

European Sustainability Shipping Forum

Sustainable Alternative Power for Shipping sub-group

Report on Marine Fuels Certification Procedures to support implementation of Fuel EU Maritime

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This document is part of a series of documents prepared by experts gathered under a workstream established in the umbrella of the “European Sustainable Shipping Forum (ESSF)”: the sub-group of Sustainable Alternative Power for Shipping (SAPS).

The workstream gathered for the period April 2023 to January 2025 in order to provide technical expertise relevant for the implementation of Regulation (EU) 2023/1805 (the Fuel EU Maritime Regulation). This report does not reflect the official view of the European Commission, nor it is legally binding.

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Sustainable Alternative Power for Shipping
Workstream Certification of Fuels

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1 Introduction

1.1 About this document

This document serves as a Guidance or Best practice Document, especially for **companies involved in the supply and consumption of marine fuels**. It outlines the necessary documentation required for compliance with FuelEU and the EU ETS maritime extension. The primary target group of this document is shipping companies that utilize renewable fuels and low-carbon fuels to meet the requirements of the legislations.

While this document does not delve into the intricacies of certification systems, it provides an overview of the regulatory frameworks around sustainability, GHG emissions savings, and traceability throughout the supply chain. This spans from the initial point of sourcing electricity, biomass, and/or carbon sources, up to the final delivery to the ship for use.

It should always be remembered that only the legislations referred by this document that are legally binding. This document interprets the legislation regarding requirements for shipping companies. It takes into account other guidance material, as well as the valuable input from the expert group of the European Sustainable Shipping Forum (ESSF). The substance of this Report was acknowledged by the representatives of the ESSF at the SAPS Plenary on 25 March 2025.

1.2 Relevant legislative frameworks

Renewable and Low-Carbon Fuels i.e., sustainable biofuels, Renewable Fuels of Non-Biological Origin (RFNBO), Recycled Carbon Fuels (RCF) or (Synthetic) Low-Carbon Fuels (LCF), are an indispensable pillar in the decarbonization of maritime transport. These fuels serve as important vectors for reducing greenhouse gas (GHG) emissions from ships.

For the sake of consistency, the fuel terminology used in this document is '*Renewable and Low-Carbon Fuels*', reflecting its adherence to the latest version of the energy legal frameworks of the European Union (EU, also further referred as the "Union"), namely **Renewable Energy Directive**¹ (RED) and **Gas Directive**². Furthermore, the term '*certified fuel*' is employed interchangeably with '*fuel originated from a certified supply chain*'. Besides RED and Gas Directive, a relevant framework such as the **Monitoring and Reporting Regulation**³ (MRR) is included as a main reference.

The EU energy legal frameworks differentiate the Renewable and LCF by energy input contributing to the fuel heating value and establish eligibility criteria taking into account sustainability, the source of carbon, the type of feedstock, the power used for production, and the GHG emissions saving. Table 1 summarises the EU policy frameworks defining fuels that are relevant to the maritime sector. As policies interact with each other, the table indicates secondary (S) policies referring to terms defined in the primary (P) policy i.e., the regulations or directives themselves including the underlying implementing and delegated acts.

¹ Directive (EU) 2018/2001 of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)

² Directive (EU) 2024/1788 of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast)

³ Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions, which was then amended by Commission Implementing Regulation (EU) 2024/2493 of 23 September 2024 as regards updating the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC

Product (liquid or gaseous)	Energy input	RED	Gas Directive	MRR
Biofuels / Biomethane	Biomass	P	S	S
Renewable Fuels of Non-Biological Origin	Renewable sources other than biomass	P	S	S
Recycled Carbon Fuels	Non-renewable waste (solid/gas)	P	S	S
Low-Carbon Fuels (except RCF)	Non-renewable sources	-	S*/P	S**

*S as (part of) Recycled Carbon Fuels defined in RED, P in other cases

**Defined as Synthetic Low-Carbon Fuels

Table 1. EU energy legal frameworks relevant to the shipping sector

For **Renewable Fuels**, **RED Article 29** (Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids, and biomass fuels), **Article 29a** (Greenhouse gas emissions saving criteria for renewable fuels of non-biological origin and recycled carbon fuels), and **Article 30** (Verification of compliance with the sustainability and GHG emissions saving criteria) establish the main rules complemented with the Delegated Regulation 2023/1185⁴ of 10 February 2023.

Meanwhile for **LCF**, the reference is the **Gas Directive Article 9** on certification of low-carbon fuels expected to be complemented with a Delegated Regulation specifying the methodology for assessing the life cycle of GHG emissions savings.

In terms of **traceability**, the chain of custody robustness is to be supported by the introduction of the **Union database** enabling a cloud-based tracing of Renewable and LCF pursuant to **RED Article 31a**.

OVERVIEW: FUELEU AND EU ETS

The use of Renewable and LCF is key to comply with **FuelEU Maritime**⁵ (FuelEU) **Regulation** and to gain possible benefit from zero-rating under the **EU Emissions Trading System**⁶ (EU ETS) **Directive**, taking into account any specific requirements for each policy implementation.

FuelEU promotes ships to use, inter alia, certified Renewable and LCF to reduce the GHG intensity of the energy used onboard. The methodology to account for the GHG intensity is based on a lifecycle i.e., Well-to-Wake (WtW) approach. Shipping companies (also further referred as “Company”⁷) report the verified values for each Well-to-Tank (WtT) and Tank-to-Wake (TtW) emissions, where default or actual values may be used, as part of their obligation under FuelEU at the end of each monitoring year and in line with the reporting deadlines.

⁴ Supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels

⁵ Regulation (EU) 2023/1805 of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC

⁶ Directive (EU) 2023/959 of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system

⁷ (Shipping) ‘Company’ means the shipowner or any other organisation or person such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner and has agreed to take over all the duties and responsibilities imposed by the International Management Code for the Safe Operation of Ships and for Pollution Prevention

Meanwhile EU ETS, extended since 1 January 2024 to the maritime sector, allows the application of an emission factor of zero for the carbon dioxide (CO₂) released from the use of certified and eligible Renewable Fuels. Under the EU ETS MRR, similar zero-rating approach is expanded to the certified and eligible LCF.

As both FuelEU and EU ETS are based on a **Monitoring, Reporting, and Verification**⁸ (EU MRV) system, ships running on Renewable and LCF will be required to monitor and record, per-voyage, all fuels used, together with corresponding GHG/sustainability declarations. The verification of compliance with the provisions of both FuelEU and EU ETS, including any relevant benefits, are calculated for each reporting period, based on the document evidence presented to the accredited verifiers. An electronic database registers the performance of each ship and ensures its compliance with FuelEU.

The financial penalties laid down in FuelEU Article 23 for non-compliance, the advantage from zero-rating of CO₂ emission under EU ETS, and the significantly higher forecasted costs of Renewable and LCF, make it crucial to ensure a **robust certification system**. That system should, as much as possible, guarantee only reliable and verifiable data are being sourced and transferred along the chain, in order to (1) minimise the risk of (un)intentional double claiming or irregularities or fraud, and (2) ensure a level playing field that supports effective implementation of the EU policies aiming to reduce GHG emissions from maritime sector.

THE FOCUS OF THIS GUIDANCE

In the context of the already well-established work of Voluntary and National certification systems or schemes operating under RED for economic operators who put renewable energy on the market to comply with RED national targets, the introduction of FuelEU and EU ETS presents new challenges for bunkering⁹ and shipping companies.

These shipping companies are required to make use of relevant and verified data, and to demonstrate compliance for eligible Renewable and LCF bunkered and used onboard ships. This obligation, derived from the provisions of FuelEU and EU ETS, adds to the existing obligations for energy suppliers to demonstrate sustainability of the energies put into consumption in the EU market for RED purpose.

This guidance focuses on the requirements to demonstrate the GHG/sustainability certification of Renewable and LCF, specifically the **coverage of (1) bunkering operations and (2) the documents needed to ensure eligibility to comply** with FuelEU and EU ETS. Currently, guidance related to these activities in the maritime sector are not yet available under RED or beyond the scope of RED. Thus, this Guidance Document may be used as a reference by Member States, or between bunkering and ship operators, in order to mitigate risks related to non-compliance and fraudulent activities.

The coverage of this guidance to demonstrate certification of Renewable and LCF supplied to ships is not only limited to bunkering activities in the EU ports, but also including bunkering outside the Union seeking compliance with FuelEU and EU ETS. This document particularly provides suggestions for safeguards against double claiming of Renewable and LCF and the corresponding sustainability properties as well as GHG emission savings.

⁸ Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of greenhouse gas emissions from maritime transport, and amending Directive 2009/16/EC

⁹ Bunker operators only applies if they take ownership of the product at the taxation point where the product is put on the market

THE ESSF

The present document was discussed and drafted with expert support of the European Sustainable Shipping Forum (ESSF) sub-group on Sustainable Alternative Power for Shipping (SAPS), in the context of the group's role in support of FuelEU Maritime implementation.

The European Shipping Forum (ESSF) provides a platform for structural dialogue, exchange of technical knowledge, cooperation and coordination between the Commission, Member States' authorities and maritime transport stakeholders on issues pertaining to the sustainability and the competitiveness of EU maritime transport.

The ESSF operates since 2013 and has become an effective tool to engage and exchange views on a wide range of environmental issues in maritime transport, such as air pollution and greenhouse gas (GHG) emissions.

In 2019, the ESSF established a number of sub-groups to work further on these objectives including a sub-group on Sustainable Alternative Power for Shipping (SAPS). Among other things, this sub-group has supported the preparation of the FuelEU Maritime proposal, which was put forward by the Commission in 2021 and adopted by the European Parliament and the Council of the European Union in 2023. The SAPS sub-group is currently working on a range of issues related to the implementation of the FuelEU Maritime regulation.

2 Scope of the Guidance Document

This guidance encompasses FuelEU and EU ETS, and it does not address voluntary markets. The subchapters below provide specific references to these legislations i.e., relevant paragraphs that form the foundation for this guidance's development.

2.1 Fuel EU Maritime (Regulation 2023/1805)

FuelEU was adopted in 2023, and its final version was published on 22 September 2023. The regulation aims to **promote the uptake of Renewable and LCF in the maritime transport**. Covering carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) as the accountable GHG emissions expressed in CO₂eq, FuelEU deploys Global Warming Potential (GWP) factors aligned with RED. Further discussion on GWP100¹⁰ is available in subchapter 5.4 *WtT emissions* (FuelEU only)

For **fossil fuels and non-certified non-fossil fuels (i.e., using least favourable fossil fuel pathway)**, reference is made to the Column 4 of the table with default emission factors provided in FuelEU Annex II. Shipping companies shall not diverge from these values.

For **RED certified biofuels**, reference is made to a certified 'E' value as per EU RED Part C of Annex V and Part B of Annex VI, which is the total GHG intensity as declared in the PoS. In order to obtain the WtT GHG emission factor, 'E' should be deducted by the TtW CO₂ emissions (as a biomass credit) using the CO₂ conversion factor divided by the LCV obtained from RED. According to RED Annex V, Part C, paragraph 13, the emissions from the fuel in use 'e_u' is zero for biofuels and can be ignored when considering the WtT emission factors.

For **RED certified RFNBOs and RCFs**, reference is made to a certified 'E' value as per the Delegated Act to determine GHG emissions for RFNBOs and RCFs, which is the total GHG intensity as declared in the PoS. The emissions from the fuel in use 'e_u' include all combustion emissions and should be deducted in order to avoid double counting of emissions under FuelEU where the TtW emission are added. Any CO₂ credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **certified synthetic LCFs**, reference is made to the Gas Directive, where the certification rules are being developed in a delegated act. This value is expected to be provided in a PoS-like document according to rules set by EU recognised voluntary and national certification schemes for the Gas Directive. The emissions from the fuel in use 'e_u' is deducted in order to avoid double counting of emissions under FuelEU, where TtW emissions are added. Any CO₂-credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **electricity provided by OPS**, reference is made to FuelEU Annex I which states that this is considered as zero emissions.

Considering the amount of reporting stakeholders and the fact that verified values need to be reported, one of the main challenges with emission factors for biofuels, RFNBO, RCF, and LCF is the timely delivery of the PoS, which in practice, can take up to three months. During this time, the ship operator can only work on estimates that might change on when the actual

¹⁰ Average warming potential over the period of 100 years

PoS is made available, hence resulting not only in a changed emission factor but also a potential FuelEU penalty.

2.2 TtW CO₂ emissions factors

For **fossil fuels**, reference is made to the Column 6 of the table in FuelEU Annex II, and Column 3 in EU MRV Annex I, providing default CO₂ emission factors. Shipping companies shall not diverge from these values.

For **certified biofuels, RFNBOs, RCFs, and Synthetic LCFs**, reference is made to FuelEU Article 10 (5) (6) which allows for using either default or actual values certified by a laboratory testing or direct emission measurements. According to EU MRV Annex II, Part C, for EU ETS the CO₂ emissions from these fuels are zero-rated. This only applies to the emission reported under EU ETS and not under EU MRV, where the actual CO₂ emissions are reported.

2.3 TtW CH₄ and N₂O emissions and CH₄ slip factors

For **CH₄ and N₂O emissions from fossil fuels**, reference is made to the Columns 7 to 9 of the table in FuelEU Annex II, and Columns 4 to 6 in EU MRV Annex I, providing default CH₄ and N₂O emission and methane slip factors. Shipping companies can, according to EU MRV Annex I and FuelEU Article 10 (5) diverge from default values for CH₄ and N₂O and use actual values certified by laboratory testing or direct emission measurements.

FuelEU Article 10 (6) mandates an implementing act to specify which international standards and certification references are accepted for demonstration of actual tank-to-wake emission factors. Currently, the IMO is developing such standards which are expected to be referenced in FuelEU after their approval at MEPC 83 (April 2025). Until then, only default factors can be used.

The provision of certain TtW emission factors is still under development and some values are still indicated with 'To Be Measured (TBM)' or 'Not Available (N/A)'. If a shipping company would like to use default values but the cell indicates either TBM or N/A, and unless an actual value is demonstrated in accordance with FuelEU Article 10 (6), then the highest default value of the fuel class in the same column shall be used. EU MRV refers to FuelEU in this matter.

Global Warming Potential.

The calculation of the GHG intensity of the energy used onboard ships takes into account the WtW GHG emission of fuels, and among them, the Renewable¹¹ and LCF meeting the certification rules as per Article 10 of the regulation, in accordance with RED or Gas Directive. FuelEU provides in its **Annex I - the methodology for establishing the GHG intensity**, and in **Annex II - default emission factors**. Otherwise, fuels that do not meet these requirements, as well as biofuels and biomethane produced from food and feed crops defined in RED Article 2(40), are considered to have the same emission factors as the least favourable fossil fuel pathway for the type of fuel in question.

The WtT and TtW GHG emissions are calculated based on Annex I and II of FuelEU, where default or actual emission factors may be used. Table 2 summarises the emission options:

	WtT	TtW
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¹¹ A multiplier of '2' can be used to reward the ship for the RFNBO from 1 January 2025 to 31 December 2033

Where can “actual emission factors” be used?		Combustion Emission Factors			Slippage
		CO ₂	CH ₄	N ₂ O	
Fossil fuels	No (1)	No (1)	Yes (3)	Yes (3)	Yes (3)
Biofuels / Biomethane	Yes (2)	Yes (3)	Yes (3)	Yes (3)	Yes (3)
Renewable Fuels of Non-Biological Origin	Yes (2)	Yes (3)	Yes (3)	Yes (3)	Yes (3)
Recycled Carbon Fuels	Yes (2)	Yes (3)	Yes (3)	Yes (3)	Yes (3)
Low-Carbon Fuels (except RCF)	Yes (2)	Yes (3)	Yes (3)	Yes (3)	Yes (3)

- (1) WtT and TtW CO₂ EF for fossil fuels - always default
(2) WtT for Renewable and LCF – Following RED and Gas Directive certification procedures
(3) Possible to certify actual values after adoption of the Implementing Act foreseen in Article 10.6 of FuelEU Maritime

Table 2. Use of default values and actual values

Additional zero-emission requirements for energy used at berth apply to containerships and passenger ships from 1 January 2030, as ruled in Article 6. Chapter 5 *Emission Rules and Applications* of this document is dedicated to discussing emissions-related topics.

FUELEU COMPLIANCE BALANCE

As of 1 January 2025, for every ship, the Verifier will **calculate annually the attained GHG intensity in gCO₂eq/MJ**, that **encompasses both WtT and TtW emissions for onboard energy use**. This attained GHG intensity may be higher (i.e., compliance balance in deficit), aligned, or lower (i.e., compliance balance in surplus) compared to the required GHG intensity that declines every 5 years from 1 January 2025 to 1 January 2050 compared to 91.16 gCO₂eq/MJ reference value.

At the discretion of the Company, ships can perform or participate in **flexibility mechanisms** as defined in Articles 20 and 21 i.e., **banking** of compliance surplus, **borrowing** from ship’s future compliance balance, and **pooling** of compliance balance.

If the attained GHG intensity is higher than the required GHG intensity, the Company¹² i.e., the **responsible party** for the compliance with FuelEU, may have to pay penalty to the respective Administering State of the Company.

Underperforming ships not opting any flexible mechanism must **pay a penalty**, with respect to the compliance balance **deficit of €2,400 per equivalent metric ton of Very Low Sulphur Fuel Oil (VLSFO)**—in accordance with the formula set out in Annex IV Part B. An extra charge of 10% per annum is applied to the penalty in case of consecutive deficits.

¹² ‘Company’ means the shipowner or any other organisation or person such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner and has agreed to take over all the duties and responsibilities imposed by the International Management Code for the Safe Operation of Ships and for Pollution Prevention, set out in Annex I to Regulation (EC) No 336/2006 on the implementation of the International Safety Management Code within the Community. Under FuelEU, the Company refers to the Document of Compliance (DoC) holder.

The Company shall report the ship's compliance balance every reporting period (i.e., calendar year) to their accredited verifier, along with **supporting documents to allow compliance balance calculation**. In FuelEU Annex I, the following reads:

1. *BDNs [Bunker Delivery Notes] including fuels other than fossil fuels used on board shall be complemented with the following information regarding those fuels:*
 - **Lower calorific value [MJ/g],**
 - **For biofuels, E values** as established in accordance with the methodologies laid down in Directive (EU) 2018/2001, Part C of Annex V and Part B of Annex VI **[gCO₂eq/MJ]** and related evidence of compliance with the rules set out in that Directive for those fuels, identifying the fuel production pathway,
 - **For fuels other than fossil fuels and biofuels, WtT GHG emission factor [gCO₂eq/MJ]** and related certificate identifying the fuel production pathway.
2. *Where there is product blending, information required by this Regulation shall be given for each product.*

The Gas Directive, which includes provisions for LCF, was adopted after the publication of FuelEU. As a result, cross-referencing between legal texts was not possible. Nonetheless, for the interpretation of “*fuels other than fossil fuels and biofuels*,” FuelEU Annex I reads:

Actual values may be used provided that they are certified under a scheme that is recognised by the Commission in accordance with Article 30(5) and (6) of Directive (EU) 2018/2001 for biofuels, biogas, **RFNBO and recycled carbon fuels [RCF]**, or, where applicable, in accordance with the relevant provisions of **Union legal acts for the internal markets in renewable and natural gases and in hydrogen**, in application of Article 10(4) of this Regulation.

When a shipping company sourcing biofuels and biomethane intending to claim the reduced GHG emission factors under FuelEU, in addition to compliance with RED sustainability and GHG savings criteria, it needs to ensure that the **biofuels and biomethane are not produced from food or feed crops** according to definition in RED Article 2 (40), otherwise the emission factors reported shall be the same as the least favourable fossil fuel pathway for that type of fuel, as guided in FuelEU Article 10 (1a).

As certified economic operators, fuel suppliers should be able to provide information whether the type of biofuel or biomethane is produced from food or feed crops as declared in the corresponding Proof of Sustainability (see more 2.5.1 *Relevant documents*).

For the purposes of FuelEU, relevant Electricity Delivery Note (EDN) for electricity delivered to the ship shall contain at least the following information, as reads in Annex I:

1. **Supplier:** name, address, telephone number, email address, representative
2. **Receiving ship:** IMO number (MMSI), ship name, ship type, flag, ship representative
3. **Port:** name, location (LOCODE), terminal/berth
4. **OPS connection point:** connection point details
5. **OPS time:** date/time of commencement/finalisation
6. **Energy supplied:** power fraction allocated to supply point (if applicable) [kW], electricity consumption (kWh) for the billing period, peak power information (if available)
7. **Metering**

The agreements between the Company and its suppliers may clarify how the information needed to comply with FuelEU is provided by the energy suppliers when the policy frameworks do not create an obligation to release this information.

2.4 EU ETS (Directive 2003/87/EC)

Concerning the EU ETS and its extension to maritime transport, the **use of renewable fuels is incentivized by the Article 14 (1) of the Directive**, as amended on 10 May 2023 and published on 16 May 2023. The principles for monitoring and reporting are set out in Annex IV of the same Directive, where **the emission factor (of carbon dioxide) for biomass meeting the sustainability and GHG emission reduction criteria as established in RED shall be zero**. Article 14 (1) also introduces methodology to account for emissions from RFNBO and RCF, ensuring that such emissions are accounted for, and that double counting is avoided. Double counting refers to the risk for emissions reductions to be counted more than once towards a climate change mitigation effort.

Aligned with that, point 1.2, Part C, Annex II of the EU MRV, as amended by the Commission Delegated Regulation (EU) 2023/2776 published on 14 December 2023, establishes a derogation from the general principle and use of emission factors pursuant to EU ETS Article 14 for Renewable Fuels complying with RED sustainability and GHG emission savings criteria. According to this derogation, the TtW CO₂ of the emission factor of the biomass fraction of the fuels is zero-rated, and the CO₂ emission factors where the company uses RFNBO and RCF determined in accordance with the MRR.

The below text outlines the derogations as provided in part C of Annex II to the EU MRV.

1.2 Derogation from the general principle and use of emission factors pursuant to Article 14 of Directive 2003/87/EC

*By way of derogation from point 1.1, companies shall not apply the rules laid down in Part A of Annex I to this Regulation as regards the determination of the CO₂ emission factors where the company uses a **fuel complying with the sustainability criteria and greenhouse gas emission saving criteria for the use of biomass established by Directive (EU) 2018/2001** of the European Parliament and of the Council, with any necessary adjustments for application as set out in Implementing Regulation (EU) 2018/2066. In such cases, the **CO₂ emission factor of the biomass fraction of the fuel shall be zero**.*

*By way of derogation from point 1.1, companies shall not apply the rules laid down in Part A of Annex I to this Regulation as regards the determination of the CO₂ emission factors where the company uses **Renewable Fuels of Non-Biological Origin (RFNBO) and Recycled Carbon Fuel (RCF)**. In such cases, the **CO₂ emission factor shall be determined in accordance with Implementing Regulation (EU) 2018/2066**.*

The **guidance for RFNBO and RCF** was clarified with the adoption of the Commission Implementing Regulation¹³ (EU) 2024/2493, updating the MRR, published on 27 September 2024. In order to avoid double counting and requiring double payment for the same emissions,

¹³ Commission Implementing Regulation (EU) 2024/2493 of 23 September 2024 amending Implementing Regulation (EU) 2018/2066 as regards updating the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council

the CO₂ emission from the combustion of RFNBO and RCF complying with the criteria laid out in RED should have **an emission factor of zero**.

The same amendment to MRR also introduces in its Article 39a rules for **the zero-rating of Synthetic LCF**, where Synthetic LCF shall be zero-rated when their carbon content has been subject to the prior surrendering of allowances under EU ETS, unless that captured carbon is zero-rated carbon as defined in Article 3 (38f) of this regulation (in which case surrendering of allowances is not needed). Article 3 (38f) further defines zero-rated carbon and zero-rated carbon fraction.

In Article 39a of the MRR, the following on the zero-rating of Synthetic LCF reads:

“Synthetic low-carbon fuels shall be zero-rated when their carbon content has been subject to the prior surrendering of allowances under Directive 2003/87/EC, unless that captured carbon is zero-rated carbon as defined in Article 3(38f) of this Regulation. ... The criteria may also be considered complied with if the operator provides evidence for a purchase of a quantity of synthetic low-carbon fuels connected to the cancellation of the respective quantity in the Union database set up pursuant to Article 31a of Directive (EU) 2018/2001, or a national database set up by the Member State in accordance with Article 31a(5) of that Directive.”

The Commission adopted on 16 October 2024 amendments to the **EU MRV**¹⁴ as regards the rules for the monitoring of GHG emissions from offshore ships and the **zero-rating of sustainable fuels**, which mirrors the zero-rating of RFNBO, RCF, and synthetic LCF from the MRR:

“By way of derogation from point 1.1, companies shall not apply the rules laid down in Part A of Annex I to this Regulation as regards the determination of the CO₂ emission factors where the company uses Renewable Fuels of Non-Biological Origin (RFNBO), Recycled Carbon Fuel (RCF) or synthetic low-carbon fuel. In such cases, the CO₂ emission factor shall be determined in accordance with Implementing Regulation (EU) 2018/2066.”

Guidance Document No.1 (GD1)¹⁵ titled **“The EU ETS and MRV Maritime General guidance for shipping companies”** was published by DG CLIMA on 4 July 2024, updated on 5 November 2024 to support the implementation of the EU MRV and the EU ETS Directive. With regards to the **application of the zero-rating** of biomass, RFNBO, RCF and LCF for the maritime industry, GD1 clarifies that, in case **where a PoS is not available to the shipping company, an equivalent proof of compliance (PoC) documentation could be considered for acceptance by the Administering Authority**. The PoC shall mirror the PoS with no data manipulation, at least until the requirements for equivalent proofs of compliance, currently under development, are included in amendment to the Guidance Document No.1.

Since 2024, the EU MRV scope has been extended to include **other type of GHG** i.e., **CH₄ and N₂O**. An identical inclusion will also take place for EU ETS as of 2026 reporting period,

¹⁴ Commission Delegated Regulation (EU) 2024/3214 of 16 October 2024 amending Regulation (EU) 2015/757 of the European Parliament and of the Council as regards the rules for the monitoring of greenhouse gas emissions from offshore ships and the zero-rating of sustainable fuels. Download link:

[Delegated regulation - EU - 2024/3214 - EN - EUR-Lex](#)

¹⁵ Guidance Document No. 1 The EU ETS and MRV Maritime General guidance for shipping companies. Download link: [31875b4f-39b9-4cde-a4e2-fbb8f65ee703_en](#)

where altogether these GHG are to be calculated and declared as CO₂eq. In order to perform the calculation, Commission Delegated Regulation¹⁶ (EU) 2020/1044 provides in its Annex values on the **GWP factors** for all relevant GHG. More details on these factors can be found in subchapter 5.4 *WtT emissions* (FuelEU only)

For **fossil fuels and non-certified non-fossil fuels (i.e., using least favourable fossil fuel pathway)**, reference is made to the Column 4 of the table with default emission factors provided in FuelEU Annex II. Shipping companies shall not diverge from these values.

For **RED certified biofuels**, reference is made to a certified 'E' value as per EU RED Part C of Annex V and Part B of Annex VI, which is the total GHG intensity as declared in the PoS. In order to obtain the WtT GHG emission factor, 'E' should be deducted by the TtW CO₂ emissions (as a biomass credit) using the CO₂ conversion factor divided by the LCV obtained from RED. According to RED Annex V, Part C, paragraph 13, the emissions from the fuel in use 'e_u' is zero for biofuels and can be ignored when considering the WtT emission factors.

For **RED certified RFNBOs and RCFs**, reference is made to a certified 'E' value as per the Delegated Act to determine GHG emissions for RFNBOs and RCFs, which is the total GHG intensity as declared in the PoS. The emissions from the fuel in use 'e_u' include all combustion emissions and should be deducted in order to avoid double counting of emissions under FuelEU where the TtW emission are added. Any CO₂ credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **certified synthetic LCFs**, reference is made to the Gas Directive, where the certification rules are being developed in a delegated act. This value is expected to be provided in a PoS-like document according to rules set by EU recognised voluntary and national certification schemes for the Gas Directive. The emissions from the fuel in use 'e_u' is deducted in order to avoid double counting of emissions under FuelEU, where TtW emissions are added. Any CO₂-credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **electricity provided by OPS**, reference is made to FuelEU Annex I which states that this is considered as zero emissions.

Considering the amount of reporting stakeholders and the fact that verified values need to be reported, one of the main challenges with emission factors for biofuels, RFNBO, RCF, and LCF is the timely delivery of the PoS, which in practice, can take up to three months. During this time, the ship operator can only work on estimates that might change on when the actual PoS is made available, hence resulting not only in a changed emission factor but also a potential FuelEU penalty.

2.5 TtW CO₂ emissions factors

For **fossil fuels**, reference is made to the Column 6 of the table in FuelEU Annex II, and Column 3 in EU MRV Annex I, providing default CO₂ emission factors. Shipping companies shall not diverge from these values.

For **certified biofuels, RFNBOs, RCFs, and Synthetic LCFs**, reference is made to FuelEU Article 10 (5) (6) which allows for using either default or actual values certified by a laboratory

¹⁶ Commission Delegated Regulation (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation (EU) No 666/2014

testing or direct emission measurements. According to EU MRV Annex II, Part C, for EU ETS the CO₂ emissions from these fuels are zero-rated. This only applies to the emission reported under EU ETS and not under EU MRV, where the actual CO₂ emissions are reported.

2.6 TtW CH₄ and N₂O emissions and CH₄ slip factors

For **CH₄ and N₂O emissions from fossil fuels**, reference is made to the Columns 7 to 9 of the table in FuelEU Annex II, and Columns 4 to 6 in EU MRV Annex I, providing default CH₄ and N₂O emission and methane slip factors. Shipping companies can, according to EU MRV Annex I and FuelEU Article 10 (5) diverge from default values for CH₄ and N₂O and use actual values certified by laboratory testing or direct emission measurements.

FuelEU Article 10 (6) mandates an implementing act to specify which international standards and certification references are accepted for demonstration of actual tank-to-wake emission factors. Currently, the IMO is developing such standards which are expected to be referenced in FuelEU after their approval at MEPC 83 (April 2025). Until then, only default factors can be used.

The provision of certain TtW emission factors is still under development and some values are still indicated with 'To Be Measured (TBM)' or 'Not Available (N/A)'. If a shipping company would like to use default values but the cell indicates either TBM or N/A, and unless an actual value is demonstrated in accordance with FuelEU Article 10 (6), then the highest default value of the fuel class in the same column shall be used. EU MRV refers to FuelEU in this matter.

Global Warming Potential.

No later than 31 December 2026, the Commission will present a **report** in which it shall examine the inclusion in EU ETS of emissions from ships, including offshore ships, below 5,000 gross tonnage but not below 400 gross tonnage, and how EU ETS can best account for the uptake of Renewable and LCF on a life cycle basis.

2.7 Information required under FuelEU and EU ETS

The simplified boundary of certification and verification activity for Renewable and LCF supply chain, including the sourcing of renewable and low-carbon feedstock, production of fuels, bunkering, onboard usage, calculations and reporting of emissions, as well as submission to verifiers and respectively authorities, when extending it to activities required under FuelEU and EU ETS, —may look like the figure below.

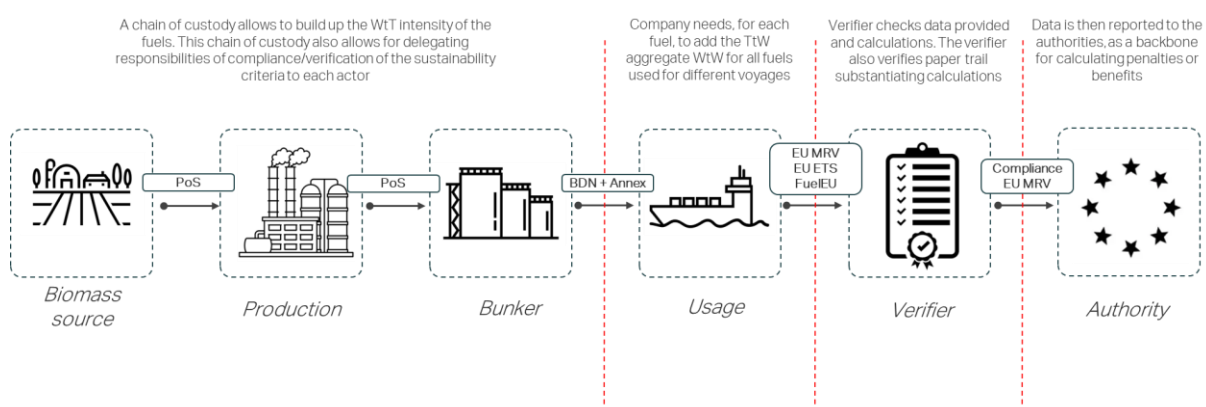


Figure 1. Boundary of Renewable and LCF compliance chain for FuelEU and EU ETS

Following the above diagram, the focus of this guideline is the interface between *Bunker* and *Usage*. Since the WtT GHG intensity and corresponding sustainability information depend on RED-certified fuel supply chain for the Company to report its emissions to their accredited verifier, it is crucial that procedures after the end of RED compliant supply chain are clarified among relevant parties.

2.7.1 Key documents for shipping company: BDN and PoS

As guided by the previous subchapters, the **two key documents for FuelEU and EU ETS** verification are: (i) **Bunker Delivery Note** and (ii) **Proof of Sustainability**, as issued by the certified fuel supplier to demonstrate compliance with GHG/sustainability certification rules.

a. Bunker Delivery Note (BDN)

A BDN is the main delivery document for marine fuel supply to ships, issued for specific deliveries. A BDN is required under MARPOL Annex VI, needed for FuelEU and EU MRV/ETS reporting and verification. It is the ultimate proof of the physical delivery of fuel to a ship, regardless of whether the Renewable or LCF delivered as a blended or neat product.

Since BDN is an internationally standardized MARPOL document, any complimentary information should be declared without amending the BDN. It is recommended to liaising closely with fuel suppliers to confirm that, in all cases, the fuel name and grade follow the ISO 8217 standard when mentioned in the BDN. It is important to note that BDN alone is seen to be insufficient to also prove sustainability.

b. Proof of Sustainability (PoS)

A PoS declares the sustainability properties of the fuel. This term is currently applicable for renewable fuels under RED i.e., biofuels, RFNBO, and RCF. For LCF, the demonstration of low-carbon properties is to be detailed once further guidance is available for the Gas Directive.

A PoS declares the specific supplier and recipient of the renewable fuel. Subchapter 4.1 on *Union Database* touches upon data required to be transmitted through the whole supply chain. Figure 2 highlights the main components of a PoS template under one of the recognized certification schemes i.e., ISCC-EU (International Sustainability and Carbon Certification). It contains general information of the product and the raw material e.g., whether it is originated from a food or feed crop or other streams, and the life cycle GHG emission.

1. General information

Type of Product: Please select
 Type of Raw Material: Please select
 Additional Information:
 Country of Origin (of the raw material):
 Quantity: mt ☐ m³ ☒ metric tons
 Energy content (MJ): MJ
 EU RED Compliant material? ☒ Yes
 ISCC Compliant material (volunt.) ☐ Yes
 Chain of custody option (volunt.) Please select

2. Scope of certification of raw material

The raw material complies with the relevant sustainability criteria according to Art. 29 (2) - (7) RED II? ☐ Yes ☐ No
 The agricultural biomass was cultivated as intermediate crop (if applicable) ☐ Yes ☐ No
 The agricultural biomass: **Emission Factors** (ILUC risk feedstocks (if applicable)) ☐ Yes ☐ No
 The raw material meets the definition of waste or residue according to the RED II? ☐ Yes ☐ No

3. Greenhouse Gas (GHG) emission information

Total default value according to RED II applied ☐ Yes ☐ No
 E = Total GHG emissions from supply and use of the fuel (gCO₂eq/MJ) gCO₂eq/MJ

$$E = E_{ec} + E_i + E_p + E_{hd} + E_u + E_{sc} + E_{ccs} + E_{ccr} = 0 \text{ gCO}_2\text{eq/MJ}$$
 GHG emission saving¹:
 0,0% Biofuels for transport 0,0% Biomass fuels for the production of electricity
 0,0% Biogas for electricity 0,0% Biomass fuels for the production of useful heat, as well as for the production of energy for heating and/or cooling
 0,0% Biogas for the production of useful heat, as well as for the production of energy for heating and/or cooling 0,0% Biomass fuels for the production of useful heat, in which a direct physical substitution of coal can be demonstrated
 Date when the final biofuel, biogas or biomass producer started operation?
 For biogas supply chains: Were incentives/subsidies received for the production of the biogas? ☐ Yes ☐ No
 If yes, please specify

Figure 2. Proof of Sustainability template under ISCC-EU

Based on market experience, PoS may not be available at the time BDN issued, because there may be delay along the supply chain. In order to accommodate a timely delivery, some certification schemes advise for a **PoS to be provided to the buyers up to 30 calendar days post-delivery** of the physical products.

The PoS is also the document that fuel suppliers **submit to the Member State**, in order to be counted towards the minimum share obligation under RED, through **a mandate or an opt-in scheme**. When fuel suppliers are not required to submit any PoS, they can declare it to a non-certified buyer i.e., not certified against any RED scheme. However, this fuel buyer cannot use the PoS to further sell the fuel as renewable.

When there is a mandate or an opt-in scheme for marine fuel suppliers, the PoS attached to all fuel batches are typically retained by the authority as a proof. This makes it **impossible to create another PoS referring to the same batch of fuel** to declare sustainability to the fuel buyer that will use PoS for their compliance, because **there is no obligatory procedure for traceability safeguard** after the last fuel supplier surrendering PoS for RED purpose.

Subchapter 4.24.2 *Operationalization of the Proof of Compliance* elaborates on an interim solution for the demonstration of GHG/sustainability certification when PoS needs to be

e.g., in the “Voluntary information” box in the PoS, or any other document handed over to the fuel buyer or the Company.

2.8 Problem statement

This Guidance Document focuses on these two questions:

- 1) How to **safeguard traceability** along the RED certified supply chain **in the maritime space**, taking into account the challenging **nature of bunkering activities**?

Background:

Uptake of Renewable and LCF is not very common in all EU ports, bunkering companies being outside of the RED-certified supply chain may be not familiar with the certification rules set out in the Directive nor the national law.

While some fuel suppliers are familiar with the implementation, typically due to their involvement in road and rail transport, it is important to provide clarity to economic operators that are new in the sphere of renewable energy provision in the EU Member States. Thus, one approach to the situation should be made available for economic operators interested in supplying Renewable and LCF for the maritime buyers.

- 2) How does **shipping company demonstrate GHG/sustainability certification** for the Renewable and LCF, to meet with FuelEU and EU ETS requirements?

Background:

When a fuel supplier holds a PoS accompanying a batch of renewable fuel, the PoS in principle can be passed on to the next entity buying the fuel. However, when EU Member States will put in place a mandate for maritime fuel supply, the national authorities may require the PoS to be submitted to the national scheme.

In this context, there are two situations:

- (a) **original PoS is available** for the Company, as there is no mandate nor opt-in scheme;
- or
- (b) **PoS is retained** for the national authority due to **mandate or opt-in** scheme, where a valid replacement of PoS should be made available for the Company.

Currently, there is a gap in certification scope around bunkering operations

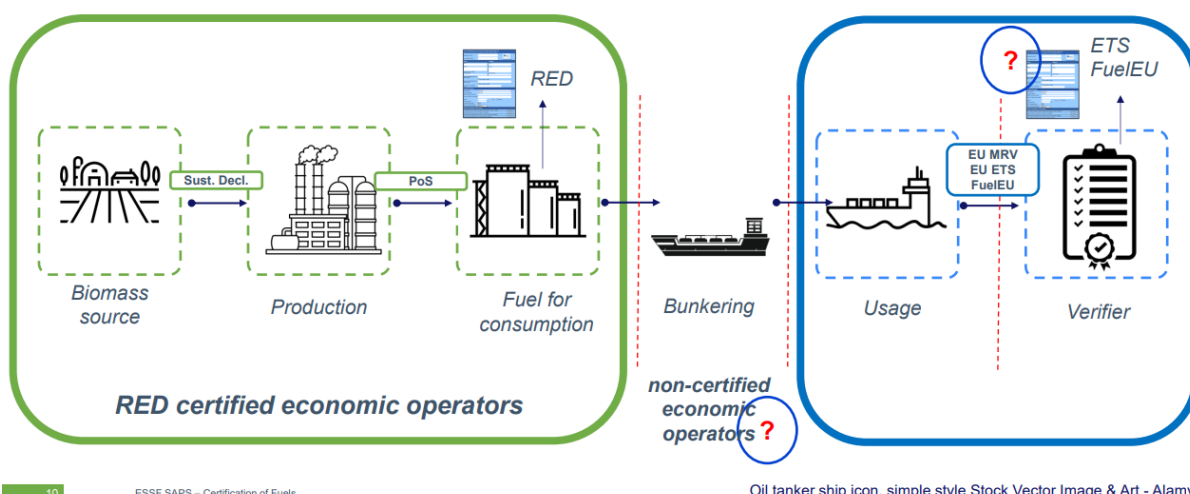


Figure 4. Illustration of traceability gap for fuel supply chain certification and for shipping company reporting

3 Operationalization of Renewable and LCF Certification in the Maritime Space

The early uptake of renewable fuels in the maritime sector started with drop-in biofuels, such as biodiesel. The demand for these fuels was primarily driven by companies' voluntary decarbonisation targets, even before the enforcement of compliance regulations such as FuelEU or the introduction of incentives like the EU ETS.

Proving the sustainability of marine fuel presented challenges, as there were no established guidelines for voluntary application of Renewable and LCF. However, on a voluntary basis, the marine sector has opted in to use biofuels, leaning on the EC-Recognised Schemes¹⁷ under RED, demonstrating a stringent adherence with sustainability and GHG savings criteria.

Following the increase in biofuel uptake by shipping companies, **IMO issued MEPC.1 Circ.795 Rev.6** dated 10 June 2022¹⁸ on the **Unified Interpretation of biofuels to be used onboard** and **Circular MEPC.1/Circ.905 dated 24 July 2023 on the Use of Biofuels Under CII and DCS**. Circular MEPC.1 Circ.795 Rev.6 clarifies that any bunker fuel with up to 30% biofuel incorporation of the volume shall be considered as fuel oil derived from petroleum refining by the Flag State for MARPOL Annex VI Regulation 18 on Fuel oil availability and quality. This has significantly shaped the supply scheme of marine drop-in biofuels, where suppliers could standardise the product as e.g., B30, or less, depending on the factor such as certifications related to bunker barge carrying chemical products including biofuels.

Since the publication of IMO MEPC.1/Circ.795 Rev.6, along with the flexibility of RED's mass balance chain of custody model, blending of conventional and renewable marine fuels has become a more common practice. In the absence of a quality standard for biofuels to be used in marine diesel engines, the ISO 8217:2024 on *Petroleum products – Specification of marine fuels (class F)* remains the main reference, including for neat biofuels or bio-blended fuels.

3.1 Coverage of RED certification schemes

For Renewable and RCFs to be eligible for emissions reduction benefits under FuelEU and EU ETS, they must satisfy the sustainability and GHG saving criteria established by RED. Voluntary or national schemes have been developed to help to ensure that biofuels, bioliquids, and biomass fuels as well as RFNBO and RCF are produced in compliance with the RED sustainability and GHG criteria, along with the relevant methodologies for RFNBO and RCF. The EC has recognised voluntary schemes and national certification schemes which can be used by economic operators to demonstrate that a fuel meets the relevant RED criteria.

This Guidance Document provides an overview of how the RED certification framework operates, ensuring clarity for the reader. In addition, voluntary schemes publish system documents and certificates of economic operators on their websites. FuelEU and EU ETS operators can obtain further information from these official sources.

Figure 5 shows a simplified certified fuel supply chain, operating from the feedstock producer through to the submission of a PoS from the fuel supplier to the national authority of a Member State to be counted towards the increase of renewable energy share and reduction of GHG intensity in the transport sector mandated by RED.

¹⁷ https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

¹⁸ Latest revision is currently IMO MEPC.1/Circ.795. Rev.9 dated 29 April 2024

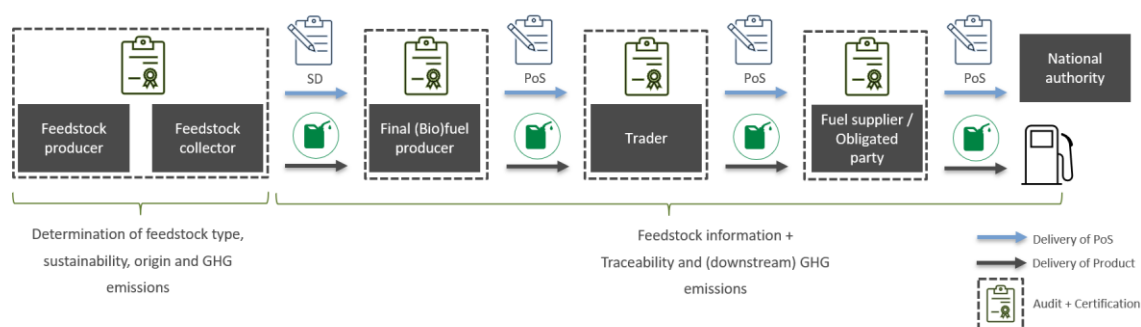


Figure 5. Simplified ISCC-EU certified supply chain

- Certified operators pass on sustainability and GHG information for the delivered product to the recipient on a PoS
- Each certified operator in the chain is allowed to issue a PoS
- When fuel is delivered to the market, the PoS is surrendered to the authority to count towards the RED national mandate
- National authority aggregates the information and report towards the European Union to demonstrate compliance with the RED targets

The RED transportation mandates have primarily concentrated on the decarbonisation of the road sector. As voluntary schemes are intended to demonstrate compliance with RED criteria, they may not align with the typical practices of the marine fuel supply chain.

At the end of the certified supply chain, the fuel supplier delivering fuels through the excise duty point to the road sector is typically subject to a RED obligation. In order to demonstrate compliance with the requirement to introduce a specified amount of renewable fuels into the market, the supplier may be required to submit the PoS documents to the relevant authorities.

3.2 Marine fuels supply operations beyond RED

Unlike the road transport sector where the certified chain of custody typically concludes with the obligated fuel supplier or the RED obligated party¹⁹, FuelEU and EU ETS require the chain to extend to the bunkering of the Renewable and LCF.

Shipping companies, as the end users of these fuels require a proof of such delivery via the BDN and a corresponding PoS or Proof of Compliance (PoC)— further elaborated in subchapter 4.2 *Operationalization of the Proof of Compliance*, to demonstrate compliance with the applicable RED criteria.

In the context of maritime transport, there are actions such as loading the fuels into a barge and let it sail to the specific fuel recipient. One barge may need to carry marine fuels to multiple recipients or waits for the recipient to arrive at the port. For FuelEU and EU ETS, the shipping companies as fuel users require a BDN and the corresponding PoS/PoC.

The below section on the contractual flow helps to distinguish the boundaries of a certified supply chain and marine fuel supply operations beyond RED.

¹⁹ RED obligated party refers to the fuel company that supplies to the market for consumption, being the last certified economic operator to hold ownership of the renewable fuels. In some Member States, a RED obligated party is not required to be certified if they act solely as a fuel receiver

3.2.1 Contractual flow

Error! Reference source not found. depicts a simplified flow of a waste-based renewable marine fuel supply chain.







Activity	Description
 <div>Certified</div>	(Waste) Collecting Point – collects waste and aggregates them on site. This economic operator can sell feedstock directly to a processing unit, or to a trader.
 <div>Certified</div>	Processing Unit – The aggregated waste and delivers to a processing facility such as esterification plant (biodiesel) and/or refinery (co-processing), and to other traders for further resale.
 <div>May be certified</div>	Fuel supplier / Trader (with Storage) – Storage and blending of renewable product with other components. In some instances, that is one point where the PoS could be surrendered i.e., this may be the end of RED certified supply chain.
 <div>May be certified</div>	Fuel supplier / Bunkering operator – Bunker barge owner or license holder. They could be two different companies often without storage onshore. Bunkering operator can be a RED Obligated Party i.e., product owner at the duty point, and the operator will have to surrender the PoS to authorities for own compliance, as such, may need to be certified.
 <div>Out of certification</div>	Marine fuel buyer (for consumption only) – Owner of the goods on board and buying the fuel. This refers to a company in charge of the procurement of fuel for the ship operations and not for further trading purpose, as per e.g., charter party agreement.
 <div>Out of certification</div>	Ship operator – The obligated party that requires BDN and PoS of the Renewable and LCF used onboard. The fuel may be purchased by another company (i.e., marine fuel buyer), or by the ship operator itself.

Table 3. A simplified contractual flow of marine fuel supply chain

The involvement of non-certified economic operators or companies outside the certification scope i.e., bunkering operators, marine fuel buyer, and ship operator, is elaborated as below.

NON-CERTIFIED TRADER AND BUNKERING OPERATOR

The above table explains that traders and bunkering operators may or may not be subject to certification. For the purposes of EU frameworks addressed by this Guidance Document, **a bunkering company or operator should be a subject to RED certification** when the operator holds risk and title of the fuel carried i.e., the owner of the fuel, and:

1. expects to meet RED mandate or opt-in scheme for maritime as required by the Member State.
2. intends to supply Renewable and LCF for Companies requiring a valid PoS/PoC following the product supply.

It is important to note that according to the certification rules, the bunkering company can own and dispatch any physical renewable fuels only after the certification process was positively concluded. That being said, the earliest fuel receiving date should be the first validity date of the certificate. This principle should also **apply to bunkering activities inside and outside the EU**, whenever the Company seeks to comply with FuelEU and/or EU ETS.

Shipping companies should ensure that their fuel suppliers delivering renewable products are RED-certified, and the legal entity that passes the title and risk of the renewable fuel to be used onboard is the same contractual party declared as supplier in the PoS/PoC. All certified companies and their scope can be found publicly on certification company's website.

Bunkering companies or bunker barge operators acting as a service provider delivering renewable fuel without owning the carried products are not subject to RED certification. Here, a bunker barge operator only plays the role of a transporter. As per the certification rule, transportation modes are outside of the certification scope i.e., only the owner of the goods is subject to certification. To the extent that a certified fuel supplier intends to measure emissions related to bunkering, the bunkering company acting as a service provider may support the provision of energy or emission data.

In situations where the certified fuel supplier uses a bunker barge as a storage for multiple deliveries, they should have the responsibility to surrender a PoS to authorities and/or forward PoS/PoC, as explained in prior section, for each different delivery accordingly.

In specific instances, there could be a number of entities owning a batch of Renewable or LCF between the fuel supplier surrendering the PoS and the fuel user. All parties owning the fuel along the chain should be certified, even the contractual format is a back-to-back trading. A fuel owner or supplier issues the PoS/PoC (elaborated in subchapter 4.2 *Operationalization of the Proof of Compliance*), together with the proof of physical delivery e.g., BDN, to their buyer.

NON-CERTIFIED FUEL BUYER AND SHIP OPERATOR (COMPANY)

Unlike the EU ETS, where the obligated party by default is the shipowner²⁰, the obligated party under FuelEU is, the FuelEU obligated party is the 'Company', which means the shipowner or any other organisation or person such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner and has agreed to take over all the duties and responsibilities imposed by the International Management Code for the Safe Operation of Ships and for Pollution Prevention i.e., the ISM DoC holder.

In cases where the party in charge of purchasing the fuels for ship operations is not the same as the FuelEU obligated ship operator, the "Company", agreements comprising responsibilities relevant to the use of Renewable and LCF onboard along with corresponding BDN, PoS, and other additional information, if any and if agreed, should be concluded.

The fuel supplier will issue the PoS/PoC declaring the entity of the fuel buyer as recipient in the PoS/PoC, which may not be the Company. Thus, **the documents needed for verification should hold clear reference to the ship** e.g., the IMO number and BDN reference. This is to allow the ship in question to be correctly and precisely referenced and identifiable for

²⁰ Commission Implementing Regulation (EU) 2023/2599 of 22 November 2023 laying down rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards the administration of shipping companies by administering authorities in respect of a shipping company.

compliance verification purposes even though the name of the Company is not mentioned in the PoS, instead the name of fuel buyer is stated.

Despite the provision of BDN and PoS/PoC between fuel buyers and Companies may involve commercial element, the boundary is in principle out of the certification rules. This implies that the handover of PoS/PoC from a fuel buyer (for consumption only e.g., charterers) to the Company does not require any of the parties to be certified under RED, nor that a fuel buyer needs to declare a specific PoS/PoC with Company's name on it.

3.2.2 Bunker preparations and operations

In principle, a bunkering activity is part of the emission for transport and distribution (Etd) under RED, covering the onboard emission of the ship carrying fuels as cargo. However, due to certification rules, it is generally not possible to include more emission values after the premise of final product manufacturer, unless there is another processing unit afterwards. Hence, the energy needed during e.g., the blending of fuel components onshore, which is common after the acceptance of biofuels by IMO,²¹ and the respective bunker barge operations.

The certification scope of the fuel suppliers **after the production of fuels** are typically Trader (with Storage), and the current implementation is that a **Trader (with Storage) does not perform any GHG emission calculation nor amend the Etd in the PoS of a final product**. Nonetheless, the GHG emissions during transport are generally within the cut-off criteria or tolerance allowed by ISO standards on GHG accounting for the fuel.

For the sake of granularity, this Guidance Document also presents a simplified illustration of activities around bunkering of blended renewable marine fuels, which is widely available in the market. All steps can be done by own operation, subsidiary, or a third party.

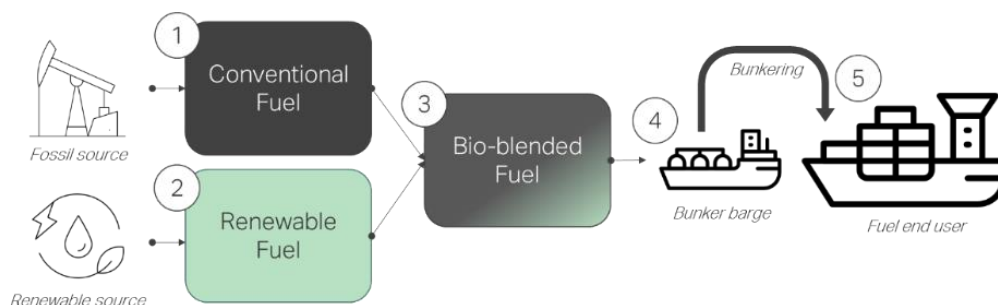


Figure 6. Simplified blending and bunkering operations

1. Procurement of fossil fuel

Fuel supplier procures a batch of fossil fuel. Required data and information are typically measured or tested.

2. Procurement of Renewable and LCF

Fuel supplier procures a batch of renewable fuel.²² Together with the physical movement, several key information to be made available are, among others (non-exhaustive list):

- weight (at dispatch and on arrival),
- relevant fuel specification analysis based on a laboratory testing,
- PoS for the submission to the national authority under RED or to fuel buyer, and

²¹ IMO MEPC.1 Circ.795 Rev.9 dated 29 April 2024 on the Unified Interpretation to MARPOL Annex VI for Regulation 18

²² Note that in this illustration, potential blending upstream the bunkering company is not considered

- If the Renewable or LCF is listed in FuelEU Annex II, hence cannot refer to any default value e.g., LCV, then an actual value shall be presented.

3. Blending of both fuel components or more

During the blending phase, the certified bunker fuel supplier should ensure

- Quality: as agreed grade e.g., based on ISO 8217:2024 standard, and the blend demonstrates homogeneity and compatibility.
- Sustainability: the allocation of sustainability information based on the mass balance bookkeeping following RED Article 30 (1). Fuel suppliers may inform the buyer if the feedstock allocated for the Renewable or LCF is classified as food/feed crops or not.

Blended fuels should be maintained homogeneous, mechanically or by means of a temperature control, until the moment it is loaded to a bunker barge for delivery. Thus, there may be a need for energy at the storage facility. Currently, blending of 24% and 30% are the most common in the market.

4. Transport of blended fuel

The transport and distribution of fuel are taken care by the bunkering company, whereas the corresponding emission of such operation is part of the WtT emission, as scoped under RED. The location of the ship, as the fuel end-user, affects the amount of fuel that the bunker barge consumes to distribute the fuel. Under certain circumstances, bunker barges may need to maintain temperature of the cargo fuel onboard—demanding more energy for bunkering. As mentioned earlier, such emission information however cannot be incorporated in the PoS yet due to certification rules for the Traders (with Storage).

5. Bunkering of Renewable and LCF

Finally, during bunkering, the crews from both bunker barge and receiving ship work together to run the operation. There is a specific flow rate agreed to perform the transfer of fuel, which might require additional heating, on top of the energy for pumping the fuel. Similar to the previous point, the emission from the energy needed for bunkering operations cannot be incorporated in the PoS yet for the same reason. The operation may sometimes be witnessed by a bunker surveyor and all the details are available in the BDN and bunker survey report.

For clarity's sake, during bunkering operations, there can be two types of onboard emissions i.e., onboard emission from the ship carrying the fuel (as part of WtT) and onboard emission from the ship consuming the fuel (TtW). The WtT emission figure based on a PoS/PoC can be directly referenced by verifiers for FuelEU and EU ETS purposes, without having to verify the emission elements incorporated in the E or WtT value, as this is the boundary of RED audits.

3.3 Use Cases

3.3.1 Bio-LNG in the EU

In light of the fact that “Bio-LNG” term is used in the FuelEU Annex II, it is viewed that “Bio-LNG” to have the same meaning as “liquefied Biomethane as transport fuel” in this document.

Reflecting on the restriction of the liquid biofuel supply chain to include the emission from transportation and distribution (Etd) from bunkering operations, it is known that a different process can happen in the gaseous biofuel stream e.g., liquified Biomethane, or Bio-LNG, because the liquefaction process (typically right before dispatch) is done by a Processing Unit.

For the context of this use case, loading to the bunker barge and delivery to the customer took place in a European port, and the chain of custody model was carried out following the concept of interconnected gas infrastructure under RED Commission Implementing Regulation (EU) 2022/996.²³ It defines the EU gas grid (and recognized third countries) including LNG terminals as an 'interconnected infrastructure' and is considered as one mass-balancing system, which means, sustainability characteristics can be reallocated to the energy units part of this system.

The possibility of extending traceability as one mass-balancing system, supported by the Union Database of Biofuels (UDB), is done upon request to the EU's neighboring countries to be included in the EU integrated infrastructure. The neighboring countries include the United Kingdom, Ukraine, and others, as the first extension stage.

GAS-TO-LIQUID CONVERSION AND BUNKERING EMISSIONS (PART OF ETD)

The GHG emissions information of the Bio-LNG delivered in this use case accounted the conversion factors from (gaseous) biomethane to Bio-LNG, as if a liquefaction step had taken place at the Bio-LNG bunkering port. The terminal from which the Bio-LNG was dispatched is certified as Processing Unit, able to convert (gaseous) biomethane to Bio-LNG. This allowed the terminal to provide emission data related to liquefaction step at the bunkering terminal, as well as the emission from Bio-LNG bunkering, and incorporate them into the Etd on the PoS.

Referring to the Commission Implementing Regulation (EU) 2022/996, ISCC-EU certification scheme provides a methodology to account and incorporate the respective conversion factors and GHG emissions in the PoS delivered to the customers i.e., GHG intensity of the bunker barge operations, including methane slip of the bunker barge.

In the gas industry invoicing is done on the High Heating Value (HHV) but PoS declare energy content in Low Heating Value (LHV). Parties in the supply chain use slightly different HHV/LHV conversion factors. There is hence a need to have a clear declaration of both LHV and HHV on the PoS or any other document agreed upon between the Company and its fuel suppliers.

ONBOARD EMISSION OF THE RECEIVING SHIP (EU)

Under FuelEU and EU ETS, onboard emissions of the receiving ship are to be reported. It was explored whether these emissions can be included on the PoS under the emission of the fuel in use (Eu). Based on this exploration, the lessons learned are as follows.

- Since fuel suppliers (Traders) are not allowed to amend the GHG intensity declared in the PoS, for the amendment of Eu to include at least the non-CO₂ onboard emissions, a fuel supplier needs to go back to the LNG terminal with the request to include these emissions. This requires manual handling with risk of errors.
- Not only that there is a time gap between the delivery of PoS/PoC and the actual use of fuel, the fuel supplier also does not have any information of the engine type in which engine the fuel will be used. The onboard emissions per engine type of the consuming ship can be directly reported in the ship's reporting system, so including the Eu figure on the PoS is perceived not to add so much value, even though the terminal can make the amendment.

²³ Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria

Based on this use case, the onboard emission or the emission from fuel use (Eu) on the PoS may not need to satisfy the FuelEU and EU ETS emission rules. In this matter and in the broader use of biofuels, the Eu in the PoS may remain as zero, following the RED Annex V paragraph 13 that nullifies all GHG types included in the Eu for biofuels.

Further down the supply chain, the Company needs to separately calculate their own onboard emissions (TtW), and not referencing the Eu declared on the PoS for FuelEU and EU ETS (as of 2026) reporting.

Finally, the total GHG emission information declared on the PoS, the mirroring PoC should consistently be the sole reference whether a batch of renewable fuel in question meeting the RED minimum requirement on GHG savings criteria as per Article 29 (10), to be eligible for FuelEU and EU ETS purposes.

3.3.2 Cargo as fuel used onboard

Ships can in some cases use its cargo as fuel. This can for example be LNG carriers where part of the cargo is Bio-LNG, or it can be ships transporting e-ammonia (i.e. RFNBO). As for the measuring instrument, the Custody Transfer Measurement System (CTMS) is widely used in these scenarios. It serves as the official figure for commercial purposes, including when cargo is used as fuel.

In principle, the use of cargo as fuel can be performed in alignment with the certification rules as per RED Article 30. This use case is limited to the economic operator transporting or distributing cargo, which can be used directly as fuels for the ships i.e., final product, where economic operator owning the molecule does not alter any chemical properties of the fuel.

When consumption takes place from cargo, there are two situations in the context of a shipping company either as a RED-certified economic operator or as a non-certified economic operator delivering fuels i.e., transport mode. In both cases, the PoS/PoC of the cargo owner prior to loading the cargo (i.e., Renewable or LCF) should be used as basis for the WtT emissions.

The shipping company is a RED-certified economic operator

If the remaining cargo from the ship is delivered for further distribution as RED-compliant fuel, the operator typically limits its role to simply buy and sell, where the certification scope of such economic operator is Trader (with Storage). This scope means that no adjustment of GHG emission intensity in the PoS may take place, which is addressed in Chapter 3.

In the context of the shipping company as a certified economic operator owning the fuel, it needs to prove a record of the consumption taken from “cargo”, and it should be made available for verification for the FuelEU and MRV/ETS Emissions Report. Furthermore, the economic operator has to record in their own mass balance bookkeeping that a batch of fuel was used for consumption. Consequently, at least two sets of new PoS/PoC may be declared for this purpose. One is for the onboard consumption, and the other is for further trading i.e., the final buyer(s).

The shipping company is a non-certified economic operator i.e., transport mode

If the shipping company is not a certified party and is not the owner of the fuel, then it only needs to prove a record of the consumption taken from the cargo similar to the previous case. The owner of the cargo accompanies the delivered fuel with corresponding PoS/PoC. The shipping company has no mass balance bookkeeping (as part of RED Article 30 requirement)

to take care of, and only needs to declare its onboard fuel consumption as a FuelEU and EU MRV/ETS operator for further verification purpose.

3.4 Bunkering operations outside the Union

As the maritime sector is not limited to regional business, it is important to acknowledge its international nature. Currently, bunkering renewable fuels supplied by RED certified economic operator already happens in certain major ports. When this supply does not follow any mandate or opt-in requirements, and all economic operators holding risk and title of the fuels are certified, the fuel sellers can issue PoS often immediately.

However, when it comes to running bunkering operations for new types of fuels where certified fuel suppliers should establish arrangement for local compliance purpose or even for cost efficiency, there can be situations where fuel suppliers need to engage e.g., with non-certified economic operators or legal entities.

Following the same logic for bunkering operations within the Union, and the principle that a certified supply chain cannot be interrupted by any non-certified economic operator (owning the molecule in the middle of the chain), this Guidance Document suggests the same requirement to be applied: **all legal entities holding title and risk of i.e., at some point holding the ownership of, Renewable and LCF bunkered outside the EU are subject to ensuring traceability through certification.**

FuelEU and ETS acknowledge the international nature of maritime by providing guidelines on the emission calculation for extra-EU voyages. As acknowledged in the previous subchapter, there are steps in the marine supply chain that are not yet covered, or currently beyond RED certification rules, which is subject to traceability safeguard. Therefore, to unify the approach, this Guidance Document emphasizes the need to establish traceability principles outside the EU as equally done in the Union.

The documentation should also be aligned with the documents submitted for bunkering in the EU. Economic operators registered in the Union database whether in or outside the EU are able to surrender PoS to the marine sector. This functionality is known to be available on the Union database. It is used for fuels that are claimed for different purposes other than RED.

INTERNATIONAL MARITIME ORGANIZATION (IMO) MID-TERM MEASURES

The International Maritime Organisation (IMO), through its Life Cycle Assessment (LCA)²⁴ Guidelines, includes a sustainability (certification) element as a part of its Fuel Lifecycle Label (FLL) concept, which is still pending further development by the Organisation. FLL is a technical tool to collect and convey the information relevant for the life cycle assessment of marine fuels and energy carriers (e.g., electricity for shore power) used for ship propulsion and power generation onboard.

Such FLL concept is viewed to be quite similar to PoS under the EU approach, and it will be an important document to prove global shipping decarbonization progress, in order to reach net-zero by or around 2050. This target gives signal to the entire marine fuel industry that expectedly in 2027, when the IMO mid-term measures have entered into force, the knowledge

²⁴ Annex 10 to the Resolution MEPC.391(81) adopted on 22 March 2024, 2024 Guidelines on Life Cycle GHG Intensity of Marine Fuels (2024 LCA Guidelines)

and experience from bunkering of Renewable and LCF under widely known certification schemes may be beneficial in the long run.

For the sake of clarity, this sub-section is outside the scope of FuelEU. However, Article 30(5) establishes that in the event of the adoption by the IMO Mid-term Measures, an impact assessment should be made without delay.

4 Demonstrating GHG/Sustainability Certification for FuelEU and EU ETS

This section outlines the pathway for enhancing Renewable and LCF traceability in the Union, especially when the entire sustainable certified supply chains will eventually be registering all transactions in the Union database. As one of the objectives of this Guidance Document is to provide clarity around demonstrating GHG/sustainability certification for FuelEU and EU ETS that originates from RED and later Gas Directive— particularly when the PoS is retained for Member States, it is crucial to view what RED aims for in a bigger picture.

The EC has been working to establish the Union Database for Biofuels (UDB) to enable the tracing of liquid and gaseous transport that are eligible for the RED obligation. The UDB is based on RED Article 28 and the ‘Clean energy for all Europeans’ package,²⁵ put in place to improve the traceability of liquid and gaseous fuels in transport sector with the objective to avoid double counting and mitigating the risks for irregularities or fraud.²⁶

The future view where all certified economic operators will need to register their transactions in the Union database is aligned with the suggestion to endorse all legal entities holding the title and risk of the Renewable and LCF. This is one step closer to establishing marine fuels supply chain into the Union database and safeguarding traceability as early as possible.

4.1 Union database

Referring to RED Recital 84, “A Union database should be put in place to ensure transparency and traceability of renewable fuels. While Member States should be allowed to continue to use or establish national databases, those national databases should be linked to the Union database, in order to ensure instant data transfers and harmonisation of data flows.”

Traceability is a key element of RED certification rules with mass balance as the required chain of custody model. A mass balance approach allows the mixing of multiple alike products and assigns the sustainability properties based on the incoming and outgoing mass flow.

Every certified economic operator that runs traceability bookkeeping is to create an account, register transactions, and passing on data electronically in the Union database. A traceability bookkeeping is one of the crucial parts in certification audits to safeguard a trustworthy chain of custody and to prevent double claiming.

The Implementing Regulation (EU) 2022/996 Annex I as depicted below in Figure 7, includes a list of data to be transmitted throughout the supply chain, which is the basis for the dataset to be uploaded to the Union database, as well as what recognized schemes need to take into account in their system documents. The transfer of PoS in the database is done electronically, so that renewable energy data is recorded and traceable in a digital environment.

As discussed in subchapter 3.1 *Coverage of RED certification schemes*, only certified economic operators holding a valid certificate can perform the buying and selling of feedstocks and fuels, while maintaining the sustainability status of the feedstock and fuels. PoS can only be issued by a certified economic operator based on the PoS received from the previous certified economic operator, and such practice is replicated until the end of the supply chain.

²⁵ https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

²⁶ [Union Database for Biofuels \(UDB\) - About - Union Database for Biofuels Info-site - EC Public Wiki](#)

ANNEX I

DATA TO BE TRANSMITTED THROUGH THE WHOLE SUPPLY CHAIN AND TRANSACTION DATA

1. Data to be transmitted through the whole supply chain
 - (a) name of the voluntary or national scheme;
 - (b) proof of sustainability number;
 - (c) sustainability and GHG emission savings characteristics, including:
 - (i) statement on whether the raw material or fuel complies with the criteria set out in Article 29(2) to (7) of Directive (EU) 2018/2001;
 - (ii) GHG emission data calculated according to the methodology set out in Annexes V and VI to Directive (EU) 2018/2001 or Delegated Regulation (EU) 2019/807;
 - (iii) description of when the installation started operation (for fuels only);
 - (d) name of raw material or name of raw material that the fuel is produced from;
 - (e) waste or animal by-product permit number (if applicable);
 - (f) fuel type (for fuels only);
 - (g) country of origin of raw material;
 - (h) country of fuel production;
 - (i) statement on whether the raw material or fuel complies with the criteria set out for low indirect land-use change-risk biofuels;
 - (j) information on whether support has been provided for the production of that consignment, and if so, the type of support scheme.
2. Transaction data
 - (a) supplier company name and address;
 - (b) buyer company name and address;
 - (c) date of (physical) loading;
 - (d) place of (physical) loading or logistical facility or distribution infrastructure entry point;
 - (e) place of (physical) delivery or logistical facility or distribution infrastructure exit point;
 - (f) volume: For fuels, the energy quantity of the fuel must also be included. For the calculation of the energy quantity conversion factors in Annex III to Directive (EU) 2018/2001 must be used.

Figure 7. Data to be transmitted through the whole supply chain and transaction data

Integral to the decarbonization effort under Fitfor55, FuelEU and EU MRV/ETS are to be connected to the reliable figures and information recorded in the Union database. The RED Article 28 (2) below reads:

“Member States shall require the relevant economic operators to enter into that database information on the transactions made and the sustainability characteristics of those fuels, including their life-cycle greenhouse gas emissions, starting from their point of production to the fuel supplier that places the fuel on the market. A Member State may set up a national database that is linked to the Union database ensuring that information entered is instantly transferred between the databases.

INTEGRATION PLAN TO THE UNION DATABASE FOR FUELEU AND EU MRV/ETS

The integration to the Union database will take place in two phases: Phase 1 (interim) and Phase 2 (full integration). The interim phase is expected to cover at least the year of 2025, and then the traceability system transitions to the full-integration solution as soon as the infrastructure for FuelEU and EU ETS purposes are ready on the Union database i.e., the Union database user account of the ships or shipping companies and verifiers.

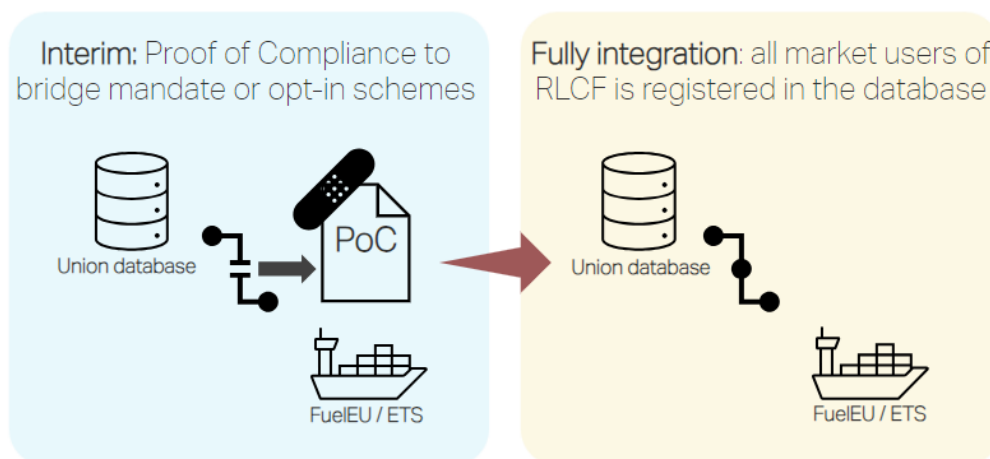


Figure 8. Integration plan to the Union database for FuelEU and EU MRV/ETS

For both Phase 1 and 2, a fuel supplier that is not certified or has not been audited to issue a PoC e.g., PoC add-on to their certificate, hence they are not able to issue a PoC to the fuel buyer to demonstrate compliance with RED— and Gas Directive in the future. Such a situation should be seen as that the fuel supplier in question is not able to provide valid evidence as demanded by FuelEU and EU ETS, when the PoS is retained for the Member State.

4.1.1 Phase 1: Interim solution

The Union database is currently in a roll-out phase for certified economic operators in RED supply chains. The Union database system currently extends as far as fuel suppliers who place final fuels on the market, crossing the duty point, and who are obligated to do so under RED. This means that the fuel supplier should have access to the PoS from their supplier in the Union database, but they cannot pass this using the system to the ship operator.

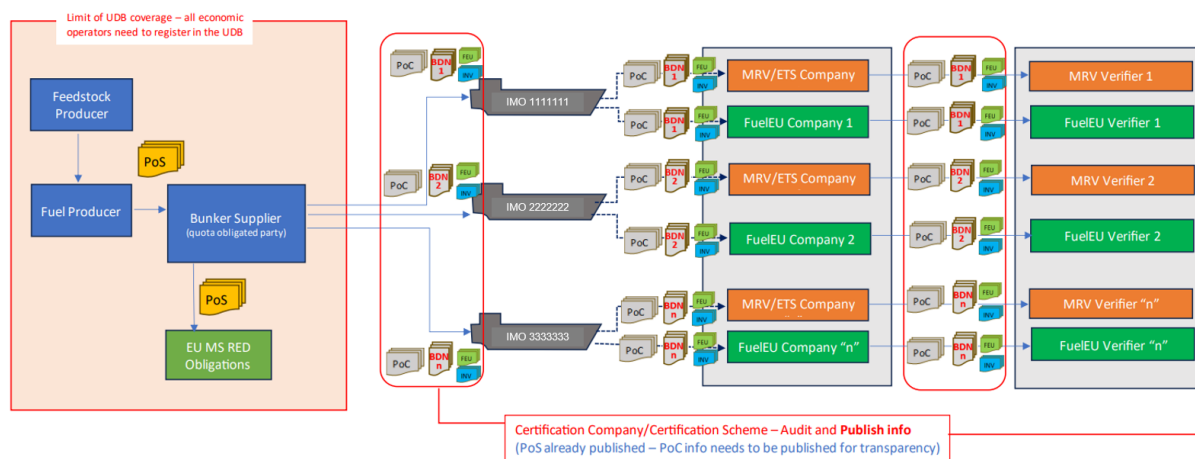


Figure 9. Phase 1 (interim) of the integration plan to the Union database (Source: DG MOVE)

The interim solution is to set up a process for the demonstration of GHG/sustainability certification during the phase when **transactions between a certified fuel supplier and a shipping company cannot be done and recorded on the Union database**, because the Company does not have any account or any access to their account yet. When there is **no marine fuel mandate nor opt-in scheme** requiring economic operators to surrender the PoS to the Member State, in principle, the certified fuel supplier or bunkering company can issue the original PoS, as illustrated in Figure 10 below.

The transaction between a certified fuel supplier and a shipping company will involve the original PoS, which is delivered in an electronic paper format, not transferred via the database. Consequently, verification processes will also not involve the Union database.

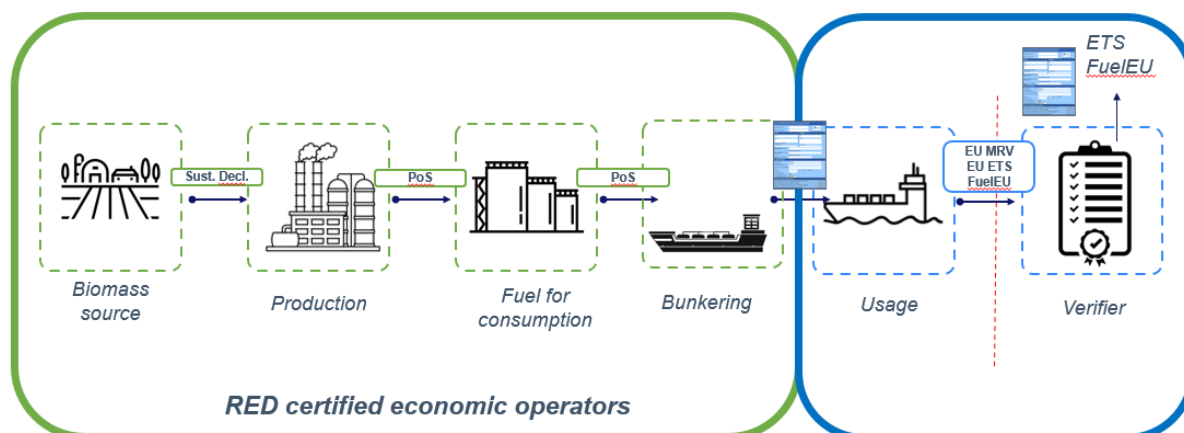


Figure 10. PoS can be issued when there is no mandate nor opt-in scheme

Until the Phase 2 is ready to be implemented, fuel suppliers will need to extract the PoS from Union database and deliver it in a(n electronic) paper format to the shipping company, who is outside the database environment.

Referring to the Guidance Document No.1 mentioned in subchapter 2.4 EU ETS (Directive 2003/87/EC), **where a PoS is not available to the shipping company, an equivalent proof of compliance documentation could be considered for acceptance by the Administering Authority.** When the **PoS needs to be retained for Member States** or for the marine sector, **certification schemes may establish additional procedures** to present such an **equivalent proof of compliance** to safeguard traceability up to the point of delivery during the Phase 1.

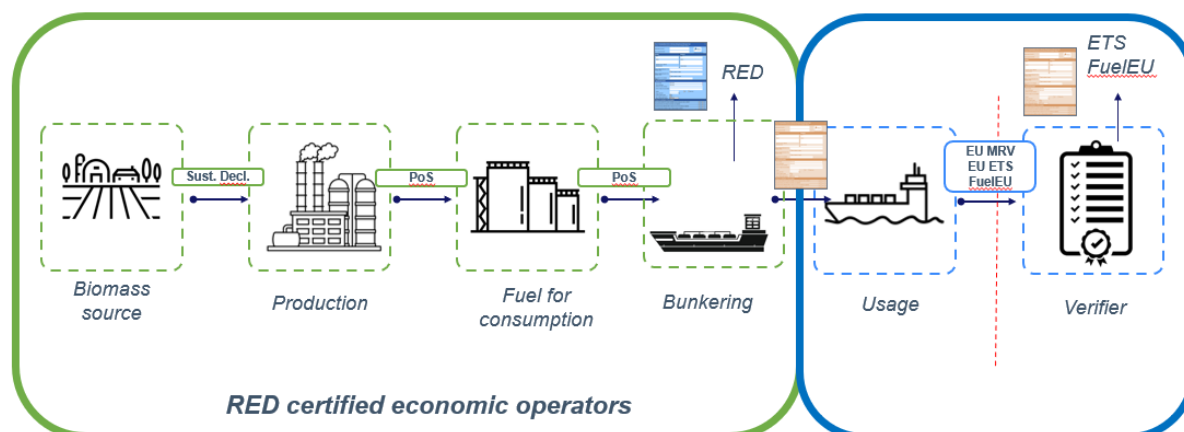


Figure 11. PoC can replace the PoS retained for the Member States

Figure 11 illustrates the use of a **Proof of Compliance (PoC)** issued by the marine fuel supplier, when the PoS is retained for RED marine mandate or opt-in incentives for a Member State. The content of the PoC mirrors the PoS to be retained, adding relevant information such as LCV and BDN reference for FuelEU and EU ETS Maritime purposes.

Should the certification scheme decide to establish standardized templates specific for FuelEU and ETS, it would be a best practice for fuel suppliers to provide the required information to the fuel buyer in such a template to reduce the risk of misinterpretation.

The PoC operationalization is discussed in the next subchapter. In principle, the respective certification company or scheme establishing a PoC framework provides specific guides in their system documents. An EC-recognized certification scheme, ISCC-EU, has published a Proof of Compliance framework in December 2024. One of the parts of this announcement is a PoC template, which can be found below in the *Annex I. ISCC EU Proof of Compliance template*.

4.1.2 Phase 2: Fully integrated solution

The EC will commence a work program to extend the Union database system to the maritime sector in 2025. The system update is anticipated to offer a PoS electronic delivery service within the database, enabling a marine fuel supplier to send a PoS to a ship operator via the specific IMO number of the ship which received the fuel as per relevant BDN. This will negate the need for paper or electronic PoS or PoC managed outside the Union database and support a more robust traceability in maritime supply chains. This Guidance Document will be updated when Phase 2 is possible.

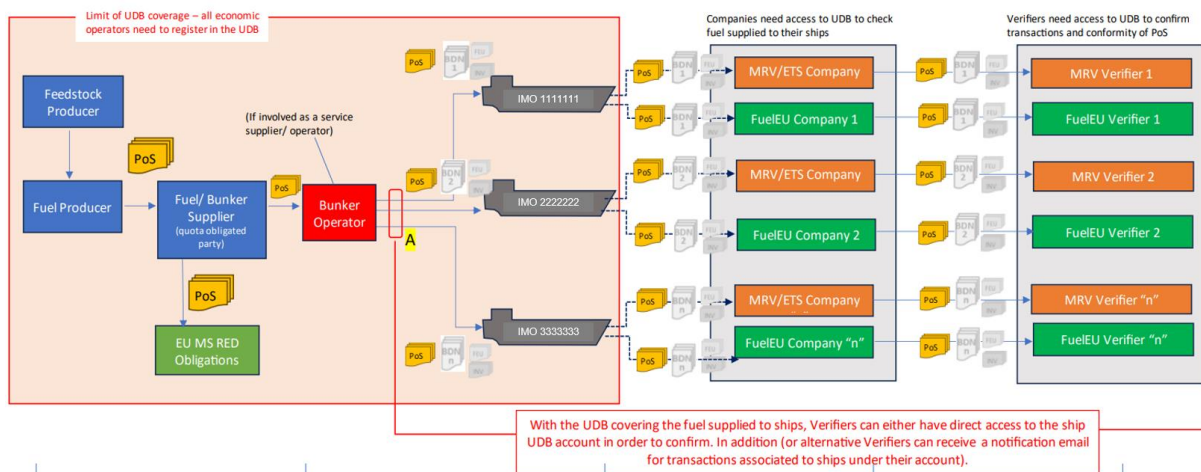


Figure 12. Phase 2 (full integration) of the integration plan to the Union database (Source: DG MOVE)

Figure 13 shows that all RED certified economic operators along the upstream supply chain are to upload PoS in an electronic format into the database. The last certified economic operator reports its renewable energy provision to the Member State as obliged under RED, including the exact market into where the energy is put for consumption.

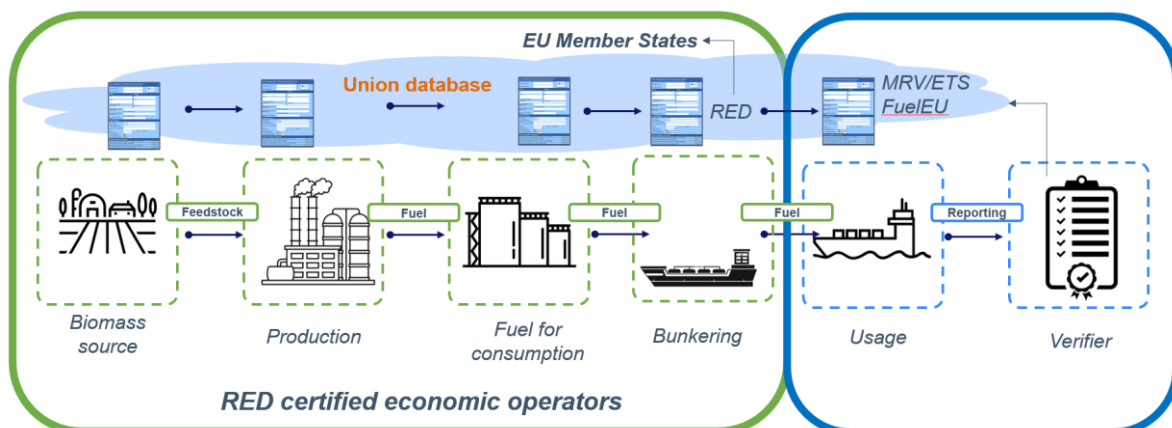


Figure 13. Transactions requiring PoS to be recorded in the Union database

The user, in the case of maritime may be ship or shipping company, will eventually be able to receive the PoS or a set of sustainability data via the database. Meanwhile, verifiers will have access to the PoS in the fuel users' account for verification purpose. The PoS may not look like a paper document when transferred in the database, but it is rather a list of data according to the legal requirements. The PoS icons in Figure 13 are for illustrative purpose only.

4.2 Operationalization of the Proof of Compliance

The use of PoC is suggested as an interim solution, until the Union database can facilitate the information transfer as described in the Phase 2. The details of the operationalization of PoC will be guided by the relevant certification scheme providing a PoC solution, yet this Guidance Document intends to provide suggestions on what is deemed best practice.

In order to prove compliance with the certification rules applicable for Renewable or LCF when PoS is retained by for the Member State, a document mirroring the PoS i.e., Proof of Compliance (PoC), is to be issued by fuel suppliers to the shipping company to demonstrate sustainability. Following the Commission Implementing Regulations 2022/996 Annex I, as depicted in *Figure 7. Data to be transmitted through the whole supply chain and transaction data*, the content of a PoC document will need to follow the regulatory provision to maintain coherence of data transfer, eventually in the database.

For the sake of efficiency, the process of issuing PoC should not be significantly different from issuing PoS. As per current practice, the issuance of a PoS is based on the allocation of sustainability properties coming from the received PoS from previous economic operators. This allocation happens during the bookkeeping of mass balanced product flows. The fuel suppliers ensure that the information in the PoC mirror the PoS, and adding specific data and information as needed and suggested as per the compliance market requirements e.g., LCV, BDN reference, and IMO number of the receiving ship.

As an economic operator required or interested in delivering Renewable and LCF compliant to RED, to be eligible for FuelEU and ETS, it would mean that certified fuel suppliers should ensure that the issuance of PoC is well-recorded and aligned with the incoming PoS traced in the mass balance bookkeeping. This is to ensure that there is no double claiming by two or more fuel buyers receiving PoC from one molecule, and such new coverage is subject to audits as long as deemed relevant. This bookkeeping between incoming PoS and outgoing PoC should be audited following the relevant RED certification by an accredited auditor.

Similar to the operationalization of PoS, it should be possible to merge multiple PoC into one, and vice versa, to separate the quantity of one PoC into multiple PoC, long as certification rules are respected. The allocation of batches and corresponding sustainability properties should be clear in the bookkeeping for an effective audit. The creation of each PoC Unique Number that allows tracing back the upstream supply chain should be done with attention.



Figure 14. PoS and PoC should be easily traced back and forward along the supply chain

Finally, at the end of each certification year, certified operators will be audited for recertification purpose, and auditors will check if the bookkeeping of PoC has been done correctly. If the certified economic operators are not meeting satisfactory performance, they will receive notes on major and/or minor Non-Compliance (NC) that should be sorted out before recommencing its business in renewable fuels trading i.e., receiving Renewable or LCF. Unresolved major NC may result in the certificate to be suspended or even revoked.

4.3 Scope of responsibility

In the light of ensuring clear responsibility and aiming for more efficient Renewable and LCF uptake in the maritime sector, particularly for the purpose of complying with FuelEU and obtaining zero-rating benefit under EU ETS, the following section describes roles and responsibilities of fuel supplier, fuel buyer or ship operator, and accredited verifier under Phase 1 and Phase 2.

4.3.1 Fuel supplier

RED (Article 25) obliges Member States to impose obligations to fuel suppliers to the transport sector to achieve minimum share of 29% renewable energy in transport in 2030 or to reduce the GHG intensity by 14.5% in 2030. In addition, Member states must ensure that the supply of biofuel (Annex IX-A) or RNFBO reaches 5.5% in the EU overall transport demand by 2030, with an obligatory minimum share of 1% for RFNBOs (Article 25 1b of EU Directive 2023/2413 – RED III).

It is in the discretion of Member States on own national approach and system they implement to make sure these targets are being met e.g., as to whether specific targets are set for fuel suppliers to supply fuels to certain transport modes, and as to whether they set an energy-based target or a GHG-reduction-based target.

The fuel supplier, in order to supply to ships Renewable and LCF eligible for FuelEU or EU ETS, must be certified by an EC-recognized certification scheme under RED. It implies that the fuel supplier:

- a. Maintains certification under an EU recognized certification scheme
- b. Is responsible for Renewable and LCF compliance with RED and later Gas Directive
- c. Issues for each batch of renewable fuel a PoS as per its recognized certification body
- d. Delivers timely to the fuel buyer (in addition to the BDN supplied to the ship), the PoS (or PoC if PoS has been retired) for EU ETS and/or FuelEU purposes.
- e. Holds an account in the Union database, which means that the fuel supplier:
 - i. is able to register its RED-compliance transactions in the database
 - ii. has an NTR ID (National Trade Register Identifier, unique company identifier) which is usually VAT ID (Value-Added Tax Identifier) and a certification number.

4.3.2 Fuel buyer and Shipping companies

In this context of fuel buyer, the roles and responsibilities mirror the above description of fuel supplier. As shipping companies, the roles and responsibilities of shipping companies under EU ETS and FuelEU may be different, hence it is addressed separately.

4.3.2.1 FuelEU

Responsible entity: Shipping company i.e., ISM holding company

The shipping company (holding the DoC i.e., ISM company) is responsible for the compliance with FuelEU requirements and liable for penalties in case of non-compliance. It implies that a shipping company:

- a. submits monitoring plans for each ship to verifiers. Each monitoring plan includes in particular a/an:
 - i. description of energy converters on board and power capacity, OPS equipment and Zero Equipment Technology (ZET)
 - ii. electrical power demand at berth
 - iii. description of sources of energy intended to be used in navigation and at berth
 - iv. description of procedures for monitoring and reporting
 - v. description of procedures for data gaps
- b. collects and reports data, including BDN, PoS/PoC (for Renewable and LCF) of fuel bunkered during the reporting period, EDN (electricity delivery note for cold ironing) according to the monitoring plan for energy used at berth and in navigation.
 - i. It implies that for each renewable fuel purchased, the shipping company should make sure that the supplier is RED certified.
 - ii. During Phase 1 of Union database implementation, PoS or PoC is of paper format
 - iii. During Phase 2 of Union database, the shipping company will have an account in the database through a self-registration process as a non-certified economic operator and will access PoS in electronic format; similarly for fuel buyers (e.g., the charterer or the ship operator).
- c. submits the ER of each ship to the verifier by 31 January following the reporting period
- d. defines the fleet pool, and banking/borrowing notification to the verifier by 30 April of the following year
- e. has paid the FuelEU penalties for any ship with a compliance deficit to the Administering State (AS) by 30 June of the verification year, resulting from:
 - i. GHG intensity applicable to the reporting year
 - ii. Non-compliant OPS port calls²⁷ (from 2030 onwards)
 - iii. RFNBO sub-target (currently not effective)
- f. obtains from the verifier a valid FuelEU DoC for each ship and the same to be available onboard each ship by 30 June of the following year.

As ISM managers, specifically third-party ISM managers, do not necessarily have a direct impact or access to that information, contractual arrangements should be put in place to cater for these provisions:

- a. between the buyer of the fuel and the shipowner, if distinct from the owner, and
- b. between the shipowner and the ISM manager, who has the responsibility for that ship at that time.

4.3.3 FuelEU Accredited verifier

The verifier shall be independent, and assess the reliability, credibility, accuracy and completeness of the data and information submitted and relating to the amount, type and

²⁷ Non-compliant port call means a port call during which the ship does not comply with the requirement set out in article 6(1) and to which none of the exceptions provided in article 6(5) apply.

emission factors of the energy used on board by each ship. The verifier shall be accredited by a national accreditation body pursuant to Regulation (EC) 765/2008²⁸ and FuelEU.

The verifier should:

- a. assess the conformity of monitoring plan of each ship
- b. verify ER of each ship and calculate the compliance balance by 31 March of the following year. The verifier will:
 - i. assess compliance based on reference to PoS, via Union database when available
 - ii. determine the non-compliant port calls (for OPS from 2030 onwards)
 - iii. calculate the yearly average GHG intensity of energy used onboard
 - iv. calculate the amount of FuelEU penalties, as per formulas detailed in the Annex IV of Regulation EU 2023/1805 (Recital 63)
- c. record in the database the definitive composition of the pool and allocation of the total pool compliance balance²⁹ of each individual ship by 30 April of the following year.
- d. Issue the FuelEU DoC for each ship by 30 June of the reporting year, when no penalty is due. In case of Otherwise, the FuelEU DoC is issued by the Administering State, once penalties are paid to the AS by the Shipping Company.

²⁸ Regulation setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93

²⁹ Total pool compliance balance means the sum of the compliance balance of all ships included in the considered pool.

5 Emission Rules and Applications

FuelEU, EU ETS, and EU MRV require shipping companies to provide relevant information and evidence for all types of fuel used onboard to determine the appropriate emission factors. Table 4 below provides an overview of the fuel classes, their qualification criteria, and how the WtT GHG and TtW CO₂, CH₄, and N₂O emission factors are determined.

		Well-to-tank GHG (FuelEU only)	Tank-to-wake	
			CO ₂	N ₂ O and CH ₄
Fossil fuels		Default factors only	Default factors only	Default or actual values certified by means of laboratory testing or direct emissions measurements
Biofuels	Sustainability and GHG saving criteria (min. 50-65%)	Actual certified values ($E - \frac{C_{fCO_2}}{LCV}$)	ETS: Zero FuelEU, MRV: Default or actual values certified by means of laboratory testing or direct emissions measurements	
RFNBO, RCF, SLCF	GHG saving criterion (min. 70%)	Actual certified values ($E - e_u$)	Default or actual values certified by means of laboratory testing or direct emissions measurements	
Electricity from OPS		Zero		

RFNBO: Renewable fuels of non-biological origin; RCF: Recycled carbon fuels; SLCF: Synthetic low-carbon fuels; OPS: Onshore Power Supply

Table 4. Requirement for emissions reporting under FuelEU and EU ETS

Biofuels, both liquid and gaseous, must fulfill the sustainability and minimum 50-65% GHG saving criteria given in RED Article 29, and for FuelEU compliance, they cannot be produced from food or feed crops. The emission factors of biofuels from food and feed crops refer to the least favorable fuel pathways, even when RED sustainability criteria are fulfilled.

Meanwhile, the minimum 70% GHG savings criteria must be satisfied for RFNBO/RCF as per RED Article 25, and for Synthetic LCF the reference is Gas Directive Article 2 (13). RFNBO, RCF, and Synthetic LCF do not have sustainability criteria, instead there is relevant criteria set up for each pathway e.g., renewability of the electricity sourced for RFNBO to comply with RED. Finally, any electricity from OPS is considered to be zero GHG emissions under FuelEU.

The regulations require reporting of emissions per fuel type, so blended fuels (e.g., a 30% biofuel and fossil fuel oil blend) must be reported separately. Only the non-fossil component needs to fulfil the GHG savings and sustainability criteria i.e., the 30% biofuel component need to fulfil the 50-65% GHG saving criterion, and not the complete blended fuel. When there is more than one biofuel of different pathway, each should be reported separately as the non-CO₂ default emission factors for the TtW part may be different too.

5.1 WtT emissions (FuelEU only)

For **fossil fuels and non-certified non-fossil fuels (i.e., using least favourable fossil fuel pathway)**, reference is made to the Column 4 of the table with default emission factors provided in FuelEU Annex II. Shipping companies shall not diverge from these values.

For **RED certified biofuels**, reference is made to a certified 'E' value as per EU RED Part C of Annex V and Part B of Annex VI, which is the total GHG intensity as declared in the PoS. In order to obtain the WtT GHG emission factor, 'E' should be deducted by the TtW CO₂ emissions (as a biomass credit) using the CO₂ conversion factor divided by the LCV obtained from RED. According to RED Annex V, Part C, paragraph 13, the emissions from the fuel in use 'e_u' is zero for biofuels and can be ignored when considering the WtT emission factors.

For **RED certified RFNBOs and RCFs**, reference is made to a certified 'E' value as per the Delegated Act to determine GHG emissions for RFNBOs and RCFs³⁰, which is the total GHG intensity as declared in the PoS. The emissions from the fuel in use 'e_u' include all combustion emissions and should be deducted in order to avoid double counting of emissions under FuelEU where the TtW emission are added. Any CO₂ credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **certified synthetic LCFs**, reference is made to the Gas Directive, where the certification rules are being developed in a delegated act. This value is expected to be provided in a PoS-like document according to rules set by EU recognised voluntary and national certification schemes for the Gas Directive. The emissions from the fuel in use 'e_u' is deducted in order to avoid double counting of emissions under FuelEU, where TtW emissions are added. Any CO₂-credits are also ready deducted in 'E' as part of the emission from existing fate or use and a deduction of the CO₂ emission as done for biofuels is not needed.

For **electricity provided by OPS**, reference is made to FuelEU Annex I which states that this is considered as zero emissions.

Considering the amount of reporting stakeholders and the fact that verified values need to be reported, one of the main challenges with emission factors for biofuels, RFNBO, RCF, and LCF is the timely delivery of the PoS, which in practice, can take up to three months. During this time, the ship operator can only work on estimates that might change on when the actual PoS is made available, hence resulting not only in a changed emission factor but also a potential FuelEU penalty.

5.2 TtW CO₂ emissions factors

For **fossil fuels**, reference is made to the Column 6 of the table in FuelEU Annex II, and Column 3 in EU MRV Annex I, providing default CO₂ emission factors. Shipping companies shall not diverge from these values.

For **certified biofuels, RFNBOs, RCFs, and Synthetic LCFs**, reference is made to FuelEU Article 10 (5) (6) which allows for using either default or actual values certified by a laboratory testing or direct emission measurements. According to EU MRV Annex II, Part C³¹, for EU ETS the CO₂ emissions from these fuels are zero-rated. This only applies to the emission reported under EU ETS and not under EU MRV, where the actual CO₂ emissions are reported.

5.3 TtW CH₄ and N₂O emissions and CH₄ slip factors

For **CH₄ and N₂O emissions from fossil fuels**, reference is made to the Columns 7 to 9 of the table in FuelEU Annex II, and Columns 4 to 6 in EU MRV Annex I, providing default CH₄ and N₂O emission and methane slip factors. Shipping companies can, according to EU MRV

³⁰ Commission Delegated Regulation (EU) 2023/1185

³¹ Referring to Commission Implementing Regulation (EU) 2018/2066, amended by Implementing Regulation (EU) 2024/2493.

Annex I and FuelEU Article 10 (5) diverge from default values for CH₄ and N₂O and use actual values certified by laboratory testing or direct emission measurements.

FuelEU Article 10 (6) mandates an implementing act to specify which international standards and certification references are accepted for demonstration of actual tank-to-wake emission factors. Currently, the IMO is developing such standards which are expected to be referenced in FuelEU after their approval at MEPC 83 (April 2025). Until then, only default factors can be used.

The provision of certain TtW emission factors is still under development and some values are still indicated with 'To Be Measured (TBM)' or 'Not Available (N/A)'. If a shipping company would like to use default values but the cell indicates either TBM or N/A, and unless an actual value is demonstrated in accordance with FuelEU Article 10 (6), then the highest default value of the fuel class in the same column shall be used. EU MRV refers to FuelEU in this matter.

5.4 Global Warming Potential

Since 1990, the Intergovernmental Panel on Climate Change (IPCC) has employed Global Warming Potential (GWP) as a standard metric to facilitate the comparison of the global warming impacts of various GHGs. The GWP quantifies the energy absorption of emissions from one ton of a particular gas over a specified timeframe relative to the emissions from one ton of CO₂.

The parameters established in GWP100 serve as the internationally recognized standard for emissions accounting and are adhered to by nations, including Member States of the EU, in accordance with the agreements reached at the United Nations level.

FuelEU mandates that, for the calculation of the GHG intensity in carbon dioxide equivalences (CO₂eq) of the energy used onboard the ship i.e., TtW, shipping companies shall apply the GWP as defined over a period of 100 years in RED paragraph 4 of Part C of Annex V— As specifically referred in FuelEU Annex I— for all GHG types i.e., carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

Whereas the RED has been revised, certain annexes thereof are still undergoing updates. In order to ensure certainty within the industry, it is recommended that any subsequent amendments to paragraph 4 of Annex V of RED could take effect in the TtW calculations for FuelEU as of the subsequent year following their entry into force.

For instance, if amendments to paragraph 4 of Annex V enter into force in March 2025, shipping companies will be required to incorporate these changes into the GHG intensity calculations for the monitoring period commencing as of 1 January 2026.

It is important to emphasize that the scope of RED is primarily devoted to GHG emissions calculations of renewable energy. The GWP100 reference applied by certified economic operators to calculate WtT emission is Annex IX to the Commission Implementing Regulation 2022/996. Meanwhile, the scope of FuelEU calculations encompasses all marine fuels. Consequently, the GWP stipulated herein should apply to all marine fuels, including TtW emission calculation of fossil fuels.

On the other hand, EU ETS and MRV mandated that emission calculations, irrespective of the fuel type, are based on GWP100 as provided in the Annex to the Delegated Regulation (EU) 2020/1044³².

In summary, the GWP100 values to be referenced for FuelEU and EU ETS calculations are:

	FuelEU WtT (1)	FuelEU TtW (2)	EU ETS (TtW only) 2024-2025 (3)	EU ETS (TtW only) as of 2026 (3)
CO₂	1	1	1	1
CH₄	28	25	N/A	28
N₂O	265	298	N/A	265

(1) Commission Implementing Regulation (EU) 2022/996 Annex IX, referring to IPCC AR 5

(2) RED paragraph 4 of Part C of Annex V, referring to IPCC AR 4

(3) Delegated Regulation (EU) 2020/1044, referring to IPCC AR 5

The GWP values referring to RED Annex V are expected to be updated in 2025. This Guidance Document will be updated following the amendments of relevant regulatory frameworks.

³² https://eur-lex.europa.eu/eli/reg_del/2020/1044/oj

6 Examples of FuelEU Calculation Balance

6.1 Fossil MGO

Ship particulars	
Ice class	N/A
Wind assisted propulsion (f_{wind})	N/A

Item	Unit	Fossil MGO
Lower calorific value (LCV)	MJ/g	0.0427
WtT GHG (CO_{2eqWtT})	g CO_{2eq}/MJ	14.4
TtW CO_2	g CO_{2eq}/MJ	$3.206 / 0.0427 = 75.08$
TtW CH_4	g CO_{2eq}/MJ	$0.00005 / 0.0427 \times 25 = 0.03$
TtW N_2O	g CO_{2eq}/MJ	$0.00018 / 0.0427 \times 298 = 1.26$
CH_4 slip (C_{slip})	%	N/A
RFNBO reward (RWD)	-	N/A
WtW GHG	g CO_{2eq}/MJ	$14.40 + 75.08 + 0.03 + 1.26 = 90.77$
Fuel consumption on voyages and ports within EU/EEA	tonnes	2000
Fuel consumption on voyages in and out of EU/EEA	tonnes	8000
Energy use in scope	10^6 MJ	$(8000 \times 0.0427 \times 50\%) + (2000 \times 0.0427 \times 100\%) = 256.2$

Item	Unit	Annual totals
Energy use in scope	10^6 MJ	256.2
GHG intensity ($GHGIE_{actual}$)	g CO_{2eq}/MJ	90.77
GHG intensity target in 2025 ($GHGIE_{target}$)	g CO_{2eq}/MJ	$91.16 \times (100 - 2) \% = 89.34$
Compliance balance	t CO_{2eq}	$(89.34 - 90.77) \times 256.2 = -366.5$

6.2 Fossil MGO with wind-assisted propulsion system

Ship particulars	
Ice class	N/A
Wind assisted propulsion (f_{wind})	0.95

Item	Unit	Fossil MGO
Lower calorific value (LCV)	MJ/g	0.0427
WtT GHG (CO_{2eqWtT})	g CO_{2eq}/MJ	14.4
TtW CO_2	g CO_{2eq}/MJ	$3.206 / 0.0427 = 75.08$
TtW CH_4	g CO_{2eq}/MJ	$0.00005 / 0.0427 \times 25 = 0.03$
TtW N_2O	g CO_{2eq}/MJ	$0.00018 / 0.0427 \times 298 = 1.26$
CH_4 slip (C_{slip})	%	N/A
RFNBO reward (RWD)	-	N/A
WtW GHG	g CO_{2eq}/MJ	$14.40 + 75.08 + 0.03 + 1.26 = 90.77$
Fuel consumption on voyages and ports within EU/EEA	tonnes	2000
Fuel consumption on voyages in and out of EU/EEA	tonnes	8000
Energy use in scope	10^6 MJ	$(8000 \times 0.0427 \times 50\%) + (2000 \times 0.0427 \times 100\%) = 256.2$

Item	Unit	Annual totals
Energy use in scope	10^6 MJ	256.2
GHG intensity ($GHGIE_{actual}$)	g CO_{2eq}/MJ	$0.95 \times 90.77 = 86.23$
GHG intensity target in 2025 ($GHGIE_{target}$)	g CO_{2eq}/MJ	$91.16 \times (100 - 2) \% = 89.34$
Compliance balance	t CO_{2eq}	$(89.34 - 86.23) \times 256.2 = 796.2$

6.3 Fossil LNG

Note: Fuel consumer unit class is defined as LNG Diesel, dual fuel slow speed.

Ship particulars	
Ice class	N/A
Wind assisted propulsion (f_{wind})	N/A

Item	Unit	Fossil LNG
Lower calorific value (LCV)	MJ/g	0.0491
WtT GHG (CO_{2eqWtT})	g CO_{2eq}/MJ	18.5
TtW CO_2	g CO_{2eq}/MJ	$2.75 \times (1 - 0.2 \%) / 0.0491 = 55.90$
TtW CH_4	g CO_{2eq}/MJ	$0.2 \% \times 25 / 0.0491 = 1.02$
TtW N_2O	g CO_{2eq}/MJ	$0.00011 \times (1 - 0.2 \%) / 0.0491 \times 298 = 0.67$
CH_4 slip (C_{slip})	%	0.2 %
RFNBO reward (RWD)	-	N/A
WtW GHG	g CO_{2eq}/MJ	$18.50 + 55.90 + 1.02 + 0.67 = 76.08$
Fuel consumption on voyages and ports within EU/EEA	tonnes	1500
Fuel consumption on voyages in and out of EU/EEA	tonnes	7000
Energy use in scope	10^6 MJ	$(7000 \times 0.0491 \times 50\%) + (1500 \times 0.0491 \times 100\%) = 245.5$

Item	Unit	Annual totals
Energy use in scope	10^6 MJ	245.5
GHG intensity ($GHGIE_{actual}$)	g CO_{2eq}/MJ	76.08
GHG intensity target in 2025 ($GHGIE_{target}$)	g CO_{2eq}/MJ	$91.16 \times (100 - 2) \% = 89.34$
Compliance balance	t CO_{2eq}	$(89.34 - 76.08) \times 245.5 = 3254.4$

6.4 Blend: Fossil MGO and Hydrotreated Vegetable Oil (HVO)

Note: The WtT emission for the HVO component is based on a 65% GHG saving compared to the fossil fuel comparator in RED of 94 g CO₂eq/MJ.

All HVO used, including on international voyages (in/out of the EU/EEA) can be allocated for the total annual GHG intensity. This calculation prioritizes first HVO and then fossil MGO until the total energy in scope is covered.

Ship particulars	
Ice class	N/A
Wind assisted propulsion (f_{wind})	N/A

Item	Unit	Fossil MGO	HVO
Lower calorific value (LCV)	MJ/g	0.0427	0.044
WtT GHG (CO ₂ eq _{WtT})	g CO ₂ eq/MJ	14.4	32.9 - 70.80 = -37.90
TtW CO ₂	g CO ₂ eq/MJ	$3.206 / 0.0427 = 75.08$	$3.115 / 0.044 = 70.80$
TtW CH ₄	g CO ₂ eq/MJ	$0.00005 / 0.0427 \times 25 = 0.03$	$0.00005 / 0.044 \times 25 = 0.03$
TtW N ₂ O	g CO ₂ eq/MJ	$0.00018 / 0.0427 \times 298 = 1.26$	$0.00018 / 0.044 \times 298 = 1.22$
CH ₄ slip (C_{slip})	%	N/A	N/A
RFNBO reward (RWD)	-	N/A	N/A
WtW GHG	g CO ₂ eq/MJ	$14.40 + 75.08 + 0.03 + 1.26 = 90.77$	$-37.90 + 70.80 + 0.03 + 1.22 = 34.15$
Fuel consumption on voyages and ports within EU/EEA	tonnes	2000	0
Fuel consumption on voyages in and out of EU/EEA	tonnes	3000	2000
Energy use in scope	10 ⁶ MJ	$(3000 \times 0.0427 \times 50\%) + (2000 \times 0.0427 \times 100\%) = 149.5$	$(2000 \times 0.0440 \times 50\%) + (0 \times 0.0440 \times 100\%) = 44.0$
Total energy use (for prioritized allocation)	10 ⁶ MJ	N/A	$(2000 \times 0.0440) + (0 \times 0.0440) = 88.0$
Prioritized allocation of HVO then fossil MGO	10 ⁶ MJ	$193.5 - 88.0 = 105.5$	$\min[193.5, 88.0] = 88.0$

Item	Unit	Annual totals
Energy use in scope	10 ⁶ MJ	$149.5 + 44.0 = 193.5$
GHG intensity (GHGIE _{actual})	g CO ₂ eq/MJ	$(90.77 \times 105.5) + (34.15 \times 88.0) / 193.5 = 65.01$
GHG intensity target in 2025 (GHGIE _{target})	g CO ₂ eq/MJ	$91.16 \times (100 - 2) \% = 89.34$
Compliance balance	t CO ₂ eq	$(89.34 - 65.01) \times 193.5 = 3635.5$

6.5 Blend: Fossil Methanol and e-Methanol (RFNBO)

Note: The CH₄ and N₂O emission factor for methanol is set to the same as for e-diesel, which is the highest default values of the same fuel class. The WtT emissions for RFNBO methanol are based on a 70% GHG saving compared to RED fossil fuel comparator of 94 gCO₂eq/MJ, deducted by the combustion emission from the fuel in use (e_u) of 68.9 gCO₂eq/MJ³³.

Ship particulars	
Ice class	N/A
Wind assisted propulsion (f _{wind})	N/A

Item	Unit	Fossil methanol	RFNBO methanol
Lower calorific value (LCV)	MJ/g	0.0199	0.0199
WtT GHG (CO ₂ eq/WtT)	g CO ₂ eq/MJ	31.3	28.2 - 68.9 = -40.7
TtW CO ₂	g CO ₂ eq/MJ	1.375 / 0.0199 = 69.10	1.375 / 0.0199 = 69.10
TtW CH ₄	g CO ₂ eq/MJ	0.00005 / 0.0199 x 25 = 0.06	0.00005 / 0.0199 x 25 = 0.06
TtW N ₂ O	g CO ₂ eq/MJ	0.00018 / 0.0199 x 298 = 2.70	0.00018 / 0.0199 x 298 = 2.70
CH ₄ slip (C _{slip})	%	N/A	N/A
RFNBO reward (RWD)	-	N/A	2
WtW GHG	g CO ₂ eq/MJ	31.30 + 69.10 + 0.06 + 2.70 = 103.15	-40.70 + 69.10 + 0.06 + 2.70 = 31.15
Fuel consumption on voyages and ports within EU/EEA	tonnes	2000	2000
Fuel consumption on voyages in and out of EU/EEA	tonnes	16000	0
Energy use in scope	10 ⁶ MJ	(16000 x 0.0199 x 50%) + (2000 x 0.0199 x 100%) = 199.0	(0 x 0.0199 x 50%) + (2000 x 0.0199 x 100%) = 39.8
Total energy use (for prioritized allocation)	10 ⁶ MJ	N/A	(0 x 0.0199) + (2000 x 0.0199) = 39.8
Prioritized allocation of e-CH ₃ OH, then fossil CH ₃ OH	10 ⁶ MJ	238.8 - 39.8 = 199.0	min[238.8, 39.8] = 39.8

Item	Unit	Annual totals
Energy use in scope	10 ⁶ MJ	199.0 + 39.8 = 238.8
GHG intensity (GHGIE _{actual})	g CO ₂ eq/MJ	(103.15 x 199.0) + (31.15 x 39.8) / (199.0 + 39.8 x 2) = 78.13
GHG intensity target in 2025 (GHGIE _{target})	g CO ₂ eq/MJ	91.16 x (100 - 2) % = 89.34
Compliance balance	t CO ₂ eq	(89.34 - 78.13) x 238.8 = 2229.8

³³ Commission Delegated Regulation (EU) 2023/1185, Annex, Part B

7 Questions & Answers (Q&A)

On 3 August 2023, a workshop took place to put the current proposed legal framework and what is known to be the practical application to test. The workshop was focused on using one sample fuel and trial different purchasing, bunkering, and deployment scenarios. The workshop concluded several open questions that are also listed in the below Q&As.

Important consideration: Although Bio-LNG was taken as an example for the exercise, this workshop was inclusive for any fuel type (e.g., bio-methanol, biodiesel, etc.). Bio-LNG was chosen as the LNG bunkering infrastructure is widely available and in operation. Therefore, the current procedures can be mirrored in the discussion.

7.1 Renewable and Low-Carbon Fuels

Do fuel suppliers have the obligation to inform the buyer about the feedstock origin of a biofuel?

- In principle, the information on the type and origin of the feedstock (or raw material) is available in the PoS/PoC. The fuel supplier needs to ensure either standard PoS/PoC is used, or any formats where the information can be easily identified by the fuel buyer, whether the feedstock is categorized as “Waste/Residue” to ensure eligibility for FuelEU reduced GHG intensity.

Can fuel suppliers blend compliant fuel (i.e., GHG savings above minimum threshold e.g., 10 gCO₂eq/MJ) and non-compliant fuel (i.e., GHG savings below minimum threshold e.g., 40 gCO₂eq/MJ) and sell the fuel blend as compliant to a shipping company?

- The fuel oil blend components eligible for both FuelEU and EU ETS are the ones sourced from RED-certified supply chain, and a PoS/PoC is present on top of the delivery of the physical fuels. If any of the fuel fraction of the blend does not meet the sustainability or GHG savings criteria as set out by RED or Gas Directive, then the fuel is regarded to have least favourable emission factors i.e., of fossil, regardless the calculated GHG emission intensity savings.

When a batch of fuel is a blended product of fossil fuel or compliant LCF and RFNBO, will the shipping company receive two set of PoS for each component?

- When a fuel is a blend of fossil and RFNBO, the shipping company will only receive a PoS/PoC corresponding to the RFNBO part that complies with RED and relevant Delegated Acts. There is no PoS/PoC corresponding to fossil fraction. For the LCF and RFNBO blend, if the LCF complies with Gas Directive, then the fuel supplier can demonstrate the compliance through the required certification rules, once available. If the compliance is not demonstrable, the LCF batch in question should be regarded to have least favourable emission factors i.e., of fossil, regardless the calculated GHG intensity savings. A PoS/PoC typically cannot be merged when fuel fractions have different type of raw material or GHG emissions.

How can shipping company know if the Bio-LNG offered by the fuel supplier will satisfy the mass balance requirement under the RED?

- If the fuel supplier is RED-certified, in principle the Bio-LNG should fulfil the RED requirements as implemented in a specific Member State. However, shipping company is advised to be adequately informed and ensured that the Bio-LNG will be bunkered from an interconnected infrastructure that satisfies the mass balance rules as per the national transposition.

What is the definition of interconnected gas grid for maritime?

- The term ‘interconnected infrastructure’ is defined in Commission Implementing Regulations (EU) 2022/996 as a system of infrastructures, including pipelines, LNG terminals and storage facilities, which transports gases, that primarily consist of methane and include biogas and gas from biomass, in particular biomethane, or other types of gas that can technically and safely be injected into, and transported through the natural gas pipeline system, hydrogen systems as well as pipeline networks and transmission or distribution infrastructures for liquid fuels.” Hence, the entire EU gas grid is regarded as one mass balancing system. The direction of gas flow is not relevant when defining interconnectivity.
- *It is important to note that the Commission Implementing Regulations (EU) 2022/996 is currently undergoing a review process, where amendments are expected to take place. The legal deadline of the amendment is 21 May 2025. Therefore, it is advised for the reader to look for the most updated reliable source when accessing this document post the mentioned legal deadline.*

Is mass balance applicable for Floating Storage Regasification Unit (FSRU)?

- Similar answer as above is applicable.

Can Bio-LNG be mass balance bunkered from LNG facilities in the UK and Spain against the flow of pipeline gas (backflow)?

- Similar answer as above is applicable, whenever the third country and the EU have recognized each other’s gas grid. The direction of the gas does not affect interconnectivity.

Can Bio-LNG from a grid-connected LNG terminal that cannot liquefy be mass balance bunkered?

- From the EU perspective, a single mass balance is eligible if a physical connection to the EU grid is available, regardless of liquefaction facility. However, it is acknowledged that the current approach by the Member States may vary. Thus, it is advised that the fuel suppliers to seek clarity with relevant Member States in which they operate/bunker to ensure compliance.

When receiving PoS/PoC for Bio-LNG from fuel suppliers, can shipping company claim that the liquefaction and bunkering emissions to be included in the total emission value?

- Yes, following the certification rules, the total emission of Bio-LNG i.e., E-value, encompasses the emission from liquefaction, which is included in Ep (emission from processing), and the emission from bunkering, which is included in Etd (emission from transport and distribution).

Can Bio-LNG bunkered outside the EU be RED certified and allowed for FuelEU Maritime and EU ETS compliance if it is mass balanced over a (non-EU) grid?

- Bio-LNG bunkered outside the EU may be sourced from a RED-certified supply chain, which can be accepted for FuelEU and EU ETS. The current interpretation, which may change after 21 May 2025, indicates that the certified supply chain needs to fulfil the mass balance requirement as per the relevant Implementing Act. The gas grid needs to be recognized by the EU, and vice versa.
- The EU is in the process to set up recognized gas grids from other countries. The first stage is recognition of EU neighbouring countries with physical connection e.g., the United Kingdom, Ukraine, and others.

Will the accounting of emissions associated with liquefaction and the transport of fuels from “liquefaction point to delivery” to the ship are accounted i.e., bunkering barge emission, be accepted under FuelEU, despite liquefaction facility at the bunkering terminal does not exist?

- Yes, both emissions are accepted as included on the PoS/PoC.

How are the emissions calculated from Bio-LNG consumption: are they based on the volumes in onshore storage tanks or volume measured at the flange?

- The volume of Bio-LNG relevant for FuelEU and EU ETS calculation refers to the one declared on the PoS/PoC.

What is the difference between mass balance and physical segregation chain of custody, in the context of biomethane flowing in a gas grid?

- In principle, **mass balance** is a chain of custody model where certain (e.g., sustainability) properties of a molecule may be reallocated to a chemically equivalent molecule within the same mass balance system. In a mass balance system, there can be two or more streams of molecule with different sustainability properties. The sustainability properties are then allocated based on a bookkeeping method based on the physical movement of the fuel.
- A batch of Bio-LNG delivered from terminals that are part of the EU interconnected infrastructure, may be originated from a fossil LNG flow, and with the sustainability properties as declared in the PoS/PoC accompanying the BDN, the received molecule is deemed sustainable. Vice versa, any LNG flow that may originally be coming from a biogenic source is deemed unsustainable without a PoS/PoC.
- **Physical segregation** refers to a chain of custody system, where there is only one type of molecule and sustainability property. Therefore, property identification of any molecule does not require reallocation, because the stream is deemed singular. In the context of sustainability under RED, it practically means that there is no mixing of sustainable and non-sustainable molecules.

For Bio-methanol to be certified, can it be produced from a mass-balanced feedstock, such as grid mass-balanced biomethane?

- Production from mass balanced feedstock can be accepted under certification schemes, provided that the interconnectivity of the grid infrastructure—when relevant, meets the definitions as per the Commission Implementing Regulations (EU) 2022/996, as elaborated in the previous questions.

How can fuel suppliers and shipping companies ensure that PoS/PoC does not arrive late for Verification purpose?

- It is advised for both parties to agree on a timeframe for the delivery of PoS/PoC and additional files, if any. Depending on the certification scheme's guidelines on their PoC operationalization, the PoC may not always follow PoS's timeline. For instance, ISCC addresses in its guidance that —although not preferred— PoC issuance and transfer before receiving PoS is allowed, under certain conditions. Nevertheless, it is acknowledged that this is a point of attention in further practice for the system to supervise that no double- nor mis-claiming could take place.

7.2 Fuel EU, EU MRV, EU ETS Procedures

Is it possible for fleet owners to have more than one verifier, resembling the possibility to operate ships under multiple flag states?

- Yes, it is possible. One ship should have one verifier per emissions report for each compliance period. Multiple verifiers can be used across the fleet, verifiers can differ for EU ETS and Fuel EU purposes and possible pooling applications.
- EU ETS has a ship level verification and a company level verification. Fuel EU Maritime has a ship level verification and a pooling level verification. The flag state is not relevant in this case, but the assigned Administering State is relevant and can intervene - you need approval and endorsement for the plan.

What is the difference between Administering Authority and Administering State?

- Under EU ETS, the term Administering Authorities is used to refer the Member State to which the shipping company is reporting. The term Administering State used under FuelEU is of the same principle as Administering Authority under EU ETS, hence it is the Member State to which DoC holder is reporting. In practice, for a ship, the Administering Authority for EU ETS and Administering State for FuelEU may be different.

Can ships allocate any fuel used on voyages and port calls in scope of FuelEU to meet the total energy in scope and to calculate the annual GHG intensity?

Specific on fuels or energy allocation:

- Article 2 specifies that the scope of FuelEU is the energy used, while there is no mention of fuels used. The fuels are only addressed in Annex I, which does not detail how fuels should be allocated, yet it specifies calculations for GHG intensity that are to be considered, notably by using any of those “*fuel types delivered to the ship during the reporting period.*” According to Article 3(41), the reporting period is 1/1/xxxx->31/12/xxxx.
- Based on the above, shipping companies can allocate fuels freely to meet the total energy required over the reporting period. This includes fuels used on 100% exempted voyages under FuelEU according to Article 2(3)-(6). The allocation can take into consideration emissions associated with the fuels, based on their respective emission factors, as well as the emission factors linked to different fuel consumers.

Specific on voyage and port of calls:

- Nonetheless, the fuels that can be freely allocated “*shall be determined using the amount reported in accordance with the framework of the reporting under EU MRV for voyages within the scope of this Regulation based on the monitoring methodology chosen by the company.*”, as required by Annex I, Paragraph 3.
- Based on the above, shipping companies can allocate fuels regardless of the type of voyage or port call where the fuel was reported, provided that this was reported under the EU MRV. This also means that potential discrepancies between the monitored fuel consumption under EU MRV and FuelEU are not permitted.

Can ships apply a pro-rata or a first-in first-out when reporting consumption of multiple fuels and fuel blends bunkered in the same tank?

- For EU MRV, GD1 states that a blend must be used in accordance with their pro-rata contribution. Since the total fuel consumption under EU MRV and FuelEU should be the same, this applies to FuelEU as well. For example, for a B30 blend, it is not possible to report consumption of only the biofuel component first and leave the fossil component for another voyage. The consumption should be reported pro-rata— i.e., a 30%/70% share of biofuel and fossil respectively.

- In case the ship first bunkers a B30 blend and later bunker B24, there is no restriction on which of the reported blends is consumed first, as long as it is reported the same way for both EU MRV and FuelEU, and the pro-rata contribution for the specific blend is adhered to.

How is the emissions accounting applicable for Bio-LNG loaded on top of fossil LNG onboard of a ship? Where and when is it deemed to be consumed?

- Accounting of Bio-LNG in a single tank is based on PoS/PoC, with the assumption that what is loaded will be consumed. This may not be applicable when a separate tank dedicated to store renewable volume is available onboard, where a proof of the consumption time can be demonstrated.

Can ships select which fuel to deduct the energy used due to ice class or sailing in ice conditions?

- Regarding the ice derogation, Annex V outlines a specific methodology for deducting the energy due to ice class and in ice conditions. It does so by deducting a corresponding amount from each and every (type of) fuel used during the year. Shipping companies can allocate ice deductions to fuels freely, starting with the fuels having the highest GHG intensity.

Do FuelEU and EU ETS cover the Scope 3 emission topic?

- While the discussion around Scope 3 emission is not directly relevant under the frameworks of EU MRV/ETS nor FuelEU, shipping companies may opt to exclude the rights to claim the Scope 3 emission attached to the fuel. For the purpose of EU MRV/ETS and FuelEU reporting, the emission value declared on PoS/PoC is the reference. While this document does not delve into the topic of other emission reporting, both fuel suppliers and shipping companies should, at their best effort, refrain from assigning any Scope 3 emission to multiple entity.


8 List of Abbreviations

AA	Administering Authority
AR	Assessment Report
AS	Administering State
BDN	Bunker Delivery Note
Bio-LNG	Bio-Liquefied Natural Gas (meaning biogenic-derived)
CIR	Commission Implementing Regulation
DME	Dimethyl Ether
DoC	Document of Compliance
EC	European Commission
EDN	Electricity Delivery Note
EMSA	European Maritime Safety Agency
ER	Emission Report
ESSF	European Sustainable Shipping Forum
Etd	GHG emission from transport and distribution
ETS	Emissions Trading System
Eu	GHG emission from the fuel in use
EU	European Union
FLL	Fuel Lifecycle Label
FuelEU	Fuel EU Maritime regulation
GD1	Guidance Document No. 1
GHG	Greenhouse Gases
GoO	Guarantees of Origin
GWP	Global Warming Potential
HVO	Hydrotreated Vegetable Oil
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISCC	International Sustainability & Carbon Certification
ISM	International Safety Management
ISO	International Organization for Standardization

ISPS	International Ship and Port Facility
LCA	Life Cycle Assessment
LCF	Low-Carbon Fuels
LCV	Lower Calorific Value
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee
MGO	Marine Gas Oil
MJ	Megajoule
MOHA	Maritime Operator Holding Account
MRR	Monitoring and Reporting Regulation
MRV	Monitoring, Reporting, and Verification
NC	Non-compliance
PoC	Proof of Compliance
PoS	Proof of Sustainability
RCF	Recycled Carbon Fuels
RED	Renewable Energy Directive
RFNBO	Renewable Fuels of Non-Biological Origin
SAPS	Sustainable Alternative Power for Shipping
TBM	To Be Measured
TtW	Tank-to-Wake
UDB	Union Database for Biofuels
WtT	Well-to-Tank
WtW	Well-to-Wake

Annex I. ISCC EU Proof of Compliance template

This Annex shows an example of a template to meet with the equivalent proof of compliance requirement. There may be newer version as owned by the International Sustainability and Carbon Certification (ISCC).³⁴

Proof of Compliance (PoC) with the sustainability and greenhouse gas emissions savings criteria of the EU PDF II v1.0	
<p>Please note: Issuance of Proof of Compliance (PoC) documents is subject to the fulfillment of several conditions. Please see the ISCC "Proof of Compliance" Guidance Document for further information. For use in regulated markets, a prerequisite for issuance of this PoC document is the acceptance by the competent authorities.</p>	
<p>Unique Number of the PoC¹:</p> <p>Date of Issuance of the PoC:</p> <p>Related Bunker Delivery Note Number (only for marine fuels):</p> <p>Unique Number(s) of the original, underlying PoS²:</p> <p>Please indicate under which fuel supplier compliance or incentive scheme the original PoS document is submitted under (e.g., UK RTFO):</p>	 <p>www.iscc-system.org</p>
Supplier	Recipient
<p>Name:</p> <p>Address:</p> <p>Certification System: ISCC EU</p> <p>Certificate Number:</p>	<p>Name:</p> <p>Address:</p> <p>Contract Number:</p>
<p>Address of dispatch/shipping point of the sustainable product:</p> <p><input type="checkbox"/> Same as address of supplier</p> <p>Address of receiving point of sustainable product (if differing from recipient address):</p> <p>Date of dispatch of the sustainable product:</p>	

³⁴ <https://www.iscc-system.org/>

1. General information			
Type of Product:	Please select		
Type of Raw Material/Feedstock	Please select		
Additional Information (voluntary):			
Country of Origin (of the raw material/feedstock):			
Quantity ³ :		m ³ /15°C	mt
Total quantity of product delivered ⁴ :		m ³ /15°C	mt
Energy content (MJ):		MJ	
Lower Calorific Value (LCV)		MJ/kg	
Product density, if available (at 15°		kg/m ³	
EU RED II Compliant material	<input type="checkbox"/> Yes		
Chain of custody option	Mass balance		
2. Scope of certification of raw material			
The raw material complies with the relevant sustainability criteria according to Art. 29 (2) - (7) RED II ⁵			<input type="checkbox"/> Yes <input type="checkbox"/> No
The raw material meets the definition of waste or residue according to the RED II ⁶			<input type="checkbox"/> Yes <input type="checkbox"/> No
3. GHG emission information (based on life cycle emissions calculation as per Directive (EU) 2018/400)			
Total default value according to RED II applied			<input type="checkbox"/> Yes <input type="checkbox"/> No
E = Total GHG emissions from supply and use of the fuel (gCO ₂ eq/MJ)			<input type="text"/> gCO ₂ eq/MJ
$E = E_{ec} + E_i + E_p + E_{td} + E_u^7 - E_{sca} - E_{ccs} - E_{ccr} = 0 \text{ gCO}_2\text{eq/MJ}$			
Allocated heat: <input type="text"/> gCO ₂ eq/MJ heat		Allocated electricity: <input type="text"/> gCO ₂ eq/MJ electricity	
GHG emission saving⁸			
Please choose whether default values were applied			
Not valid without ID number of the ISCC certificate above			

Explanations

- 1) Please ensure that the unique PoC number clearly refers to the underlying unique number(s) of the PoS
- 2) Please note that in some cases the PoC may refer to multiple PoS (and vice versa). Unique numbers of all relevant PoS must be stated here
- 3) Please note that the quantity of sustainable product stated on the PoC always refers to the sustainably certified portion of the batch only.
- 4) Total quantity of product that forms part of the delivery, i.e., quantity of certified product plus quantity of non-certified (generally, fossil) product.
- 5) Applicable to agricultural and forest biomass including residues from agricultural, aquaculture, fisheries and forestry
- 6) Applicable to waste and residues and products produced from waste and residues
- 7) Emissions of non-CO2 greenhouse gases (N2O and CH4) of the fuel in use must be included in the Eu factor for bioliquids and biomass fuels
- 8) Saving is calculated automatically based on the fossil fuel comparator according to RED II:

$$(EF - EB)/EF$$
 where EB = total emissions from the biofuel, bioliquid or biomass fuel
 and EF = total emissions from the fossil fuel comparator.

Eec	GHG emissions from the extraction or cultivation of raw materials
+ Ei	Annualized (over 20 years) GHG emissions from carbon stock change due to land use change
+ Ep	GHG emissions from processing
+ Etd	GHG emissions from transport and distribution. e_{td} includes downstream emissions for distribution up to and including the filling station
+ Eu	GHG emissions from the fuel in use
- Esca	GHG emissions savings from soil carbon accumulation via improved agricultural management
- Eccs	GHG emissions savings from carbon capture and geological storage
- Eccr	GHG emissions savings from carbon capture and replacement
= E	Total GHG emissions from supply and use of the fuel

Fossil fuel comparators:

Biofuels for transport: 94 gCO₂eq/MJ;

Bioliquids/Biomass fuels used for electricity: 183 gCO₂eq/MJ;

Biomass fuels used for the production of electricity (outermost regions): 212 gCO₂eq/MJ;

Bioliquids/Biomass fuels used for the production of useful heat, as well as for the production of energy for heating and/or cooling: 80 gCO₂eq/MJ;

Biomass fuels used for the production of useful heat, in which a direct physical substitution of coal can be demonstrated: 124 gCO₂eq/MJ;