shipping

By SHIPPING AUSTRALIA

Ocean Network Express, a Shipping Australia member, has revealed a flurry of activity as it seeks to advance its ambitions in green shipping.

The Singapore-based, global ocean container shipping company, announced the successful completion of a second trial of sustainable marine biofuel onboard the MOL Experience earlier this year. The specifications of the second trial were different from the first trial, with the mixing ratio three times higher in biofuel content.

MOL Experience was refuelled with marine biofuel during bunkering at the Port of Rotterdam, Netherlands on 7 March 2021. The vessel, deployed in the AL5 service, fully consumed the biofuel 24 days into the 36-day trial period, which ended on 12 April 2021.

As with the first trial, the bunkering and testing period was performed in collaboration with shipowner Mitsui O.S.K. Lines and the leading sustainable biofuel pioneer GoodFuels.

"The success of the trial once again proves the viability of sustainable biofuels, while helping ONE to meet its carbon reduction targets by 2030 and 2050 respectively," the company said.

The biofuel was derived from renewable sources. The biofuel used in the trial is produced from certified feedstocks labelled as 100% waste or residue products, such as used cooking oil.

"Biofuels are considered to be carbon-neutral because the carbon dioxide absorbed by the source of the biomass is equal to the carbon dioxide released when the fuel is burned. It has gained attention around the world as an environmentally-friendly alternative to fossil fuels," the company said.

It added that the GoodFuels biofuels are virtually free of sulphur oxides and deliver 80% to 90% well-to-exhaust carbon dioxide reduction versus fossil fuel equivalents. They are technically and operationally equivalent to petroleum-derived marine fuels and require no modifications to marine engines or fuel infrastructure.

Industry collaboration to advance maritime decarbonisation

ONE has also announced it is helping to set-up an SGD\$120 million fund for maritime decarbonisation in Singapore. The company has joined forces with BW Group, Sembcorp Marine, Eastern Pacific Shipping, Foundation Det Norske

Veritas and BHP in signing a memorandum of cooperation with the Maritime and Port Authority of Singapore for this purpose.

Under the terms of the Memorandum, each private sector partner will contribute SG\$10 million to support the establishment of the centre, to fund maritime decarbonization research and technology development projects and to also collaborate with institutes of higher learning.

Ms. Quah Ley Hoon, the Chief Executive of the MPA, said: "Maritime decarbonisation is a global challenge requiring a collective responsibility from all stakeholders involved. It is crucial to have strong public-private sector partnerships. We thank likeminded partners like ONE that have responded strongly to our call for collaboration. The agreement signed today is a first step, which we hope will catalyse a larger, much needed momentum to make international shipping more sustainable."

ONE green strategy

ONE has also announced the launch of a new Green Strategy Department. The new department will drive ONE's environmental sustainability endeavours through the collaboration with internal and external synergies.

"This new department will be designing and implementing strategies so that ONE continues to meet the relevant industrial and international standards at the same time as ensuring that ONE is at the forefront of green thinking in the shipping and logistics industry", the company said in a statement.

Pictured: oil on water presents an abstract-like image. Shipping companies are increasingly turning to bio-diesel to reduce their environmental impact. Photo credit: Solen Feyissa via Unsplash.



Pictured: a Maersk Line vessel alongside at berth. Photo credit: Galen Crout via Unsplash.

Bestseller secures carbon-neutral ocean transport with Maersk

By A.P. MOLLER-MAERSK

A.P. Moller-Maersk (a Shipping Australia member) has announced the signing of a fully carbon-neutral transport agreement on ocean services with fashion retailer Bestseller. The open-ended agreement on lifestyle logistics covers all of Bestseller's global transportation requirements and includes inland logistics and CFS handling (warehousing).

"I am very pleased that Bestseller, one of the top fashion and lifestyle groups in the world, has chosen Maersk ECO Delivery to reduce the company's carbon footprint in transportation at sea. This is a solution that makes a real difference as ECO Delivery uses sustainable biofuel to power selected Maersk-vessels and helps Bestseller make progress towards their ambitious sustainability goals," said

Vincent Clerc, Executive Vice President and CEO Ocean & Logistics, A.P. Moller-Maersk.

Bestseller has an ambitious climate strategy with clear reduction targets in line with the Paris agreement with the ultimate goal of becoming climate positive. Bestseller has through the Science Based Targets Initiative committed to reduce absolute scope 1 and 2 GHG emissions with 50% by 2030, and scope 3 GHG emissions from purchased goods and services and upstream and downstream transportation by 30% over the same timeframe.

"In Bestseller, we are continuously exploring ways of improving our environmental footprint and we see the option of leveraging biofuel for our sea

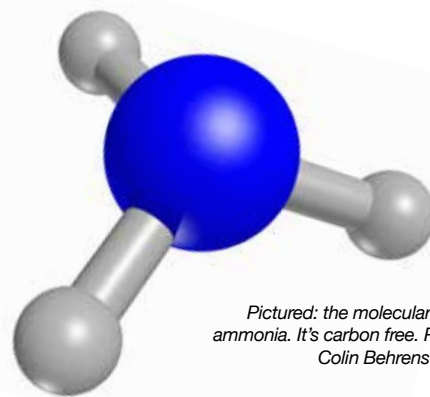
transportation as an important course of action. We are pleased to be working with Maersk to take this initial step, which we expect to be one of several on our way to ultimately realizing a fully carbon neutral transportation option," says CFO and Head of Logistics, Thomas Børglum-Jensen, Bestseller.

The Maersk ECO Delivery is a biofuel that is carbon neutral and manufactured from recycled sustainable biomass. It is certified as a sustainable fuel by the International Sustainability and Carbon Certification (ISCC) body.

The global agreement on ECO Delivery and long-term logistics partnership between Maersk and Bestseller will enter effect as of 1 September 2021.

Ammonia – the smell of a green fuel opportunity?

By JOHN PAGNI with additional material by Shipping Australia



Pictured: the molecular structure of ammonia. It's carbon free. Photo credit: Colin Behrens via Pixabay.

Everyone 'nose' ammonia even if they do not exactly know what it is. Your nostrils will quickly sniff it out when it is an ingredient in cleaning products because of its pungent pong. Agricultural properties may also reek of ammonia when farmers spray their fields because ammonia is used as a fertiliser.

The stinky chemical can also be used as a fuel and it was once used by the US Air force in its experimental rocketry programme. Ammonia is now attracting a lot of interest as it is a strong candidate to be the shipping industry's future fuel of choice.

Ammonia facts

Ammonia contains about 11.62 megajoules per litre compared to, say

diesel, which has 36.10 megajoules per litre according to the NH3 Fuel Association (the predecessor of the Ammonia Energy Association). So ships would have to consume large volumes of ammonia as fuel.

Ammonia is mass produced – about 235.3 million tonnes per annum according to Statista. That volume is forecast to grow to 290 million tonnes by 2030 when new capacity comes on-stream, mainly in Asia and the Middle East.

The chemical is lighter than air, liquefies easily at about -34°C and freezes at -78°C. Liquid ammonia is kept in two forms: at normal temperature under pressure (17.2 bar) or at -33°C at atmospheric pressure. Ammonia is not very flammable, which

is both a boon and a hindrance for a fuel. It auto-ignites at 650°C and needs a pilot fuel to combust at 132°C in a 15-25% air mix.

Combustion of ammonia creates high levels of nitrous oxides, which is no laughing matter because nitrous oxides present a lot of safety issues. Ammonia can explode if heated, can cause severe skin burns, is toxic if inhaled and is toxic to aquatic life. Exposure can be deadly to humans at 2,700 ppm with a 10 minute exposure.

Ammonia's big benefit

That's a lot of drawbacks, so why consider this colourless (but not, alas, odourless) chemical as a fuel?



Pictured: a farmer sprays his fields with fertiliser. Ammonia is used as fertiliser the world over. Photo credit: Franz W via Pixabay

Pictured: the X-15 experimental hypersonic rocket aircraft, powered by ammonia. It might stink, but ammonia's got the power to punch a rocket through the sky. Photo credit: US Air Force.



An initial move could be to mix ammonia with marine diesel oil in a compression ignition internal combustion engine.

“This combination enables operators to significantly reduce harmful emissions while maintaining the reliability of a conventional marine engine. Furthermore, the ammonia fuel system will be less expensive as redundancy of ammonia fuel supply is not required when using redundant diesel fuel supply,” C-Job says in its report.

A second stage could be combustion in an internal combustion engine using an ammonia-hydrogen mix. A third stage could be the use of an ammonia solid oxide fuel cell, although, of course, it was noted that fuel cells are not currently a viable option for powering ships today. That could, however, be an option in the near future given ongoing developments in technology and there are projects underway investigating that exact scenario (see more, below).

Well, there is one very important benefit. Ammonia is completely carbon free. Ammonia is comprised of three hydrogen atoms and one nitrogen atom, earning it the chemical formula “NH₃”. Carbon dioxide (CO₂) is not emitted after combustion because carbon is not present in ammonia before combustion.

Production is potentially carbon-free too. Current ammonia production is carbon-heavy because a lot of energy is consumed in the process and hydrocarbon compounds, such as natural gas, are the main feedstock. However, renewable carbon-free energy sources can be used to power production and hydrogen can be used as an ammonia feedstock. Clean hydrogen can be obtained by splitting ordinary freshwater into its component gases – oxygen and hydrogen – with renewable energy in a process called electrolysis.

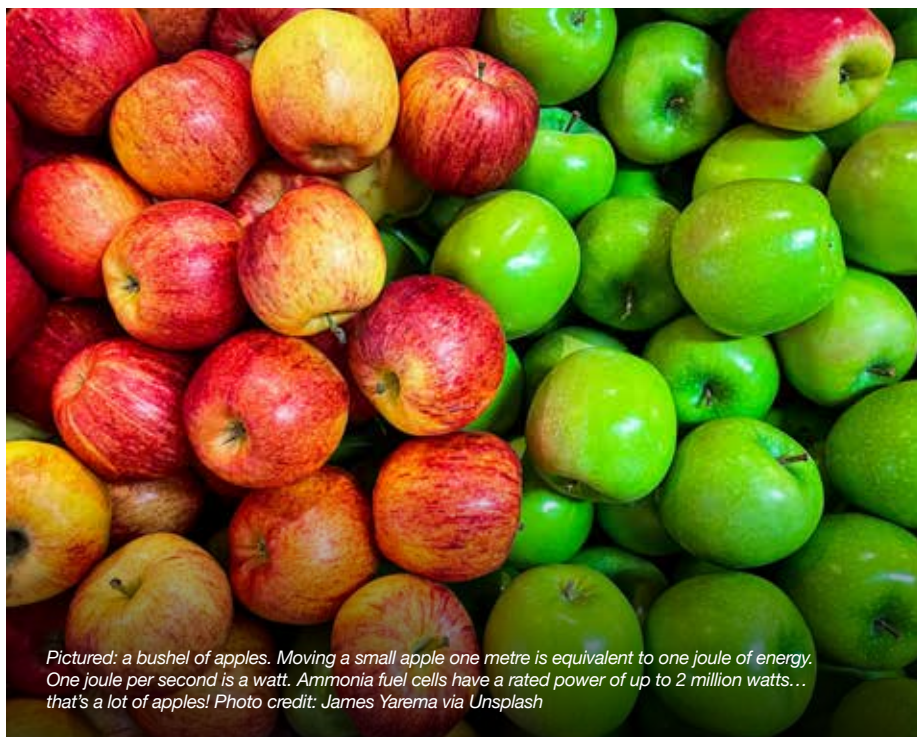
Global energy business “Engie” has announced plans to build a solar powered hydrogen electrolyser near Karratha (the home of the Port of Dampier) in Western Australia. The hydrogen produced will be used to create ammonia by fertiliser company Yara Pilbara Fertilisers. The ammonia will be shipped as fertiliser to countries around the world. It only takes a small step in the imagination to see how that could be applied to the production of ammonia as bunker fuel.

Acceptance as a marine fuel

One study on ammonia as a marine fuel has been done by naval architect Niels de Vries of international ship designers C-Job. That company suggests that a step-by-step approach could be taken to hasten ammonia’s widespread acceptance as a mainstream marine fuel.

LNG tankers may have shown the way

One way in which ammonia-powered vessels could become more commonplace is if the boil-off gas from cargoes of ammonia are exploited as a source of fuel. Ammonia stored in tanks will start to evaporate owing



Pictured: a bushel of apples. Moving a small apple one metre is equivalent to one joule of energy. One joule per second is a watt. Ammonia fuel cells have a rated power of up to 2 million watts... that's a lot of apples! Photo credit: James Yarema via Unsplash



Pictured: a bottle of liquid ammonia. Ammonia liquefies under pressure at normal temperatures. Photo credit: Fotoedukacja via Wikipedia

to the presence of heat. As ammonia re-gasifies, it expands, leading to an increase in pressure that is potentially dangerous. Merely releasing the gas would be problematic from a safety viewpoint, so one way to deal with the problem is to re-direct the boil off gas to the engines and use it as fuel.

A similar system was deployed in liquefied natural gas tankers. Just like liquefied natural gas tankers, an ammonia boil-off gas system would entail special design for safe handling, fuel lines, detection systems and ventilation along with shut-off valves and areas that could be closed off in case of leakage.

Unlike some other potential fuels, such as hydrogen, there is no “vicious circle” problem with ammonia. Hydrogen fuel will require lots of infrastructure to be built so that hydrogen can be deployed widely as a fuel. The problem is that, without a ready market, it is difficult to get the business case to build hydrogen infrastructure.

That vicious circle is avoided in the case of ammonia. It is already an internationally produced, traded, and transported commodity used by the

fertiliser industry. Ships of up to 60,000 deadweight already transport ammonia. And there are ports in existence that can already handle large volumes of ammonia. Bunkering infrastructure would, of course, have to be expanded to cope with increased demand.

Innovative project gets underway

Projects are getting underway. One such project is being run by the Norwegian company Eidesvik Offshore. It runs a fleet of vessels that provide services to the offshore industries. It owns and operates the Viking Energy (IMO 9258442), which is a supply vessel that provides services to the Norwegian state oil company, Equinor. Eidesvik says that the vessel was the world’s first LNG cargo vessel in 2003 and the first battery-powered hybrid vessel in 2016. In another major milestone for the vessel, it will be powered by an ammonia fuel cell by 2024.

“Together with Equinor, we are now launching a full-scale research project to test a propulsion solution based on fuel cells running on pure and emission-free ammonia... This will make the vessel the world’s first emission-free supply vessel,” says Jan Fredrik Meling, CEO of Eidesvik.

With dimensions of 95 metres long, 20.4 metres wide, 5073 gross tonnage and 6013 deadweight, the 2003-built Viking Energy will be a good sized guinea pig. The project will involve a scale up from a 100 kilowatt fuel cell to a 2 megawatt fuel cell, that will be installed in 2023. That’s a huge development. To put it in perspective, one “joule” is the amount of energy needed to move, say, a small apple by one metre. A “watt”, a measure of power, is the expenditure of one joule per second. A “kilowatt” is one thousand watts (1000 joules per second) and a “megawatt” is one million watts. That’s a lot of apples!

The new fuel cell will demonstrate that the vessel can sail using only ammonia for up to 3,000 hours a year with zero emissions, thereby demonstrating that long range voyages using ammonia as a fuel are possible.

Fuel cell testing is being carried out on land in a parallel project at the Sustainable Energy Norwegian Catapult Centre with development and

construction undertaken by Norway’s Prototech. The shipboard ammonia system supplier is Wärtsilä.

Fuel economics

Ammonia as a fuel is currently financially challenging. Scenarios have shown ammonia can be considerably more expensive compared to conventional fuel when NH₃ is at a price €850 (AUD\$1,327) per tonne and Very Low Sulphur Fuel Oil is €500 (AUD\$781)/tonne.

But alternative pricing scenarios suggest more encouraging results: for example, NH₃ at a price of €400 (AUD\$625) per tonne is considerably more competitive when heavy fuel oil is priced at €500 (AUD\$781) per tonne with, say, a €100 (AUD\$156) per tonne CO₂ levy.

Fuel prices change all the time of course. Over a 24 month timeframe, the mean average price per tonne of VLSFO is USD\$485 (AUD\$628) per tonne. That average price disguises a range of prices that run from a low of USD\$206.5 per tonne to a high of USD\$741 per tonne. In comparison, ammonia is, at the time of writing, priced at about US\$720 per tonne, according to market price provider Two Rivers Co-Op. So ammonia can be more competitive when more conventional fuel prices are at the higher end of their pricing range.

In the future ammonia prices could fall if there is an uptick in the rate of decarbonisation, a massive expansion of ammonia infrastructure and a huge increase in the production of the chemical. None of these factors look particularly outlandish given the current socio-political environment and the likely demands that the marine fuel sector would put on the ammonia production sector if shipping adopted ammonia.

“Although at present the economics of green ammonia are not particularly favourable, it is possible that with significantly lower capital costs, efficiency gains, aggressive decarbonisation policies and lower renewable energy costs, a significant market for green ammonia will develop in the long term,” consultancy firm Argus concluded in its report “Green Ammonia: Opportunity Knocks”. ▲



*Pictured: the Maersk Pelican equipped with Flettner rotors.
Photo credit: Wilsca under the Creative Commons Attribution Share Alike License v4*

Is the answer blowing in the wind?

By JOHN PAGNI with additional material by Shipping Australia

The big and obvious advantages of wind as a source of propulsion power is that it is available now. Admittedly, we're unlikely to see any 22,000 TEU wind-powered box ships any time soon. But there are smaller, niche, trades that could benefit from close to 100% wind powered ships and there are a wide variety of commercial cargo ships that can generate huge savings from wind power.

The past may be the future...

One main advantage of wind power is that it is very well understood because of its extraordinarily long history. Wind power was the only non-muscle propulsion power for most of history. The first true sailors (i.e. people who

sailed under wind propulsion) were likely the Stone Age peoples of what is now the northern part of the Persian Gulf about 6,000 to 5,500 years Before the Common Era. From then until the early 18th century, wind successfully powered ever larger ships around the globe. Sailing ships were slowly displaced: firstly by hybrid steamships equipped with masts for hoisting sails and then later by true steamships.

For much of the 20th century ships were powered by an engine, whether it be steam, fuel oil, diesel or even nuclear. Wind assistance is now making a comeback by reviving old ideas and by being combined with information technology.

Rotor sails

Rotor sails are generally recognised to have been invented by a Finn, Sigurd Savonius, in the 1920s with the concept taken further and patented by Anton Flettner. Rotor sails are often called "Flettner Sails" or "Flettner Rotors".

Rotor sails use the 'Magnus Effect' to power a ship. The wind blows from side-on and it spins a vertical steel tube. The spinning tube disrupts the air flow around the tube by dragging a little of the air with it. That creates turbulence and areas of high and low pressure around the tube. An object with high pressure on one side and low pressure on the other will experience a pushing force.

Pictured: the "Neoliner", a cargo-carrying sailing ship. It is scheduled to begin operations carrying tyres from the U.S. to Europe. Photo credit: Neoline



Ball sports help explain the phenomenon. When a soccer player hits a ball, it will fly through the air at an impressive speed. And if the ball is struck low down then it will have back-spin. The Magnus Effect will lift the ball up, high over the intended target. Top spin will cause the ball to dip.

Golfers have also witnessed the Magnus Effect on their bad shots even if they don't know the physics behind it. So next time you accidentally slice your shot, you can curse German physicist H.G. Magnus. It won't benefit your game. But it may impress rivals and make you feel better.

Rotor sails are making a bit of a small comeback.

Enercon, a wind-turbine manufacturer, had the ro-ro vessel, E-Ship 1, built in August 2010. E-Ship 1 has four Flettner Rotors. In 2018, the tanker, Maersk Pelican, was equipped with rotor sails and it delivered a reduction in fuel consumption. Savings of 8.2% were recorded during the first year of operation. The vessel was later sold with the rotor sails still installed.

Finnish company Norsepower designs tailor-made rotor sails for specific ship installation projects using the latest materials and – just as importantly – Norsepower's bespoke software package. There are several successful installations and they have generated information about the fuel savings and associated emissions cuts. Generally, savings differ with each ship and conditions but they are in the area of 5-20% with a rough payback period of 5-10 years.

Norsepower's latest innovation is a tiltable version for vessels that must pass under bridges and power lines. The sails tilt to near-horizontal when required.

Such rotors were installed aboard SEA-CARGO's SC Connector at the start of 2021. Two 35m tall x 5m wide rotors on the 12,251 gt ro-ro are intended to save 25% in fuel consumption, cost and carbon emissions. In the right conditions, they can power the ship's 12-knot service speed alone. Excess power is stored in batteries for later use.

Norsepower has also ordered its first large bulk carrier newbuilding, but the customer wishes for anonymity until completion. In addition, two systems will be supplied for Viking Line's new ro-pax ferry, Viking Glory, which is being built in China.

Daewoo Shipbuilding & Marine Engineering has Approval in Principle for its rotor sail system from DNV GL. Daewoo says its technology is eco-friendly for large oil and LNG tankers.

Let's go fly a kite...

The sail-kite concept was announced in the early 2000s but, despite great public relations, it does not appear to have wowed a sceptical shipping industry. In essence, a giant kite is installed at the front of a ship which helps drag the ship along. The kite's software can collect and analyse real-time data to operate and furl the kite automatically in the right conditions. Technology proponent, AirSeas, estimates that such kites can save costs of 20% and generate fuel savings of 20%.

Meanwhile, back in mid-2019, AirSeas reported a deal with Japanese shipping company "K" Line to install a kite and service one ship for 20 years. There is the possibility for an order for another 50 kite systems. ClassNK granted Approval in Principle of AirSeas SeaWing kite system in August last year.

The 5,200dwt ro-ro Ville de Bordeaux is scheduled to have an AirSeas SeaWing fitted to pull the vessel sometime in 2021.

Stay soft

Neoline is a French cargo-carrying sail-ship operator. It has done a deal with Michelin Group Logistics to carry vehicle tyres inside containers from Halifax (Canada) to Saint-Nazaire-Montoir de Bretagne (France) by 2023.

"This initiative and this new partnership promotes innovation in the field of



Pictured: the "Oceanbird", a wind-powered car and truck carrier with 80 metre and 40 metre wide sails. Wallenius Marine says that wind "is the most interesting energy source for ocean transport". Graphic credit: Wallenius Marine

carbon-free transport. This first step in carbon-free shipping is fully in line with the CSR strategy of Michelin's operations. It will contribute to achieving the objective of reducing CO2 emissions from logistics by 15% in absolute terms between 2018 and 2030," said Pierre-Martin Huet, Michelin Group Supply Chain Director.

The Neoliner has ro-ro capacity of 1,500 linear metres or 500 cars. It can carry 280 TEUs and will have a 5,000 deadweight tonne capacity. The 136 metre long vessel will have a beam of 24.2 metres, a draught of 14 metres and a 41 metre air draft (when the masts are tilted). Although it will have diesel-electric engines, it will primarily be propelled by wind and its 4,200 square metre of total sail surface. It will have a maximum speed of 14 knots and an in-service speed of 11 knots. A second vessel is due a year later with the aim of operating a fortnightly service with two vessels.

Soft sails have also made a comeback in the boutique cruise ship category. For instance, Star Clippers is a Swedish-owned specialist cruise operator that has two four-masted barquentines and a fully-rigged tall ship.

Suction sails

A suction sail is a vertical, rigid, sail that is shaped like an airplane wing. A suction system pulls air into tubes which helps decrease pressure on one side of the sail. Accordingly, the sail experiences somewhat similar forces to an aeroplane wing and the vessel can be steered by moving a flap. The sails are fixed on a revolving axis and can continuously receive the best wind. They can also fold for cargo access.

The first large scale suction was probably the system installed on the Alcyone, an expedition ship commissioned by the famous French mariner and conservationist Jacques Cousteau. The Cousteau Society said that the system was considerably more efficient than traditional sail types.

Since then, Dutch company Econowind has taken up the challenge of suction sails. The company reckons that suction and pumping out air can triple the amount of force applied to sails.

Econowind's sails rotate automatically to find the optimal angles relative to

the apparent wind. The generated force helps propel the ship; the engine uses less power and propeller thrust to maintain speed. The sails are foldable so as to enable travel under bridges or to avoid exposure to unfavourable wind conditions.

The company offers two types of such suction sail wing-like wind-propulsion units, which it calls "Ventifoils". Its flat rack unit can be fixed on a ship with ISO-fix corners and are also removeable.

Meanwhile, its retro-fitted units are tailor-made and are not limited by the 40-foot container dimensions. Once installed, the retro-fitted units are not removable. A maiden installation on the Lady Christina between November 2018 and 2019 saw the vessel sail from Emden (Germany) to Plymouth (UK) and then to Finland. The savings were in the region of 7% to 11%.

Econowind hopes to install such systems on bulk carriers in between the dry bulk hatches.

Rigid wing sails

The rigid wing sail is what it implies. Wallenius Marine, along with Swedish technical partners and financiers, have revealed the concept for a wind-powered car and truck carrier, "Oceanbird", to hit the water in 2024. Displacing 32,000 tonnes, 200 metres long, 40 metres wide with 5 steel and composite wing sails that are 80 metres tall, the vessel's maximum height will touch 105 metres. The telescopic wings can lower the overall height down to 45 metres.

Oceanbird will – if built – be able to take 7,000 cars across the Atlantic in 12 days at an average speed of 10 knots. There will be an auxiliary engine – using clean fuel – and Wallenius says Oceanbird will cut emissions by 90%.

Per Tunell, chief operating officer, Wallenius Marine said: "it is critical shipping becomes sustainable. Our studies show wind is the most interesting for ocean-going transport and with 80-metre high wing sails on Oceanbird we are developing the ocean-going freighters of the future."

Oceanbird is the third iteration of the wind design, which has been worked on for "several years". Wallenius Marine has started tests with 7 metre models in open water. It hopes the design will be ready for orders this year (2021) and it is hoping for a possible launch in 2024. ▲

Wind is one of the oldest sources of energy for propulsion known to man. Today, the descendants of kites are being proposed as a source of propulsive power. Photo credit: Agnieszka Ziomek via Unsplash

Wind-power can make ships much more efficient!

Multiple academic and industry researchers have investigated the impact of variability in wind speed and directions, trade patterns, geographical areas, seasonal effects, long vs short-haul voyage, ship operation profile and limits, and route optimisation. The results have repeatedly shown that wind assisted propulsion has significant potential to make ships more energy efficient.

Results	
Rotors	0.4–50%
Kites	1–50%
Rigid sails	5–60%
Soft sails	4.2–35%
Wind turbines	1–4%

Source: "A Comeback of Wind Power in Shipping: An Economic and Operational Review on the Wind-Assisted Ship Propulsion Technology" Chou et al in "Sustainability" 2021, 13, 1880; <https://doi.org/10.3390/su13041880>

Hydrogen fuel- clean, plentiful and not ready

By SHIPPING AUSTRALIA

Hydrogen is potentially one of the best fuels around.

Kilogram for kilogram, hydrogen is the king of energy content with a whopping 2.6 times more energy content than the second-most energy rich fuel, methane. Hydrogen boasts of 142.2 megajoules of energy per kilogram, according to the Engineering Toolbox. Methane has an energy content of 54.0 MJ/kg, conventional diesel 45.8 MJ/kg and residual oil about 42.2 MJ/kg.

There's no shortage of hydrogen. About 50 million tonnes of hydrogen is produced each year, which is equivalent to about 150 million tonnes of ship's fuel, reports class society DNV GL. Hydrogen is produced through industrial processes, so production can in theory be ramped up as necessary.

It's also the cleanest combusting fuel any industrial civilization could hope to burn.

Although hydrogen combustion may produce a little nitrous oxide (because there is nitrogen in air) there is no production of sulphur oxides or particulate matter. The other main product of hydrogen combustion is pure water. Carbon dioxide is not emitted from hydrogen, which makes it a great candidate fuel to meet the demands of the International Maritime Organization.

The IMO has mandated a 40% cut (based on 2008 numbers) in carbon dioxide emissions by 2030. That's only nine years and a few months away. The IMO is also demanding both that there be a 50% cut by 2050 and that the industry must be pursuing efforts towards a 70% cut.

There's a lot of work to be done and not much time to do it in.

Hydrogen is one of a few potential marine fuels that can simultaneously meet IMO standards, has enough energy

to power a ship, and which can also be supplied in huge industrial volumes.

Greening hydrogen production

Typical hydrogen production is dirty, unfortunately. Hydrogen is normally produced from a fossil fuel feedstock, such as methane, which generates a lot of carbon dioxide. Walter Mérida, an Associate Dean of Research for Applied Science at the University of British Columbia, writes that grey hydrogen generates between nine and 12 kilograms of CO₂ for each kilogram of hydrogen produced. That's not compatible with a worldwide push for lower carbon emissions.

Hydrogen production could be decarbonised if carbon capture and sequestration becomes economically viable. But that is complex, expensive and difficult at the moment.

Hydrogen can be made by splitting water using electricity. As each water molecule is comprised of two hydrogen atoms and one oxygen atom, splitting seawater produces two valuable industrial gases. There's plenty of seawater to use as a feedstock too. If hydrogen is made with renewably-sourced electricity from wind or solar then it's green as there's no production of carbon dioxide.

Hydrogen powered vessels

There are a few hydrogen-fuelled vessels. Hydrogen is used in a few tiny boats, some pleasure-craft, in experimental passenger ferries and even in a dual-fuel diesel-hydrogen submarine.

But there do not appear to be any

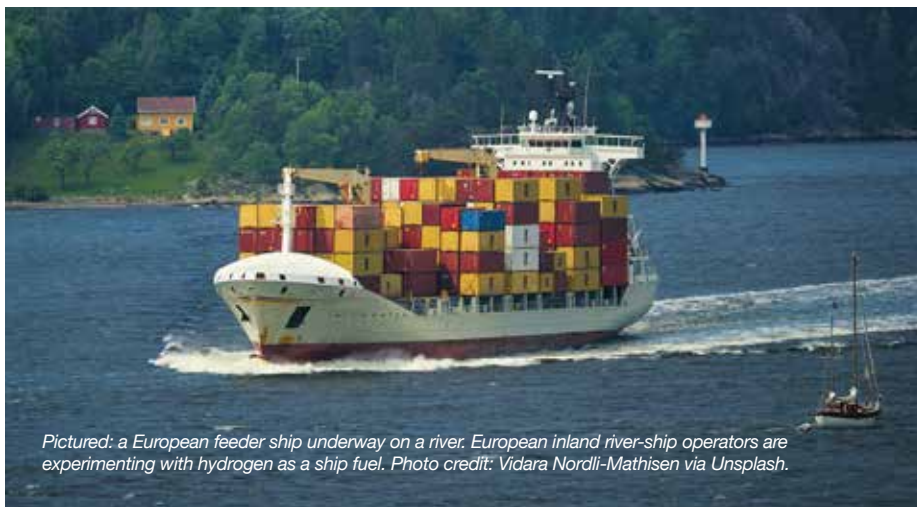
hydrogen-fuelled ocean-going cargo ships. Of the 5,969 alternative-fuel-technology ships in operation, or on order, right now, just three vessels are hydrogen fuelled, according to class society DNV GL.

Cargo-carrying companies working Europe's inland river sector are experimenting with hydrogen fuel cells. French barge operator Compagnie Fluviale de Transport is building a compressed hydrogen-powered cargo barge at a shipyard in Romania. Funds for the project have been provided by the European Union's "Flagships" project.

In the Netherlands, the company Future Proof Shipping hopes to build a fleet of ten zero-emissions vessels for inland and short sea deployment. It has announced plans for an inland river container vessel (110 metres x 11.45 metres) to be retrofitted to run on hydrogen. The engine and gearbox will be replaced with electric motors, compressed hydrogen tanks, fuel cells and a battery. The new system will use cargo space equivalent to at least two forty foot containers. That's a costly trade-off. Ocean freight rates were generally about US\$1,400 per forty-foot box on the China to North Europe route before the current freight rate boom, according to Freightos.

So, while the loss of space for two forty foot boxes doesn't sound significant, it's a big chunk of change over a 20-year vessel lifespan, especially if every ship in a fleet loses two forty-foot slots.

In Singapore, engineer Sembcorp Marine, oil major Shell and ship operator Penguin International will jointly develop a hydrogen-fuelled ship. Sembcorp will design, build and install a hydrogen fuel system on a ro-ro vessel; Shell will



Pictured: a European feeder ship underway on a river. European inland river-ship operators are experimenting with hydrogen as a ship fuel. Photo credit: Vidara Nordli-Mathisen via Unsplash.

supply the fuel and charter the ship while Penguin will own and operate the vessel.

“This trial is an important step in demonstrating the applicability of hydrogen and fuel cells on ships... We see fuel cells and hydrogen as a promising pathway for decarbonising shipping and working with partners in this way will develop our understanding of this critical technology,” said Nick Potter, General Manager of Shell Shipping and Maritime, Asia Pacific and Middle East.

Hydrogen carriers

An experimental ship has been built to trial the carriage of hydrogen as a cargo. The Susio Frontier is being developed by a consortium of Japanese heavy industrial manufacturers. The consortium is exploring technologies for a hydrogen supply chain using hydrogen sourced from Australian brown coal. The Susio Frontier, with dimensions of 116m x 19m, a draught of 4.5 m and 8,000 gross tons, will sail the 9,000km distance between Hastings, Victoria, to a liquefied receiving terminal at Kobe, Japan.

Western Australia-headquartered Global Energy Ventures (ASX: GEV) has also begun the development of a pilot-scale compressed hydrogen cargo ship.

The company hopes to develop an operating fleet of hydrogen carriers by the mid-2020's and the development program is targeting full class approvals late in 2022. The 430 tonne capacity ship will be a scaled version of a 2,000-tonne compressed hydrogen ship, which received class society approval in principle in March 2021. The containment system, which fits within a Handymax-sized vessel, is made up of two large circular 12m diameter tanks contained within the hull of the ship. The system will store ambient temperature hydrogen at an operating pressure of 250 bar.

Poor energy density

While hydrogen packs a lot of energy content by weight, it's also one of the least energy dense fuels by volume. Hydrogen gas has an anaemic energy content by volume of 12.79 megajoules per cubic metre. Liquefied hydrogen has a much denser content of 10,027 MJ / m³.

In comparison, gaseous methane has an energy density of 40.34 MJ / m³; liquefied and super-cooled methane

(i.e. LNG) has a content of 23,612 MJ / m³. Conventional diesel has an energy content by volume of 38,243 MJ / m³ while residual fuel oil has an energy content of 41,787 MJ / m³.

“On a volumetric basis, due to its lower volumetric energy density, liquid hydrogen may require four times more space than [Marine Gas Oil] or about two times more space than liquefied natural gas for an equivalent amount of carried energy,” reports Class Society ABS.



Pictured: a vast cloud of hydrogen in the Triangulum Galaxy. Hydrogen is the most abundant material in the universe. Photo: NASA.

High tech handling and storage

Handling hydrogen requires high technology and a lot of expertise.

Marine fuel hydrogen will be stored either as a compressed gas or a super-cold liquid. Gaseous hydrogen will be stored in tanks made from advanced composite materials. Compressed hydrogen will usually be stored at pressures between 350 bar (5,000 pounds per square inch (psi)) and 700 bar (10,000 psi). The lower end of that pressure range is about the same kind of pressure that experienced on the sea floor at about 3.4 kilometres deep. The upper end of that pressure range is close to the pressure experienced at the bottom of the Middle America Trench in the Pacific waters off Mexico, which is nearly seven kilometres deep.

Hydrogen can be stored as a liquid at sea-level pressure. But, to do that, it has to be really cold. It liquefies at a chilly minus 253 degrees Celsius. That's not far off “absolute zero”, which is a

temperature of minus 273.15 degrees Celsius. That's the temperature at which it is so cold that atoms stop moving.

Hydrogen can also be cryo-compressed i.e. it is kept cold and under pressure, which decreases storage requirements.

Small size, big danger

Hydrogen presents a myriad of dangers. Its molecules are super-small and can diffuse into metals, which makes the material crack and fracture. Vulnerable ship infrastructure includes the interior of tanks, weldments, pipes, valves and nozzles, according to the ABS. Cryogenic hydrogen brings its own dangers including ice build up which may block ventilation. Super cold hydrogen can also induce oxygen condensation and its subsequent evaporation can create an “oxygen rich and potentially flammable gas concentration”.

Hydrogen presents problems both as an asphyxiant and as a fire risk. As an odourless, colourless gas, workers are unlikely to notice a hydrogen leak. Although it is not toxic, hydrogen can displace oxygen and cause death by asphyxiation. Hydrogen is explosive when combined with even small volumes of air. It ignites easily and, when it burns, it burns hot and with a near-invisible flame.

Needless to say, handling a fuel with this kind of pressure, temperature and hazard-profile is challenging.

A fuel of the future

In evaluating hydrogen as a marine fuel, class society ABS notes that “the various challenges exhibited by hydrogen as marine fuel must be resolved before being commercially available for use by a widespread fleet. Hydrogen is in the early stages of development for marine propulsion”.

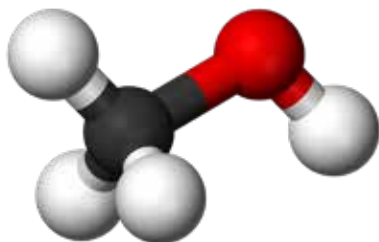
Hydrogen holds a lot of promise as it can be cleanly produced and burnt. It's also available in potentially huge volumes. But it's definitely a fuel of the future. There are formidable engineering issues but hardly any lived, operational, experience. And we haven't even touched on important matters such as cost or infrastructure.

Hydrogen may be a contender as a widely-used marine fuel in the future. But it's not a contender now.

It's not ready, basically. ▲

Methanol – a strong contender

By SHIPPING AUSTRALIA



Pictured: a ball-and-stick model of methanol. Four hydrogen atoms (white), one carbon atom (grey) and one oxygen atom (red). Graphic credit: Benjah Bmm27 via Wikipedia.

Methanol is a simple, clear and colourless, alcohol that is attracting huge interest as a potential marine fuel.

Maersk signed a contract for a 2,100 TEU methanol-powered container ship in July this year with the intent to launch in 2023. In March this year, Class NK issued an approval-in-principle to Sumitomo Heavy for its methanol dual-fuelled tanker design.

New large scale methanol-fuel testing began at Scandinavian industrial giant Alfa-Laval in earlier this year. In February this year, Italian class society, RINA, and the Shanghai Institute for Ship Design, formed a partnership to develop methanol-fuelled tankers. In November 2020, the IMO adopted interim guidelines on ethyl/methyl fuels.

There are, right now, 26 methanol-powered ships either in operation or on order, according to the “Alternative Fuel Insight” platform by class society DNV GL, that’s 22 oil or chemical tankers, two gas tankers, one ro-pax and one tug.

Methanol’s a potential fuel that’s nearly ready for widespread use by the shipping industry.

“While there are a several technical and engineering issues to be resolved, class society DNV GL rates the technological maturity of methanol as a marine fuel as “commercially available, but not fully mature”.

Globally used, traded worldwide

Methanol has many uses, including but not limited to, a feedstock for the creation of other chemicals, for synthetic fibres, pharmaceuticals, plastics, and plywood. It is an internationally transported commodity so there is a lot of handling experience. Although toxic and flammable, it is easily handled because it is a liquid between -93 Celsius and 65 Celsius at atmospheric pressure.

Because it’s globally traded, logistics and storage infrastructure for methanol already exists. There are methanol terminals at Melbourne, Newcastle, and Taranaki (New Zealand), according to DNV GL. Methanol can even use the same type of storage as diesel, albeit with minor modifications to cope with the fact that methanol fuel has a low flash point, according to industry body the Methanol Institute.

Methanol is already produced in large volumes and there are about 90 methanol plants around the world with a combined production capacity of 110 million tonnes, according to industry body, the Methanol Institute.

Because it is widely traded, there’s good pricing data. Methanex, the world’s largest producer and supplier to global markets, recently posted per tonne prices of EUR 410 (US\$483) for Europe; US\$542 for North America and US\$420 for Asia-Pacific. That’s not a million miles away from existing bunker prices. At the time of writing, Singapore bunker prices per tonne were US\$539 for Very Low Sulphur Fuel Oil (0.5%), US\$538 for Marine Gas Oil and US\$413.50 for Intermediate Fuel Oil.

Ignition and energy content

There are disadvantages to the use of methanol as a fuel. For instance, it currently needs help (usually from diesel) to ignite. That creates ship-design issues, which is a matter being investigated by Alfa-Laval.

“At present, combusting methanol requires a pilot ignition with fuel oil,” said Lars Skytte Jørgensen, Vice President Technology Development, Alfa Laval Marine, in a public statement. “This necessitates two fuel lines and different types of fuel tanks on board. If methanol from renewable sources could be burned directly in standard compression engines, it would offer a shortcut to carbon-neutral shipping.”

Methanol has a lower energy content than conventional fuels. Lower energy density means that methanol-fuelled ship will either carry less fuel (giving it a smaller sailing distance, or requiring it to carry out more frequent bunkering) or it will have to carry bigger fuel tanks which will likely result in less cargo-carrying space.

Class society DNV GL estimates that methanol powered ships will need fuel tanks about 2.5 times bigger than vessels powered by marine gas oil (a distilled, diesel-like, fuel). DNV GL says that methanol tanks would need to be similar, or a bit smaller, in size than LNG tanks. Given that there are already 729 LNG-powered ships either in, or nearly-in, commercial service, according to DNV GL, the bigger tank size issue seems to be manageable.

Methanol’s safety reputation

Methanol toxicity is very much dependent on species and size. Rabbits, rodents, and dogs might be able to recover from a dose that would seriously harm a person. Unfortunately, humans are particularly sensitive to methanol. Methanol poisoning can occur through ingestion, inhalation of vapours or through skin absorption. Symptoms include irritated eyes, skin and respiratory tract irritation, shortness of breath, nausea, headache, blindness, vomiting, diarrhea, and death.

Methanol does not appear to pose a severe risk to aquatic life. The toxic level in fish,



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according to the Methanol Institute, is 15,400 mg/litre, which compares extremely well to heavy fuel oil which has a toxicity to fish of 79 mg/litre. That said, methanol toxicity very much depends on the nature of the critter. About half of a sample population of small freshwater Japanese Rice Fish (*Oryzias latipes*) will die with an exposure of 7,900 micrograms / litre. However, it takes nearly twice as much methanol exposure, about 15,400 micrograms / litre, to kill half of a sample population of freshwater Bluegill (*Lepomis macrochirus*).

If there is a methanol spill, the alcohol evaporates quickly when exposed to air and it dissolves quickly when mixed with water. A methanol spill at sea would quickly disperse to non-toxic levels because of wind and wave action. Methanol is not persistent and industry body "Methanol Fuels", reports that methanol biodegrades within seven days or less, depending upon conditions. The alcohol also doesn't bioaccumulate in higher-level predatory animals.

Methanol's green benefits

Nitrous oxides, sulphur oxides and particulate matter emitted during the combustion of fossil fuels are highly adverse to human, plant, and animal health. They're also terrible for the general environment too. Acid rain, for instance, is caused by atmospheric sulphur oxide.

So the less, the better.

Methanol combustion results in far lower levels of these toxic nasties compared to heavy fuel oil combustion. According to the International Transport Forum's 2018 "Decarbonising Maritime Transport" paper, methanol combustion offers emissions reductions of 99% for sulphur oxides, 60% for nitrous oxides and 95% for particulate matter when compared with heavy fuel oil. Nitrous oxide emissions can also be further reduced with emissions control technologies.

Methanol can also be made with clean, renewable, energy, which is a further point in its favour.

Methanol's two weak points

Methanol has two weak points: carbon emissions during production and during combustion.

The chemical formula of methanol, CH_3OH , shows that the alcohol is comprised of



six atoms: one carbon, one oxygen and four hydrogen. Even one carbon atom means methanol is not a zero-carbon fuel. However, it contains less carbon than fossil fuels. Methanol's carbon content is 37.5% by weight while, in comparison, Liquefied Natural Gas has 75.0% carbon by weight and diesel has 86.9%, according to analyst FCBI Energy.

Methanol is commonly made from natural gas. Industry body, Methanol Fuels, reports that, formerly, a "typical methanol manufacturing plant would emit about 0.9 – 1.0 metric tonnes of carbon dioxide for every ton of methanol produced". The body adds that, as the methanol industry has replaced its heavy industrial plant over time, carbon dioxide emissions have declined by up to 40%.

However, emissions science is not favourable to natural gas-produced methanol. Brynholf et al in "Environmental assessment of marine fuels" (2014) conclusively demonstrated on a full life cycle basis (including production, transport, and usage) that methanol fuel made from natural gas is a bit worse than heavy fuel oil from a global warming perspective.

But methanol can also be made from renewable feedstocks, such as biomass. This includes biomass from the paper industry, the sugar industry (bagasse, molasses, cane leaves), other agricultural industries and forestry. Biomass production massively reduces the greenhouse gas effect of methanol. Brynholf et al demonstrated that life-cycle emissions from forestry-sourced methanol have about five times less global warming potential than heavy fuel oil.

"The shipping industry needs to reduce its emissions of greenhouse gases

significantly in the future in order to bear its share of the burden. This study highlights that LNG and methanol produced from natural gas will not reduce the global warming potential in the life cycle. However... methanol produced from biomass is one possible pathway to reducing shipping greenhouse gas emissions," Brynholf et al wrote.

It is also possible to make methanol directly from carbon dioxide and hydrogen.

For maximum environmental benefit, CO₂ could be supplied by carbon capture. Capture can come in several forms, two of which are relevant here: capture from industrial facilities or capture directly from the air. In both cases, carbon capture technology exists but economic viability has not been demonstrated. That may change with new technology or the introduction of carbon pricing.

Carbon capture from industrial plant would prevent emissions being vented to the atmosphere. Meanwhile, production of methanol using direct air capture of carbon would greatly reduce emissions and possibly even reduce atmospheric carbon, provided the necessary hydrogen was also produced in a green manner.

It may be possible to use carbon offsets by, for instance, buying credits to fund the restoration of mangrove swamps, or re-planting rainforests. That could potentially lead to a net-neutral position.

Methanol's here, it's manageable, mostly green and its carbon problems can be overcome. It's a contender. ▲



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Photo: student doing Coxswain boat practical
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