

Your Trusted Provider of Biofuel Solutions



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# Introduction

## Biofuel Solutions

### Introduction

The maritime industry is undergoing a transformation like never before, driven by regulatory reforms by the IMO and the EU aimed at decarbonising the sector. Most notably, and now in effect, FuelEU Maritime sets limits on the annual average greenhouse gas (GHG) intensity per unit of energy (gCO<sub>2</sub>e/MJ), based on a well-to-wake perspective, for vessels above 5,000 gross tonnage. The regulation applies to all intra-EU voyages and further extends to voyages to and from EU or EEA ports, regardless of the vessel's flag.

A baseline GHG intensity limit is set at a level that most vessels currently exceed and will be progressively tightened over time based on the 2020 baseline, with increasingly stringent targets aiming for an 80% reduction by 2050.

Figure 1. Expected FuelEU GHG Intensity (g CO<sub>2</sub>e/MJ) limits

Year	Reduction from 2020	Approx. Maximum GHG Intensity (g CO <sub>2</sub> e/MJ)
2025	-2 %	~89,34 g
2030	-6 %	~85,69 g
2035	-14,5 %	~77,94 g
2040	-31 %	~62,30 g
2045	-62 %	~34,64 g
2050	-80 %	~18,23 g

### Why does it matter?

The reductions imposed are difficult for ships to comply with without drastic changes to their current operations. If the limit is not achieved, compliance can be balanced through banking, borrowing, and pooling with vessels that have over-complied. Moreover, companies may purchase compliance by paying substantial penalties, which increase progressively over time. At present, ships that fail to comply must pay €2,400 per tonne of VLSFO-equivalent.

Regardless of the chosen alternative strategy, there is a significant financial cost associated with non-compliance with the imposed GHG limits. Moreover, other existing and pending maritime regulations further incentivise the industry to decarbonise in a substantive manner.

# Introduction

## Biofuel Solutions

Figure 2. Summary of Dominant Maritime Decarbonisation Regulations

<i>IMO Net Zero Framework (Pending formal adoption)</i>	<p>The Net Zero Framework (NZF) from the IMO.</p> <p>Commits international shipping to reach net-zero GHG emissions by around 2050 and extends climate enforcement globally by introducing (i) a fuel standard that progressively lowers the GHG intensity of energy used on board and (ii) an emissions pricing mechanism that assigns a cost to each unit of GHG emitted.</p> <p>Expected end 2026.</p>
<i>FuelEU</i>	<p>80% reduction of annual average GHG emissions on vessels above 5,000 gross tonnage by 2025.</p> <p>Penalty rate: €2,400 per tonne of VLSFOe.</p> <p>Enforced since January 1 2025.</p>
<i>EU ETS</i>	<p>EU Emissions Trading System (ETS) sets a price on carbon and distributes carbon allowances to stakeholders creating a trading system of EU allowances (EUAs). However, other GHGs are not included and can therefore not be offset by purchasing allowances.</p> <p>Maritime transport was formally included in the ETS January 1 2024.</p>

### High Costs of Non-Compliance, Opportunities by Compliance

However, shipowners can mitigate these costs by complying with the regulation through the use of zero- or near-zero (ZNZ) GHG-emitting fuels (e.g biofuels). Early adoption of alternative fuels such as B30 blends reduces dependence on conventional fossil fuels, avoids EU and IMO penalties, and further positions companies advantageously by the opportunity to pool or trade surplus compliance with other companies/shipowners who are under-compliant.

### Mission Statement

Biofuel Global is committed to facilitating the decarbonisation of the shipping industry by offering biofuel solutions that support both individual and regulatory emission reduction targets. We encourage clients to view this as an opportunities from compliance and to partner with us in pioneering the industry's green transition. Accordingly, we believe the most effective strategy for adapting lies in the development and adoption of B30 blends that directly address the fundamental challenge of reducing GHG emissions.

# Maritime Decarbonisation

## Global Context

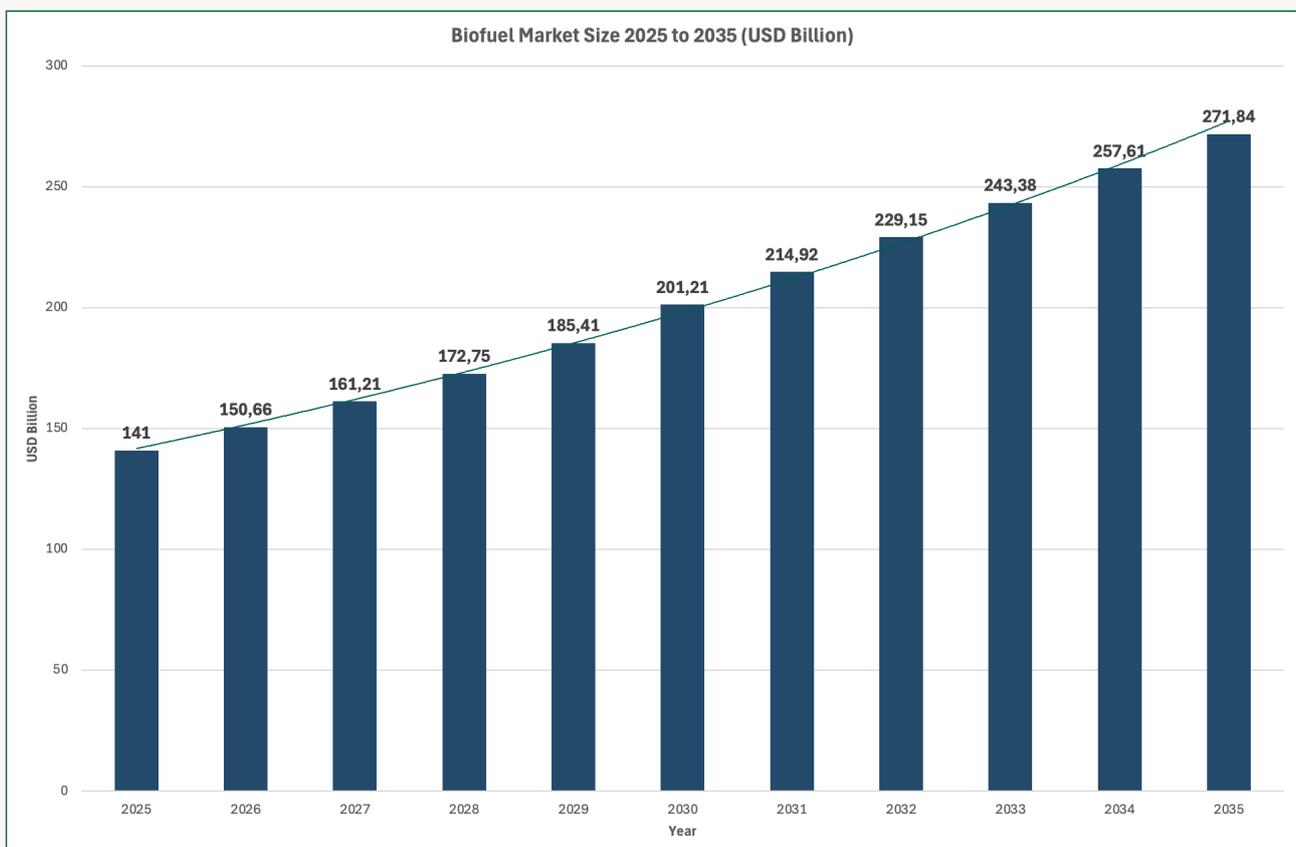
### Biofuel Market Gaps & Opportunities

Biofuels are energy sources derived from biomass feedstocks, typically sourced from industrial or municipal waste streams. The global biofuel market was estimated at USD 141 billion in 2025 and is projected to reach USD 271.84 billion by 2035. Actual growth may be even higher, as the current market is constrained by limited supply. Lloyd's Register confirms that the main challenge to biofuel adoption is scalability and global availability.

#### **The challenge is not demand, the issue is supply.**

Biofuels represent a key solution for the future, and accommodating their inevitable uptake requires focused investment in technology and production capacity. As more industries seek zero- and near-zero (ZNZ) solutions to meet regulatory requirements, a significant market opportunity emerges, and overall readiness and adoption levels are expected to increase.

Figure 3. Forecasted Biofuel Market Size 2025-2035



(Data source from Precedence Research)

# Flagship Project

## Maritime Fuel Blend 30

### Introduction

Our experience in West Africa revealed the potential of cashew nut shell (CNS), a by-product of growing cashew production, to be converted into cashew nut shell liquid (CNSL) for use as a FuelEU-compliant B30 marine fuel. In 2022, our co-founder Søren Retz Johansson, then serving as Port Captain in West Africa for a major Danish shipping company, observed first-hand the untapped value of CNS, inspiring its development as a sustainable maritime fuel solution.

Alfa Laval, a global leader in heat transfer, separation, and fluid handling technologies, supports our R&D and scale-up process and is a key technology partner under a signed development agreement for CNSL feedstocks. The final product will be marketed as **Maritime Fuel Blend 30 (MFB30)**.

### CNSL

CNSL exhibits a high calorific value ( $\approx 39\text{--}42$  MJ/kg), comparable to conventional diesel. Despite some technical concerns related to its properties, recent studies and trials on vessels indicate that when CNSL is properly upgraded and used in optimised blend ratios (typically 20–30%), these issues can be mitigated. The process enables satisfactory engine performance and supporting the use of upgraded CNSL as a viable component in compliant low-carbon B30 marine fuel blends when developed and applied under appropriate technical conditions.

**Market:** Global CNSL market size was valued at USD 415.2 million in 2024 and is projected to reach USD 711.6 million by 2031 (8% CAGR), although this forecast does not fully capture the significant untapped potential should CNSL become more widely adopted and standardised as a fuel component.

### Our Production Line - Technical Development

In collaboration with Alfa Laval, Biofuel Global applies advanced centrifugation and thermal treatment to upgrade technical CNSL to marine-grade quality, reducing metals from  $\sim 6,000$  ppm to below 200 ppm and phosphorus to  $\sim 1.5$  ppm. As of 2025, the process is at laboratory testing level showing positive results, and has been independently validated by Alfa Laval R&D and Bureau Veritas as suitable for 20–30% blending in ISO 8217-compliant marine fuels, with commercial launch targeted for 2028.



## CNSL Sourcing

Through a close and trusted local partner in Ghana, cashew nut shells will be ethically sourced and processed into CNSL, which will then be exported for further upgrading using centrifugation technology.



The facility produces cashew pellets, cashew cake, and CNSL oil from cashew shells. To obtain high-purity CNSL, the raw oil from the expellers is heated, allowing separation of moisture, acidity, and sludge based on differences in boiling points.



All production batches follow strict quality control procedures. A laboratory technician applies standard operating procedures (SOPs) for each delivery, including density, moisture, pH, and acidity testing. SGS acts as an independent external control body throughout the year.

### Additional benefits of CNSL from West Africa

West Africa is a leading producer of raw cashew nuts, accounting for approximately 45% of global supply. Despite this, only a small share of CNS is currently utilised for energy, while an estimated 75–95% is discarded, causing environmental pollution. This creates a strong sustainability case for Africa: large volumes of underutilised CNS can be converted into valuable biofuel feedstock, reducing waste, lowering environmental impact, and generating local economic value.

# Additional Services

## Biofuel Solutions

### Green Port & Decarbonisation Consultancy Services

We further support the decarbonisation of the global maritime industry through bespoke advisory solutions tailored to our clients' needs, both in port and on board vessels.

Our services include:

- Green port development guidance and roadmap planning
- Port decarbonisation strategies
- New fuel audits and readiness assessments
- Biofuel bunkering audits and port preparedness GAP analyses
- Tailored port training services
- Senior Port Captain services

With proven experience in bulk carrier and tanker operations, including transshipment, and recognised expertise in port optimisation, our combined sea-going command and senior port-captain background ensures a comprehensive understanding of cargo operations and port systems.

### Code of Conduct

At Biofuel Global, we uphold the highest standards of ethics, compliance, and social responsibility as fundamental principles guiding our operations. Our Code of Conduct provides a framework for employees, partners, and stakeholders, with a strong focus on human rights, labour conditions, and occupational safety. Adherence to these principles ensures sustainable operations and demonstrates our long-term commitment to responsible development in West Africa.

We invite you to connect with us at any time to join forces in a shared mission to reduce greenhouse gas emissions and advance sustainable progress in the maritime sector.



# Biofuel Global Team

## Biofuel Global White Paper

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### Who We Are

Biofuel Global is a maritime decarbonisation company founded by Captain Soeren Retz Johansson and Henrik Welander, combining decades of experience across shipping operations, port development, biofuels, and entrepreneurship. Capt. Soeren brings extensive sea-going command and senior port-captain expertise from global tanker, bulk, bunkering, and transshipment operations, while Henrik contributes a strong background in maritime business development, biofuel strategy, and scaling industrial ventures.

Together, the founders and a growing team of specialists lead Biofuel Global with a clear focus on developing practical, compliant biofuel solutions and supporting the transition to low-carbon shipping through technical advisory, port readiness, and fuel innovation. Operating through a strong international network of maritime, engineering, and research partners across Europe, Africa, and the Middle East, the company combines operational insight with advanced fuel development capabilities. We also maintain a broad and reliable network of maritime surveyors and technical experts, enabling rapid deployment of independent assistance whenever needed.

Biofuel Global is in an active growth phase, expanding its production, advisory, and R&D activities, and is open to strategic partnerships and investor collaborations that share the ambition of accelerating the deployment of sustainable fuels and infrastructure for the global maritime industry.

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