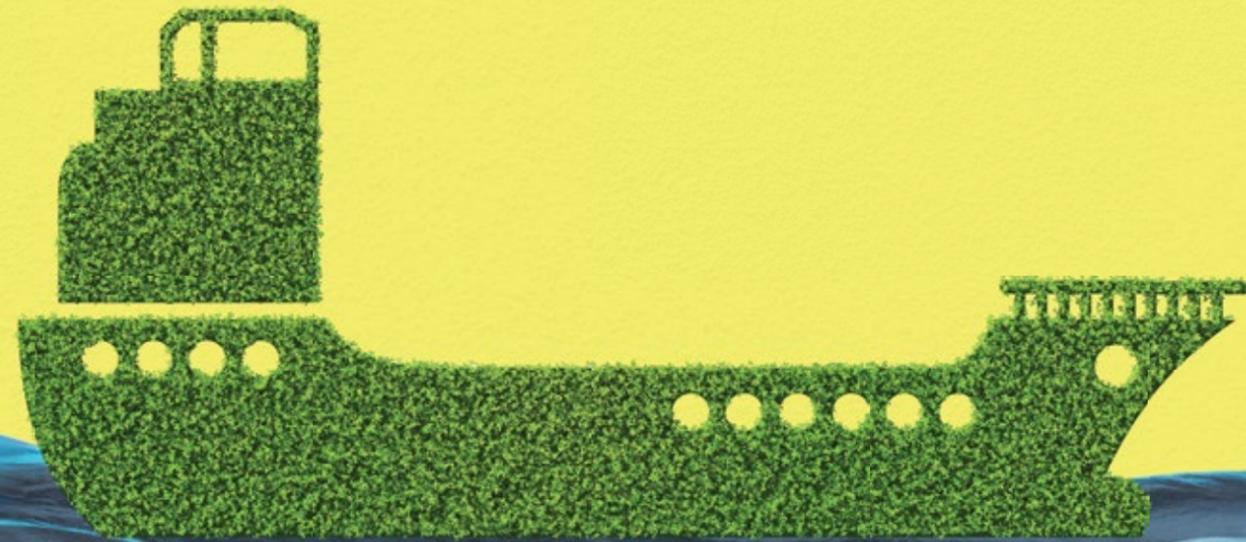


Riding the Decarbonisation Wave:

BHP and Its LNG Dual-Fuelled Vessels



What does it take to decarbonise charter-related shipping?

by Shantanu Bhattacharya, Flocy Joseph, and Mahima Rao-Kachroo

It was a breezy morning in February 2022 at Jurong Port, and Rashpal Bhatti was filled with immense pride as he watched the world's first Liquefied Natural Gas (LNG)¹ dual-fuelled Newcastlemax vessel, Mt. Tourmaline, pull into the port for its first LNG bunkering². The bunkering signalled a significant transition from fuelling ships with highly pollutive conventional marine fuels to using LNG, which had the potential to reduce greenhouse gas (GHG) emissions³ by nearly 30 percent per voyage. Mt. Tourmaline's journey was thus the start of a promising new era towards shipping sustainability.

REDUCING GHG EMISSIONS IN SHIPPING

With more than 80 percent of globally transported goods shipped by sea, maritime transport was the backbone of the global economy. It played a vital role in international trade as it was an energy-efficient and economical way of transporting goods.⁴ Such efficiency saw a growth in maritime trade, and between 1990 and 2020, trade volumes had more than doubled.⁵ As maritime transport grew, so did carbon dioxide (CO₂)-heavy GHG emissions.

The growth in maritime trade led to higher demand for fossil fuels. Heavy fuel oil (HFO)⁶ was the traditional and inexpensive option as it had a high energy density—a small amount could fuel ships over great distances. However, it produced pollutants which resulted in acid rain and airborne toxic particulates that contributed to respiratory diseases.⁷

Moving towards net-zero maritime emissions

To curb the release of pollutants, regulatory authorities like the International Maritime Organization (IMO)⁸ had implemented multiple measures over the years. In 2018, it mandated that using 2008 as the base year for comparison, ships had to reduce their emissions, per international transport route, by an

average of at least 40 percent by 2030, with the aim to reduce them by 70 percent by 2050.⁹

The mandates called for the industry to analyse the fuel consumption of ship types and subsequently, whether they were well-placed to use alternative fuels. Since it was possible to forecast fuel requirements and consumption based on the ship's specifications, its route, and schedule, this made it easier to plan which fuel bunkering facilities to use along such routes if alternative fuels had to be tapped on.

Exploring alternative fuels and innovations

Using alternative fuels to decarbonise was challenging. The industry typically comprised large, capital-intensive, long-life assets with lifespans of around 25 years, which operated on fuels like HFO. It was especially difficult to find sustainable fuel solutions for transoceanic large vessels as this required coordinated efforts within the maritime ecosystem—shipyards, vessel owners, ports, regulatory bodies, and fuel suppliers—to facilitate long-distance maritime travel with carbon abatement technologies.

Despite the hurdles, the maritime industry began to explore the use of fuels such as LNG, hydrogen, ammonia, and biofuels as alternatives to HFO, even though they all came with limitations. Over the years, various shipping companies had studied the use of biomass fuels.

Many within the shipping industry agreed that using alternative and emerging fuels required more than just technological know-how. Biofuels were produced from biomass, so it was imperative that the shipping industry implement sustainability criteria to manage potential biomass shortages and subsequently, biofuel availability. This way, supply and price risks could be mitigated along the fuel supply chain.

In spite of the existing solutions for shipping-related GHG abatements, most came with multiple barriers while other solutions were met with growing distrust. It became increasingly clear that the adoption of low-carbon or carbon-neutral fuels required a push from regulatory authorities to convince companies to adopt such practices.

COLLABORATION IN THE MARITIME ECOSYSTEM

It was clear that the maritime industry needed market-based interventions from multiple stakeholders, including regulatory authorities, to push for the use of zero- and low-carbon fuels. However, the global maritime fleet was highly fragmented—there were thousands of shipowners, including some that owned only a few ships. The top 10 shipowners comprised just 20 percent of the group.¹⁰ Such fragmentation often led to a lack of consensus when it came to decision-making.¹¹ On the other hand, private companies such as financial institutions saw an opportunity and were more willing to fund sustainable industries.¹² Sustainable shipping targets required a large portion of investments for land-based infrastructural changes. Of the estimated US\$1.65-trillion investment needed to reduce shipping-related emissions by 2050, 87 percent was required for land-based infrastructure changes that comprised fuel production, storage, and bunkering facilities.¹³

BHP: MAPPING THE ROUTE FOR SUSTAINABLE SHIPPING

BHP began operations as a mining company in 1885 in Broken Hill, Australia. The company discovered, developed, and marketed natural resources such as metals, coal, oil and gas, and diamonds before it diversified into creating value-added flat steel products.¹⁴ In 1915, BHP chartered the steamer Emerald Wings to transport the first shipment of iron ore from South Australia to Newcastle, England. Nearly a century later, BHP became one of the largest dry bulk charterers in the maritime trade industry.

BHP's Maritime and Supply Chain Excellence (MSCE) team oversaw the company's maritime transportation strategy and ocean freight charters to meet its transportation needs. Over time, BHP's MSCE team grew to become an important part of the business. In 2019, the company had chartered ships to perform more than 1,500 voyages and transported 250 million tonnes of commodities globally.

As BHP's maritime business grew, and the company became a key player in the industry, the sustainability agenda quickly became a key priority. The company believed that more had to be done to truly support its mission of bringing

“people and resources together to build a better world”. It decided to focus on reducing its charter-related GHG emissions from ships.

BHP, SUSTAINABILITY, AND THE MARITIME ECOSYSTEM

Tasked with overseeing BHP's maritime sustainability efforts, Bhatti saw that more had to be done to help shipowners reduce their GHG emissions. He needed the company's internal buy-in before exploring technological options for shipping-related decarbonisation efforts and also, he needed to garner the support of the maritime ecosystem to make decarbonisation a long-term focus for the shipping industry.

Securing internal buy-in

Bhatti first needed his team to be aligned with BHP's focus. “Your team must enable you, and see the same bigger picture as you,” he maintained. To facilitate this, he hired headhunters to look for people better suited to his vision. “I inherited a wonderful team but today, we have retained only three out of the original 70 team members we had.”

He worked just as hard to convince his peers to see the value in his efforts. “Not many shared my vision, but at the same time I was told plainly to just go ahead and do it. After all, BHP was a mining company that decided to have a ship chartering arm. We had to make a mark in our efforts towards supporting decarbonisation in this part of our value chain or not do it at all,” he said.

Exploring decarbonisation technology

To reduce GHG emissions, Bhatti and his team decided that BHP and the maritime industry needed a two-pronged approach: first, find a reliable way to measure emissions, and second, explore the use of alternative fuels.

GHG emission ratings in action

BHP aimed to measure the GHG emissions of its charters, which would then translate into tangible action that supported sustainability. For this, Bhatti turned to RightShip¹⁵, an organisation that developed industry-wide safety standards to avoid the loss of human life at sea. RightShip created a GHG rating that, by 2017, enabled it to steer charterers towards using vessels with a lower emissions rating. The rating system was on a scale from ‘A’ to ‘G’, with ships holding an ‘A’ rating releasing the least emissions and those with a ‘G’ rating discharging the most emissions. BHP stayed the low-emissions course and did not charter vessels

that had the lowest (‘F’ and ‘G’) ratings. Through this, BHP saw a 12-percent reduction in GHG emissions from the vessels that it chartered.

Using green fuel

Determined to see greater GHG abatements, BHP, in a trailblazing move in 2019, released a world-first tender for LNG-fuelled Newcastlemax bulk carriers, which were capable of transporting up to 27 million tonnes of iron ore, or nearly 10 percent of the company's annual transportation volume of iron ore.

LNG was the fuel of choice for this endeavour as it resulted in significant reductions in polluting oxides, compared to conventional fuel. Additionally, LNG bunkering infrastructure existed in the industry, as LNG was being used as a marine fuel for smaller vessels. Furthermore, BHP collaborated in a joint industry project to establish an LNG-dual fuel Newcastlemax vessel design, which indicated that LNG was a viable commercial prospect.

BHP's tender was open to shipowners, LNG fuel providers, and even financial organisations. When Bhatti and his team evaluated the tender proposals, they realised some companies offered vessel design options with 30 percent or more reduction in emissions.

Through the tender exercise, it was found that there was a multitude of partners who could bring value to their GHG emission reduction endeavour. BHP eventually awarded the tender for a five-year charter in 2020 for five Newcastlemax bulk carriers capable of being fuelled on LNG to Eastern Pacific Shipping (EPS).¹⁶ Bhatti lauded EPS's foresight, and commented, “EPS had pre-empted the market's requirements and already had vessels in the build phase, in slots in the shipyards. This

meant that it could deliver the vessels to us at least a year before anybody else in the market, and at a more cost-effective rate. Additionally, when we specified our requirements, it agreed to customise the vessels accordingly.”

BHP subsequently ran a tender for the supply of LNG bunker fuel and signed an LNG supply agreement with fuel company Shell Eastern Petroleum.

Despite a successful tender, many of Bhatti's colleagues were sceptical. He recalled, “Risk assessments were a mile long. Our ex-CFO (Chief Financial Officer) rightfully played the devil's advocate and brought my attention to all the risk factors and liabilities—what if the LNG leaked? What if the ship didn't turn up? How would this affect BHP's reputation?” However, Bhatti was adamant that the potential for GHG emissions reductions ought to be prioritised. “As a leader, you must have conviction about something, either because it makes financial sense or it's the right thing to do for the company, the industry, or the people. This was smack bang in the middle of it all.”

His efforts paid off and in February 2022, the vessel Mt. Tourmaline was delivered into service under the charter between EPS and BHP and berthed at Jurong Port for its first LNG bunkering before it sailed to Western Australia for iron ore loading. The ship was bunkered through the FuelNG Bellina, the first LNG bunkering vessel in Singapore, which was a joint venture between Shell and mobile offshore platform company Keppel Offshore & Marine.

Everyone present then was jubilant. EPS CEO Cyril Ducau saw the maiden LNG-fuelled trip as a solid step in the right direction: “Today's historic LNG bunkering is further evidence that the industry's transition is in full swing...” Bhatti reflected on the journey, “We saw nearly 30-percent GHG emission

It became increasingly clear that the adoption of low-carbon or carbon-neutral fuels required a push from regulatory authorities to convince companies to adopt such practices.



abatements compared to existing ships, with a significant reduction in pollutants. The best part was, because the vessels were leased on a charter basis, they became part of our operational expenditure—we didn't need to shell out a single dollar of capital expenditure towards the project.”

A collaborative maritime ecosystem

It was a validating moment for Bhatti to see Mt. Tourmaline berth at Jurong Port, a feat made possible only because many parties within the maritime ecosystem had pulled together to realise a vision. He recollected, “Government officials were there, CEOs from across the industry were there, and BHP employees from the office were there too. It had become a movement because it was good for us, good for them, and good for the ecosystem. That was the moment the penny dropped for us. That was a solidifying moment for BHP.”

For Bhatti, perhaps the greatest enabler of them all was the Singapore government. The Maritime and Port Authority of Singapore (MPA) had shared information and provided pathways for operational discussions that helped BHP prepare for a safe and efficient LNG bunkering operation. “Singapore enabled companies like BHP because it was willing to share its network of connections and support a good idea.”

BEYOND THE HORIZON

Bhatti felt the Mt. Tourmaline experience had proven the experts right—a collaboration among vessel owners, regulatory authorities, and fuel suppliers was necessary for the industry to progress towards decarbonised shipping.

Achieving long-term emission goals required long-term planning and collaboration. Although some companies in the shipping industry had taken to investing in the research and development of sustainable fuels, Bhatti's experience had shown him that investments alone were not enough. The support of the Singapore government had helped enable this endeavour, but some wondered what the ideal role of regulators should be in driving sustainability in the maritime sector in time to come. How else could governments enable the growth of sustainable or green fuels? Furthermore, since the development and use of sustainable fuels in the maritime sector required a collaborative effort across governments, fuel suppliers, shipowners, and other industry participants, what else could the maritime sector do to develop the ecosystem for sustainable fuels? Lastly, could the lessons learned from their maritime experience be transferred to BHP's other business verticals? [AMI](#)

Dr Shantanu Bhattacharya

is Lee Kong Chian Professor of Operations Management and Deputy Dean (Programmes) at the Lee Kong Chian School of Business at Singapore Management University

Dr Flocy Joseph

is Senior Deputy Director and Head of Commercial in Executive Development at Singapore Management University

Mahima Rao-Kachroo

is Case Writer with the Centre for Management Practice at Singapore Management University

This article is based on the case study ‘Riding the Decarbonisation Wave: BHP and its LNG-Fuelled Vessels’ published by the Centre for Management Practice at Singapore Management University. For more information, please visit <https://cmp.smu.edu.sg/case/5686> or scan the QR code below



Endnotes

- ¹ LNG was a form of natural gas that had been converted to a liquid state for the purpose of safe transport.
- ² LNG bunkering was the process of fuelling a ship with LNG.
- ³ GHG emissions comprised mostly carbon dioxide, followed by methane, nitrous oxide, and other fluorinated gases. All GHG emissions and operational energy consumption data or references to GHG emission and operational energy consumption volumes (including ratios or percentages) in this case were estimates and, due to differences in emissions calculation methodologies, they might not be comparable with one another or with data provided by other parties.
- ⁴ United Nations Conference on Trade and Development, “Review of Maritime Transport 2021”.
- ⁵ Statista, “Volume of International Seaborne Trade from 1980 to 2020, by Cargo Type”.
- ⁶ HFO was the residue after crude petroleum had been treated and distilled to create more valuable fuels like automotive diesel and gasoline.
- ⁷ Mitch Jacoby, “The Shipping Industry Looks for Green Fuels”, Chemical & Engineering News, February 27, 2022.
- ⁸ Set up in 1948, the IMO was an international organisation that promoted maritime safety and facilitated administrative and legal matters pertaining to shipping in international trade.
- ⁹ International Maritime Organization, “Greenhouse Gas Emissions”.
- ¹⁰ Shell Global, “Decarbonising Shipping: All Hands on Deck”.
- ¹¹ Ibid.
- ¹² Henrik Hagberg and Ingrid Skjelmo, “Norway: Towards a More Sustainable Shipping Industry—Where are We Now?”, Mondaq, March 4, 2021.
- ¹³ Raucci Carlo, Bonello Jean Marc, Suarez de la Fuente Santiago, et al., “Aggregate Investment for the Decarbonisation of the Shipping Industry”, UMAS.
- ¹⁴ Value-added flat steel products referred to special grade semi-finished sheets and plates of steel that were used in the power, shipping, defence, and automobile industries.
- ¹⁵ Launched in 2001, RightShip was the result of a collaboration between BHP and mining company Rio Tinto.
- ¹⁶ EPS was a Singapore-based ship owner and management company.