



# THE COST OF FRAUD IN THE MARITIME FUEL MARKET

**FUELTRUST.IO**

JUNE 2023




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## A HISTORY OF FRAUD

Fraud in the maritime industry has a long history dating back to ancient times, with stories of unethical practices on the open seas shared since 300 BC. "Bunker" fraud was so named when coal suppliers began inflating their profits by putting wood, rocks, and other cheaper materials into the loads being shoveled into the coal bunkers of steamships. Although proving fraud has become more challenging in modern times, the existence of numerous incidents involving fuel contamination and global arrests related to bunker fraud clearly indicates this issue persists.

Astonishingly, even fuel that is considered "on-spec" experiences a significant amount of volume or content issues, leading to financial losses or engine problems. In the past year alone, over 600 vessels were disabled due to "on-spec" fuels, resulting in estimated global supply chain losses exceeding \$5 billion. Even where damage hasn't occurred, both supplier and shipowners incur financial losses which are challenging to detect, and even more difficult to make claims against.



According to research conducted by the Protection and Indemnity (P&I) clubs, approximately 48%<sup>1</sup> of reported claims fall under the category of "machinery" issues. Within this category, around 16% of the claims are attributed to damage caused to the main engine due to the use of off-spec bunkers<sup>2</sup>. On average, the repair costs for such damages amount to \$545,000<sup>2</sup>. It is important to note that the machinery claims do not encompass catastrophic incidents resulting from the loss of propulsion, often associated with fuel-related problems or long-term fuel damage. These catastrophic claims can reach multimillion dollars per occurrence.

The fuel contagion episodes that occurred in Asia, the ARA zone, and the Fujairah regions in 2022 had significant financial implications. These incidents are estimated to have incurred towing fees alone, amounting to nearly \$50 million.

Our findings reveal that between 2019 and 2022, more than 39% of global bunkers exhibited a fuel content delta of 2% or more compared to the amounts stated in their delivery paperwork. The primary issue identified was the introduction of water into the fuels during the journey from onshore storage tanks to the ship's bunker tank. This problem typically involved an increase from 0.1% to 0.29% water content, which, although below the regulated threshold, still resulted in average losses of \$14,910 per affected delivery.

## Better technology, better decisions

Common practices in the **\$245 billion** maritime **fuel market** is causing significant financial losses. Trusted technology to enable **better transparency** can make transactions more **cost-efficient**.

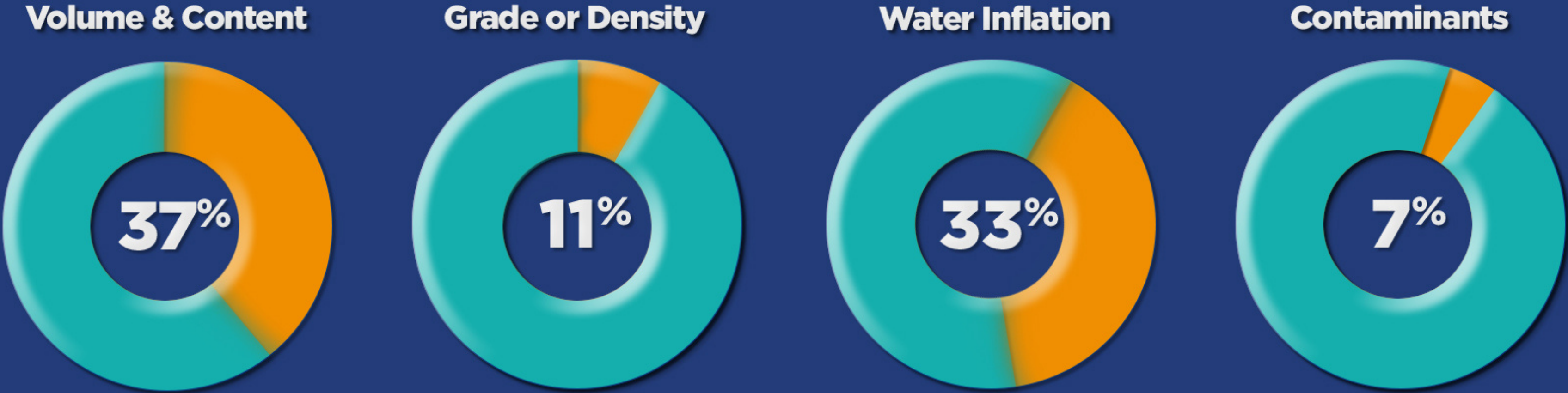
<sup>1</sup> <https://www.google.com/url?q=http://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/reports/AGCS-Safety-Shipping-Review-2023.pdf&sa=D&source=docs&ust=1686585637026838&usg=AOvWaw1yZt6xKz3eYyxk8fZ1wRHZ>

<sup>2</sup> Global Marine Insurance Casualty Trends, IUMI Cefor, 2018



It is worth noting that the implementation of electronic mass flow meters has proven beneficial in reducing instances of "paper fraud" and collusion. The industry recognizes the importance of transitioning to paperless operations and providing real-time transactional reporting, and efforts are underway to develop viable solutions. However, with the introduction of transitional and future-fuels into the market, new potential points of loss are emerging.

Operating heavy machinery in the middle of the ocean already carries inherent risks even under the most reliable conditions. When the possibility of contamination, fuel instability, and incompatible fuel mixtures - whether intentional or accidental - is introduced, that risk level grows exponentially. The maritime industry can only safely embrace new fuels and more efficient fuel supply channels by fostering transparency among all parties involved, with decisions grounded in reliable data provided by trusted partners who mutually benefit.



**ERRORS, CONTENT ISSUES, OR POTENTIAL FRAUD FOUND IN "ON-SPEC" BUNKERS FROM 2021-2022**

## Fuel Density Inaccuracy

# KEY AREA FOR FRAUD OPPORTUNITY

One instance where fraud can occur is through misrepresenting the fuel density during delivery. Marine fuel is sold based on weight, but delivered based on volume. If the density stated on the Bunker Delivery Note (BDN) is incorrect, indicating a higher volume than the actual weight delivered, it results in a shortfall in the quantity received, leading to commercial losses. Studies reveal that around 33% of Very-low Sulfur Fuel Oil (VLSFO) samples analyzed had a lower density declared on the BDN compared to the actual lab-tested density of the fuel.<sup>3</sup> This discrepancy is a typical indicator of "short bunkering."

However, it's important to note that not all variations in density are due to deliberate fraud. Unintentional contamination that affects the density can naturally cause discrepancies. Currently, the industry generally lacks the capability to identify patterns of contamination or predict the risks associated with density differences. As collaboration and transparency expands, these patterns and risks will become more visible and provable.

<sup>3</sup> VLSFO Insights. (2020). Veritas Petroleum Services Group. <https://www.v-p-s.com/vps-data-services/vlsfo-insights/>



Based on an analysis of more than 18 million metric tons of bunker fuels in 2022, it is estimated that short bunkering costs over \$2.95 billion annually, considering the approximately 128,000 vessels in the global fleet.

Determining the impact of the industry's practice of excluding fuel quantity differences below 3% is more challenging. For instance, a 3% variation on a single 1000 metric ton fuel delivery, equivalent to approximately 30 metric tons, would likely not be disputed, allowing for an acceptable loss of \$15,700. This discrepancy is distinct from the density issue as it involves a loss in volume. Assuming a global fleet of 60,000 blue water vessels, estimates suggest that undisputed losses amount to over \$209 million per month. This practice implies that suppliers may be losing revenue, and customers may be paying for products they did not receive.

Average Annual Loss per 20 Ship Fleet

**\$388,800**

2022 FuelTrust Density Delta losses assessment of over 18M MT of bunker fuels deliveries reviewed

FuelTrust Analysis: **Economic Impact due to Density Deltas in Bluewater Bunkering Operations**  
January-December 2022

Bunker stemmed per vessel each month	avg. 1000 MT
Density of Fuel @ 15c (BDN declared value)	0.9889
Density of Fuel @ 15c (actual tested value)	0.9865
Density Delta @15c	0.0024
Short Delivery/month due to Density Delta	2.4MT /month
<b>Annual Economic Impact per Vessel (USD)</b>	<b>\$19,728</b>





## Temperature Volume Relationship

Like the problems observed with density inaccuracies, there is another frequent area where misconduct can occur, namely, the relationship between temperature and volume. All petroleum products exhibit a considerable rate of thermal expansion, which should be considered when delivering significant quantities. If a fuel delivery agent intentionally understates the temperature during the initial measurement and subsequently overstates the temperature during the final measurement, it can easily lead to a discrepancy in volume.



## Water in Fuel

The presence of water in fuel is not unusual and can result from sources like condensation in tanks. However, real-world analysis has shown that intentional introduction of water into fuel affects both its quantity and quality. Unfortunately, determining the exact amount of water in the fuel during delivery is challenging, and it's only after settling that an accurate measurement can be obtained.

The costs associated with high water content extend beyond the loss of genuine fuel. They may also include the expenses of disposing of the water separated from the fuel by the vessel's oily water separator (OWS). These disposal costs are increasing in ports worldwide.



## Bunker Fuels

Bunker fuels inherently possess impurities, even when they are in their cleanest state. These fuels require distillates and additives, known as "cutter stocks," to reduce their viscosity enough to function effectively in ship engines. It's crucial to maintain a delicate balance between acceptable enhancements that improve fuel quality and contaminants that can cause severe damage to a ship's engine.

"Bad bunkers" have been discovered to contain a wide range of substances, including used motor oil, restaurant vegetable oil, and rubber by-products. None of these should be part of a reliable fuel supply chain. While blue water ships have earned the reputation of being the "incinerators of the refining industry," they should not become literal incinerators that pollute the global environment due to fraudulent activities.

Incidents in ports such as ARA, Fujiriah, Singapore, and Houston in 2022 revealed the consequences of unauthorized disposal of refrigerant oils into bunker batches. This resulted in numerous disabled ships and a shortage of replacement engine parts, severely impacting global shipping for months.



**Bunker fuels account for more than 50% of the operational costs of a vessel. The presence of fraudulent activities, and insufficient supply chain controls, greatly impacts the overall profitability of vessel owners and charterers.**

**The widely recognized 3% benchmark in the industry for fuel loss, resulting from short bunkering or specification differences, leads to a financial loss exceeding \$6.9 billion.**



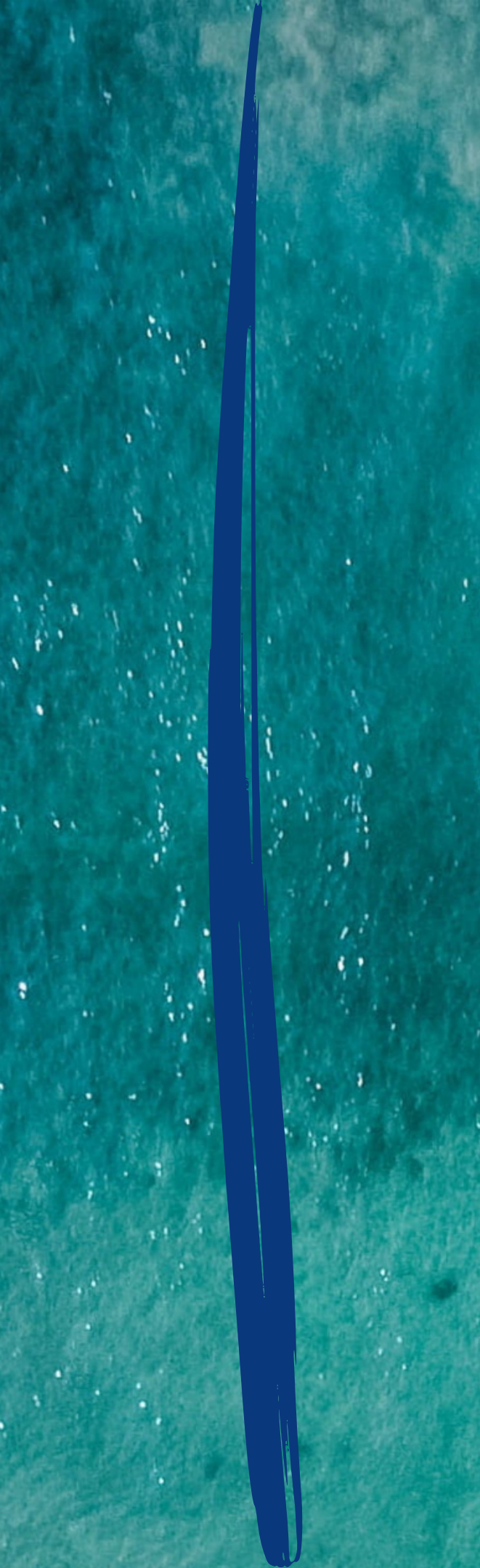


## **Intentional Collusion**

The simplest form of bunker fraud occurs when collusion takes place between the supplier or barge crew and the ship crew, resulting in the delivery of less fuel than what was purchased. In this fraudulent scenario, a buyer might order 1000 metric tons (MT) of fuel but only receive 700 MT. However, the ship crew dishonestly signs the Bunker Delivery Note (BDN) to falsely indicate that the full 1000 MT has been received. Consequently, the buyer pays the supplier for the complete delivery, unknowingly covering the cost of the missing 300 MT. The value of this discrepancy, amounting to \$165,000 based on an average price of \$550 per MT, is divided among the colluding parties. To cover up the shortage, the ship crew manipulates records by reporting greater bunker consumption than actually occurred during the reported month of voyages.


Instances of bunker fraud can involve various combinations of fraudulent actions, such as an owner defrauding a charterer, the ship crew defrauding the owner, or a charterer's bunker buyer defrauding the charterer. To prevent this type of collusion fraud, the best approach is to implement fully digitized supply chain systems. More manual means could include engaging reputable third-party bunker surveyors and implement regular monitoring of voyage performance. However, these manual measures often involve additional costs, new equipment, and increased efforts, which can lead to neglect by individuals who are not diligent or vigilant. Some port authorities have responded by implementing random or compulsory surveys on parties that have been previously implicated in fraud.



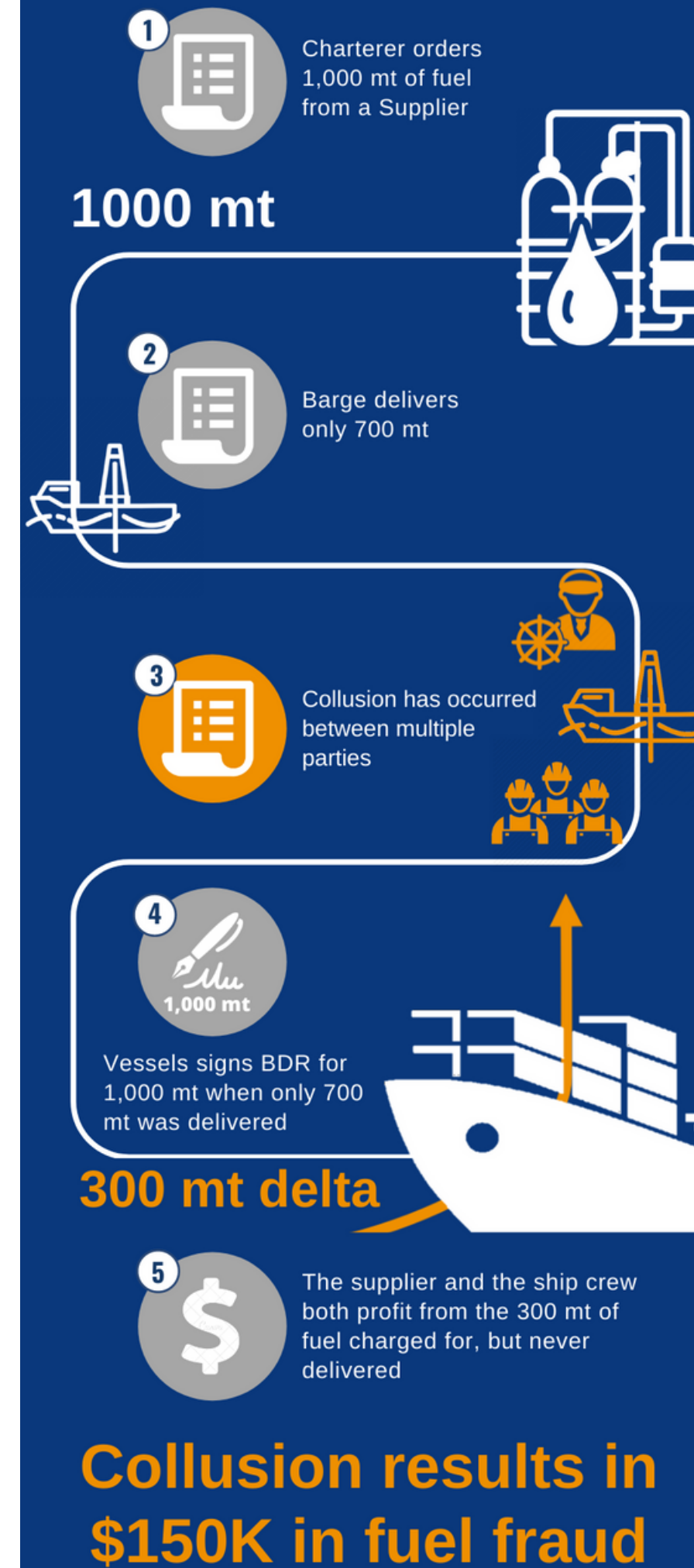


Complicating matters further, when an owner disputes the quantity or quality of fuel provided to a vessel by a charterer, they have a limited timeframe within which they can lodge a protest and face several obstacles in seeking resolution. BIMCO, an international shipping association that establishes the basis for most fuel purchase/sale contracts, allows the buyer and seller 14 days to file a claim regarding quantity and 30 days to file a claim regarding quality. The burden of conducting a responsible investigation places immense pressure on owners and suppliers, which may often be unattainable given the current technology or manual methods available.

Even when BIMCO updated their widely accepted Standard Fuel Sulfur Content Clause for Time Charterers in response to the MARPOL air quality regulations that came into effect in May 2019, the time limits for claims remained unchanged. The affected party is required to gather a comprehensive set of evidence and investigate within a short timeframe, leading to decisions based on accepting losses and thus avoiding notifications to regulators, insurers, or other third parties. Consequently, the losses are concealed within an opaque market model, but they still impact the supplier, the charterer, and the shippers' financial bottom line.



# Maritime Fuel Fraud is Costing the Industry \$5 Billion a Year





# CREATING A TRUSTED FUEL ECOSYSTEM THROUGH TRANSPARENCY AND TRACEABILITY

While challenges in the fuel supply chain persist throughout the industry, including the maritime sector, there is still hope for improvement. Fuel suppliers are actively seeking ways to gain visibility into the final outcomes of their products, while fuel buyers are increasingly adopting advanced technologies to combat fraud, minimize losses, and mitigate environmental risks.

FuelTrust has developed an AI-based approach to assess and validate the fuel supply chain that creates a digital profile, or DNA, for each fuel batch, documenting its chemical composition and other crucial characteristics. Throughout the entire delivery process, from initial supply to post-combustion, we can assess fuel volumes, quality, and emission potentials. Additionally, we have incorporated fraud and risk detection mechanisms that alert relevant parties.

To ensure privacy and security, we utilize patented blockchain-enabled products to securely share this valuable data. By “fueling trust” among all stakeholders through our cross-party platform, we equip fuel suppliers, shipowners, charterers, and regulators with the necessary information to make informed decisions. This comprehensive approach enables accurate emission reporting, reduces the risk of fuel contamination, prevents collusion, and minimizes commercial losses.

## About Us

FuelTrust® is a green-tech start-up SaaS company building solutions to create a trusted and sustainable fuel ecosystem. Along with our head office in Houston, Texas, our growing team is spread across the US and Europe.

Leveraging advanced AI and a private blockchain network, we help complex industries form trusted commercial ecosystems through transparency and traceability.

Through deep insight into when, where, and by whom risk is introduced into a business lifecycle, FuelTrust empowers companies to identify opportunities, reduce fraud, mitigate risk, and validate compliance in every part of their business lifecycle.

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Produced in the United States of America  
May 2023

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