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TECHNICAL BULLETIN

Customer Technical Service

ULSFO – BLACK SHEEP OR SAVIOR

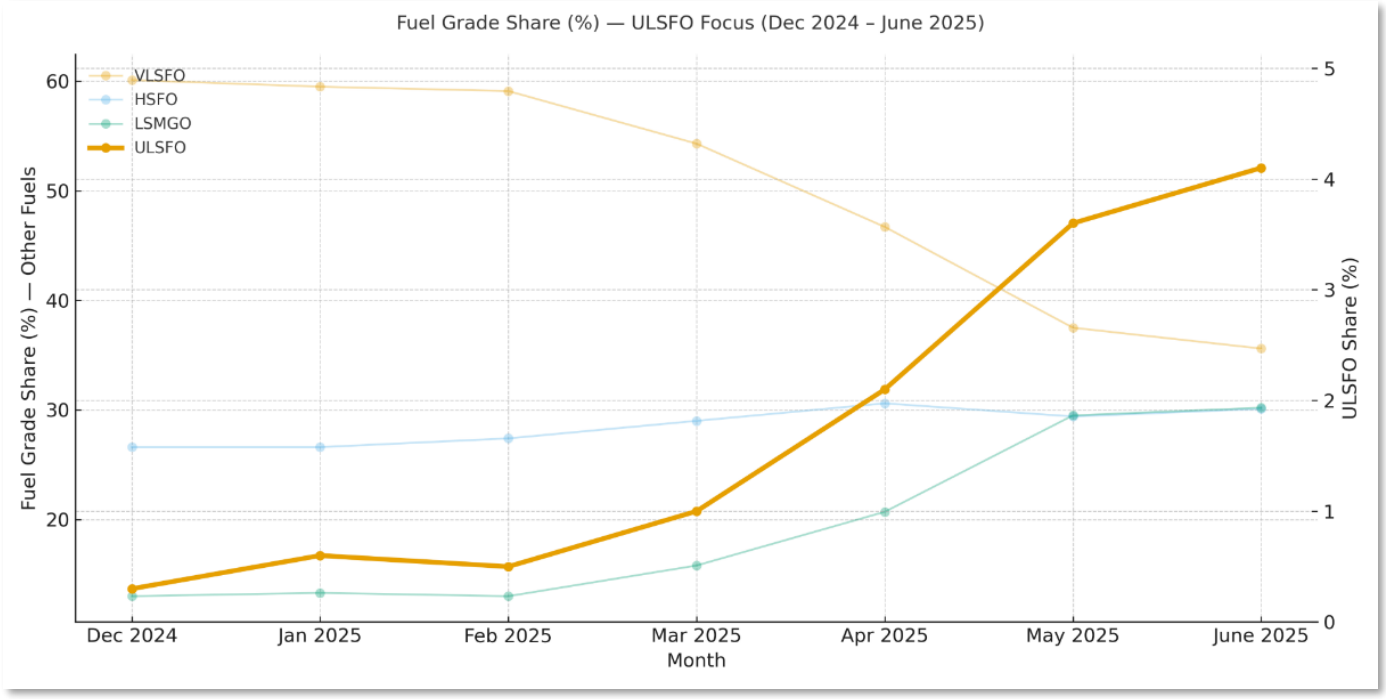
Rising relevance of Ultra-Low-Sulphur Fuel Oil in a changing marine landscape

Since 2015, Ultra-Low Sulphur Fuel Oil (ULSFO) has occupied an awkward position in marine fuel markets — too cheap to ignore, yet too complex to fully trust. For nearly a decade, it remained a niche compliance option used mainly inside existing 0.10% Sulphur Emission Control Areas (ECAs), such as the North Sea, Baltic, and North American coastlines. The combination of limited storage capacity onboard and the short distances typically sailed within ECAs made it difficult for ship operators to justify the logistical and quality risks of adding a "third grade" fuel between HSFO and MGO.

That equation changed in May 2025, when the Mediterranean Sea officially became an ECA one of the busiest trading corridors in the world. Suddenly, vessels transiting the Suez–Gibraltar route must comply with the 0.10% Sulphur cap for over 2,700 NM, representing nearly 28% of the Singapore–Rotterdam voyage (up from 5% previously). By 2028, with the Canadian Arctic, Norwegian Sea, and North-East Atlantic also joining the ECA map, nearly 40% of this global route will be under 0.10% Sulphur control.
Even using a modest ULSFO-to-MGO price differential of *USD 50/MT, the potential savings are compelling: for a vessel burning 75 MT/day, a 30-day voyage could save USD 31,500 today, rising to USD 45,000 by 2028.

A market at a crossroads

According to recent market analysis, ULSFO availability in the Mediterranean — notably Istanbul and Algeciras — has expanded rapidly, yet demand remains uneven. Some operators report steady MGO preference due to perceived stability & handling safety; others have turned to ULSFO as a cost-effective alternative that complies with new ECA rules. Recent VPS data supports this trend: by June 2025, ULSFO represented 4.1% of total fuel samples tested — up from 0.3% in December 2024 while VLSFO's share fell sharply from 60.1% to 35.6% over the same period. HSFO remained relatively stable at around 30%, and LSMGO rose modestly to 30%. The fuel mix shift clearly shows ULSFO's emergence as a serious player rather than a transient anomaly.



Stability and Compatibility – The Achilles' Heel

How different is ULSFO to VLSFO? ULSFO is much more sensitive in terms of stability when compared to VLSFO. While cost and compliance make ULSFO an attractive option, its inherent blend complexity introduces a higher operational risk compared to more homogenous fuels. ULSFO grades are typically intermediate blends formulated to meet the 0.1% Sulphur limit, often combining low-aromatic cutter stocks with paraffinic base components from diverse refinery streams. The variability in composition makes stability highly dependent on storage conditions, temperature history, and fuel management practices onboard.
As a result, instability risks increase during prolonged storage, fuel changeovers, or when ULSFO is mixed with other grades. These issues are not always immediate apparent at bunkering and may only manifest after thermal cycling or agitation within the fuel system. In practice, this can lead to:

- **Asphaltene precipitation** causing filter blockage, separator inefficiency, or sludge accumulation.
- **Fuel Incompatibility** between ULSFO and MGO or VLSFO, particularly when bunkering sequentially without adequate segregation or tank preparation.
- **Cold-flow and pour-point challenges** especially in paraffinic blends operating in colder climates or during winter operations.

Without proactive fuel management and appropriate additive treatment strategies, these risks can translate directly into increased maintenance workload, reduced system reliability, and potential costly operational disruptions.




Laboratory data from VPS and FOBAS indicate rising reports of borderline or off-spec ULSFO fuels in Mediterranean ports, with total sediment potential (TPS) occasionally exceeding ISO 8217:2024 limits and a growing need for additive stabilization.

Best Practices for Operators

1. Segregate tanks:
Never co—mix ULSFO with MGO or VLSFO unless verified compatible by spot-testing.

2. Monitor stability:
Regularly check TSP. viscosity, and density drift during storage.

3. Pre-heat: conservatively:
Many ULSFO blends exhibit higher wax content, maintain optimal viscosity at engine inlet without overheat-

4. Condition fuel before use:
Utilize purification and filtration steps sulted to low-viscosity fuels.

5. Stabilize proactively:
Use deposit-control and asphaltene-stabilizing additives designed for paraffinic ULSFO.

When compliance meets complexity, let chemistry deliver clarity.

The Road Ahead – Complement, Not Replacement

ULSFO is not poised to eliminate Marine Gas Oil—nor should it. MGO will remain indispensable for critical operations such as engine start-up, maneuvering, and low-temperature or intermittent service where ultra-low viscosity and rapid responsiveness are essential. That said, ULSFO's increasing availability, widening supplier base, and structural cost advantage position it to dominate ECA-compliant voyages, particularly within hybrid bunkering strategies where operators seek to optimize cost without sacrificing compliance.

Far from being a problematic outsider, ULSFO is increasingly proving itself as a pragmatic enabler of transition - a functional bridge between traditional distillates and the next generation of low- and zero-carbon marine fuels. Its long-term success, however, will hinge on several non-negotiables: consistent blend quality, disciplined onboard fuel management, and close collaboration across the supply chain. Suppliers, testing laboratories, and additive developers must work in concert to ensure stability, cleanliness, and predictability—from storage tanks to exhaust stack.

Innospec Insight

Our ongoing surveillance of Mediterranean ULSFO samples reveals a clear and repeatable trend: Fuel instability strongly correlates with aromaticity below 10% and Total Acid Number (TAN) values exceeding 0.5 mg KOH/g. These parameters materially increase the risk of asphaltene dropout, sludge formation, and separator fouling.
Targeted additive treatment has demonstrated the ability to establish dispersion stability and reduce purifier and separator fouling by up to 70%, significantly improving operability and reducing unplanned maintenance. As ULSFO adoption expands, active fuel conditioning and chemical stabilization will become decisive differentiators.

In this context, chemistry is no longer a background variable; it is a primary enabler of operational confidence. Talk to Innospec to turn ULSFO challenges into reliable, profitable, and sustainable marine operations.

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