



IBIA

INTERNATIONAL BUNKER INDUSTRY ASSOCIATION



S
Q
A
E

Biofuels in the Shipping Sector



FAQs:

Biofuels in the Shipping Sector

CONTENTS

A. Biofuel for Marine

01. What are "Biofuels"	3
02. What do "biofuels" mean for marine?	3
03. What does the «B» stand for in B100, B30-VLSFO, B24-VLSFO and so on?	3
04. What options do buyers have?	4
05. Are there provisions for bio in marine currently?	4

B. Environmental regulations and requirements

06. Which regulatory regimes necessitate the use of "low carbon" fuel products such as biofuels?	5
07. Are they the same?	6
08. What is a renewable feedstock?	7
09. Are any specific tests or trials required before biofuel use, in relation to Marpol Annex VI regulation, specifically relating to NOx and SOx emissions?	7

C. Practical Considerations for use

10. "Drop in Fuel"... what is a drop in fuel?	8
11. Are all biofuels considered "drop-in fuels"?	8
12. What do the OEMs say?	8
13. CIMAC can help	8
14. Are there limits to onboard storage time?	9
15. Why can't I bunker ISCC-certified biofuel in the Netherlands?	9
16. How can you confirm the validity of the biofuel to the bunkered?	9

D. Other considerations

17. We hear a lot about "B24" what is the relevance of "B24"?	10
18. Will there be enough biofuel to go around for bunkering when emission regulations tighten?	10
19. Are biofuels priced in different ways than conventional fuels?	10

01. What are “Biofuels”

Biofuels are renewable fuels produced from biological sources such as agricultural crops, residues or waste and are specifically designed to reduce greenhouse gas emissions. Sustainable biofuels are typically produced from waste and residue-based feedstocks that have not contributed to land use change or offer competition with food production. Definitions vary slightly, with the [EU](#) focusing on sustainability and emissions reductions, the [IMO](#) emphasising their role in decarbonising shipping, while [CIMAC](#) and [ISO](#) prioritise technical performance, engine compatibility and fuel quality standards.

02. What do “biofuels” mean for marine?

In relation to the marine sector the term “biofuel” is generally considered to be a generic term covering a range of different fuel products, containing varying concentrations of different “bio elements” that have originating from different renewable / sustainable feedstocks, which, in turn, have been subjected to different treatment processes.

These “bio elements” are subsequently blended with a “base” fuel (HSFO, VLSFO or distillate grade fuel) to give a final product which is used as a direct replacement for “traditional” marine fuels. The bio blend created will depend on the specific demand from the fuel buyer and will also depend upon price and availability of the “bio element”. Additionally, due to lack of availability and price, the majority of the bio/renewables will be used for percentage blending.

03. What does the «B» stand for in B100, B30-VLSFO, B24-VLSFO and so on?

The “B” in terms of “B100”, “B30-VLSFO”, and “B24-VLSFO” refers to the biofuel content in the fuel blend. The number following the “B” indicates the percentage of biofuel in the blend.

For example:

- B100 is pure biodiesel, containing 100% biofuel.
- B30-VLSFO is a blend consisting of 30% biodiesel and 70% very low sulphur fuel oil (VLSFO).
- B24-VLSFO similarly contains 24% biodiesel mixed with 76% VLSFO.

04. What options do buyers have?

In real terms buyers can choose to purchase and utilise any “bio” product provided the product in question does not breach class requirements or any regulatory requirements such as SOLAS or IMO regional / global sulphur requirements.

That said careful attention is needed to ensure that the “bio” element is viewed as being “sustainable” in light of the regulatory framework that governs its use – failure to do so could lead to the product being allocated a carbon intensity in line with the fossil equivalent.

Looking at the practicalities of standardised commercial transactions ISO 8217 provides specific guidance in relation to the nature and quality of “bio” elements for consideration.

ISO 8217, from 2010 onward cites regulated FAME as being in accordance with the EN 14214 - Automotive fuels. Fatty acid methyl esters (FAME) for diesel engines. Requirements and test methods or ASTM D 6751- Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels.

It also cites paraffinic / synthetic diesel in accordance with the EN 15940 - Automotive fuels. Paraffinic diesel fuel from synthesis or hydrotreatment. Requirements and test methods.

Work has already been undertaken by certain national standards bodies to look at extending the scope of biomass-based products for use in the marine sector. The recently published NEN standard – NEN 7427 - Fatty acid methyl esters (FAME) and related products for use as blending component in residual marine fuels - Part 1: Fatty acid methyl esters for marine fuel (M-FAME) is one such initiative.

When considering alternative bio products an evaluation should be carried out looking at the differences between such products and established quality specifications and a risk assessment carried out in conjunction with all relevant parties – it may be that approval from the relevant authorities may be required.

05. Are there provisions for bio in marine currently?

The ISO 8217 specification has covered provisions for bio in marine fuel since the Fourth Edition which was published in 2010.

The aspect of “De minimis” in relation to FAME content was introduced in the 2010 revision at approx. 0.10% (“de minimis” being an amount that does not render the fuel unacceptable for use in marine applications that are not designed or suited to handling fuels containing FAME). The “de minimis” value was re-evaluated in the sixth edition (published in 2017) and increased to approx. 0.50% by volume.

The 2017 revision also saw the inclusion of three “DF” grades (Distillate Marine containing FAME) in Table 1 with an allowance of up to 7% FAME by volume.

The seventh edition of ISO 8217 published in 2024 saw a substantial overhaul of all considerations relating to bio including new tables, test methods and revised annexes to address allowances for the use of FAME up to 100% FAME (by volume or mass).

B. Environmental regulations and requirements

06. Which regulatory regimes necessitate the use of “low carbon” fuel products such as biofuels?

The IMO regulations cover the energy efficiency design index (EEDI) of applicable new vessels built since 2013. The EEDI provides a specific figure for an individual ship design, expressed in grams of carbon dioxide (CO₂) per ship’s capacity-mile (the smaller the EEDI, the more energy efficient the ship design) and is calculated by a formula based on the technical design parameters for a given ship. The same regulation also required all ships to have an individual Ship Energy Efficiency Management Plan (SEEMP) which is an operational mechanism to improve the energy efficiency of a ship in a cost-effective manner. These requirements were supplemented by the existing ships energy efficiency index (EEXI) to ensure that applicable vessels built prior to 2015 had reached a specific level of efficiency in order to continue to operate (this had to be verified by the first special survey after 1st January 2023).

IMO requires all vessels of 5,000 gross tonnage and above to submit fuel consumption and voyage data to the IMO data collection system (DCS) and from which, for applicable ships, their Carbon Intensity index (CII) will be calculated.

The CII has a target value, and that target reduces, year on year, to ensure continuous improvement. The attained CII will get a grade, annually from A to E with corrective action to be taken on any vessel rated D for three consecutive years or rated E in any year.

The EU has two different mechanisms. The EU Emission Trading System (EU ETS) is a cap-and-trade system market-based-measure (MBM) for reducing greenhouse gas emissions (GHG). It is part of the EU “Fit for 55” programme. Operators have to purchase allowances to cover their emissions as reported to the EU under the monitoring, reporting and verification (MRV) data of the previous year.

The second EU regulation is FuelEU Maritime which sets maximum limits for the yearly average greenhouse gas (GHG) intensity of the energy used by ships above 5,000 gross tonnage calling at European ports, regardless of their flag. Targets will ensure that the greenhouse gas intensity of fuels used in the sector will gradually decrease over time, starting with a 2% decrease by 2025 and reaching up to an 80% reduction by 2050. Those targets will become more ambitious over time to stimulate and reflect the necessary developments in technology and the uptake in production of renewable and low-carbon fuels. The targets cover not only CO₂ but also methane and nitrous oxide emissions over the full lifecycle of the fuels used onboard, on a Well-to-Wake (WtW) basis. It should be noted that in the EU-ETS ship emissions are calculated on a Tank-to-Wake (TtW) basis only.

B. Environmental regulations and requirements

07. Are they the same?

Both EU and IMO regimes have slightly different requirements on vessel size and vessel type related to the application and very different ways of calculating the level of emissions, especially with non-conventional fuels.

The EU regulations cover the emissions of applicable vessels, irrespective of flag when sailing between EU or EEA ports. They also cover 50% of the emissions of applicable vessels on voyages from a non-EU – EEA port to a port in the EU or EEA. EU-ETS is being phased in over 3 years with 40% of emissions in 2024 requiring the purchase of allowances, 70% for emissions in 2025 and 100% in 2026.

The impact on vessels of the IMO CII ratings is not so easy to quantify but it is likely to impact the commercial returns of vessels, those with low ratings finding it more difficult to attract employment and those with high ratings seeing preferential employment and possibly incentives on port dues etc.

At the moment the IMO regulations are built around the “Tank to Wake” concept (TtW), for example, IMO 2020 0.5% sulphur limit, but a future Global Fuel Standard (GFS) for marine fuel GHG intensity and a maritime GHG emissions pricing mechanism are expected to take into account “Well to Wake” emissions. WtW is frequently referred to as Life Cycle Assessment or LCA. Declaration of a fuel’s sustainability and WtW emissions will be required through the presentation of additional instruments, e.g., Proof of Sustainability (PoS). For example, reference is made to use of PoS for biofuels by IMO in Interim Guidance on the use of biofuels under regulations 26, 27 and 28 of MARPOL Annex VI (DCS and CII) (MEPC.1/Circ.905).

IMO LCA

The 2023 IMO GHG Strategy indicates that it “should take into account the well-to-wake GHG emissions of marine fuels with the overall objective of reducing GHG emissions within the boundaries of the energy system of international shipping and preventing a shift of emissions to other sectors”. This is to ensure that in undertaking shipping’s transition to “net zero” the IMO does not take action that leads to emissions from the shipping sector being transferred to other sectors of the global economy, for example, production of “zero-carbon emitted” fuels from fossil fuels so negating the efforts to reduce those GHG emissions from shipping.

IMO has therefore prepared Guidelines on life cycle GHG intensity of marine fuels (LCA guidelines) that identifies different pathways for all current and likely future alternative marine fuels with a view providing default emission values for those fuel pathways and enabling the calculation of actual emission values. Emission values can be determined on both a Well-to-Wake (WtW) and Tank-to-Wake (TtW) basis as their specific use will be determined by the regulatory framework that is still to be agreed. The 2024 LCA Guidelines are set out in resolution MEPC.391(81).

EU “sustainability” requirements for fuels produced and supplied to be in compliance with FuelEU Maritime are set out in the EU’s Renewable Energy Directive (RED III).

B. Environmental regulations and requirements

08. What is a renewable feedstock?

A renewable feedstock is one that is considered to be derived from a resource that can replenish itself / be replenished through natural processes.

This is one of the key differentiators that is applied to the identification of different types of biofuel products and is specifically scrutinized when looking at the “sustainability” of a biofuel.

Regulatory regimes pay specific attention to the nature of feedstocks used to create biofuels such that they do not compete directly with the food chain or promote indirect / direct land use change.

09. Are any specific tests or trials required before biofuel use, in relation to Marpol Annex VI regulation, specifically relating to NOx and SOx emissions?

- a. SOx: Biofuels must meet the sulphur limit requirements as given in regulation 14 in the same way as any other marine fuel.
- b. NOx: Biofuel with up to 30% of bio product (it can be FAME but not limited to only FAME) blended with 70% residual or distillate fuel can be considered a petroleum fuel meeting regulation 18.3.1. (i.e. no further testing requirement). Biofuel with greater than 30% bio-product can be considered non-petroleum and should meet the requirements of regulation 18.3.2. A marine diesel engine which can operate on a biofuel without changes to its NOx critical components or settings/operating values outside those as given by that engine’s approved Technical File, should be permitted to use such a fuel oil without having to undertake the assessment as given by regulation 18.3.2.2. (i.e. biofuel up to 100% bio-product can be used without further tests/trials if no NOx critical engine operation changes are required.)

C. Practical Considerations for use...

10. "Drop in Fuel"... what is a drop in fuel?

A drop-in fuel is defined as:

"An alternative fuel that is completely interchangeable and compatible with conventional fuel and can be used in an engine without any adaptation of the engine or fuel system."

11. Are all biofuels considered "drop-in fuels"?

That's a bit of a tricky question...

Some sources, such as the IEA, have very specifically stated that FAME biofuels are not considered to be a "drop in" fuel given the requisite considerations for use and the potential risks surrounding the use of FAME biofuel products with incompatible materials within onboard systems.

The IEA specifically noted that...

"FAME biodiesel cannot be blended with diesel fuel in high concentrations without substantial risks for fuel quality, engine operation, exhaust emissions and infrastructure. FAME is not so called "drop-in" fuel."

Renewable or Synthetic diesel [which is a paraffinic product which is chemically indistinguishable from fossil diesel (i.e. it consists of the same molecules)] is considered to be a "drop in fuel".

That said the thinking behind FAME products has changed as experience has been gained and it's become more apparent that FAME Biodiesel can be / and is being used as a direct substitute for traditional fossil fuels with some fuel buyers purchasing and directly using FAME biodiesel as a drop-in fuel. However, in line with current best practice recommendations it is prudent to consult with OEMs regarding different characteristics of FAME products in relation to the specific handling and treatment requirements and the different range of materials used by the OEMs in the construction of the equipment they provide.

12. What do the OEMs say?

Practical guidance has been provided by a range of equipment manufacturers relating to their specific experiences when utilizing a range of different biofuels with their products – service letters and technical updates are available from individual companies via their websites or through direct contact. As has already been noted when considering the use of a bio product an evaluation should be undertaken in conjunction with the different OEMs such that a risk-based assessment can be carried out with a view to conducting trials and / or tests with appropriate product(s) prior to putting into use on board the vessel.

13. CIMAC can help

The discussions surrounding different biofuels, the practical implications of use and some of the associated challenges can appear to be quite complex, however, a series of industry published, best practice, guidance documents have been developed to offer support in these areas. Both CIMAC and ISO have featured prominently in these conversations and as a result CIMAC has contributed a range of documents which can be accessed free of charge via the Fuel Working Group (WG7) web page:

<https://www.cimac.com/working-groups/wg7-fuels/index.html>

14. Are there limits to onboard storage time?

Given the wide, and up to point unknown, variety of biofuels' feedstocks It is not advisable and certainly not fully reliable to provide a set amount of time for recommended storage onboard, in weeks or months, as there is no prior knowledge of how the different biofuels are going to be handled, especially as there is no set info for all types of biofuels.

Ship operators are strongly advised to be aware and cautious of extended storage time and of the required management of on-board conditions, including strict quality control which is essential. In any case, long term onboard storage of most biofuels is not advised, however the requirements and risks will vary depending on the specific type of biofuel product in question. Prior knowledge of the production date and quality characteristics of the product will also offer guidance about appropriate fuel management protocols. Furthermore, additional and appropriate fuel lab testing can be used in some cases to better understand the fuel's stability and identify any degradation over time.

Specifically for FAME based biofuels existing industry guidance is available in the form of the CIMAC Guideline Marine-fuels containing FAME, "A guideline for shipowners & operators, which provides recommendations for the management of such products and advises that consumption of such fuels be conducted in a reasonable timeframe, adopting a "first-in first-out" mindset.

In any case, procurement of at least FAME based biofuel products should be carried out based on a procurement strategy which takes into account individual vessel's on-board storage capacity and fuel management capabilities – particularly with a view to limiting the on-board retention time of FAME based bio products.

15. Why can't I bunker ISCC-certified biofuel in the Netherlands?

Dutch biofuel bunker suppliers need to show a Proof of Sustainability (PoS) document to the Dutch Emissions Authority to verify that they have sold sustainable biofuels. A PoS is coincidentally also the document shipowners need to show to the EU to verify that they have bought sustainable biofuels.

Emission reductions listed on a PoS cannot be double-counted because this runs a risk of fraud. This being the case, once a Dutch bunker supplier has retired a PoS with Dutch authorities, this PoS cannot be passed onto a bunker buyer.

A PoS is a document that was created by the International Sustainability & Carbon Certification (ISCC) and it follows a batch of biofuel from all the way through its supply chain. When a PoS is not passed onto a shipowner, the chain of sustainability is broken, and the stem can't be ISCC-certified.

16. How can you confirm the validity of the biofuel to be bunkered?

When placing an order or checking biofuel availability, it is essential to request a copy of the Proof of Sustainability (POS). The POS contains a unique identification number and the issuance date. To verify the validity of the biofuel batch, access the relevant certification platform e.g., ISCC, RSB, etc., input this data, and receive confirmation of the biofuel's authenticity.

In the Port of Singapore, The Maritime & Port Authority (MPA) has issued a Marine Port Circular No. 11 of 2023 on 16th October 2023 that requires all suppliers to provide such a POS with the Bunker Delivery Note (BDN). Such required documentation can be a useful criteria for biofuel validity.

D. Other considerations...

17. We hear a lot about "B24" what is the relevance of "B24"?

The relevance of "B24" as a biofuel blend comes solely from the requirements relating to the transportation of FAME in accordance with current MARPOL regulations.

It is not a "limit" for the maximum quantity for FAME permitted in a blend given the revised ISO 8217 permits the blending of FAME up to 100%.

MARPOL Annex II outlines the Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk with Chapter 17 of the IBC Code listing the specific products.

If a biofuel blend has 75% or greater of a MARPOL Annex I cargo it is subject to the requirements covered in MARPOL Annex I.

Biofuel blends containing >1% but <75% of a MARPOL Annex I cargo are subject to MARPOL Annex II, with the carriage requirements set out in chapter 17 of the IBC Code;

Biofuels blended with ≤1% of a MARPOL Annex I cargo are not considered as blends and are therefore to be shipped in accordance with MARPOL Annex II, under the appropriate product entry in the IBC Code.

This being the case transportation of any blend that contains in excess of 25% FAME needs to be undertaken using a class 2 chemical tanker. Currently, this requirement is under review by IMO and for bunker vessels specifically may be extended to 30% FAME in Spring 2025.

18. Will there be enough biofuel to go around for bunkering when emission regulations tighten?

As emission regulations tighten, biofuels are expected to play a crucial role in shipping's decarbonisation. But there are concerns about whether enough biofuel will be available for marine bunkering, especially in competition with the aviation and road fuels.

DNV estimates that global production of advanced biofuels will rise to 23 million metric tonnes of oil equivalent (Mtoe) by 2026, but this still falls short of the volumes needed by shipping alone. And if shipping were to decarbonise primarily using biofuels and energy efficiency measures, it would require up to 250 Mtoe annually by 2050, which would represent a significant portion of the global supply.

Significant investments in biofuel production and infrastructure, and in other alternative fuels like ammonia and hydrogen will be necessary to meet growing demand.

19. Are biofuels priced in different ways than conventional fuels?

Like conventional HSFO, VLSFO and LSMGO, biofuels are typically priced in US dollars per metric tonne (\$/mt). Biofuels come from different feedstocks than oil-based fuels, and these feedstock commodities respond to other market factors. Biofuels can therefore be priced in a variety of ways.

In the ARA it has been common to use Argus UCOME and Argus Advanced FAME price indexes in combination with a fossil index like ICE Low Sulphur Gasoil, or Platts FOB Rotterdam VLSFO barge.

Pricing formulas can vary in Singapore, the other major biofuel bunker market. Common formulas seen have been Platts FOB Singapore VLSFO cargo + premium and delivered Singapore bunker VLSFO + premium.

Getting familiar with bio price indexes is key to manage price risks that cannot be mitigated through fossil indexes only.