

# Bunker Quality Trends

January 2025

By failing to prepare, are you preparing to fail?

GLOBAL QUALITY  
& AVAILABILITY



BIOFUEL & LNG  
DEVELOPMENTS



REGULATIONS &  
BUYING STRATEGIES



# Introduction

Written by: Chris Turner, Manager of Bunker Quality & Claims

For many years, the industry has been used to relatively smooth seas, with isolated choppy periods because of legislative changes, the last being IMO 2020.

We are entering another period of significant change and it is essential that we prepare and act accordingly to ensure our businesses can sail unhindered.

This report highlights three main challenges that are now at the forefront of our focus.

First, there is the need to adapt to the ISO 8217:2024 specification and leverage its benefits on a grade-by-grade basis.

Second, we must prepare for the incoming Mediterranean ECA (Med ECA), which will enforce the use of 0.1% sulphur fuels across the region starting May 2025.

This change comes against the backdrop of ongoing tensions in the Middle East and Red Sea.

Finally, we face the challenges of decarbonisation, particularly with the introduction of FuelEU Maritime, which took effect in January 2025. This regulation mandates an initial 2% reduction in carbon intensity compared to a 2020 baseline.

The need to reduce carbon intensity until now has been largely brushed off by most as not being worth the effort or cost. However, a new world is on the horizon as the cost of doing nothing will soon be less than the cost of doing something i.e. consuming LNG or biofuels.

Of course, conventional fuels will still play an active role in bunkering for many years to come so the continued challenges of buying smartly also remain a focus of this report.

This is Integr8 Fuel's fifth Bunker Quality Trends report covering the last six months of global supply. Utilising our best-in-class data from over 130 million metric tons (MT) of deliveries, we assess fuel quality trends and challenges from region-to-region, port-to-port and supplier-to-supplier.

## Data Used in This Report

+130m

MTs of Deliveries

1,300

Global Locations

+800

Suppliers

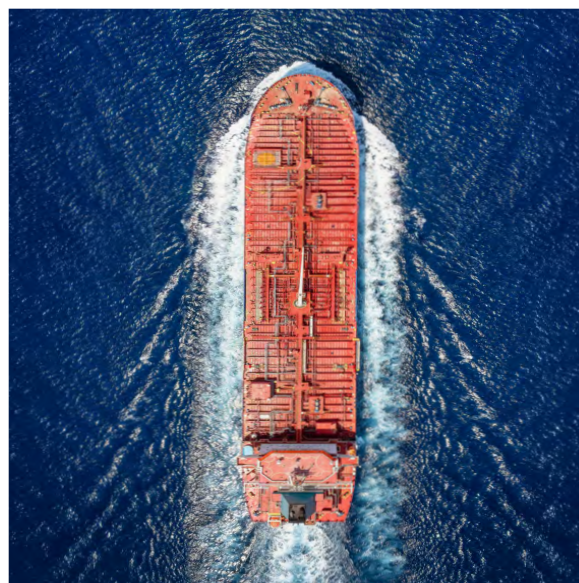
# Part 1: Conventional Fuels

Written by: Chris Turner, Manager of Bunker Quality & Claims

## A Picture of Quality

How likely are we to be faced with an owner's analysis testing beyond 95% confidence limits for Table 1 or Table 2 parameters?

In the last 180 days (to the end of October 2024) owners' analysis available to Integr8 Fuels has highlighted that you are still most likely to have a notification\* of a fuel testing beyond 95% confidence with Marine Gas Oil (MGO) than with Heavy Fuel Oil (HFO) with the lowest level of notifications being with Very Low Sulphur Fuel Oil (VLSFO) (see figure 1).



| Grade | Beyond 95% Confidence % | Compliance %  | Critical %    | High Risk %   | Low Risk %    |
|-------|-------------------------|---------------|---------------|---------------|---------------|
| HSFO  | 2.8<br>(-0.6)           | 0.1<br>(=)    | 0.2<br>(-0.2) | 0.3<br>(-0.2) | 2.5<br>(-0.4) |
| VLSFO | 2.4<br>(+0.3)           | 0.8<br>(+0.1) | 0.4<br>(=)    | 1.2<br>(+0.1) | 1.2<br>(+0.1) |
| MGO** | 3.3<br>(+0.5)           | 1.5<br>(-0.4) | 0.2<br>(=)    | 1.7<br>(-0.4) | 1.6<br>(+0.9) |

Figure 1: Types and frequencies of notification by grade excluding biofuel blends (% change since last report)

\*Beyond 95% confidence for a parameter listed in Table 1 or Table 2 of ISO 8217:2010 basis owner test.

\*\*Data includes pour point notifications in Singapore (which is not routinely guaranteed) and fuels that may contain biofuels but are not identified as such.

## What is the likelihood of a fuel testing above 95% confidence for compliance or critical parameters?

Thankfully, and despite what the press may say or assumptions often made, actual proven critical off-specification incidents remain very few and far between.

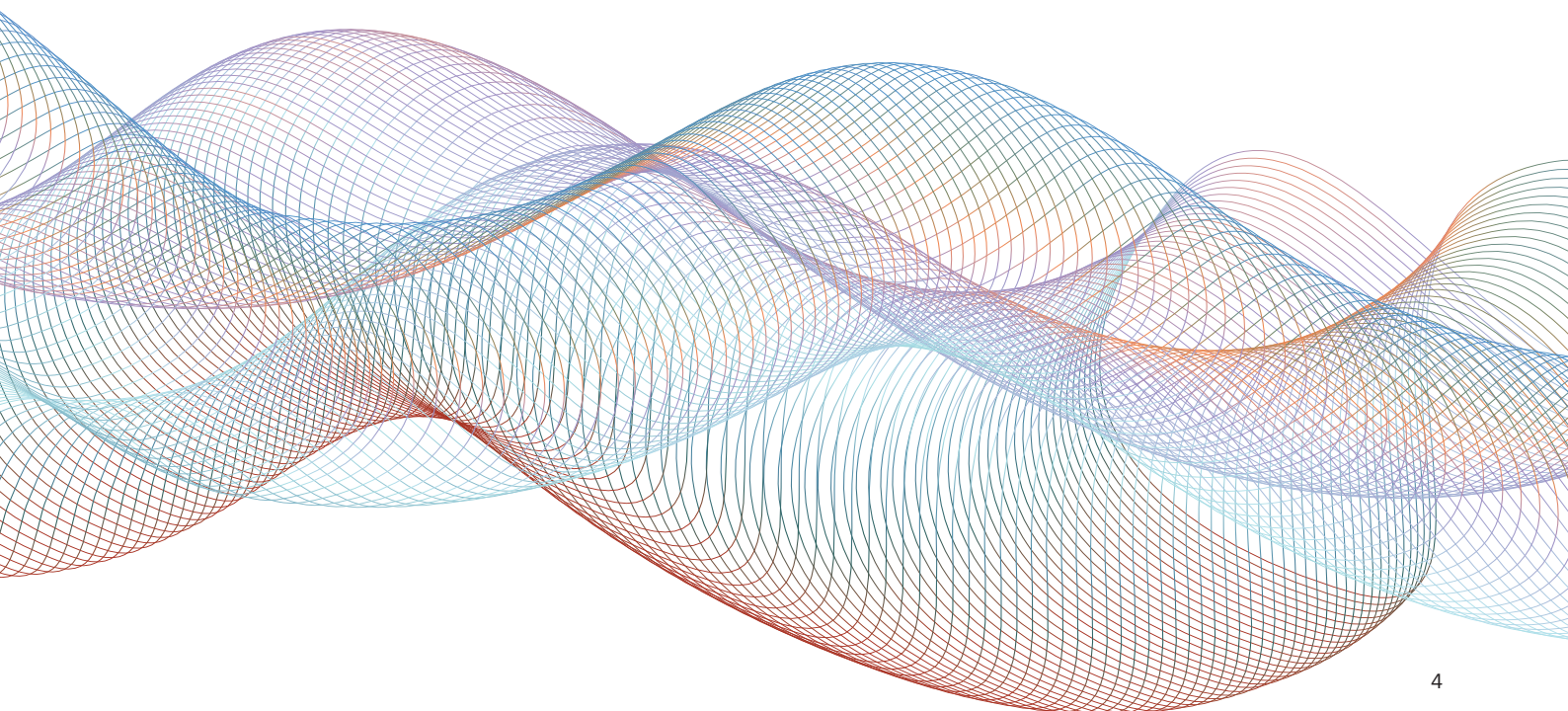
Reports of fuels allegedly not meeting the specification are more common, but many of these, if proven, can be easily dealt with either commercially or with some manipulation on board the vessel rather than the nuclear option of a costly de-bunkering. For example, increasing the temperature of a storage tank by 3-6°C in the case of elevated pour point would require action by the crew with knock-on costs associated with heating.

Many potential quality infractions arise from the optimisation of fuel quality during blending directly at the terminal. Blending so close to the mark leaves very little headroom for pick up or cross contamination in the supply chain (see figure 2).

This report explores the nuances that vary from port-to-port and region-to-region, providing insights to support informed decision-making when purchasing bunkers in today's complex landscape.

| Grade | Target Parameters    | Beyond 95% Confidence Total % | Share of Off Specs % |
|-------|----------------------|-------------------------------|----------------------|
| HSFO  | Density<br>Viscosity | 2.8                           | 52%                  |
| VLSFO | Sulphur              | 2.4                           | 30%                  |
| LSMGO | Sulphur              | 3.3                           | 27%                  |

Figure 2: Impact of blending on potential quality infraction.



# HSFO Availability

High Sulphur Fuel Oil remains the only product that is not readily available globally with just 237 ports listed as of October 2024 (see figure 3).

Availability continues to be centred around bunkering hubs and geographically key areas likely to receive passing trade from very large crude carriers (VLCCs) and / or the ever-growing scrubber-fitted fleet.

Singapore can be seen to be by far the largest market for HSFO with volumes being approximately one third of the market globally, however, demand increase has been noticeable in some other ports including Barcelona (50%), Hong Kong (15%), and Panama (20%).

Factors increasing the demand for HSFO include avoiding the Red Sea, with vessels continuing to travel longer distances at higher speeds, and yet another significant increase in the number of vessels equipped with scrubbers. Data available to Integr8 suggests another 75 million MT of deadweight being either delivered or retrofitted with scrubbers in 2024 (on top of the 100 million DWT last year).

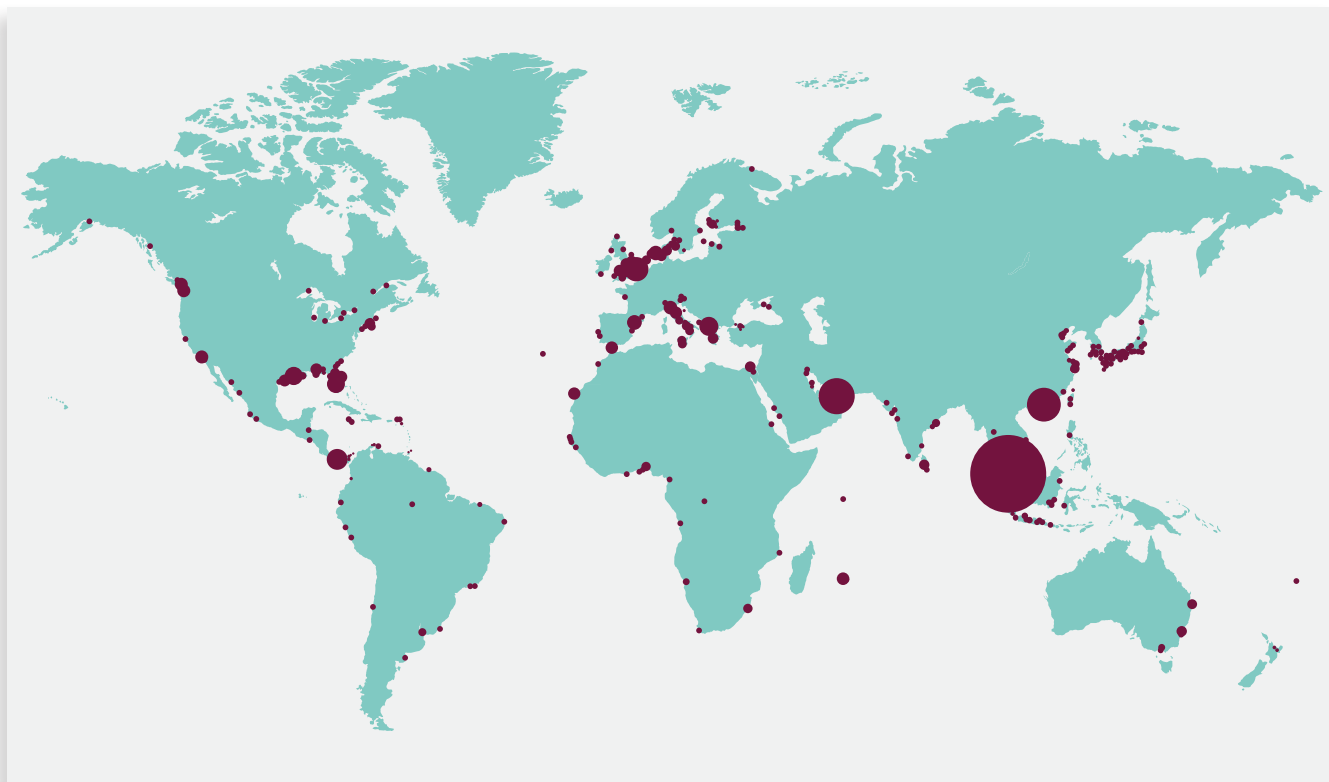


Figure 3: Availability of HSFO.

# HSFO Traded Specifications

In the last 6 months, the share of HSFO sold to the obsolete 2017 specification has increased by approximately 10% to 39% (see figure 4). Regrettably, at the time of writing, HSFO complying with ISO 8217:2024 is rarely available, or requested globally.

The adoption of ISO 8217:2024 faces fewer challenges for HSFO than VLSFO, particularly in Singapore, where there are no significant obstacles. This is due to the minimal relevance of the minimum viscosity specification, stricter supply chain controls, and additional testing by the Maritime & Port Authority of Singapore (MPA), which aligns with the requirements of ISO 8217:2024.

That said, it will still need the ex-wharf suppliers to meet the requirements of the certificates of quality, by reporting existent, accelerated and potential sediment, for the fuel to be fully compliant and certified. For this reason, we see the opportunity for majors and blenders to be first movers in this market, rather than the independent suppliers where it would be unreasonable to suggest they would warehouse such risks as an intermediary.

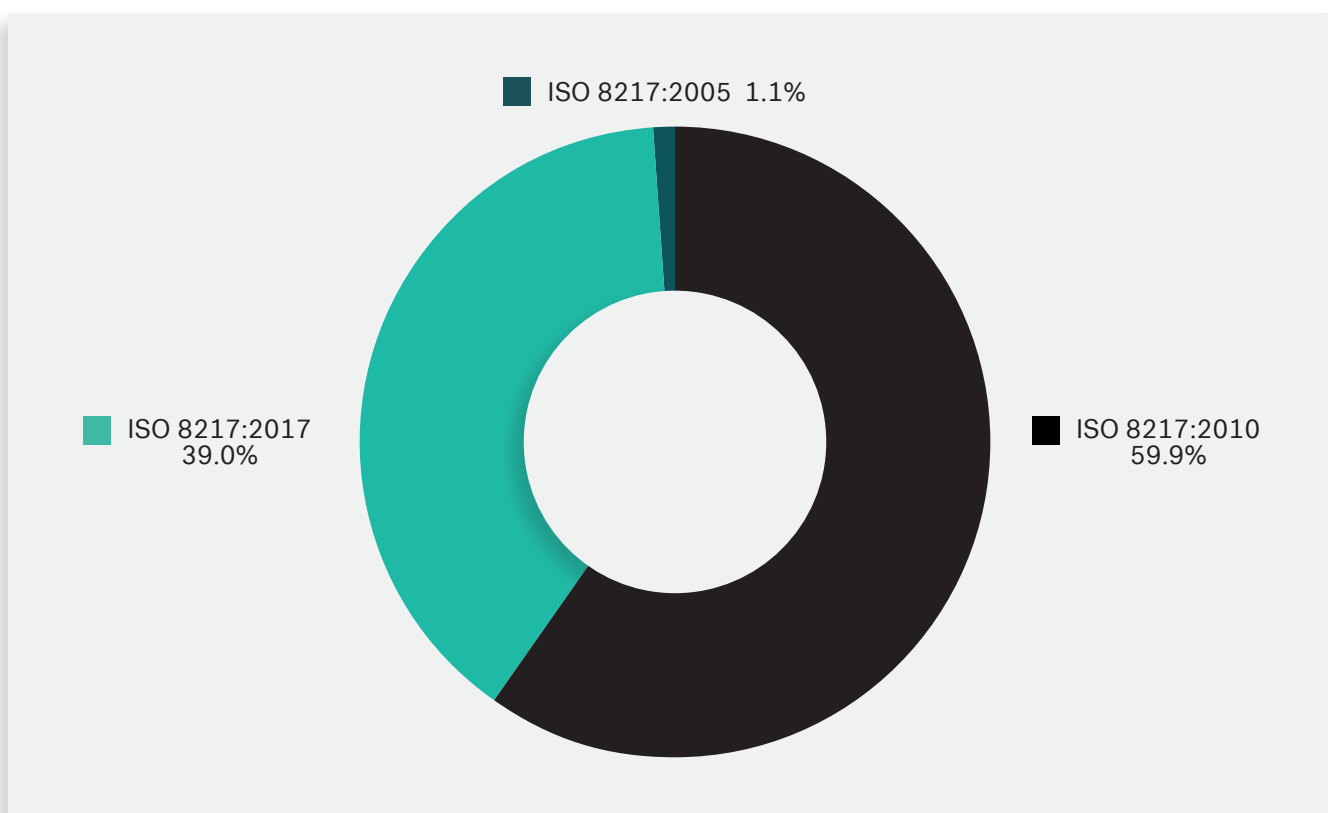


Figure 4: HSFO traded volumes by specification.

# HSFO Problematic Parameters

2.8% of all HSFO supplies were reported as testing beyond 95% confidence limits for ISO 8217 Table 2 parameters in the last 180 days, this significantly down from 3.4% when compared to previous.

The data identifies that the risk of elevated sulphur (above 3.5% Wt.) or flash point (SOLAS) non-compliance is very low, and based on the cross section of potential infractions, we can identify the hit-rates of critical matters such as aluminium + sulphur (Al+Si) and total sediment potential (TSP) remain at extremely low levels (see figure 5) - in real terms around one to two supplies per thousand each.

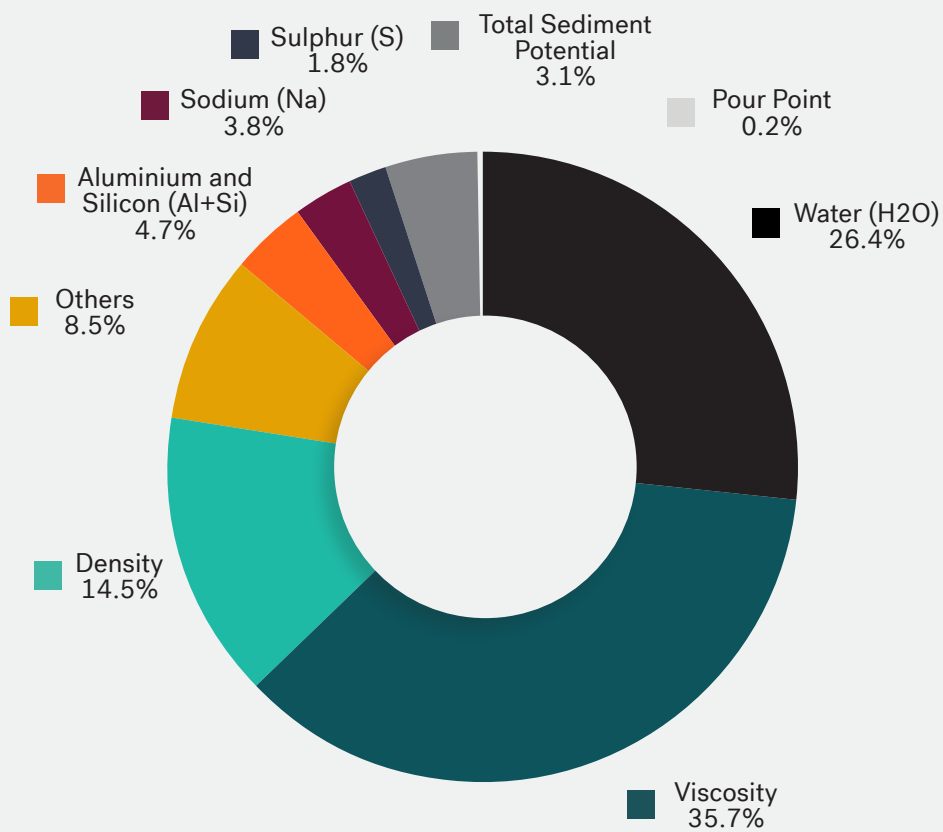


Figure 5: HSFO parameters of fuels testing beyond 95% confidence.

The overall picture is largely unremarkable. However, a key takeaway is that Singapore performs significantly better than the global average (2.8%) with a hit rate of just 1.2%.

Buyers in Singapore are nine times less likely to receive a report alleging an infraction compared to Balboa (10.8%) and over three times less likely compared to Rotterdam (3.8%) (see figure 6).

| Port           | Potential Infraction (Hit Rate %) |
|----------------|-----------------------------------|
| Global Average | 2.8                               |
| Singapore      | 1.2                               |
| Antwerp        | 2.2                               |
| Fujairah       | 3.3                               |
| Rotterdam      | 3.8                               |
| Balboa         | 10.8                              |

Figure 6: HSFO hit rate of potential infraction by blend hub.

## VLSFO Availability

VLSFO remains available in almost twice as many ports (483) as HSFO, a slight increase of around 6% on the previous report (see figure 7).

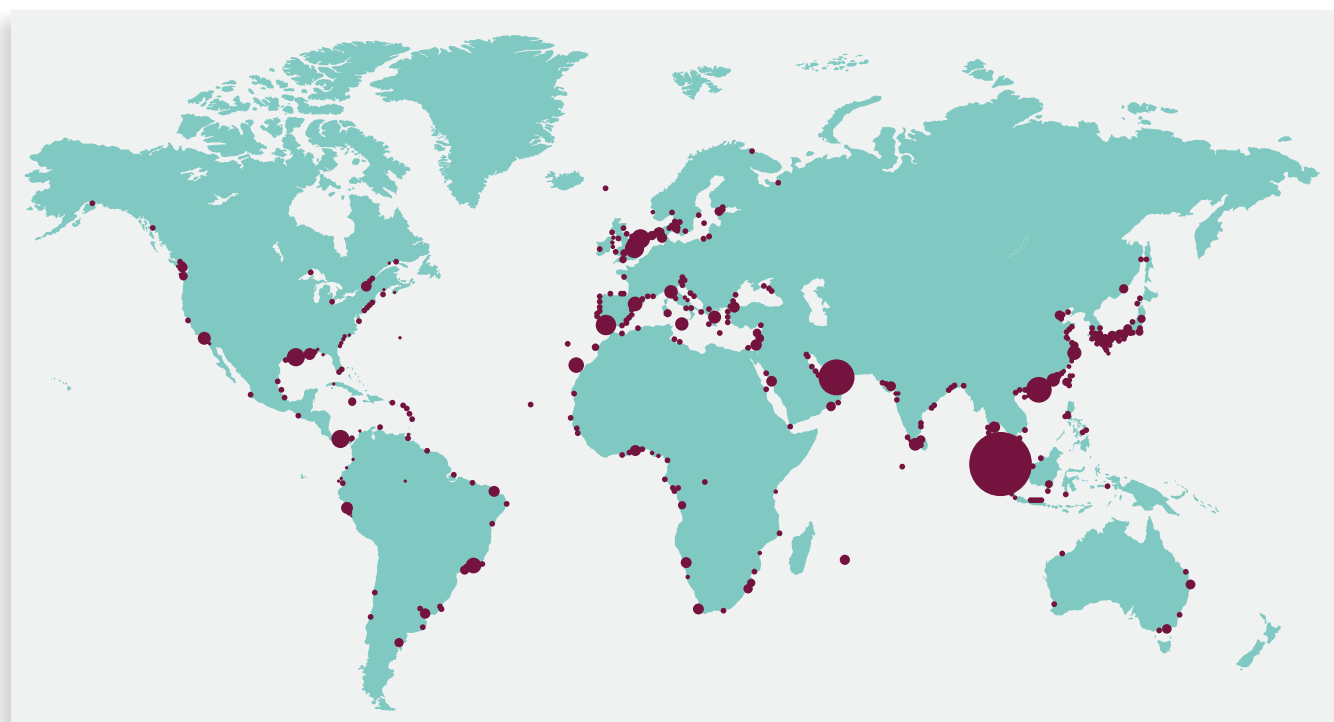


Figure 7: VLSFO availability last 180 days.

# VLSFO Traded Specifications

In the last 6 months, we have seen an 8% shift in trading from 2010 material to 2017 material (now at 39%).

However, we would remind readers that this specification is not the latest version of ISO 8217, since the 2024 specification was published at the end of May 2024. Despite this, the lion's share of VLSFO sales remain to the 2010 specification (see figure 8).

2024 fuels are again rarely marketed or requested at this time. Of more concern are the stronger headwinds that exist for VLSFO in comparison to HSFO, with minimum viscosity limits being seen to be a significant challenge.

The minimum viscosity limit was created to avoid the small amount of VLSFOs (6.5%) that had viscosities more akin to an RMA10 or RMB30 fuel (under 30 cSt) but being marketed as an RMG380 fuel, possibly with the added kicker of an elevated pour point. The latter would be considered a potential critical handling issue on board the vessel due to the potential inability to either efficiently purify the fuel or inject the fuel at the optimum temperature.

Apart from such examples and considering the inevitable future reports alleging that VLSFOs fail to meet the new minimum limits, there is generally little cause for concern. These instances would typically amount to little more than an inconvenience for the end user. However, guarantees must still be provided— by the fuel blender (ex-wharf) and, in the case of independent suppliers, potentially by the seller as well.

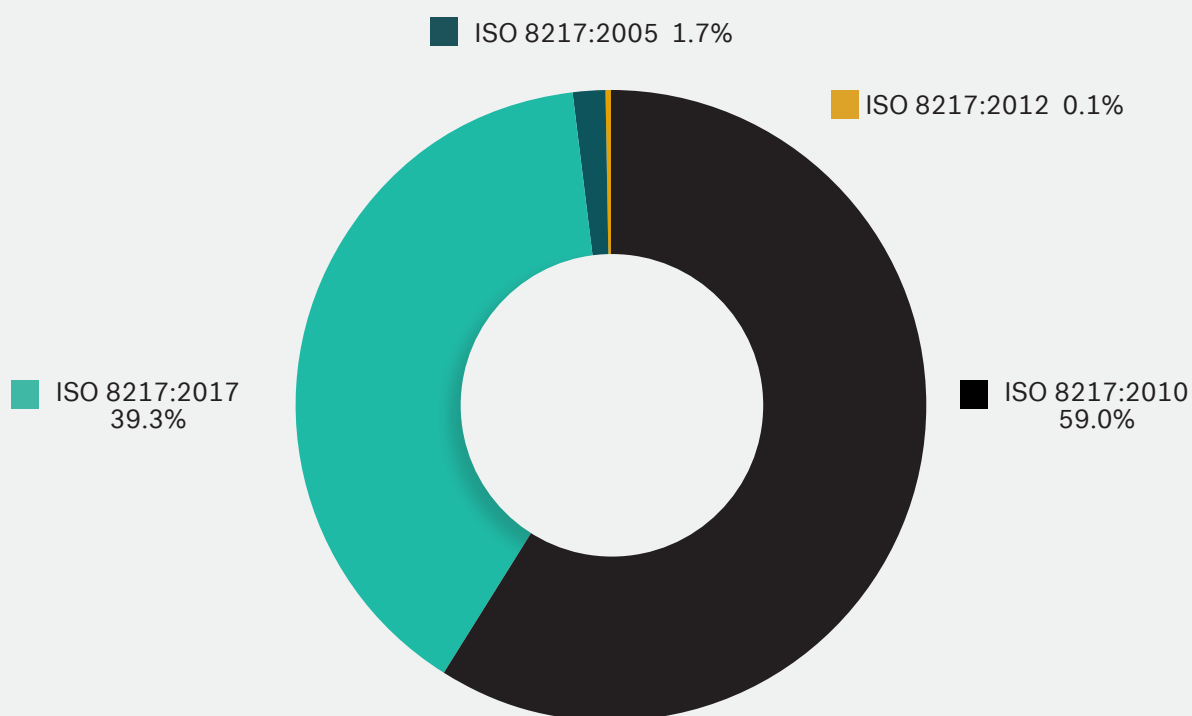


Figure 8: VLSFO traded volumes by specification.

Referring to figure 9 below, data available to Integr8 suggests that over 45% of the global VLSFO supply would not meet the RM380 2024 specification for viscosity in 0.5% sulphur fuels. Significant regional variances exist with worse case adjustments needed to blend recipes in Houston where over 80% of fuels would not meet this minimum limit.

Equally worryingly given the sheer volume in Singapore, over two thirds of their supplies would also need blend adjustments. On a more positive note, some blending hubs including Fujairah, Gibraltar and Algeciras would only have to adjust around one fifth of supplies to meet the 120 cSt minimum.

We have many examples of similar blend changes causing spikes of problem fuels and whilst the transition may not be as aggressive as IMO 2020, we do expect some challenges to appear as blends are adjusted or cutter stocks changed etc., possibly impacting the fuel stability amongst other parameters.

The speed of such change will of course be driven by the end users adjusting charterparty wording, adapting the term “latest version of ISO 8217 unless unavailable”, which remains, in my view, long overdue.

| Port<br>(90 Days)        | Fuels <30 cSt % | Fuels <114 cSt % | Fuels >114 cSt % |
|--------------------------|-----------------|------------------|------------------|
| Globe                    | 6.5             | 45.7             | 54.3             |
| Singapore                | 3.8             | 67.8             | 32.2             |
| Fujairah                 | 2.7             | 16.8             | 83.2             |
| ARA                      | 5.7             | 36.2             | 63.8             |
| Houston                  | 4.4             | 81.5             | 18.5             |
| Panama                   | 1.6             | 44.8             | 55.2             |
| Gibraltar &<br>Algeciras | 5.3             | 17.6             | 82.4             |

Figure 9: VLSFO viscosity spread last 180 days.

# VLSFO Problematic Parameters

In the past 180 days, 2.4% of all VLSFO supplies were reported to exceed the 95% confidence limits for ISO 8217 Table 2 parameters, marking a slight increase from 2.1% in the previous report and 2.0% a year ago.

The global risk of MARPOL non-compliance for VLSFO remains significantly higher than for HSFO, which is at 0.8% (up from 0.7% previously). However, this does not provide the full picture, as certain locations exhibit notably higher risks of VLSFO non-compliance, than others.

Based on the cross section of potential infractions, we can identify that the hit-rates of high risk matters such as Al+Si and TSP thankfully remain very low at rates of around two supplies per thousand each (see figure 10). The risks of issues because of complex blending remains almost exclusively in bunker hubs rather than those areas with either simpler blending models or refined products available.

The type of VLSFO quality infractions remains very similar to the last report with almost two-thirds of all infractions because of sulphur, water, TSP and cat-fine (Al+Si) infractions. Reports of flash point issues on VLSFO remain very rare, only noted in under one sample per thousand.

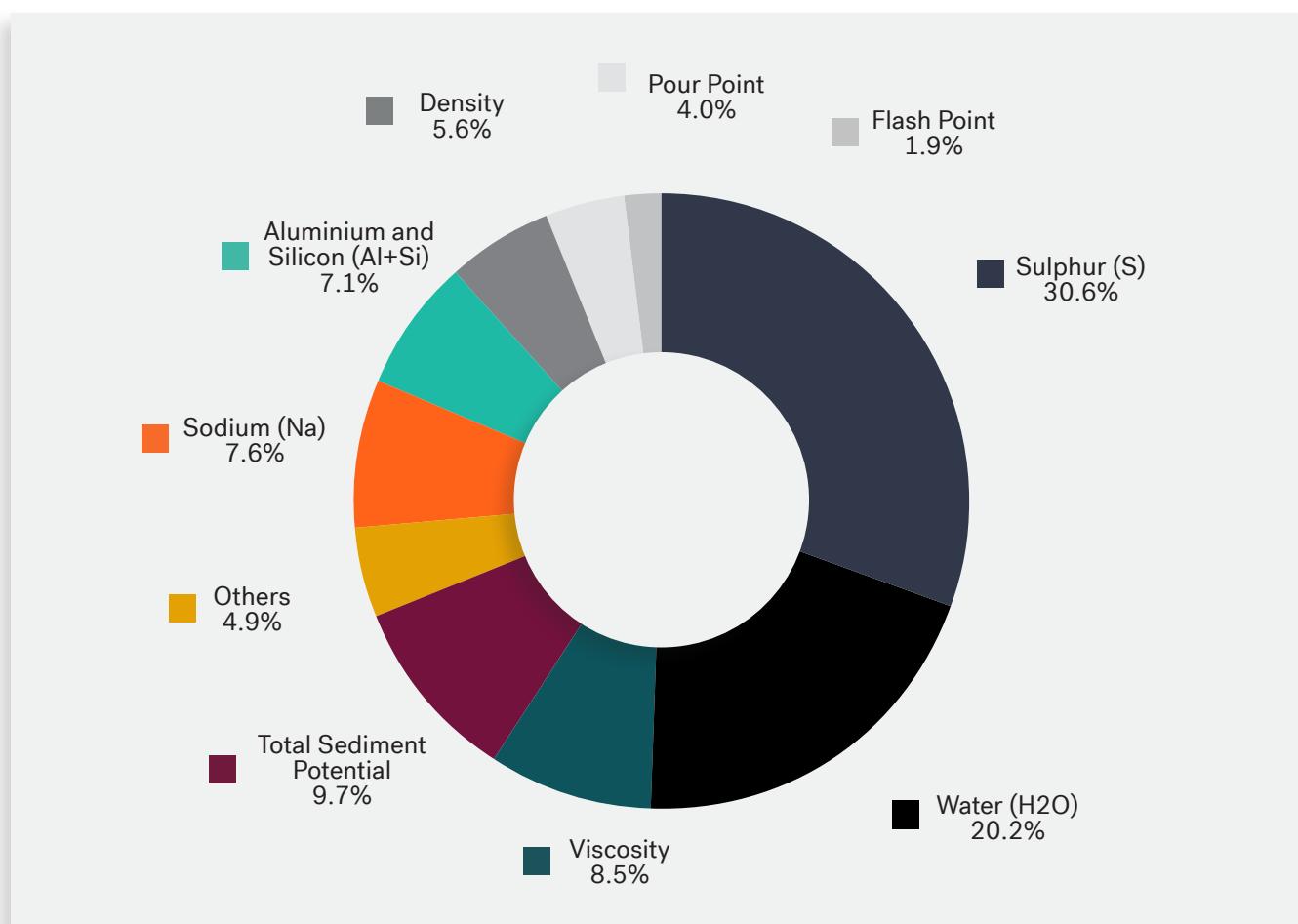


Figure 10: VLSFO parameters of fuels testing beyond 95% confidence.

Previous fuel quality reports have already identified the Amsterdam, Rotterdam and Antwerp (ARA) region as a potential problem area for VLSFO sulphur non-compliance especially when compared to Singapore. Interestingly, current data (see figure 11) shows a significant increase in the risk of obtaining a sulphur result within 95% confidence limits of the specification in Singapore (3.4% vs 1.0%) yet results beyond 95% confidence remain low at 0.5%.

ARA ports remain a similar risk profile to previous with the likelihood of an owner's sample testing beyond 95% confidence, four times more likely than Singapore. When we expand the search, it is very noticeable that the likelihood of a sulphur notification is not limited to these main hubs, although an interesting pattern is often present, in that the likelihood of obtaining results that

significantly exceed 0.53% is higher than that of a result borderline to the limit. Non-exhaustive examples may be seen below in figure 12.

All the below examples, have a common denominator in that some barges are seen to be switching from supplying HSFO to VLSFO and back in the last 180 days.

When evaluating the root cause, in the cases of Trieste and Barcelona the increase is likely to be because of the need to cater for the increased demand in HSFO or in the case of the other ports, purely because of continued challenges relating to infrastructure.

Therefore, given the severity of outcome should such an incident result in a proven claim, it remains essential, if identified, to avoid such examples, further reinforcing the need for data-driven buying and a proactive approach.

| Country                     | Tolerance Sulphur<br>0.51-0.53 Incl. % | Sulphur Exceeding<br>0.53 % |
|-----------------------------|----------------------------------------|-----------------------------|
| Singapore                   | 3.4 (+1.0)                             | 0.5 (+0.3)                  |
| Belgium & Netherlands (ARA) | 9.1 (+7.7)                             | 1.9 (+2.0)                  |
| Rest of the World           | 1.7 (+2.0)                             | 0.9 (+0.9)                  |

Figure 11: % distribution of owner sulphur results for VLSFO by area (% change since last report).

| Port            | Tolerance Sulphur<br>0.51-0.53 Incl. % | Sulphur Exceeding<br>0.53 % | HSFO Demand Increase<br>Q2 to Q3 |
|-----------------|----------------------------------------|-----------------------------|----------------------------------|
| Barcelona       | 2.9                                    | 11.6                        | 50%                              |
| Augusta (Italy) | 4.1                                    | 10.2                        | -25%                             |
| Kali Limenes    | 4.0                                    | 16.0                        | -50%                             |
| Trieste         | 1.5                                    | 9.1                         | >100%                            |

Figure 12: % distribution of owner sulphur results for VLSFO by area.

# MGO Availability

LSMGO remains the most available of all conventional grades globally with 665 ports seen to supply it in October 2024.

Marine Gas Oil (0.5% sulphur) is not available inside the EU and limited to around 50 ports worldwide predominantly in West Africa, Brazil and the Middle East.

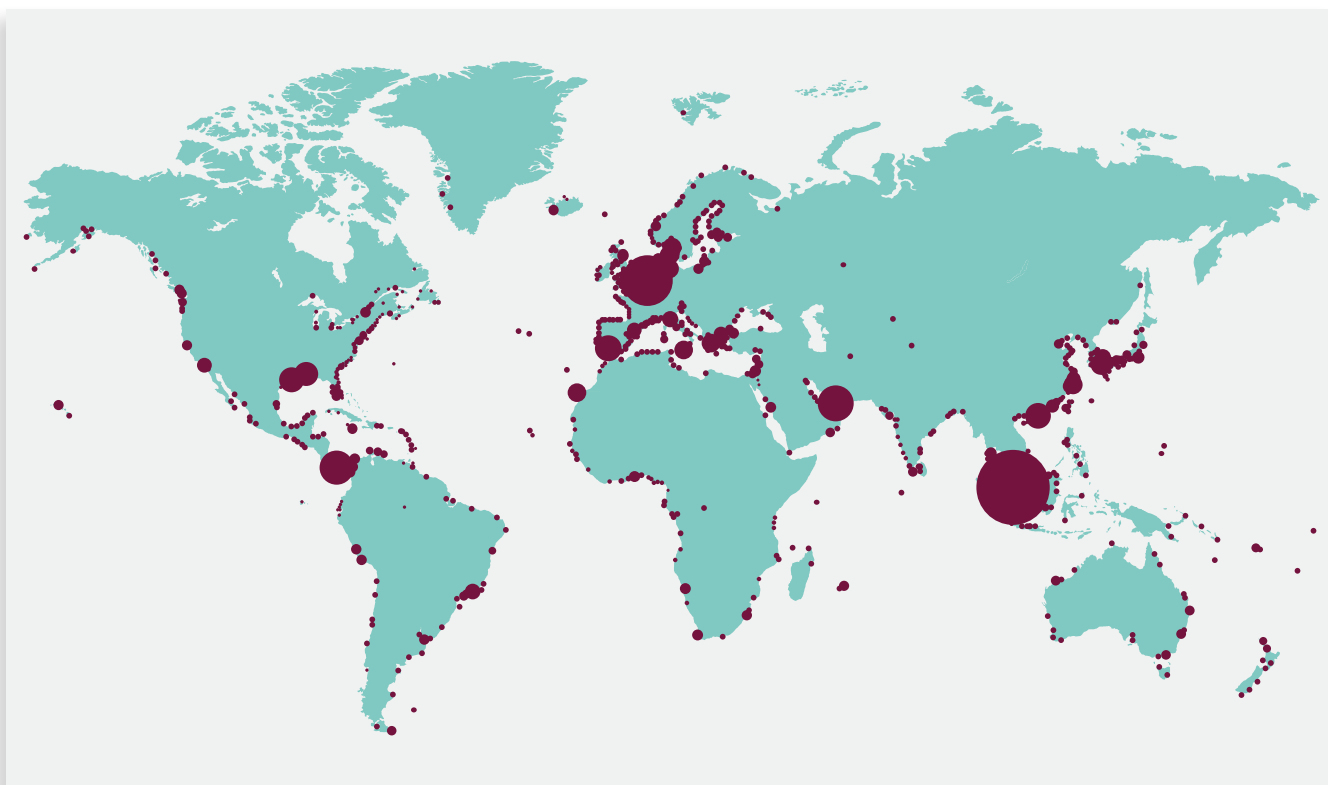
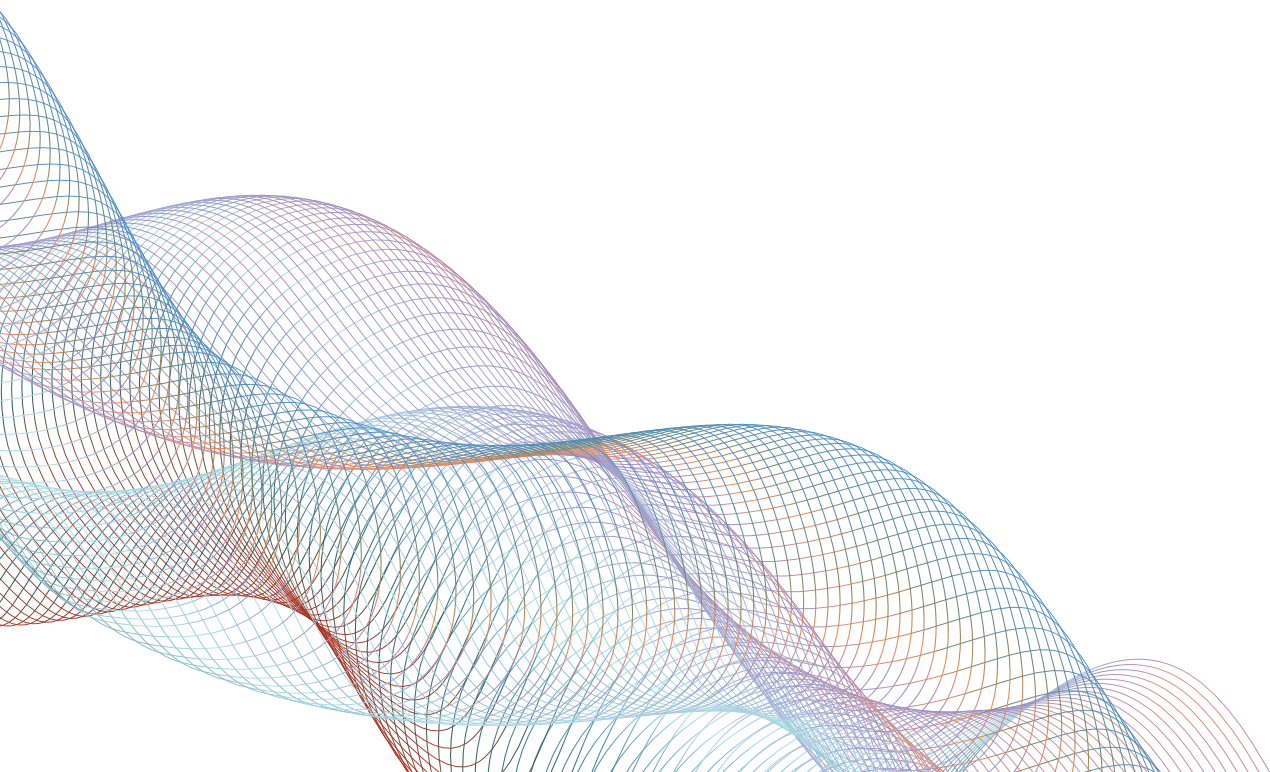


Figure 13: LSMGO availability October 2024.



# MGO Traded Specifications

In the case of LSMGO, a quarter of fuels traded were sold as 2017 fuels in the last 180 days, this at similar levels as the previous period.

It remains a concern that almost one in ten of all fuels continues to be traded using the 2005 specification.

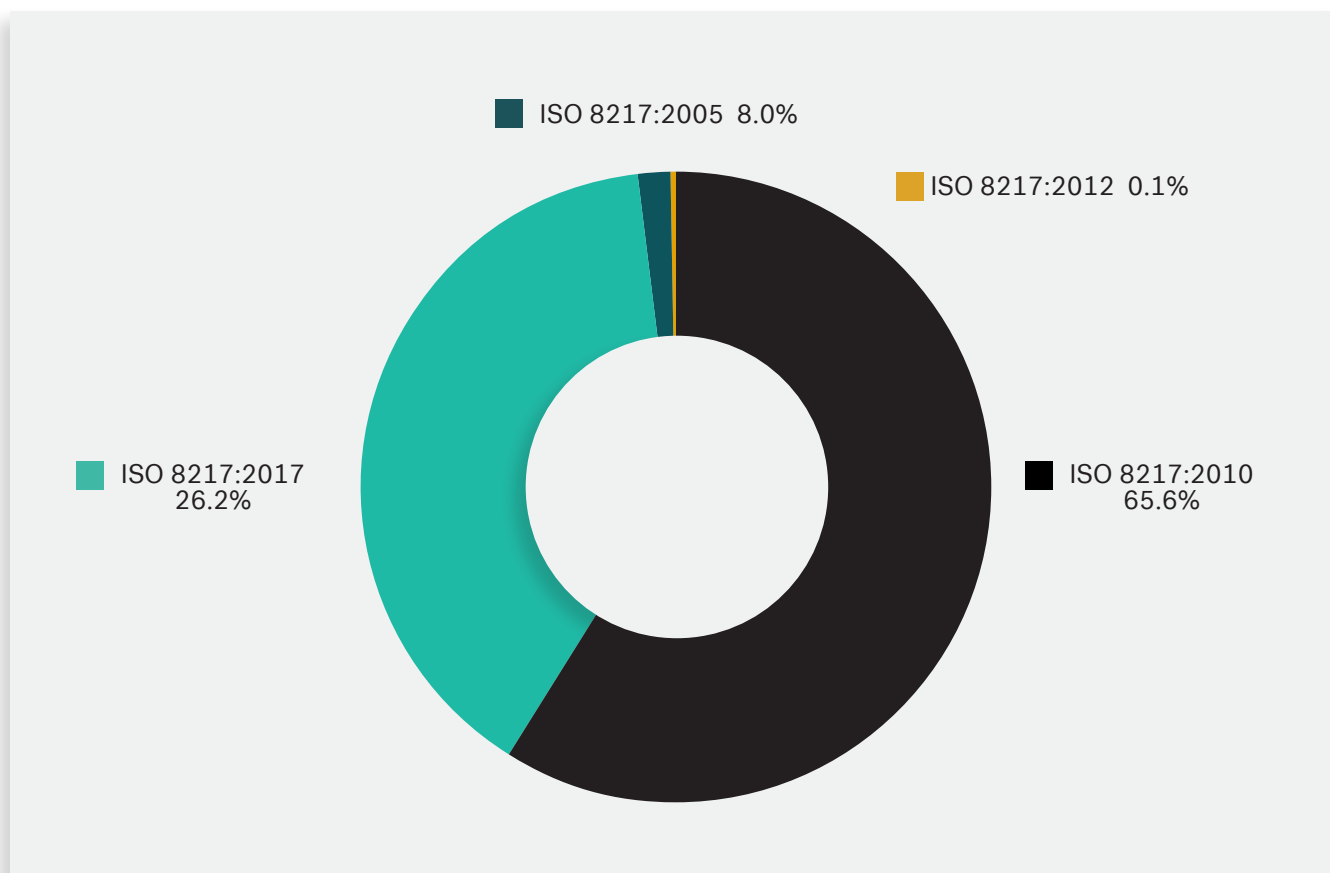


Figure 14: LSMGO traded specifications.

The 2024 specification for Marine Gas Oils (without biodiesel) has not materially changed other than mandating the reporting of cold flow properties i.e. cloud point and pour point.

Given the qualities and deltas between pour point and cloud point (as can be seen from figure 15 below) it remains concerning that the continued additisation of fuels with middle distillate flow improver in and around ARA (or areas fed by ARA supply) results in these fuels masquerading as winter grade fuels when they handle on-board more realistically as a summer grade.

As a result, end users must continue to add specific cloud point or cold filter plugging point limits to their DMA contracts with suppliers to ensure that the vessel is receiving fuels with cold flow properties fit for their use, which is unilaterally disclaimed in virtually all bunker sales.

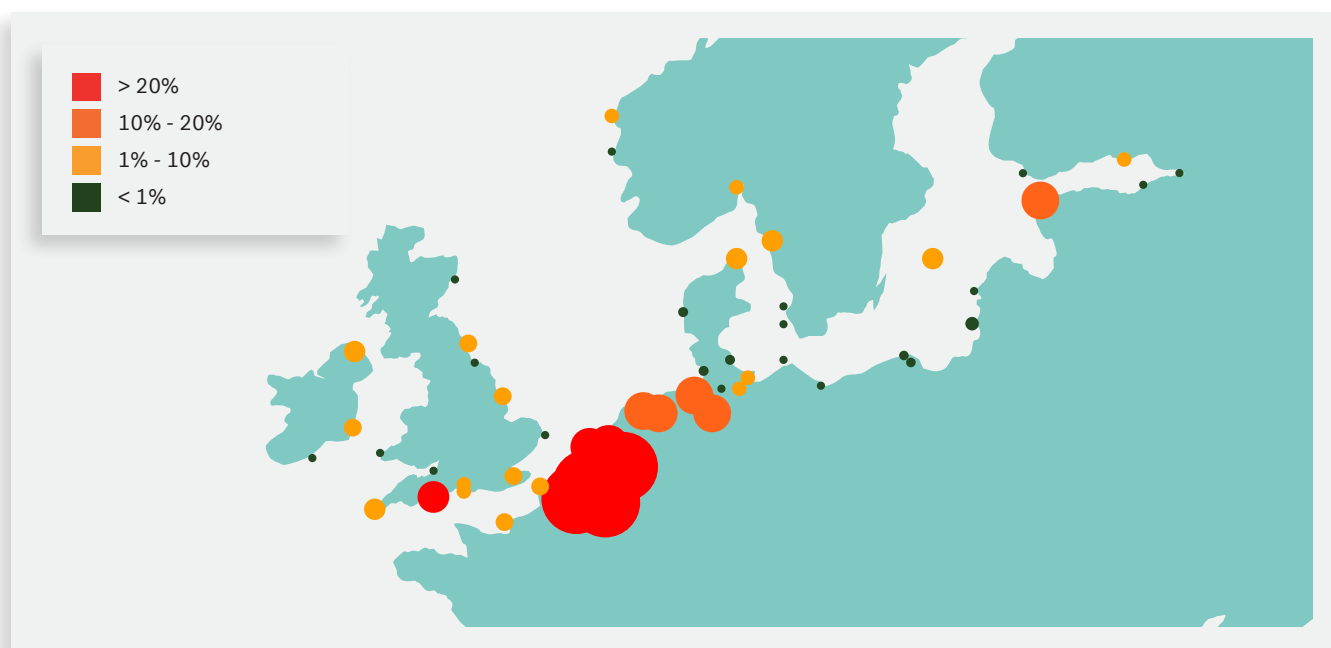


Figure 15: Fuels with potential cold flow challenges in Northwest Europe.

# MGO Problematic Parameters

3.3% of all LSMGO supplies were reported as testing beyond 95% confidence limits for ISO 8217 Table 1 parameters in the last 180 days, this up from 2.8% in the previous report.

The data identifies that the risk of potential MARPOL or SOLAS non-compliance is 1.5%, this lower than the previous level of 1.9%. Drilling into the individual parameters, sulphur remains responsible for over 30% of all infractions globally with flash point issues falling back from 33% to 25% (see figure 16).

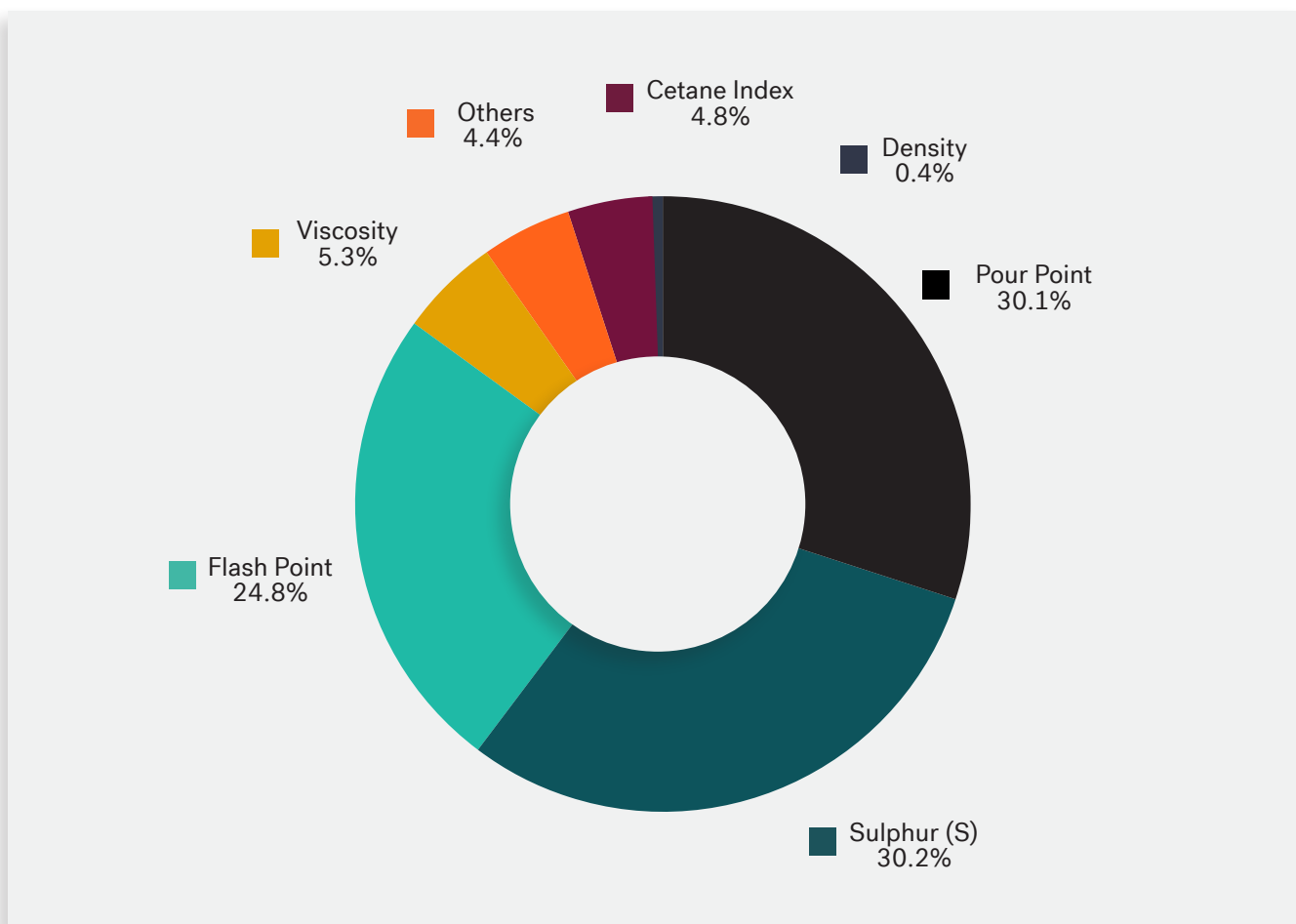


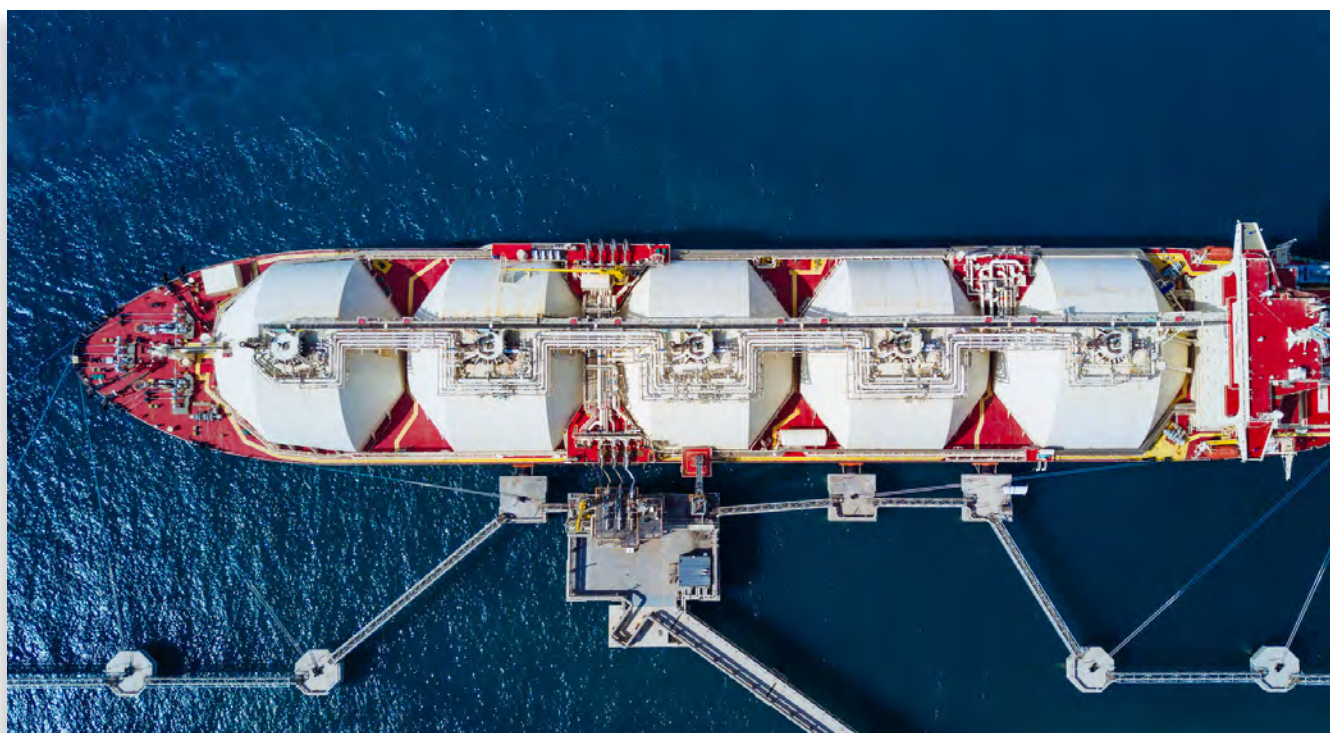
Figure 16: LSMGO parameters of fuels testing beyond 95% confidence limits.

Globally, the flash point picture remains similar to the last report with a few countries providing a large share of owners' tests below 60°C, namely Spain, Italy, UAE and the USA (33%).

However, it is always important to consider port-to-port variances which can be stark. The UAE is a classic example of this, with Fujairah not having a single sample testing below 60°C in the last 180 days compared with Sharjah at 11.8% (see figure 17).

| UAE Port    | Flash Pt % <60°C |
|-------------|------------------|
| Sharjah     | 11.8 (20.9%)     |
| Hamriyah    | 6.7 (26.3%)      |
| Dubai       | 4.9 (16.0%)      |
| Jebel Ali   | 4.4 (2.4%)       |
| Khor Fakkan | 0.9 (3.0%)       |
| Fujairah    | 0.0 (0.2%)       |

Figure 17: LSMGO flash point testing below 60°C in UAE ports last 180 days (previous hit rate in brackets).



# Part 2: Focus on the Med ECA

Written by: Chris Turner, Manager of Bunker Quality & Claims

## LSMGO Demand, Supply, and Quality Outlook

LSMGO avails are currently plentiful in the Mediterranean basin, however, it has been reported that demand for LSMGO will increase by at least 20%.

This exceeds both current refining and storage capacity which in turn is expected to put pressure on prices. Perhaps a consequence of this could be the comeback of ULSFO (0.1% sulphur) which is currently only available in Algeciras but would, for vessels on fixed routes, be a viable and cheaper solution.

However, vessels operating on a spot basis would face logistical challenges in maintaining

segregation and sufficient onboard storage capacity for an additional fuel, while still running auxiliaries on LSMGO.

For the period assessed, the Med was generally seen to perform better than global LSMGO quality wise, with 1.4% of all samples reported as testing beyond 95% confidence limits for ISO 8217 Table 1 parameters in the last 180 days (see figure 18).

However, the key message is that any such report is more than likely (>80%) to be of a high-risk nature, namely either a MARPOL or SOLAS infringement, or a critical quality parameter.

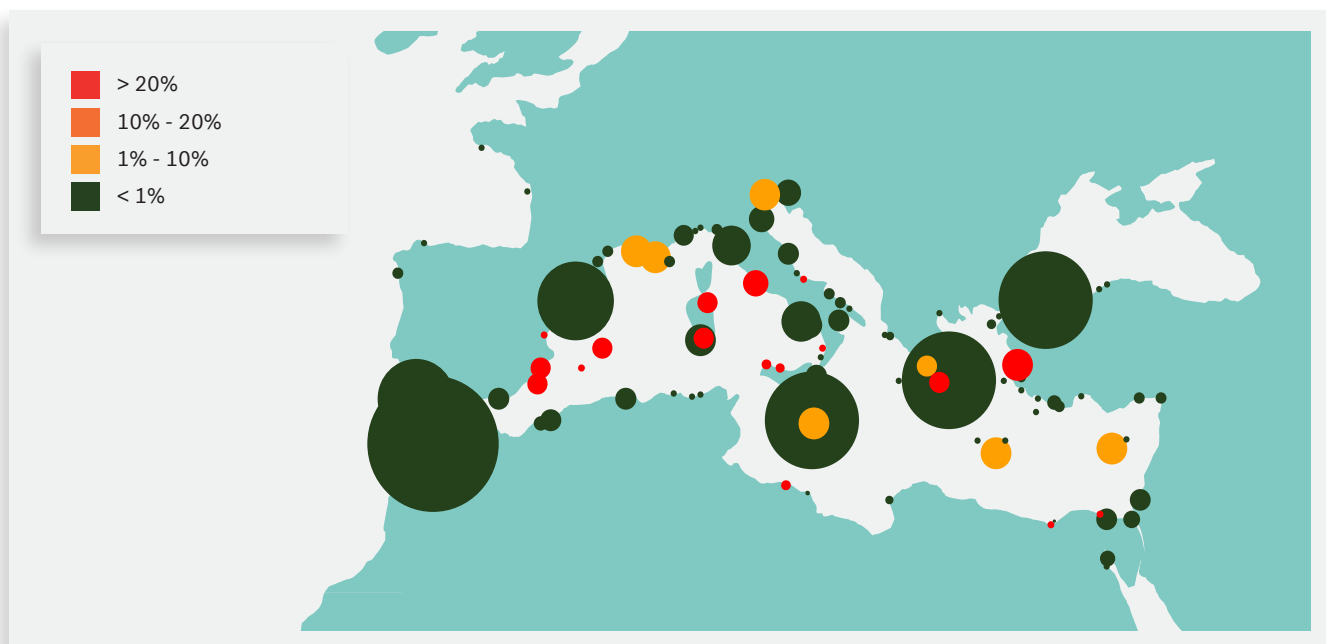


Figure 18: Reports of LSMGO testing beyond 95% confidence in the Mediterranean.

# Legislative Compliance with MARPOL Annex VI or SOLAS

Cross contamination in the Med is very rare given the 0.5% sulphur grade is not allowed to be marketed within the EU (with Turkey following suit), but it is possible for this to occur in the Middle East and/or North Africa.

Although sulphur content is rarely a concern in LSMGO, the anticipated increase in demand may lead to a greater reliance on fuels compliant with EN590—the specification for automotive diesel. However, these fuels only guarantee a minimum flash point of 55°C, rather than the 60°C minimum required for marine fuels.

This potentially leaves the buyer in a challenging situation if the fuel is not guaranteed to DMA specifications, or at worse, significantly increases the risk of a potential SOLAS infraction, which is a very serious matter indeed.

The use of such road fuels in bunkers can be generalised by looking at the cross section of supply, applying two rules; firstly a fuel that tests below 60°C, and secondly a fuel with a larger kerosene portion with the result that the viscosity is below 3.0 cSt at 40°C (see figure 19).

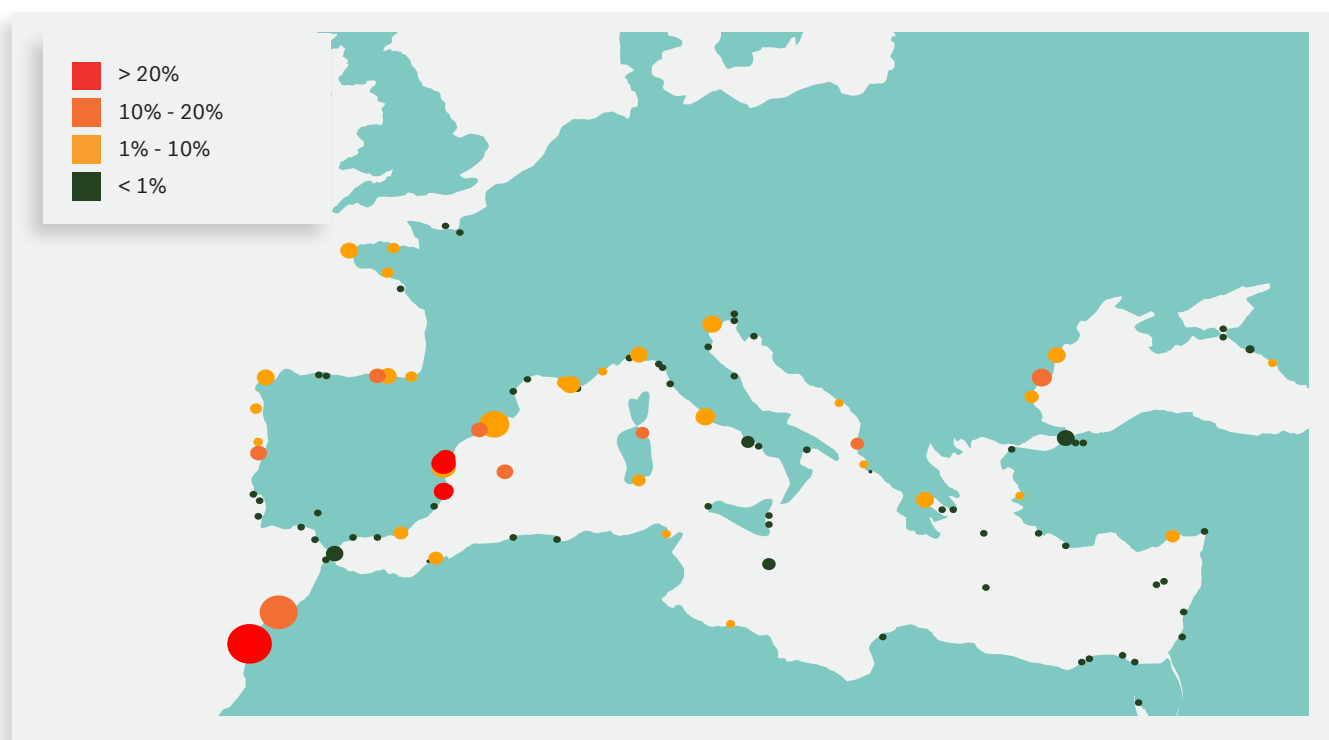


Figure 19: LSMGO reported low flash occurrences in the Med, combined with low viscosity (<3 cSt).

LSMGO buying strategies should be carefully controlled to consider the greatly elevated risk profiles in countries such as Spain and Italy where notifications of flash points under 60°C are common, especially, but not exclusively, when the delivery is via truck.

Such fuels do at least remove the other main challenge for LSMGO, this being cold flow

properties, which rear their heads at this time of year across much of Europe. The Mediterranean basin is not immune to these fuels, as can be seen from figure 20, with significant portions of supply in the Gibraltar Strait and Malta exhibiting cold flow properties that may not be suitable for the end user, especially if the vessel is transiting to colder climes.



Figure 20: Fuels with potential cold flow challenges in the Mediterranean.

# Part 3: Focus on Biofuels

Written by: Chris Turner, Manager of Bunker Quality & Claims and Erik Hoffmann, Managing Editor (ENGINE)

## Biofuel Availability

Two main (but very different) types of biofuels are currently available.

These are fatty acid methyl ester (FAME) (made from a variety of sources such as rapeseed methyl ester (RME), palm (PME) and used cooking oil (UCO)) and, hydrotreated vegetable oil (HVO) again produced from similar plant or animal fat-based sources.

The physical characteristics of FAMEs are closer to those of fossil diesel fuels than pure vegetable oils, but properties depend on the feedstocks utilised to produce them. FAMEs must comply with EN14214 in Europe and ASTM D6751 in the USA and can be supplied as blends from B7 (7% biofuel) to B100 (100% biofuel).

Data available to Integr8 identifies both neat and blended biofuel availabilities and qualities, although still at much lower levels than conventional fuels. More locations have been added to the global biofuel bunker availability map in the past year, and suppliers keep launching new locations (see figure 21).

The ARA used to dominate with first-mover suppliers and access to bio refineries, dedicated storage capacity and cargo import flows. Singapore suppliers have since caught up with and surpassed those in the ARA in total bunker volume and ability to offer competitive prices. Other locations like Istanbul, upriver Argentina and Houston have been launched, but demand has so far been tepid.

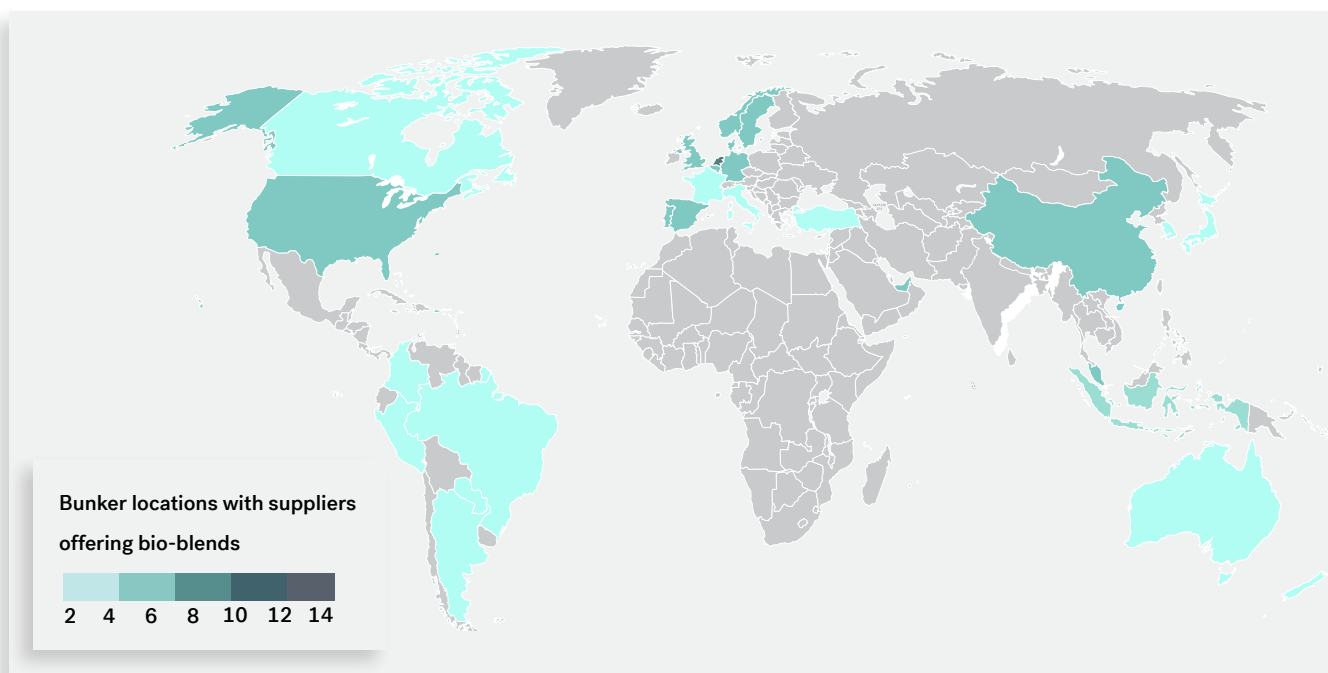


Figure 21: Distribution of B7-B100 marine fuels (FAME)

Biodiesels produced from a variety of feedstocks are on offer in different regions. First-generation – and unsustainable – feedstocks like palm oil are blended into LSMGO by mandate in Indonesia.

US suppliers have been seen to offer biodiesel produced from a mixture of tallow, soy and used cooking oil. While in the EU, second-generation UCO and palm oil mill effluent (POME) are key feedstocks.

# Biofuel Quality

## Distillate Biofuel Blends

Aside from conventional issues relating to LSMGO quality we will concentrate on those which, with increasing FAME content, are seen to increase, namely total acid number (TAN) and cold flow properties (pour point, cloud point and cold filter plugging point).

The scale of the challenge is routinely proportional to the level of FAME identified in the MGO blend. A rise in acidity is possible to identify in LSMGO due to the inherently low levels of TAN (0.10 mg/KOH/g) in fuels that do not contain biofuels (beyond de minimis levels of 0.5%). However, in FAME concentrations ranging from B7 to B40, TAN increases to 0.16 mg/KOH/g, and beyond B40 again to 0.27 mg/KOH/g.

The creep of TAN may suggest that some of the FAME components present in blends tested are becoming susceptible to oxidation, with this chemical reaction being accelerated by heat and resulting in the formation of free fatty acids.

This is an important point when you combine TAN with the other main challenge of FAME rich fuels (>40%), namely cold flow properties with pour points regularly exceeding summer specification limits of 0°C for distillate marine fuels (DMA) and occasionally being tested as high as +15°C which, without the use of middle distillate flow improvers, will require the heating of vessels tanks to prevent the waxy fuels from setting.

## Residual Biofuel Blends

The quality is largely unremarkable in the period, with the linear blending of low sulphur, low metal FAME having a positive effect on the base quality of the fuel, in the cases of B24 and B30 etc.

For example, a VLSFO with 60 mg/kg Al+Si being blended at B30 with Al+Si free FAME would provide for an Al+Si, in the blend, of 42 mg/kg approximately. Similarly, a borderline VLSFO sulphur with a certificate of quality (COQ) of 0.50% Wt would be cut back, as a result of the FAME, to around 0.36%Wt.

Unlike blends with distillate, it is not possible to track any increase in acid number or pour point due to the masking nature of the existing acidity within the residual base stock.



# How much biofuel do I need?

Well, that completely depends on what you will use the biofuel for. FuelEU Maritime, for example, does not set a specific share of biofuel to be compliant.

It is not about a vessel's individual voyages, but an average across its voyages during a calendar year. The target is a 2% reduction, but that doesn't mean 2% biofuel. It means a 2% reduction in the greenhouse gas (GHG) intensity of the fuel used between two EU ports, and half that between an EU port and a non-EU port. That translates to around 3% biofuel blended with HSFO or VLSFO, or 2% biofuel blended with MGO.

However, 3% or 2% biofuel blends are not smart options because it's the average reduction across a pool of vessels throughout the year that counts. A vessel is much better served by taking 24%, 30% or even 100% biofuel on one vessel and transfer this vessel's compliance surplus to make other vessels in that pool compliant before emission reports are due for verification in January 2026.

B24 (24% biofuel), B30 (30% biofuel) and pure B100 (100% biofuel) are more commonly stocked or blended by bunker suppliers. In the ARA, you will have access to B30 and B100 deliveries from most suppliers, while in other ports around the world B24 is the typical blend and suppliers will need an IMO II chemical tanker to hold and deliver blends above 25% biofuel.

It is also important to note that the 3% bio-HSFO/VLSFO and 2% bio-MGO estimates are based on default GHG intensity factors from FuelEU Maritime, which references biofuel factors from the EU's recast Renewable Energy Directive (RED II). They are not necessarily the actual values from the biofuel products bunker suppliers have on offer. Sometimes a supplier will list a default GHG intensity 14.9 grams of carbon dioxide-equivalent per megajoule (gCO<sub>2</sub>eq/MJ) of fuel

in the Proof of Sustainability (PoS). This PoS is the sustainability document that bunker buyers should receive with biofuel stems and will use to verify their emission reductions towards FuelEU Maritime. But a stem's actual GHG intensity might also be some grams lower or higher than the default.

Fatty acid methyl ester (FAME) bottoms, for example, has been seen with 11 gCO<sub>2</sub>eq/MJ and can achieve a better value than normal FAME as it's a byproduct of FAME, a residue- and waste product. For normal used cooking oil (UCO)- or palm oil mill effluent (POME)- based FAMEs, we have seen actual GHG intensity values in PoS documents hover around the default 14.9 gCO<sub>2</sub>eq/MJ, and as high as 18 gCO<sub>2</sub>eq/MJ.

FAME bottoms fall into a category of biofuel products that should be handled with caution because they are not widely used and their compositions vary, according to the International Council on Combustion Engines (CIMAC). Other fuels in this category include pyrolysis oils, cashew nut shell liquid (CNSL), lignocellulosic biomass products and unprocessed waste- and residue fats and oils. CIMAC recommends a full risk assessment with comprehensive testing and ship trials with engine manufacturers and class societies involved in the process.

## Bottom Line:

It is important to plan your FuelEU Maritime compliance well ahead if you are going down the biofuel route. Remember that it is not about being compliant on individual voyages to EU ports, or even on individual vessels. It is the average GHG intensity across pools of vessels sailing to EU ports throughout the year that determines your compliance balance. To get your balance right, it helps to familiarise yourself with PoS and GHG intensity factors so that you can request what you need in the bunker enquiry.

# Summary

Momentum is building in the biofuel market as more suppliers enter the scene and expand blending capabilities.

While adoption remains uneven across regions, the drop-in nature of biofuels, combined with a growing emphasis on sustainable feedstocks, highlights their potential as a key component of maritime decarbonisation.

However, shipowners operating in colder climates should closely monitor cold flow properties and consider measures such as middle distillate flow improvers or tank heating to mitigate operational risks.



# Part 4: Focus on Fossil-LNG

Written by: Paul Gorin, Bunker Trader, LNG (Integr8 Fuels)

## LNG Availability

The LNG market is expanding, driven by economic incentives, environmental regulation and a growing orderbook of dual-fuelled LNG vessels.

In 2024, 8% of all newbuild orders were for LNG-powered tonnage compared to <1% of the current sailing fleet (DNV AFI, 2024), with global LNG bunker demand projected to triple from 2024 to 2030 (S&P Global Commodity Insights, 2024).

However, despite the recent growth in the global LNG bunker vessel (LNGBV) fleet, with 65 vessels available, and 24 on order, the delivery of LNGBVs is failing to keep up with the growing LNG bunker market demand.

This shortfall is driven partly due to shipyard capacity constraints and high newbuild costs for LNGBVs - with the most recent contract awarded rumoured to be \$370m for four LNGBVs - \$92.5 million each! (TradeWinds, 2024).

To manage a tightening LNG supply chain, shipowners and operators should closely monitor LNGBV movements and supply availability to seize spot opportunities. Collaborating with traders who maintain strong supplier relationships and access to real-time market data can offer a reliable and efficient way to secure competitive LNG fixtures amidst growing constraints.

## LNG Quality

LNG is known for its high safety standards as a bunker fuel as its composition is uniform at the point of production and remains consistent throughout the supply chain, requiring no blending.

This eliminates many of the off-spec fuel issues that can be found with traditional bunkers, making contamination or quality issues exceptionally rare.

Over the past five decades, more than 100,000 LNG cargoes have been delivered globally without any major incidents (LNG Journal, 2024), and 2024 remains unremarkable in this regard.

# Med ECA: LNG Demand Implications

The introduction of the Med ECA from 1 May 2025 will likely boost LNG bunker demand in the region. This regulation imposes stricter SOx emission limits on vessels of 0.1%, and in response, shipowners are evaluating various compliance strategies.

Common options include paying a premium for compliant low sulphur fuels or investing in emission abatement technologies such as scrubbers. LNG presents an alternative compliance option given its wide availability in the region, negligible SOx emissions, and favourable market conditions.

A continued decrease in European LNG demand, partly influenced by the growing adoption of renewable energy and nuclear power generation (IEA, 2024), looks set to further improve LNG availability, as

suppliers look to other markets, including shipping, to compensate for lower European gas consumption.

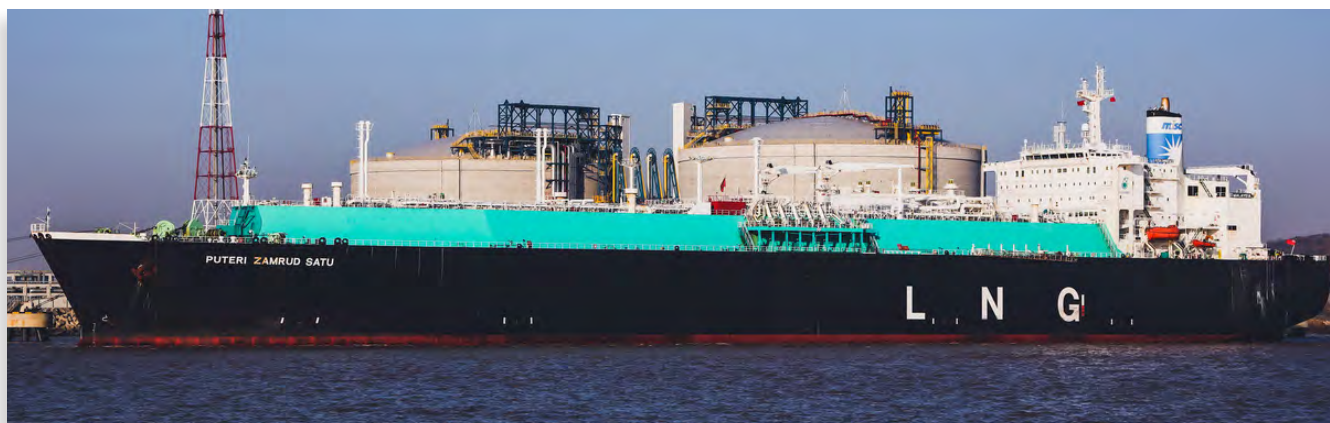
The roll out of existing regulations such as FuelEU Maritime and the EU ETS are expected to further stimulate demand for LNG bunker fuel in the region. When paired with modern, high-pressure dual-fuel engines designed to minimise methane slip, LNG's lower greenhouse gas emissions make it a cleaner alternative to traditional bunker fuels.

Although LNG is not without its critics and complexities, it remains a viable transitional fuel, especially for vessels operating in Europe, enabling them to meet increasingly stringent environmental regulations while laying the groundwork for the switch to a more sustainable maritime future.

## Summary

The LNG bunkering market is expanding rapidly, fuelled by stricter regulations, economic incentives, and a growing fleet of dual-fuel vessels.

While supply chain challenges, such as limited LNGBV availability, exist, the entry of new suppliers and LNG's low SOx emissions reinforce its role as a key compliance option, particularly with upcoming regulations like the Med ECA. For now, LNG remains a practical and viable transitional fuel.



# Conclusion

Written by: Chris Turner, Manager of Bunker Quality & Claims

The message that should resonate within the industry more than ever is that standing still is not an option.

Delaying the incorporation of ISO 8217:2024 prevents us from benefiting from lessons learned in the past and from being adequately prepared for the future, particularly with regard to alternative fuels.

Neglecting to prepare for the incoming Med ECA (enforced from May 2025), will mean inefficient and potentially ineffective fuelling strategies.

Failing to plan and secure the necessary analytics and contractual protections for complying with FuelEU Maritime requirements can lead to costly penalties.

Stakeholders need to understand the challenges, evolve to meet them, and in doing so, exceed customers' expectations! Are you failing to prepare, if so, are you preparing to fail?

At this time of year, it is often said "out with the old and in with the new", this is certainly the case for the industry going forward.

Here's to charting a course for success in 2025.

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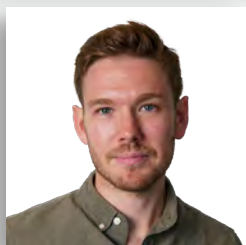
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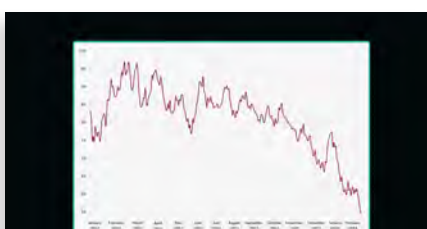


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# Additional Resources

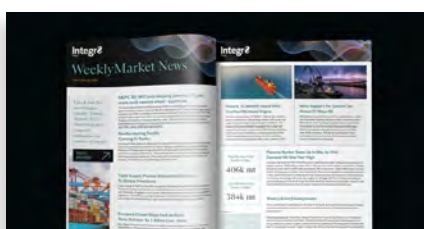
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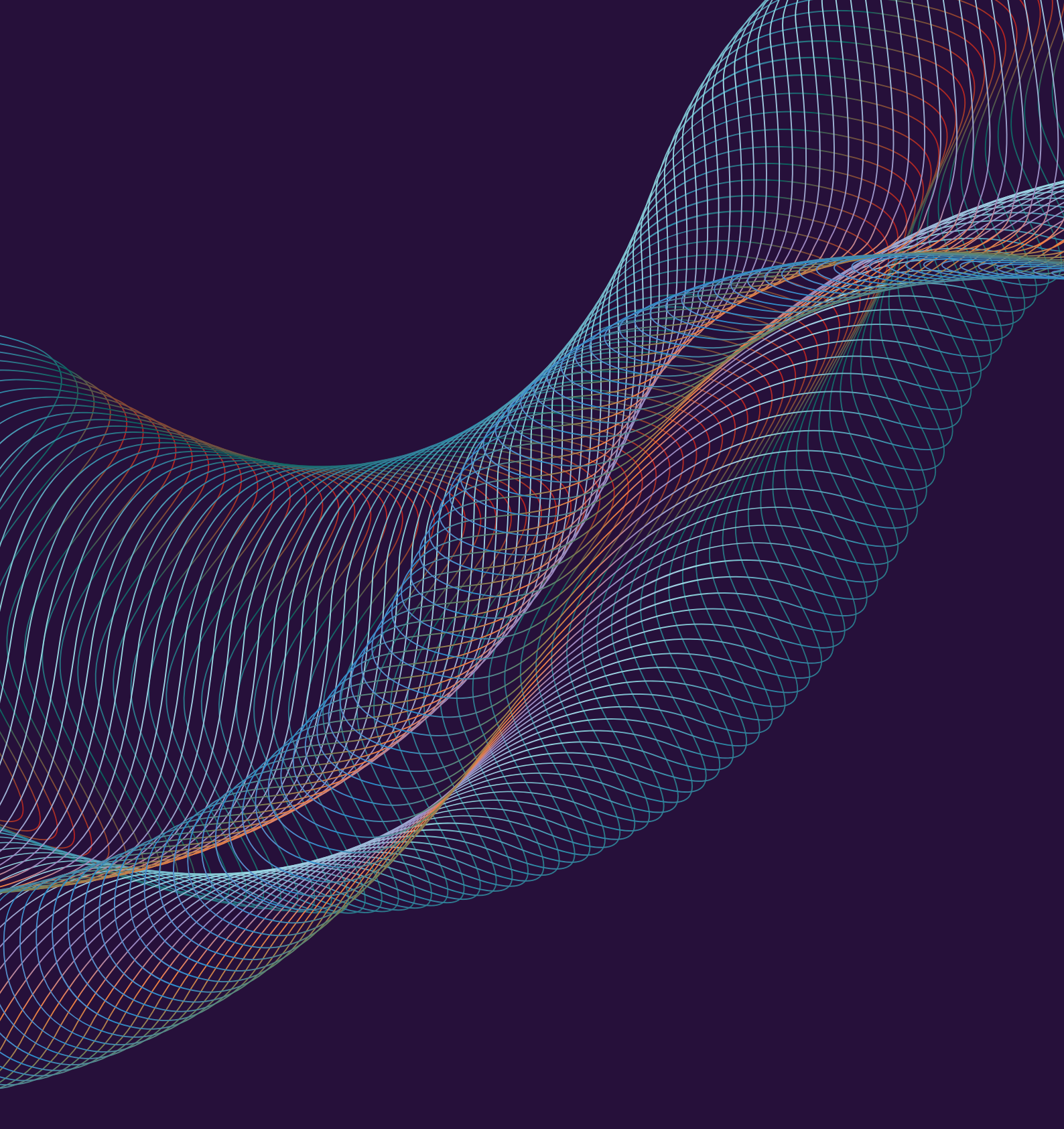
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