In technology's trust

by Jonathan Arneault, *CEO, FuelTrust*

The marine fuel sector is historically opaque in its operations. Fuel users and suppliers often lack the information they need to understand the history and complete make-up of the products they handle. However, knowing how a fuel will combust in an engine is key to understanding how a vessel performs and the emissions it will produce. The lack of accurate information about fuel provenance and quality hinders day-to-day operations for individual organisations, likewise the delivery of the industry's future environmental and sustainability goals. Here is how this information can be put into the hands of shipowners and bunker suppliers.

Quality and fraud issues are well known in the bunker industry and frequently accepted by vessel operators as an unavoidable cost of doing business. Discrepancies in the quantity of fuel delivered during bunkering are often overlooked, even though deliveries can be up to 3% less than that stated on the bunker delivery note (BDN). These low-transparency transactions tot up to billions of dollars lost by shipping each year.

In addition, the industry faces its biggest challenge – tackling climate change by meeting the shipping industry's decarbonisation and the wider sustainability targets. Shipping is being pushed to be more transparent and open by regulators and influential stakeholders calling for the sector to deliver greater (environmental, social, and governance) accountability. For instance, nearly 50% of the global ship finance portfolio comes from signatories to the Poseidon Principles, which set strict finance access criteria for shipowners and operators and, therefore, their ability to operate.

The Poseidon Principles and all emissions trading and credit methods currently measure vessel emissions using government guidelines based on generalised calculations: a one-size-fits-all approach formulated to simplify enforcement. They overlook the range of different engine types and how operations and maintenance decisions might influence their performance. At a vessel level, emissions are estimated using manufacturer specifications and ranges classified by fuel type and grade. The resulting figure is only a rough approximation of the emissions of a vessel.

Calculating ship emissions using these broad-brush methods results in vessel owners and operators being charged or taxed too much relative to their actual emissions – even if they have taken actions to improve their performance.

Breaking the fuel DNA code

FuelTrust uses Artificial Intelligence (AI) and blockchain-enabled technology to authenticate relationships across the marine fuel life-cycle to provide more accurate fuel and emissions tracking. This approach allows users to create a decentralised, immutable store of information – a single shared source of truth, if you will, recording the fuel's life-cycle. In this way, we eliminate the opaqueness that has been typical of the bunker sector.

We then analyse the data recorded in the blockchain using our proprietary AI Digital Chemist™, a tool analysing information from suppliers, BDNs, certificates of analysis, and

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vessel operation data to create a chemical digital twin of the fuel. It then replicates interactions in the fuel at a molecular level to identify how it has been blended, what reactions would have taken place between molecules, and what occurred during combustion. This provides a precise 'DNA' of fuel at the batch level, enabling us to report fuel characteristics and emissions accurately.

The experience of tracking, recording and analysing these data sets using our Bunker Insights™ and Carbon Baseline™ products often reveals huge discrepancies in fuel characteristics. One issue discovered while working with our clients and their counterparties' data is a stark difference in fuel energy densities. Based on our data analysis on 14m barrels of very low sulphur fuel oil across 28 batches, we identified a difference in performance between batches of fuel of up to 3%. For a fully laden Panamax container ship, this would equate to a 50t fuel saving on a voyage from Vancouver to Portsmouth in the UK – or up to 469 nautical miles of extra sailing distance on a typical bunker.

For shipowners and operators, such insights are crucial to understanding where and when to buy fuel. They also come in handy when dealing with regulators and seeking potential carbon credits based on their decarbonisation initiatives.

Building trust with buyers

For fuel suppliers, our findings represent an opportunity to market a superior fuel offering. Due to the lack of insight into the fuel supply chain, suppliers cannot currently gain any advantage by supplying better quality fuel. Documenting the life-cycle of fuel batches allows suppliers to gain a competitive edge by providing reliable evidence of fuel quality and building trust with buyers. Over time, they can use these data to build a reputation as high-quality suppliers.

Fuel suppliers must also protect themselves in the event of quality claims, and FuelTrust's products document a fuel's journey through the supply chain without the risk of disclosing commercially sensitive information. In the case of claims, our Bunker Insights™ provides parties with pre- and post-purchase insight into the life-cycle history, chemical compatibility, and regulatory compliance of fuel – alerting all parties to potential risks and problems.

Creating a cleaner world

Future fuels and stakeholders' increased interest in tweaking their operations will continue to drive the shipping industry and the bunkering sector to increase their understanding of the fuels they use and supply. FuelTrust is both commodity and fuel agnostic. We can use our technology to trace the origin and outcomes of alternative fuels such as green ammonia and biofuels – or even fuels and materials in other supply chains like chemicals, aviation fuels, or metals.

The importance of this cannot be overstated. Fuels presently represent over half of the expenses involved in operating a ship, and the cost of new fuels is anticipated to be much higher than existing fossil fuels. Today, maritime fuels make up 12% of the global fuel market but lead to over 30% of emissions, so ensuring accuracy and accountability in bunkering is critical to creating a cleaner world.

During the decarbonisation transition, the industry will need to deliver accountability and value for investors, regulators, customers, and consumers alike. Achieving this will impose tremendous logistical challenges. Fortunately, by accurately simulating and analysing the contents of fuel tanks and engines, we can create a trusted, transparent fuels supply chain that can deliver insight and accountability quickly and cost-effectively. ■