Off the fence

by Linda Sørensen, *Head of Marine, Quadrise*

The shipping industry is undergoing a decisive transformation, but the pace of change is mismatched with the tools available to deliver it. Practical progress remains constrained by uncertainty over fuel availability, infrastructure readiness, and the escalating cost of regulatory compliance. Shipowners are being asked to decarbonise faster than the supply chain can support, and the gap between ambition and operational reality is widening.

The sector's caution around alternative fuels is unavoidable. Green ammonia, methanol, and e-fuels are central to long-term decarbonisation plans, but today they remain limited in supply, expensive to scale, and reliant on infrastructure that will take decades to build. Safety frameworks and certification pathways are advancing, but not fast enough to give the market the confidence to commit. Meanwhile, compliance obligations continue to rise.

Nowhere near sufficient

Regional regulation is now accelerating the industry's exposure to carbon costs. FuelEU Maritime (FEUM) and the EU Emissions Trading System are reshaping compliance planning by tying greenhouse gas (GHG) intensity directly to fuel choice and requiring owners to show measurable emissions reductions every year. FEUM's introduction in 2025 has already pushed operators to re-evaluate fuel strategies, integrate efficiency technologies, and quantify the financial impact of every percentage point of GHG performance. The EU ETS compounds those pressures by adding a rising carbon-price obligation that cannot be offset without some change to fuels.

This is forcing owners to make strategic decisions on their own transition pathways before the global regulatory pathway is fully settled. And in October 2025, the International Maritime Organization's Marine Environment Protection Committee added another layer of uncertainty by postponing adoption of a mandatory Net-Zero Framework for shipping until October this year. That delay extends the period in which shipowners must make high-stakes fuel and compliance decisions without clarity on the long-term structure of global rules. It reinforces the commercial need for practical options that cut emissions immediately, reduce exposure to carbon costs, and remain compatible with future regulations – regardless of which long-term fuel pathway ultimately dominates.

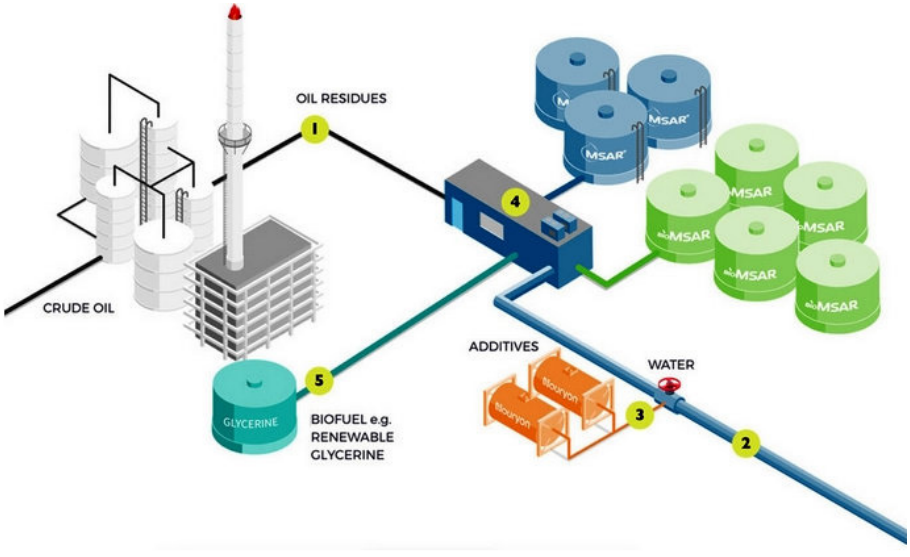
At the same time, the physical capacity to convert the global fleet to alternative fuels is nowhere near sufficient. **Lloyd's Register estimates** only 16 shipyards worldwide possess the expertise and facilities required, with a combined annual capacity of just 300 conversions, located primarily in China and the Middle East. By the mid-2030s, this capacity is expected to support as little as 10% of projected demand. Furthermore, conversion lead times are already lengthy, averaging 18 months according to Everllence (formerly MAN Energy Solutions); in 2024, only three vessels were converted to run on methanol, highlighting the significant challenges in scaling alternative fuel adoption. In such an environment, near-term decarbonisation solutions are essential.

Tested & ready to scale

Emulsion fuel technologies have emerged as one of the few pathways capable of delivering immediate emissions reductions at scale without requiring new engines, newbuilds, or disruption to established bunkering processes.

The Quadrise MSAR® and bioMSAR™ fuels are at the forefront of this opportunity. By converting heavy fuel oil (HFO) into a low-viscosity oil-in-water emulsion, they deliver measurable emissions reductions and compliance benefits through existing systems and at significantly lower cost than alternative-fuel adoption. MSAR® reduces CO_2 emissions by up to 9.0% compared to HFO.

Photos: Quadrise



1. Oil residues are taken from the refinery or heavy oil production and cooled to under 200°C to achieve the required viscosity.
2. Water, which can be derived from several utility or waste-water sources is added to the residue.
3. Special additives provided by our long term chemical technology partner Nouryon are included in the water phase to stabilise the emulsion for long-term storage and transport, and to promote complete combustion.
4. The mixture is processed in a proprietary emulsion module to produce a highly-stable oil-in-water emulsion with enhanced fuel properties.
5. A biofuel component such as renewable glycerine can be added to produce bioMSAR™ as an alternative to MSAR® for further carbon dioxide savings. bioMSAR™ and MSAR® can be made interchangeably and are compatible with each other.

bioMSAR™, which incorporates renewable bio-components, achieves over 20% emissions reductions. Both fuels cut NO_x emissions by up to 45% and eliminate visible particulate soot, while improving combustion efficiency.

This performance is already compatible with over 40% of the world's installed marine diesel engine capacity. Production can be scaled rapidly using modular, containerised units deployable at refineries and terminals in months – not years – and at a fraction of the cost associated with building green fuel infrastructure.

In recent years, Quadrise has collaborated with leading maritime partners to test and prove the viability of MSAR® and bioMSAR™ in a live operational environment. Our company conducted a 1,500-hour operational trial with Maersk aboard the 48,788-gross tonnage *Seago Istanbul*, using fuel produced at Cepsa's San Roque refinery in Spain, which demonstrated MSAR's™ end-to-end performance capabilities, from refinery production to bunkering and combustion. A successful trial has also been undertaken on a MAN 4-stroke engine for Sparkle Power in Panama, expanding the fuels' application potential, and further trials are planned for Morocco in collaboration with the OCP Group.

On the front foot

A mix of transitional and transformative solutions will ultimately shape shipping's decarbonisation. But meeting long-term goals depends on the choices made now, not the fuels that might become available in the 2030s or 40s.

With regulatory pressure rising, carbon costs increasing, and global rules still taking shape, the industry is entering a period where delay carries its own operational and financial risk. Geopolitical uncertainty – be it shifting tariffs, evolving trade patterns, and the impact of conflicts on voyage routes – adds further pressure on owners' bottom lines, making costly investments even harder to justify. This is the moment and opportunity for owners to come off the fence – not by locking into a single fuel pathway, but by adopting solutions that deliver immediate, verifiable progress while preserving strategic flexibility.

Emulsion fuels provide that option; they lower emissions today, reduce exposure to carbon pricing, and avoid dependence on infrastructure that does not yet exist. Quadrise's technologies give shipowners and refiners a practical, scalable way to stay ahead of regulation, protect competitiveness, and maintain freedom of choice as the long-term fuel landscape evolves.

Acting now is not about choosing winners. It is about ensuring the industry remains on the front foot while the future of global fuel regulation and supply continues to take shape. □