Seatrade Maritime NEWS

# The shipping industry's decarbonisation odyssey

**Anne Marie Elder and Jarek Klimczak from Marine at AXA XL explore how the maritime industry is navigating through new risks to hit net-zero targets**

Anne Marie Elder and Jarek Klimczak - Marine, AXA XL | Jan 15, 2024

The Exxon Valdez was the worst oil spill in U.S. waters until the Deepwater Horizon oil spill in 2010. The accident had a profound impact on the oil industry, leading to changes in regulations, technologies, and corporate practices to mitigate the environmental risks associated with oil exploration and transportation. The spill served as a wake-up call for the industry and society at

large, prompting a reevaluation of the environmental and ethical implications of fossil fuel-related activities. The spill also brought attention to the concept of corporate social responsibility within the shipping industry. Companies began to recognize the importance of environmental stewardship and the need to operate in a socially responsible manner.

**Demystifying complex jargon**

Corporate Social Responsibility ("CSR") has existed as a business concept for decades, with expectations that companies consider their impacts on the local communities in which they operate, as well as the duties they have with respect to their own workforce. Since its inception, CSR concepts have continually evolved, as has the terminology associated with them, with Sustainability, Corporate Citizenship and ESG now becoming part of company strategy and corporate language, considering not just social impacts, but environmental and governance impacts too.

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Since the Paris Agreement in 2015, there has been an increased focus on a company's contribution to global Greenhouse Gas ("GHG") emissions, most notably carbon, given the direct link between increasing carbon emissions and climate change. All organizations are now expected to measure and reduce their carbon footprint, with a view to becoming "net zero" by 2050, to ensure that the world avoids the most catastrophic impacts of climate change.

"Net zero" and "Carbon neutral" are terms that are often used interchangeably, but there are important differences in their meanings.

According to the Science Based Targets initiative ("SBTi"), the international body driving climate action across the private sector, "when companies claim carbon neutrality they are counterbalancing CO2 emissions with carbon offsets without necessarily having reduced emissions by an amount consistent with reaching

net-zero at the global or sector level. This may conceal the need for deeper emissions reductions that are in line with what the science requires for the world to keep global warming to 1.5°C... long-term deep emissions cuts of at least 90% before 2050 are crucial for net-zero targets to align with science.

That is not to say that carbon offsets cannot play a role in company's carbon management strategies, but these should be used in conjunction with the development of longer-term reduction — and ultimately, net zero — plans.

**The shipping industry's decarbonisation trajectory**

The shipping industry has been actively working on initiatives to reduce its carbon footprint and move towards decarbonization. Decarbonization in the shipping industry is crucial to address environmental concerns, comply with regulatory requirements, and contribute to global efforts to combat climate change.

***To achieve net zero, the industry must understand risks and opportunities in customer demand, regulation, financing, operational and technological efficiency, future fuels, and ecosystem collaborations.***

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The International Maritime Organization (IMO) has set a target to hit Net Zero "by or around" 2050, and while criticized for its ambiguity, it reflects a building momentum in the industry. Reaching this goal will necessitate a revolution in clean fuel technologies, efficient ship design, and supportive infrastructure, all requiring extensive funding.

To achieve net zero, the industry must understand risks and opportunities in

customer demand, regulation, financing, operational and technological efficiency, future fuels, and ecosystem collaborations. Customers are increasingly willing to pay a premium for carbon-neutral shipping, which will contribute to funding the transition. However, additional measures like subsidies will be necessary.

**Uncovering opportunities**

The maritime sector's decarbonization also presents business opportunities, particularly for developing countries with renewable energy resources, which could tap into a future fuel market estimated at over $1 trillion. Companies need to innovate in fuel efficiency, adopt new technologies, and revise their business models to prioritize climate-friendly investments. Zero-carbon bunker fuels, biofuels, synthetic kerosene, and CO2-free ammonia are among the options for cleaner fuels, with expectations to scale up from 2030 onwards. In addition to adopting new fuels, increasing energy efficiency through technical (electric, hybrid, wind, solar propulsion, hull design) and operational measures (weather routing, slow steaming, air lubrication) can significantly reduce emissions.

Governments are urged to foster innovation by implementing policies, standards, and incentives that reward low-emission actions, including national emission reduction strategies to promote technology and fuel efficiency. Multi-stakeholder partnerships and collaboration will be crucial in driving change, sharing R&D investments, and ensuring that the technologies reach those who need them most.

**The carbon paradox**

Creating low carbon fuels, often touted as a critical component of our transition to a sustainable energy future, inherently involves a paradox. These fuels are designated as 'low carbon' because they release fewer greenhouse gases than traditional fossil fuels when burned. However, right now, the production process for these alternatives can be surprisingly carbon-intensive, potentially

undermining their environmental benefits.

For instance, biofuels like ethanol made from corn or sugarcane must go through extensive cultivation, harvesting, and processing stages. Each of these steps requires energy, often sourced from fossil fuels. The farming process involves the use of tractors, harvesters, and other machinery that emit carbon dioxide. Additionally, the synthesis of fertilizers and pesticides for these crops often involves high levels of energy consumption and greenhouse gas emissions. The process of converting these crops into usable fuel also consumes energy, and if the energy comes from coal or natural gas, the carbon savings of the final biofuel may be minimal.

Another example is hydrogen fuel. Hydrogen is considered a clean fuel because it only emits water vapor when burned. However, most hydrogen is produced through steam methane reforming, a process that requires a significant amount of energy and releases a substantial amount of CO2. Even when hydrogen is produced via electrolysis, if the electricity used comes from carbon-intensive sources like coal or natural gas, the overall carbon footprint can be quite high.

Electric vehicle batteries also present a similar dichotomy. The mining of lithium, cobalt, and nickel, which are essential for these batteries, often involves heavy machinery and can result in significant environmental degradation. The production of the batteries themselves is energy-intensive, and if that energy is not sourced from renewable sources, the carbon footprint can escalate.

Approved and regulated by the IMO, scrubbers are a controversial solution that employs sea or fresh water to cleanse engine exhaust gas, eliminating sulfur oxides. However, ship engine emissions from burning fossil fuels also carry heavy metals and PAHs (Polycyclic Aromatic Hydrocarbons), found naturally in coal, crude oil, and gasoline. Unfortunately, open-loop scrubbers discharge wash-water into the marine environment, relocating pollution from air to water.

**New risks (fire-induced carbon emissions and air pollution)**

While many are relying on the storage of energy in lithium-ion batteries, this new energy source has proven to carry some risk for the shipping industry. The transportation of these batteries introduced fresh challenges and heightened the risk of fires aboard car carriers and roll-on/roll-off vessels.

Traditional onboard firefighting methods prove ineffective in dealing with thermal runaway resulting from the unique chemistry of these new Li-Ion batteries. Once ignited, such fires are formidable and practically impossible to extinguish, often persisting for days or even weeks. This typically leads to complete ship loss and the release of significant amounts of polluting gases into the atmosphere.

The shipping industry, and many other industries, are learning the nuances of fighting such fires, as well as how they can be avoided, or the risk minimized. (Read, Lithium vs Lithium-ion batteries: the differences matter when fighting a fire, an article by AXA XL Risk Consulting's John Frank.)

**Taking a broad life cycle view**

What's crucial in the production of low carbon fuels is the life-cycle analysis—from raw material extraction to end-use. If the total emissions associated with the fuel over its life cycle are lower than those for traditional fossil fuels, it can genuinely be considered low carbon. However, if the production process relies heavily on fossil fuels, the benefits may be reduced.

To truly capitalize on the potential of low carbon fuels, it is essential to ensure that their production processes are as sustainable as possible. This might involve integrating renewable energy sources into the production process, improving energy efficiency, or developing new, less carbon-intensive production methods. It also necessitates stringent regulation and transparent reporting of the carbon

emissions associated with the entire life cycle of these fuels to ensure that they deliver on their promise of sustainability.

**The carbon credit option**

Carbon credits are a way for companies to offset their carbon emissions by investing in projects which reduce or avoid carbon emissions. By purchasing carbon credits, companies can manage emissions in their footprint which are challenging to reduce, as a short-term solution, while developing longer term emissions reduction plans.

The marine industry could benefit significantly from carbon credits as part of their current carbon management strategies. Shipping companies, for instance, could purchase carbon credits to offset their emissions from shipping goods across the world, helping to provide a competitive advantage for shipping companies, as consumers increasingly demand more environmentally friendly shipping options.

Carbon credits could also help shipbuilders and manufacturers reduce their carbon footprint by investing in renewable energy projects to power their facilities.

In addition to the environmental benefits, carbon credits could also provide financial benefits for the marine industry. By investing in renewable energy projects, companies can earn credits that can be sold on the carbon market. The value of carbon credits varies depending on the market, but it can be a lucrative investment for companies that choose to offset their carbon emissions. Overall, carbon credits offer a promising interim solution for the marine industry to reduce its carbon footprint while developing net zero roadmaps and potentially generate additional revenue.

Another available option may be a new insurance policy. AXA XL in the UK recently launched its Excess Emissions Insurance product helping marine clients

to manage their environmental footprint and support action on carbon emissions. Excess Emissions Insurance is an extension to AXA XL's existing marine hull product and indemnifies a vessel's carbon output in the event of an unforeseen extended journey, caused by a covered risk, which results in additional emissions. Following such an event, the policy pays out with voluntary carbon credits equal to the amount of excess emissions emitted.

**Final thoughts**

It has been 34 years since Exxon Valdez and the lesson has been learned. Although the construction of the vessels became more robust with regulations more stringent and innovation starting to play major role to find new solutions, new challenges have emerged.

The environmental disaster resulted in legislation of The Oil Pollution Act of 1990 (OPA 90), intended to avoid oil spills from vessels and facilities. It enforced removal of spilled oil and assigned liability for the cost of cleanup and damages.

The urgent push towards decarbonization introduces a new set of environmental risks, as seen in the previously discussed Li-Ion batteries or scrubbers. Despite MARPOL Annex VI, which has been regulating air pollutants from ships' exhaust gases since 1997, including sulfur oxides (SOx), particulate matter, and nitrous oxides (NOx), and prohibiting deliberate emissions of ozone-depleting substances (ODS), there are currently no established methods for mitigating penalties (like OPA90) on emissions resulting from accidental fires. This gap in regulation extends to incidents occurring within Exclusive Economic Zones (EEZ) or territorial waters of respective countries and their jurisdictions.

The marine industry's path to net zero by 2050 is complex and challenging yet filled with opportunities for innovation and collaboration. It requires an industry-wide transformation with proactive strategies, adoption of new business models, and significant investment in clean technologies, supported by a conducive policy environment and global cooperation.

As the industry continues to learn, technologies improve and helpful programs are put into place, it will be much smoother sailing on the shipping industry's decarbonization journey.

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