The sixty-four thousand dollar question(s)

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One of the main challenges facing the global shipping sector is the inevitable transition to green fuels, among them biofuels, which will have a transformative effect on an industry not necessarily noted for its readiness to adapt at speed.

The International Maritime Organization's (IMO) ambitious emission targets for both 2030 and 2050 mean shipowners/operators need to broaden the conversation around biofuels and become familiar with supply and demand issues, onboard fuel management, regulatory framework, and government policies. It will ensure a smoother and quicker transition and ultimately a wider uptake of biofuels. This Q&A, compiled from questions submitted to the UK P&I Club from stakeholders across the sector, offers guidance on types of biofuels, specifications, handling and usage, and highlights obstacles impeding progress.

Types and manufacture of biofuels

☐ ***How does the supply of large quantities of biofuels with lower lignin-carbohydrate complexes (LCC) compare against the supply of conventional fuels?***

There is a significant potential supply of sustainable biomass for biofuel production, coming from different sources. However, to expand production over today's volumes, more expensive biomass sources will need to be utilised, which will increase costs.

☐ ***Which countries produce the most hydrotreated vegetable oil (HVO) or fatty acid methyl esters (FAME) available on the market?***

Generally, the US and Brazil are the two single most significant producers of biofuels (mainly ethanol and FAME). The EU also has a substantial production of HVO. A growing number of port stakeholders in Sweden and Finland are shifting away from fossil fuels to HVO to, for example, power their vehicles and cargo handling equipment.

☐ ***Is biomethane, derived from waste, a viable marine fuel of the future in terms of logistics and volumes?***

Liquefied biogas (LBG) can be a carbon-neutral drop-in fuel for gas-fuelled vessels, which makes it a future fuel of great interest for shipping. Current availability is limited; however, there are concrete plans to ramp up LBG supply across the Nordics, one of the pioneers of using liquefied natural gas (LNG) as ship fuel and now also LBG (as a blend).

☐ ***What materials are mainly used to produce biofuels? How many different types of biofuels are there at present?***

There are many different feedstocks used for biofuel production today. However, by volume, ethanol, FAME, and HVO are by far the three most common biofuels.

☐ ***While biofuels certainly help reduce harmful emissions from a ship's engines, what environmental cost is there to produce and manufacture these?***

The key here is the choice of feedstock used for biofuel production. Some biofuels, produced from feedstock such as food crops or energy crops, have moderate lifecycle greenhouse gas (GHG) emission savings relative to fossil fuels – or no savings at all. Other feedstocks, such as wood residuals and waste sources, can be used to produce biofuels with very low lifecycle GHG emissions.

☐ ***What is the impact of biofuels on food security?***

Some feedstocks used for the production of conventional biofuels can also be used for food production and thus will impact food security. However, advanced biofuels are produced from feedstock not used for food production and will have a low-to-no impact on food security. A well-thought-out policy is critical in ensuring that supplying biofuels doesn't won't backfire from an environmental standpoint.

Quality, characteristics, and specifications

☐ ***Why does palm oil-based biofuel have high lifecycle GHG emissions?***

This high emission is due to the high indirect land usage change associated with palm oil production.

☐ ***Do nitrogen oxides (NO_X) emissions outweigh the benefits of lower carbon emissions from biofuels?***

NO_X emissions are not likely to be much higher than for conventional fuels, and, in some cases, they have been reported to be lower. More research is needed to better understand the NO_X emissions arising from using liquid biofuels.

☐ ***Which ports currently offer biofuel or biofuel blends for ships?***

At present, chiefly hub ports like Fujairah, Singapore, and across the Antwerp-Rotterdam-Amsterdam area. However, these may be contracted and therefore not always available.

☐ ***What proportion of the international marine fleet is already using biofuels?***

The use of biofuels in marine shipping is currently mostly restricted to trials; therefore, take-up is low.

☐ ***What are the International Organization for Standardization (ISO) standards for biofuel quality?***

Presently, there are no ISO standards for biofuel onboard ships. Discussions regarding these are ongoing.

Handling and usage

☐ ***Do we still need separation and purification of biofuels onboard?***

Yes, separation and purification are still required. The separation temperature will be determined based on the analysis report, which is the same as for very low sulphur fuel oil (VLSFO). The difficulty you may experience will be managing the temperature, so it is neither too cold (cold flow properties) nor too warm (ageing of the fuel and too low viscosity for the engine). This level will be different for every individual fuel, which will add to the difficulty. It is also worth noting that VLSFO may still have aluminium-silicon/water present; therefore, purification remains essential.

☐ ***Is biofuel compatible with low sulphur fuel oil?***

Yes, but the bunker supplier should offer the mix. Do not mix onboard!

☐ ***Can B100 biodiesel be used directly on existing marine propulsion internal combustion engines?***

Trials for this are ongoing.

☐ ***What is the shelf life of biofuels when stored in ship bunker tanks?***

Use the biofuel as soon as possible. We recommend that you dewater the tanks, including the bunker tanks, as water contributes to bacterial growth.

Obstacles to growth

☐ ***We are heading towards Artificial Intelligence (AI) controlled ships, but biofuels present several on-site challenges. How will shippers accept the combined increase in costs while reducing manning schemes and simplifying ship design to cut costs?***

The shipping industry is not a uniform entity. If fully automated ships are a choice, maybe biofuel is not the best solution; however, a shipowner must then accept that the rest of the installation with another alternative fuel will also be more expensive, and the cost of that fuel itself.

☐ ***The increased testing, additional technology, training, and monitoring that will come with biofuels will be extensive. How can crews be expected to manage this trend within the shipping industry?***

Without a doubt, using alternative fuels, including biofuels, requires a lot more from the shipping industry. There is no opt-out option, however, since legislation will force everybody to take action.

☐ ***Will biofuel replace distillate fuel by 2030?***

It is not likely, but it may well account for a significant proportion of the future fuel market. However, many ships may use blends consisting of biofuels and fossil fuels to comply with IMO's short-term GHG measures.

☐ ***Can biofuels only be used in newly built vessels? Old vessels may not be designed for biofuels, and cost-wise it may be expensive for companies to carry out drastic changes in drydock on older ships.***

The changes required wouldn't be any more challenging to implement than the change to VLSFO. You may need to verify equipment components, and some upgrades might be necessary, too, but no new equipment installation should be required.

☐ ***Getting permissions – from engine makers, class, and flag states – makes it difficult to enable the trial of biofuels. How can the industry support shipowners in making these more easily accessible?***

The industry can help to incentivise the uptake of biofuels, as well as remove regulatory barriers. On the regulatory side, IMO rules development on lifecycle GHG emission factors and change of NO_X regulations to make it easier to use biofuels on existing vessels would help. Short-term decarbonisation measures are likely to be adopted by the IMO. Also, a push from banks and cargo owners towards cleaner logistics will help lift many of the barriers faced by biofuels today by boosting their demand. ■

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