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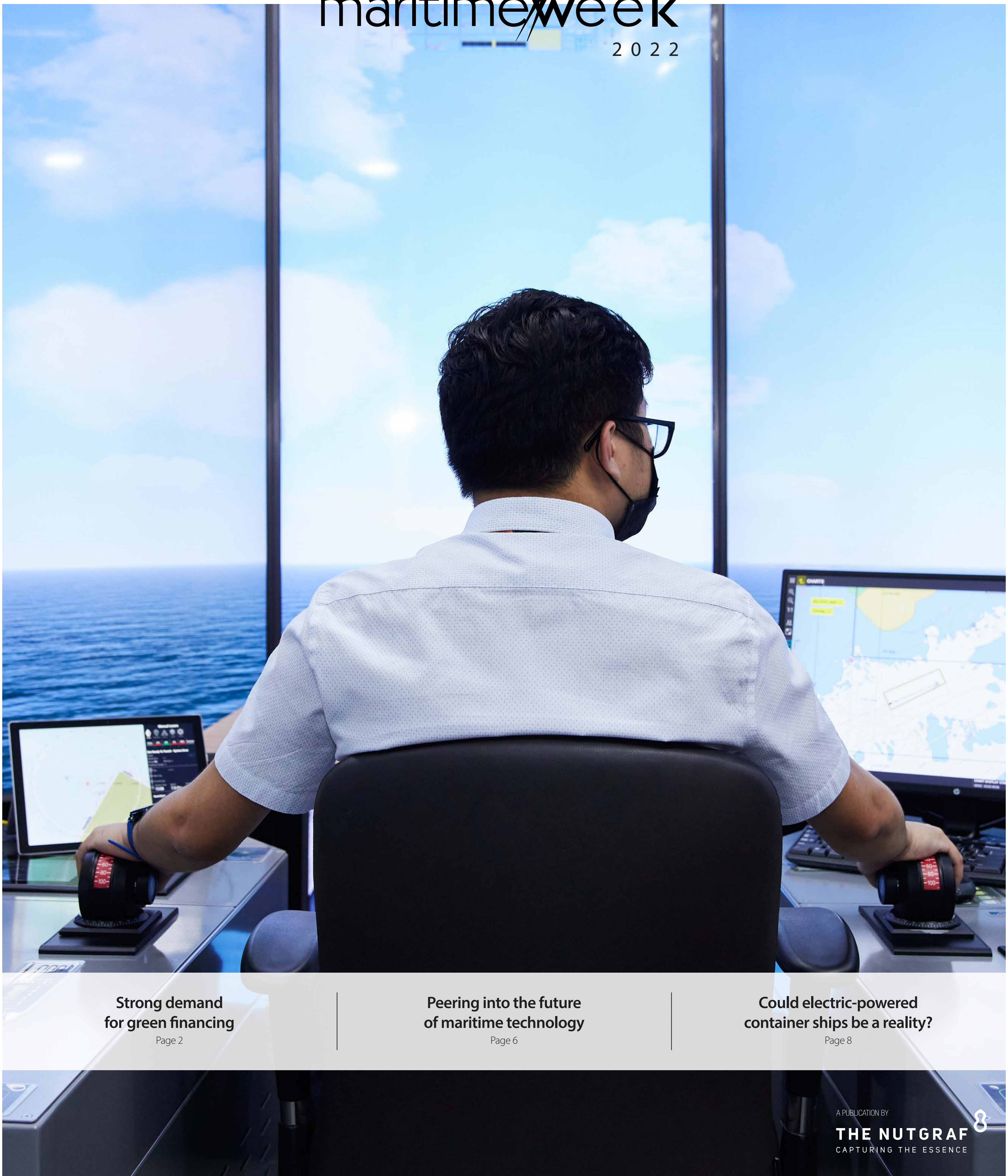

Strong demand for green financing

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Peering into the future of maritime technology

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Could electric-powered container ships be a reality?

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THE NUTGRAF
CAPTURING THE ESSENCE

Quah Ley Hoon, Chief Executive of the Maritime and Port Authority of Singapore, believes green financing is one of the maritime services which requires greater collaboration.

Let It Flow: Unlocking Capital Streams In The Transition To Decarbonisation

Derek Wong
derek@nutgraf.com.sg

There is unprecedented interest in green financing – a boost for Singapore in its role as a green finance hub to aggregate and match-make capital to the right projects.

"We need to gather like-minded players with different risk appetites to match funds to the right green projects at the right time," said Quah Ley Hoon, Chief Executive of the Maritime and Port Authority of Singapore (MPA).

Green financing is one of three maritime services which requires greater collaboration, with the other two being regulation and risk management.

"We need strong maritime services to transform for growth," she said in her opening remarks yesterday at the inaugural Maritime Services Leaders Forum during the Singapore Maritime Week.

The importance of unlocking capital flows for the maritime industry was discussed at the ensuing panel, "SMW Conversation: Green Finance Trends and Unlocking Capital Flows for the Maritime Industry".

> "You have to have diversity (in financing)... there is no one-size-fits-all. Each person likes a different flavour of ice cream."
>
> **Julian Proctor**
> Chief Executive Officer, Purus Marine (UK)

A GROWING MOMENTUM

Panel moderator Audra Low, Chief Executive Officer of Clifford Capital (Singapore), kicked off the discussion by setting the context of how the debt capital and loan markets have made marked improvements, providing a "nice momentum" in the financial sector.

Chu Kheng Sin, Regional Head, Shipping Finance ASEAN and South Asia, Standard Chartered Bank (Singapore), added to the buoyant mood: "From a ship financing perspective, the fundamentals are looking great.

"Every year when I go to a conference, everyone is always talking about being 'cautiously optimistic'. This is one of the few years where industry players are actually optimistic about the future," he said.

However, there remains a limited uptake in green financing from the maritime sector. This is because sustainable finance taxonomies are structured such that maritime players often struggle to get loans while they still use carbon-based fuels – in a bid to push more companies towards eco-friendly fuels.

It is a quandary which Julian Proctor, Chief Executive Officer of maritime holding company Purus Marine (UK), is accustomed to. He shared how it is "incredibly difficult" to source for European banks to finance the firm's ferry businesses, even as its fleet strives to be environmentally-friendly.

He has had to be resourceful in finding new capital streams beyond the usual lending banks. "What may shock you is that the deepest pool of capital for some of our businesses comes from Asia," said Mr Proctor, listing Japan and China as examples.

But he also sees value in finding different lenders. "You have to have diversity (in financing)... there is no one-size-fits-all. Each person likes a different flavour of ice cream," he explained.

PARTNERSHIPS ARE PARAMOUNT

MPA's Senior Advisor Tan Beng Tee noted that capital is a key concern for shipping companies.

"In the long term, we want to be a place where there is access to diverse types of capital," said Ms Tan, adding that Singapore aims to provide a "suite of services" to companies at different stages, whether that includes the provision of traditional bank loans or equity financing.

Maritime companies will also be heartened that asset management firms such as Hayfin are closely partnering the sector. Stephen Majeski, Managing Director, Hayfin (USA), said his company is actively figuring out how to underwrite transactions and identify quantifiable carbon measurements to assure investors as the industry decarbonises.

Such partnerships may ultimately be key in unlocking capital streams. Singapore seeks to harness more collaborations through initiatives such as the International Advisory Panel on Maritime Decarbonisation to find out the "pain points" of companies – one of which is financing.

Mr Proctor agreed that it is crucial to build strong partnerships among governments, businesses, and financial lenders. Citing an example of how he brought financiers to visit a ferry system in Antwerp that is incorporating the use of hydrogen, he explained that it is especially important to bridge the knowledge gap in emerging technology between operators and lenders.

"It's a slow but incredibly important process that goes back to collaboration, education, and building trust," he said. ▪

Russia-Ukraine Conflict Has Left Marine Insurance "Fraying At The Edges"

Pearl Lee
pearl@nutgraf.com.sg

The Russia-Ukraine war, a black swan event that followed closely from the COVID-19 pandemic, has posed significant challenges to marine insurers, especially as the conflict overlaps with sanctions.

That the sanctions are still unfolding have also added another layer of uncertainty, panellists said yesterday at a dialogue on the changing nature of maritime risks.

"The picture is confusing and rapidly changing from a marine insurance perspective," said Richard Turner, President of the International Union of Marine Insurance, who joined the discussion virtually.

Responding to moderator John Sze, Deputy Managing Partner of law firm Joseph Tan Jude Benny, on how the conflict has affected how insurers perceive risk, Mr Turner highlighted three immediate effects.

First, insurers have had to ensure compliance with the regulatory sanctions. Second, they have had to manage their exposure to the escalating risks. Third, he has also observed cases of self-sanctioning – where insurers are reluctant to underwrite Russia-linked businesses, even though there are no restrictions in place yet.

Since Russia launched an invasion into Ukraine on February 24, it has been slapped with severe sanctions by major economies, including the United States, the European Union, and Britain. The latest to be imposed include bans on imports of Russian oil and gas, and restrictions on Russian-affiliated vessels.

Both the UK and US have placed financial restrictions on Sovcomflot, Russia's state-owned shipping company. The penalties have serious ramifications for the maritime industry, affecting every level of operations, from vessels to companies and seafarers.

Already, some insurers have dropped coverage for Sovcomflot vessels. The conflict has also led to vessels and seafarers stuck in the conflict zone, at times even coming under attack, as supplies run low.

This, said Mr Turner, has led to the infrastructure of marine insurance "fraying at the edges".

The move to extract Russian entities from the global supply chain will not be a straightforward one, said Nick Shaw, Chief Executive Officer of the International Group of P&I Clubs, at a dialogue discussing the changing nature of maritime risks.

Paul Hackett, Joint Head of Marine of specialty insurer and reinsurer Canopius, said the number of changes and sanctions in the last six to seven weeks have been "unprecedented". The penalties have disrupted global flows of grain, coal, and oil, affecting major shipping players and leaving the world wrestling with food and fuel security issues.

"We have seen different sets of sanctions from different regulators, and ultimately trying to keep abreast of them and staying ahead of them is proving to be really difficult," he noted.

"This is especially when we have got a situation where shipowners and cargo owners are looking to extract their cargoes from the impacted areas, and we are waiting two or three days to see if we are going to get the sanctions approval to see (the move) come through."

Nick Shaw, Chief Executive Officer of the International Group of P&I Clubs, which provides liability cover for the marine sector, added that even though the protection and indemnity clubs are used to handling emerging risks, the move to extract Russian entities from the global supply chain is "far from straightforward".

He noted: "We have to make sure we are able to give good advice to shipowners on the latest sanctions and help them understand the rules which are changing very fast."

The key is for underwriters to keep abreast of the situation. Mr Hackett added: "Ultimately this is an ongoing situation and there will be challenges... But we are trying to do all that we can to find the solutions." ▪

Sunny For Now, But Shipping Faces A Cloudy Outlook

Justin Kor
justin@nutgraf.com.sg

The past year has been an outstanding one for the shipping industry, with companies posting soaring profits and record revenues.

And while the good times may roll for a bit longer, panellists at the Singapore Shipping Forum 2022 warned that the outlook is looking far from peachy.

Indeed, with the world now fraught by a triple threat of supply chain issues, geopolitical tensions, and an increasingly urgent climate crisis, shipping could be entering precarious waters.

"The maritime sector is navigating unprecedented changes as it moves towards a decarbonised future while still tackling the impact of the COVID-19 pandemic and now the repercussions of the conflict in Ukraine," said Esben Poulsson, Chairman of the International Chamber of Shipping.

"We're faced with a complex landscape in which we must balance current needs and costs required to make the leap into an efficient, low-carbon future."

Mr Poulsson was giving the opening address at the event yesterday, held in conjunction with the Singapore Maritime Week. The virtual event was co-hosted by accounting firm Moore Stephens and banking group BNP Paribas Singapore.

The forum began on a high note, with Mick Aw, Chairman of Moore Asia Pacific Moore Global Network, sharing a stellar report card of the industry. Bulkers, tankers, and container ships all saw earnings soar last year. ClarkSea – the shipping index of shipbroker Clarkson that covers the entire shipping industry – hit a daily average of US$28,700 in 2021, the highest level since 2008.

Container shipping, in particular, saw a bumper payday. According to the McCown Container Results Observer, the industry's net income in the third quarter of 2021 stood at US$48.1 billion – a nine-fold increase from the same quarter in 2020.

"Everything seems to be good, very good, or super good," said Mr Aw of the shipping sector.

But he also noted despite the calm surface, dangers bubbling beneath are keeping industry players awake. One example: the war in Ukraine. This makes for poor visibility and could signal a potential drop-off in performance ahead for some sectors of shipping, noted speakers at the forum.

The dry bulk market, for instance, could be at risk. With war raging in Ukraine – the world's fourth largest grain exporter – production capacity has been affected. This could likely result in a net loss of cargo volumes and a decline in earnings in the future. Economists are also now worried about the effects of inflation on the global economy, with some analysts pointing to a potential global recession this year.

"Recent events could make this a bumpy year for the dry bulk market," said Charles Chasty, Senior Analyst at shipbroker Affinity (Shipping). "There is uncertainty with the invasion of Ukraine and how it will play out."

In light of the current global supply chain disruption, shipping may also be impacted by a change in supply chain strategies, noted David Lee, Vice President of the Economic Society of Singapore and Professor at the School of Finance at the Singapore University of Social Sciences.

"We can see that a lot of manufacturers are trying to minimise vulnerabilities by having their plants closer to home and reducing dependence on risky sources of raw material and uncertain supplies," he said.

Manufacturers are also pivoting from a just-in-time approach to one that is just-in-case, as they stock up on inventory rather than place orders whenever there is a need to, said Prof Lee. This could have profound implications on how shipping companies conduct their operations in the future.

Change is nigh and the shipping sector will need to seek ways to adapt accordingly, said Mr Poulsson.

"We must respond to all these challenges... the pace of change in this industry is only going to increase in the coming years," he said. ▪

> "We're faced with a complex landscape in which we must balance current needs and costs required to make the leap into an efficient, low-carbon future."
>
> **Esben Poulsson**
> Chairman, International Chamber of Shipping

From left: Mary Liew, General Secretary, Singapore Maritime Officers' Union and President, National Trades Union Congress (NTUC); Arasu Duraisamy, General Secretary, Singapore Port Workers' Union and Secretary for Financial Affairs, NTUC; Quah Ley Hoon, Chief Executive, Maritime and Port Authority of Singapore; Chee Hong Tat, Senior Minister of State for Transport and Deputy Secretary-General, NTUC; Caroline Yang, President, Singapore Shipping Association and Chief Executive, Hong Lam Marine.

New Agreement To Boost Maritime Tripartism Efforts

Ignatius Koh
ignatius@nutgraf.com.sg

Seafarers and maritime workers will soon be equipped with the right skills to excel at jobs in Industry 4.0 and beyond.

The Maritime and Port Authority of Singapore, the Singapore Shipping Association, and the Singapore Maritime Officers' Union (SMOU) signed a Memorandum of Understanding (MoU) yesterday to further collaborate on training and transforming the maritime workforce.

It is part of plans to bolster tripartite efforts to enhance Singapore's position as a global shipping hub. This will be driven by Company Training Committees (CTCs), an initiative launched by the National Trades Union Congress (NTUC) in April 2019 to spearhead business and workforce transformation.

Companies with CTCs will be able to approach NTUC to develop training programmes and roadmaps while helping their employees upskill. There are more than 800 CTCs today.

On how the partnership will benefit workers, Senior Minister of State for Transport Chee Hong Tat said: "Workers will become more resilient, holding relevant skills to be able to navigate a digitalised and sustainable shipping industry, and increased productivity levels will allow workers to command fair and better wages, welfare, and work prospects."

Mr Chee, who is also NTUC Deputy Secretary-General, added that unions, the government, and businesses will need to work closely as tripartite partners – a key competitive advantage for Singapore that promotes economic competitiveness.

He was speaking at a conference on charting Singapore's maritime manpower transformation, organised by SMOU.

CTCs are platforms where management and workers come together to co-create the future. This will be enabled via the Operation and Technology Roadmap (OTR). It gathers representatives from all facets of the company, from leaders to workers, to visualise transformation through collective ownership.

From addressing specific pain points and redesigning jobs, to workforce training and change management, CTCs will be able to help maritime organisations meet new demands.

"Whether it is sea jobs or shore jobs, I think there are opportunities everywhere – so how do we tap them?" said Gilbert Tan, Assistant Director-General and Director, Training & Placement Division at NTUC. "(CTCs) will help in leadership development as well, so our leaders will know what to do."

For the maritime industry, these growth opportunities – brought on by the COVID-19 pandemic – have opened doors for tripartite partners to get on board the CTC initiative. This will future-proof the workforce amid updated regulatory guidelines and technological advancements.

With decarbonisation, digitalisation, and research becoming more prominent on the agenda, tripartism will create more "win-win" situations for businesses and workers as collaborations will push boundaries for development, said Mr Chee.

He referenced the early days of the pandemic, when crew change was a massive challenge that left many seafarers stuck at sea. Robust discussions between union leaders, the industry, and the government led to a swift change in protocol that facilitated crew changes in those difficult times while safeguarding their health, as well as Singapore's.

"That effort could not have happened so quickly if we did not have tripartism," he added. "It was a very important enabler to allow us to move quickly during a crisis, because there was already a lot of understanding and trust, and we were able to work with our partners without too much delay."

Meanwhile, Mr Chee reiterated how the formation of the Maritime Industry Tripartite Transformation Committee will oversee the implementation of maritime industry transformation plans.

"It will not be smooth-sailing – there will always be choppy seas. And therefore tripartism is one of the key pillars that gives us strength and trust in one another to be able to sail the stormy seas together," he said. ▪

> "It will not be smooth-sailing – there will always be choppy seas. And therefore tripartism is one of the key pillars that gives us strength and trust in one another to be able to sail the stormy seas together."
>
> **Chee Hong Tat**
> Senior Minister of State for Transport, Singapore

At Wärtsilä, the latest digital technologies are being put to work, helping seafarers to prepare for the future of shipping.

TODAY'S HIGHLIGHTS

Fri April 8

Maritime Manpower Forum
9.30am - 12.45pm
Marina Bay Sands (Level 4, Orchid Ballroom)
Maritime Manpower Forum brings together leaders to discuss, promote, and join forces to streamline manpower strategy for the maritime industry. As the top leading maritime city of the eorld, Singapore will also share perspectives on driving national and corporate level talent development initiatives.

Maritime Singapore Connect (MSC) Maritime Case Summit Challenge
7pm - 9pm
The Maritime Singapore Connect (MSC) Maritime Case Summit Grand Finals Prize Presentation will be happening on 8 April 2022. Organised with BHP, CMA CGM, Standard Chartered Bank and Toll Group, the case challenge allows tertiary students to tackle issues that are at the intersection of business and sustainability.

Technology In Action

Jacqueline Woo
jacqueline@nutgraf.com.sg

The maritime industry is in the midst of a technological revolution – one that will completely reshape its entire future, from the way ships plot their voyages to how goods will be tracked and accounted for.

Nowhere is this as evident as at Wärtsilä Voyage, the arm dedicated to transforming maritime ecosystems by leveraging the latest digital technologies at Finnish technology group Wärtsilä. Its mission is to change how ships perform their voyage by building a digital ecosystem where all vessels are technologically smart, safer, and more energy-efficient.

At the company's Jalan Kilang Barat office in Singapore, these efforts have come to life. Wärtsilä's Smart Realities solution uses virtual and mixed reality to create highly-immersive simulation exercises that train and prepare seafarers for handling complex environments and systems, for instance.

Visitors to the site yesterday – as part of a series of exclusive site visits organised during the Singapore Maritime Week (SMW) – also observed the IntelliTug project at work. The system, comprising an integrated suite of hardware and intelligent software that enables autonomous capabilities, results in smarter tugs that can perform a range of routine missions more efficiently and safely.

In the Port of Singapore, where there are about 1,000 vessels at any one time, the IntelliTug project can help to reduce the workload and pressures on operators in one of the world's most demanding harbour environments.

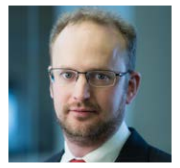
Another project on showcase was the Wärtsilä Navi-Port, a ship traffic control solution that connects ships to ports with dynamic and real-time data sharing, enabling just-in-time arrivals.

This year's SMW featured a special line-up of site tours where visitors viewed up-close some of the key innovation projects in Singapore and how technology is used in maritime operations. In addition to the visit to Wärtsilä, there were also guided visits to PSA Singapore, the world's busiest transshipment hub, and the Technology Centre for Offshore and Marine Singapore (TCOMS), a national research and development centre dedicated to the marine and offshore engineering, maritime, and other ocean sectors.

A number of visitors also had the opportunity to see drones in flight at the Maritime and Port Authority of Singapore's Maritime Drone Estate (MDE), which was launched in 2021. The MDE serves as a regulatory sandbox and a conducive space for drone companies to develop and test-bed their drone technologies for maritime use cases.

As the industry navigates an increasingly complex landscape, digital tools are playing a bigger role than ever in redefining operations and business models. The future of clean, autonomous shipping may just be closer than we think. ▪

Global Supply Chains Could Normalise By 2023, But Significant Downside Risks Remain



James Frew

David Jordan

The containership industry is in the midst of one of its most remarkable periods across its 70-year history. Both freight and time charter markets are, by a considerable distance, at their strongest levels on record.

The SCFI (Shanghai Containerized Freight Index) Comprehensive Index, at US$4,434 per Twenty-foot Equivalent Unit (TEU) on March 25, sits 350 per cent above its 2010 to 2020 average level, while 4,300 TEU Panamax 1 Year rates are currently assessed at over US$120,000 a day.

A combination of port congestion, container shortages, and wider supply chain disruption has driven supply-demand imbalances to the extent that Maritime Strategies International (MSI) estimates the gap between effective demand and available supply has risen north of 15 per cent in the past year. The market has moved beyond the traditional stalwarts of just supply and demand fundamentals.

To understand the prospects of the container market, a fuller view of the situation at ports and in the supply chain is critical. In broad terms, you can break the problem down into three key elements: the onward intermodal connections, the terminal itself, and the shipping considerations.

The evolution of these issues will ultimately dictate how the supply chain crisis is resolved, and consequently how long it will take for freight and then charter markets to normalise. In short, until the landside issues are resolved, there won't be any relief in the pressures on the containership market.

Let's first look at the intermodal situation across regions. Prior to the outbreak of hostilities in Europe, it appeared as if the port situation in Europe was stabilising. However, operational throughflow effects from the Russia-Ukraine conflict have had a detrimental impact on activity there. Even before March, the message in North America was more one of deterioration, with issues on the West Coast seen at East Coast ports as well. In China, the intermodal situation has been disrupted once again by fresh lockdowns in response to COVID-19 outbreaks.

In the West, at the start of the year, it appeared as if road freight costs in Europe and the United States had peaked and were starting to fall. However, provisional data showed these trends reversing throughout March following the outbreak of hostilities in Europe, with road freight costs rising. This has been due largely to surging fuel prices, given the sanctions on Russian oil.

In addition to escalating fuel prices, difficulties around the movement of freight by road in China have been compounded by the restrictions relating to the recent lockdowns.

Broadly, if the road freight market maintains its current status quo, the supply of trucks will remain well below demand for most of 2022. It remains to be seen how the continued hostilities in Europe and other factors would affect demand.

Early this year, there were indications that supply-side factors might ease pressures on the system, with a pick-up in new truck deliveries anticipated for the second half of 2022. However, some major truck manufacturers have recently reported massive supply gaps in truck manufacturing amid the Russia-Ukraine conflict. Chinese lockdowns have also impacted production there. These factors could lead to renewed delays in new truck deliveries.

Another element contributing to the supply chain crisis is the shortage of storage capacity, both at the ports as well as at warehouses and inland container storage spaces. The Logistics Manager Index (LMI) for Warehouse Utilisation is still at elevated levels after firm increases in the first two months of the year. Over the next 12 months, the expectation is that warehouse utilisation will increase as supply continues to struggle to keep up with demand.

When the pandemic took hold in 2020, transportation capacity plummeted, but this has since stabilised. The current expectation is one of continued growth in transportation utilisation over the course of this year. Whilst the trucking industry continues to contend with high volumes and structural challenges around the recruitment of truck drivers, this represents another piece of evidence suggesting the road freight industry's contribution to the supply chain crisis may be diminishing.

The situation is immensely complicated and constantly evolving. However, there is a plausible scenario in which the non-maritime elements of pressure on the supply chain will ease beyond the end of this year. The key question is whether this alone will be enough to spark normalisation in the wider container shipping industry. MSI suspects that it will be: if landside congestion eases, there will be a move towards normalisation in the industry.

In MSI's first-quarter 2022 Base Case outlook for the containership market, published at the end of March 2022, we assume that the Russia-Ukraine conflict will be resolved in a military sense over the Northern Hemisphere summer and any further lockdowns will be swiftly lifted. If this transpires, the intermodal situation in key regions will ease.

We also expect over a million TEUs of fresh containership capacity to be added to the global fleet this year. This will help alleviate some of the vessel shortages and, coupled with increased vaccination of terminal workers and an unwinding of inland bottlenecks, resolve the logjam at ports.

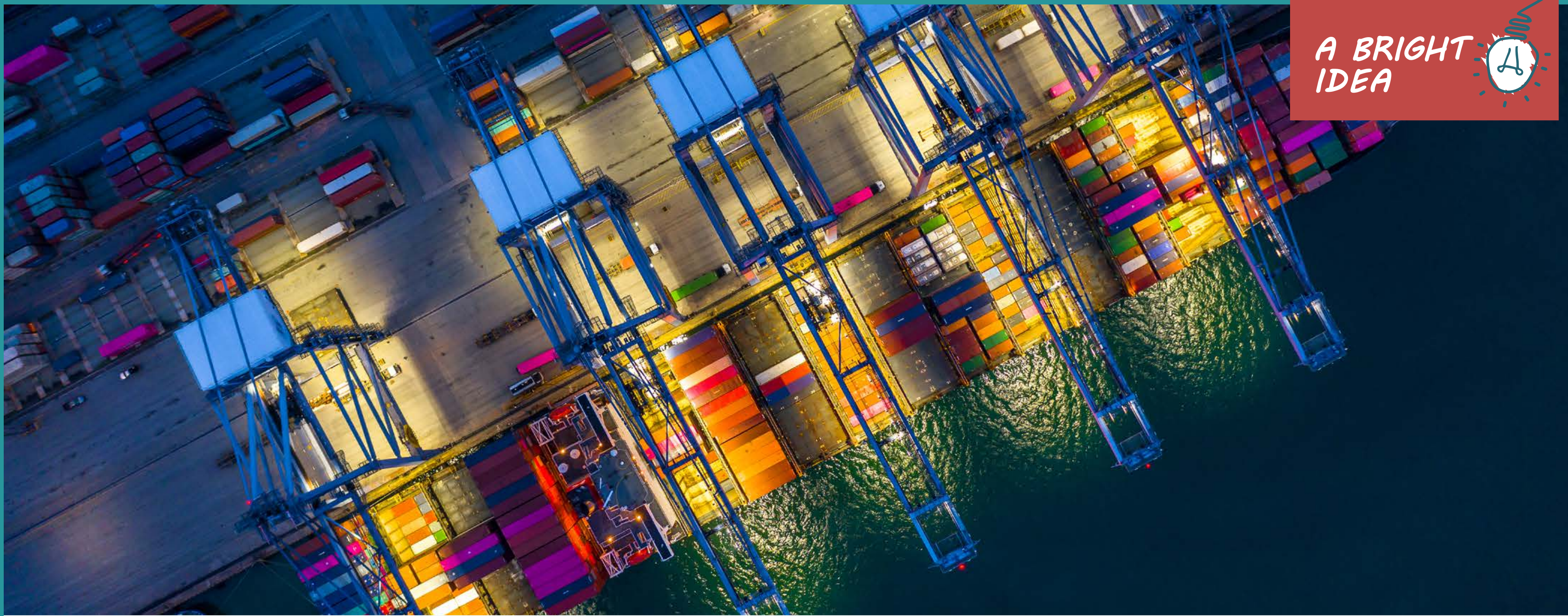
Of course, numerous factors could undermine this scenario. Firstly, there is the inherent uncertainty surrounding the evolution of the Russia-Ukraine conflict and its secondary effects – principally through energy costs, and in an extreme scenario, energy rationing, and increased inflation.

Second is China's adherence to a zero-COVID policy. The renewed lockdowns in recent weeks have resulted in a precipitous rise in congestion and significant delays at key Chinese ports. It is hard to see China abandoning their zero-COVID policy any time soon. This makes further lockdowns likely, which could create ripple effects on the wider maritime supply chain.

In light of these factors, it is easy to envisage a situation whereby MSI's first-quarter 2022 Base Case outlook of normalising containership freight and charter markets towards early 2023 is imperilled.

However, the industry does have an ace up its sleeve. Nearly 2.5 million TEUs of containership capacity is expected to be delivered each year over 2023 to 2024. This is a significant buffer to help the industry start absorbing the impact of exogenous factors without driving freight rates back into the stratosphere. ▪

The authors James Frew and David Jordan are Director and Regional Director, Asia respectively at shipping consultancy Maritime Strategies International, which specialises in independent market forecasting and business advisory services for shipping, offshore, and allied industries.



Electric Dreams: Can Big Ships Run On Batteries?

THE SPARK - 100% CHARGED

Grace Ng
grace@nutgraf.com.sg

Just four months into 2022 and the global maritime industry has already witnessed two milestones in its journey towards a greener, decarbonised future.

In late February, the world's first fully electric cargo ship successfully completed its maiden voyage in Norway. Christened *Yara Birkeland*, the ship is fitted with an electrical propulsion and battery system with a capacity of close to 7 megawatt hours (MWh) – roughly equivalent to the battery power of 100 electric cars.

Then last month, China put into service what is touted as the world's largest electric cruise ship. Measuring 328 feet long, the *Three Gorges 1* is powered by batteries totalling 7.5 MWh and can accommodate 1,300 passengers.

Many vessels do use a diesel-electric transmission system, and some small-sized ones are shifting to hybrid or electric. But trying to electrify large-scale container, cargo, and cruise ships in a commercially viable way had seemed more of a pipe dream – until recently.

Successful pilots like *Yara Birkeland* and the *Three Gorges 1* are paving the way for certification and commercial production of battery technologies that can be used to power ships without generating carbon emissions.

This comes as the International Maritime Organization's "Paris Agreement for shipping" calls for the global shipping industry to make emission cuts of 50 per cent by 2050.

Top maritime hubs such as Singapore and Norway not only align themselves with this agreement but are also actively promoting innovation to create new solutions, fuels, and ecosystems that can support low-carbon or zero-carbon shipping.

Singapore is taking the lead in developing hybrid-electric propulsion technology for offshore support and harbour vessels. At the same time, it is awarding funds to support the development of fully electric cargo vessels, complete with interoperable swappable battery infrastructure solutions for the Port of Singapore.

CHALLENGES IN STORE

While breakthroughs in electrification technologies are encouraging, the industry will have to contend with various challenges, such as developing viable business models to bring the costs of electrification down and enticing ships to switch away from diesel.

Another barrier is the inadequate energy density of existing lithium-ion batteries. Batteries in today's market are around 300 watt-hour (Wh) per kilogramme, noted Singapore Institute of Technology Assistant Professor Elsa Feng.

"This is still much lower than what's required to pull off an intercontinental trip that requires around 11,700 Wh/kg," explained the lead author of the paper "On Maritime Electrification – Electrification Technologies, Charging Infrastructure and Energy Management Strategies".

This limits most electric ships to short-distance trips currently, as it is not feasible for them to carry enormous amounts of batteries. The *Yara Birkeland*, for example, was able to operate only within 30 nautical miles of Norway.

"We will need batteries with much higher energy densities to better support electric cargo ships for global shipping," said Professor Feng, who is one of the speakers at the Singapore Maritime Week. She presented her paper yesterday, at the International Maritime and Port Technology and Development Conference (MTEC) and the 4th International Conference on Maritime Autonomous Surface Ships (ICMASS).

Looking ahead, onshore and offshore charging infrastructure "that can ensure fast, safe, and reliable charging under (a) special sea environment" will be one of the most important technologies to advance electrification and reduce carbon emissions for ports like Singapore, she added.

If hybrid and electric cargo and container ships do become more widespread, another challenge facing the industry will be to ensure the port's electric grid is resilient enough to support the charging infrastructure.

"As the power ratings of large-scale shore charging infrastructure are normally on the higher end, scenarios like simultaneous charging of many ships at the same time may cause power system stability problems," explained Prof Feng.

Electrifying the shipping industry on a large scale will clearly not be plain sailing. But as more retail giants such as Ikea, Amazon, and Unilever push for the ocean shipping industry to move towards zero-carbon fuel sources by 2040, we may see even more innovative solutions surface to steer ships towards "full battery ahead". ▪