CHARTING THE FUTURE

ClassNK

FAQs on the FuelEU Maritime (5th Edition)

[English]

FuelEU Maritime

Contents

Introduction

The Paris Agreement adopted in 2015 sets a common goal for the global GHG emissions reduction, which is to keep the increase in global average temperature to at least well below 2°C above pre-industrial levels while aiming to limit it to 1.5°C.

International shipping is no exception; the International Maritime Organization (IMO) adopted the *2023 IMO Strategy on Reduction of GHG Emission from Ships* in July 2023, which includes a target for total annual GHG emissions from international shipping to be net-zero by or around 2050.

On the other hand, European Union (EU) has set a goal of reducing GHG emissions by at least 55% by 2030 compared to the 1990 levels, with the aim of achieving net zero emissions by 2050. In July 2021, a comprehensive climate policy package, "Fit for 55," was announced to achieve the 2030 target, including proposals of the extension of the **EU Emissions Trading System (EU-ETS)** to the shipping sector and **FuelEU Maritime** to promote the decarbonization of fuels used on board ships. Subsequently, the EU-ETS extended to the shipping sector from January 2024 and the FuelEU Maritime has been introduced from January 2025.

In this "FAQs on the FuelEU Maritime (5th Edition)", the contents have been updated to include mainly information regarding the guidelines on the reporting and verification of actual Tank-to-Wake methane slip emission factors, which were issued by the European Commission in October 2025. Readers of this document may wish to note that the information provided herein is solely based on as of the end of February 2026 and that many points are yet to be clarified about the practical implementation. The latest information will be provided to the stakeholders without delay once further details become available.

We hope that the "FAQs on the FuelEU Maritime (5th Edition)" will help all the stakeholders in the shipping sector for their preparation for the FuelEU Maritime.

Lastly, discussions are ongoing at the IMO regarding the development of mid-term measures, including "regulations aimed at reducing the life-cycle GHG intensity of fuels (i.e., GFI regulations)" and "promotion of decarbonization through the IMO Net-Zero Fund". (At the second Extraordinary Session of the MEPC (MEPC/ES.2) held in October 2025, it was decided to postpone for one year the adoption of the draft amendments to MARPOL Annex VI, which included the mid-term measures.) Therefore, it is also necessary to keep a close watch on future developments at the IMO.

Correction / Revision Record

Version	Date	Section	Details
1.0	Aug. 2023	–	–
2.0	Jun. 2024	Entire document	Updated with the latest information.
3.0	Aug. 2024	Q1, Q2, Q4	Amend “fuels used” to “energy used”, etc. for clarification.
		Q2-3	Updated with the latest information.
		Q2-6	Newly added.
		Q5, Q5-1	Updated information on the FuelEU Monitoring Plan and FuelEU Report.
		Relevant Information	• Updated information on ClassNK ZETA is added in the “Verification and management tools related to FuelEU Maritime”. • “List of regulations related to FuelEU Maritime regulations” is added.
4.0	July 2025	Entire document	Updated with the latest information.
		Q1	Updated with the information on the delay of application of the regulation in Norway and Iceland as of June 2025
		Q2	Clarified the regulatory treatment of port of calls related to Outermost regions
		Q2-1	Introduced the GHG intensity up to two decimal places in the graph and added an explanation of the background.
		Q2-2	• Clarified Borrowing and Pooling conditions in detail • Added a diagram showing possible options for vessels with a surplus/deficit in their compliance balance
		Q2-3	Added an explanation on GHG intensity calculation for RFNBOs
		Q2-4	Clarified the condition that is considered as a ’penalty incurred in two consecutive years’.
		Q2-6	Clarified the GHG intensity calculation method that prioritizes the allocation of energy from fuels with lower GHG intensity
		Q2-7	Newly added.
		Q3	Updated the regulation number of the referred legislation
		Q5	Updated the wording
		Q5-1	Updated the wording
		Relevant Information	Updated “FuelEU Maritime and the IMO’ s candidate mid-term measures” and “Verification and management tools

			related to FuelEU Maritime" based upon the latest information
			Added "FuelEU Maritime Clause for Time Charter Parties 2024"
			Added references to "List of regulations related to FuelEU Maritime regulations"
5.0	Feb. 2026	Q1, Q2-5, Q5	Updated with the latest information.
		Q2-8	Newly added.
		Relevant Information	Updated with the latest information. Added a reference to "List of regulations related to FuelEU Maritime regulations"

Q1. What is the FuelEU Maritime？

FuelEU Maritime is a set of regulations that has been introduced in EU/EEA Member States from 2025 with an aim of promoting the decarbonization of fuels used on board ships, and consists of:
(1) provisions setting a limit of lifecycle GHG intensity of energy used on board a ship;
(2) provisions requesting the use of on-shore power supply (OPS) or zero-emission technology in port (containerships and passenger ships only); and
(3) provisions requesting the use of RFNBO (Renewable Fuels of Non-Biological Origin).

◆Countries to which the FuelEU Maritime applies

FuelEU Maritime is introduced in the 30 States (EEA States) consisting of 27 EU Member States and 3 States, namely, Norway, Iceland and Lichtenstein. In this document, the terms such as “EU/EEA Member States” or “EU/EEA ports” are used.

Attention should be paid that the application of the FuelEU Maritime is in delay to Norway and Iceland, which makes the ports in Norway and Iceland are being regarded as third-country ports in the context of the FuelEU Maritime as of February 2026. While work is ongoing with the aim of implementation within 2026, the specific effective date has not yet been finalized. (Refer also to ClassNK Technical Information “TEC-1342”)

◆Responsibility for FuelEU Maritime

Shipping companies are responsible for the compliance with the FuelEU Maritime. (Refer also to Q1-1)

◆Monitoring, reporting, verification and DoC under the FuelEU Maritime

Ships subject to the FuelEU Maritime are required to prepare a FuelEU Monitoring Plan, conduct monitoring of fuel consumption, etc., prepare a report for the calendar year and have it verified by a verifier. FuelEU Document of Compliance (DoC) is issued to the ship when its compliance with the FuelEU Maritime is confirmed.

◆Overview of the three provisions that consist of FuelEU Maritime

An overview of the three provisions that consist of FuelEU Maritime is as follows.

(1) An overview of provisions setting a limit of lifecycle GHG intensity of energy used on board a ship

- Starts from 1 January 2025.
- Energy used on board ships of over 5,000 GT, arriving at or departing from EU/EEA ports are in the scope of this provision.

- For the energy covered, a limit is set for the annual average of "GHG emissions per energy [gCO2eq/MJ]", called as "GHG intensity". This GHG intensity limit will be strengthened every five years.
- The GHG intensity is assessed on a lifecycle (Well-to-Wake) basis.
- The corresponding amount of GHG emissions that achieved GHG intensity limit (compliance surplus) can be banked for the use in the following years (Banking). The corresponding amount of GHG emissions that did not achieve GHG intensity limit (compliance deficit) may be compensated by compliance surplus that expected to be obtained in the following year (Borrowing). It is also possible to compensate the compliance surplus and compliance deficit among multiple ships in a certain year (Pooling).
- If the GHG intensity of a ship exceeded the GHG intensity limit for that year (even when using banking, borrowing, or pooling) in the end of that year, by paying a penalty corresponding to the compliance deficit, the ship will be deemed to be in compliance with the requirements.

(2) An overview of provisions requesting the use of on-shore power supply (OPS) or zero-emission technology in port (containerships and passenger ships only) (Refer also to Q3)

- Starts from 1 January 2030. (For some ports, starts from 1 January 2035.)
- Containerships and passenger ships over 5,000 GT should use an on-shore power supply (OPS), etc., when being moored in designated ports of EU/EEA Member States.
- There are exemptions, e.g., mooring for less than 2 hours is not applicable.
- Failure to comply with this provision is, by paying a penalty based on the amount of power, etc. during the mooring, deemed to be in compliance with the requirements.

(3) An overview of provisions requesting the use of RFNBO (Renewable Fuels of Non-Biological Origin) (Refer also to Q4)

- Starts from 1 January 2034, <u>if the share of RFNBO use in 2031 of the total energy used on board ships covered by FuelEU Maritime is less than 1%.</u>
  - ✓ RFNBO refers to Renewable Fuels of Non-Biological Origin ("e-fuels"), such as ammonia produced using hydrogen from renewable energy sources.
- Energy used on board ships of over 5,000 GT, arriving at or departing from EU/EEA ports are in the scope of this provision.
- Requires each ship to use RFNBO as 2% of the total energy used in a year.
- As with the GHG intensity provision (1) above, banking, borrowing and pooling can also be used to comply with this provision.
- Failure to comply with this provision is, by paying a penalty based on the energy used, etc., deemed to be in compliance with the requirements.

◆Enforcement of FuelEU Maritime

If a ship does not comply with the provisions of (1), (2) or (3) above, FuelEU Document of Compliance will not be issued. Where a ship fails to comply with the regulation to have a FuelEU Document of Compliance for two or more consecutive reporting years by unpaid penalty, for example, the competent authority of EU/EEA Member State of the port of call may issue an expulsion order. Every Member State shall refuse entry of the ship which is subject to the expulsion order into any of its ports until the ship obtains valid FuelEU Document of Compliance.

Q1-1. What company should have a responsibility for the FuelEU Maritime?

Under the FuelEU Maritime, a shipping company is responsible for the compliance with regulations and is defined as follows:

> *'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;*

This definition is similar to that of a shipping company under EU-MRV Regulation and EU-ETS Directive, but unlike the EU-MRV and EU-ETS, it is clarified that an ISM company (DOC holder) should have a responsibility for the FuelEU Maritime.

A shipping company covered by the FuelEU Maritime will be registered with one of the EU/EEA Member States (= Administering State). This Administering State is the same Member State with which the shipping company is registered under EU-ETS.

Q1-2. What is the “port of call” under the FuelEU Maritime?

Port of call under the FuelEU Maritime is defined as follows:

> *‘port of call’ means a port where ships stop to load or unload cargo or to embark or disembark passengers with the exclusion of stops for the sole purposes of refuelling, obtaining supplies, relieving the crew, going into dry-dock or making repairs to the ship, its equipment or both; stops in port because the ship is in need of assistance or in distress; ship-to-ship transfers carried out outside ports; stops for the sole purpose of taking shelter from adverse weather or rendered necessary by search and rescue activities; and stops of containerships in a neighbouring container transhipment port listed in the implementing act adopted pursuant to Article 2(2);*

As such, “stops of containerships in a neighbouring container transhipment port” are excluded from the *port of call* under the FuelEU Maritime, and the neighbouring container transhipment ports are “neighbouring container transhipment ports where the share of transhipment of containers, measured in twenty-foot equivalent unit, exceeds 65% of the total container traffic of that port during the most recent twelve-month period for which relevant data are available located outside the Union but less than 300 nautical miles of a port under the jurisdiction of a Member State.” It means that the voyages preceding and following such ports are considered as consecutive voyages.

A list of such container transhipment ports was published by the European Commission on 6 June 2025. As same as maritime EU-ETS, TANGER MED in Morocco and EAST PORT SAID in Egypt have been designated.

Q2. What is an overview of the GHG intensity provision？

◆Overview of the GHG intensity provision

This provision is to set a limit for the annual average of “GHG emissions per energy [gCO2eq/MJ]”, called as “GHG intensity”, for energy used on board ships.

◆Ship to be covered

Ships over 5,000 GT arriving at or departing from ports under the jurisdiction of EU/EEA Member States are covered.

◆Greenhouse gases (GHGs) to be covered and the GHG intensity

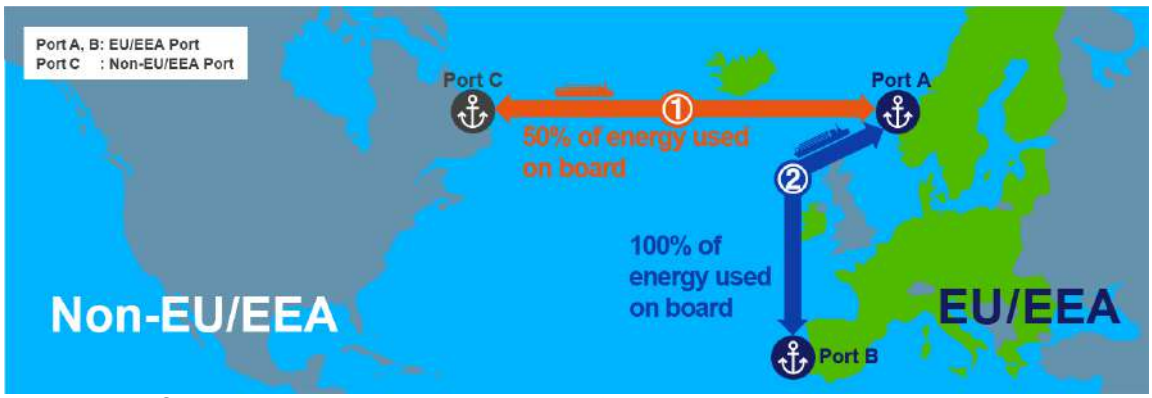
- The greenhouse gases (GHGs) covered are CO2, methane (CH4) and nitrous oxide (N2O).
- In calculating GHG intensity, not only GHG emissions on board ships (Tank-to-Wake), but also GHG emissions during production, distribution and storage of the fuel (Well-to-Tank) are included, i.e., on a life-cycle (Well-to-Wake) basis. The GHG emissions are assessed for each type of fuels.
- The GHG intensity is calculated by converting CO2, CH4 and N2O emissions into CO2 equivalent emissions in the unit “CO2 equivalent emissions per energy [gCO2eq/MJ]”.
- The energy used on board is calculated by multiplying the fuel consumption during the voyage and at berth, as identified below, by the lower calorific value (MJ/g) of the fuel.

◆Energy used on board ships to be covered

The geographical scope of the energy used on board under the FuelEU Maritime is as follows:

- Voyages between EU/EEA and non-EU/EEA ports (Route ①) :50% of energy used
- Voyages within EU/EEA ports (Route ②) :100% of energy used
- Berthing in EU/EEA ports :100% of energy used

Voyages and berthing in the scope of the FuelEU Maritime



Note: For the route② above, for voyages departing from/arriving at ports in the outermost regions of EU/EEA Member States, 50% of energy used is covered instead of 100%. Further, for the voyages to or from the particular ports designated by the EU/EEA Member States, the energy used during that voyage will not fall under the scope of the FuelEU Maritime.

Q2-1. How will the energy used and GHG intensity be confirmed?

In the FuelEU Maritime, the energy used by a ship and GHG intensity of the ship are confirmed based on the data collected under the FuelEU Monitoring Plan (see Q5-1).

In the FuelEU Maritime, GHG intensity is calculated on a life cycle (Well-to-Wake) basis. The GHG intensity of each fuel is calculated based on the default emission factors determined for the Well-to-Tank and Tank-to-Wake parts, respectively, and the sum of those values is the default GHG intensity value of the fuel. For example, in the case of marine diesel oil (MDO), the GHG intensity of the Well-to-Tank part is 14.40[gCO2eq/MJ] and that of the Tank-to-Wake part is 76.37[gCO2eq/MJ], resulting in a total of 90.77[gCO2eq/MJ] as the GHG intensity of the fuel.

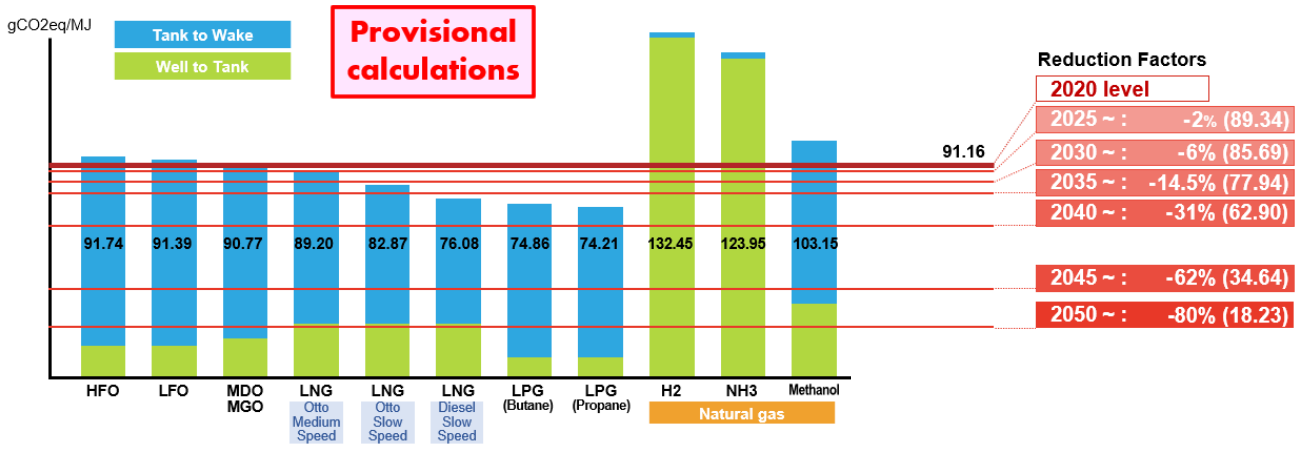
The GHG intensity limit is strengthened every five years based on the 2020 level of 91.16[gCO2eq/MJ]. For instance, the limit value for 2025, the starting year of the provision, would be 89.34[gCO2eq/MJ], with a reduction of 2% from the reference value.

There are no default GHG intensity values assigned to biofuels, such as biodiesel, and RFNBOs (Renewable Fuels of Non-Biological Origin) which are produced using hydrogen derived from renewable energy sources, such as e-methanol. This is based on the understanding that the GHG intensity of such fuels vary significantly depending on the production methods. Therefore, the GHG intensity of these fuels must be calculated individually using the method described later in Q2-3.

It has also been clarified that the values used for monitoring and reporting under the FuelEU Maritime must be presented with five decimal places. (please note that, for penalties, the values are rounded to the nearest whole number.)

The GHG intensity values for each fuel, along with the limit values, are outlined in the diagram below. (In the diagram below, GHG intensity values are shown with two decimal places for simplicity.)

Overview of GHG intensity of each fuel and limits



If more than one type of fuel is used, the GHG intensity of the ship is calculated as a weighted average of the GHG intensity values of those fuels, based on the amount of energy used. (Refer also to Q2-6 regarding the GHG intensity calculation.)

To incentivize the use of renewable fuels of non-biological origin (RFNBO), such as ammonia produced using renewable energy, the GHG intensity from those fuels is calculated as half in the GHG intensity calculation. This measure applies from 1 January 2025 to 31 December 2033.

In addition, the data collected under the EU-MRV Regulations must also be used for the FuelEU Maritime monitoring and reporting purpose, i.e., fuel quantities reported for EU-MRV Regulation and FuelEU Maritime should be consistent.

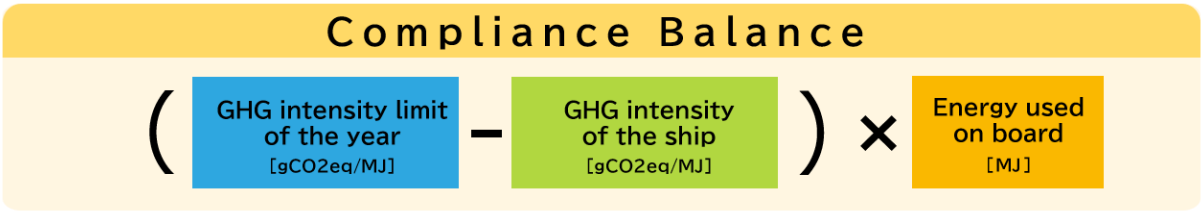
Q2-2. What is Banking, Borrowing, Pooling?

The GHG intensity provision allows a ship to bank the corresponding amount of GHG emissions that achieved GHG intensity limit for the use in the following years (“Banking”). In addition, the corresponding amount of GHG emissions that did not achieve GHG intensity limit may be compensated by compliance surplus expected to be obtained in the following year (“Borrowing”). Further, it is also possible to compensate the compliance surplus and compliance deficit among multiple ships in a certain year (“Pooling”).

Compliance Balance

The calculation of banking, borrowing and pooling is based on the surplus or deficit of GHG emissions against the GHG intensity limit for the relevant year, known as the “compliance balance”. This is expressed in [gCO2eq].

If the ship’s GHG intensity achieves the limit, a “compliance surplus” occurs, resulting in a positive value. Conversely, if the ship’s GHG intensity does not achieve the limit, a “compliance deficit” occurs, resulting in a negative value.



(Note) If OPS is used, then a separate calculation is required.

An overview of Banking, Borrowing, Pooling is outlined below.

◆Banking (for the same ship only)

If the ship’s GHG intensity of a reporting year achieves the GHG intensity limit for that year, the compliance surplus can be carried forward to the following year. Banking should be recorded in the FuelEU database by the shipping company after approval by the verifier. However, the banking is not available after the issue of a FuelEU Document of Compliance.

◆Borrowing (for the same ship only)

If the ship’s GHG intensity of a reporting year exceeds the GHG intensity limit for that year, the corresponding amount of the compliance surplus can be borrowed from the following year. Borrowing amount can be counted to the GHG intensity calculation for the reporting year for the ship in question, but 1.1 times of the borrowed amount will be subtracted from the following year. Borrowing cannot be used for two consecutive reporting years. Also, the

maximum amount that can be borrowed is up to 2% of the GHG intensity limit for the year, as follows:

Borrowing limit [gCO2eq]: 2% of the GHG intensity limit for the year [gCO2eq/MJ] × energy consumption for the year [MJ].

The borrowed amount should be the same amount of the compliance deficit. For example, if the borrowing limit is 5,000[tCO2eq] and there is a compliance deficit of 7,000[tCO_2eq], it is not allowed to borrow only 5,000[tCO_2eq] leaving the remaining deficit of 2,000[tCO_2eq]. Borrowing is only permitted when the total compliance deficit is equal to or less than the borrowing limit of 5,000[tCO2eq].

◆Pooling (in the same reporting period)

Shipping companies can compensate the compliance surplus and compliance deficit among multiple ships in the same reporting period, by allocating a compliance surplus of a ship to a compliance deficit to another ship, which is called “pooling”. Pooling can also be set up by two or more shipping companies. The remaining compliance surplus after the pooling can be banked.

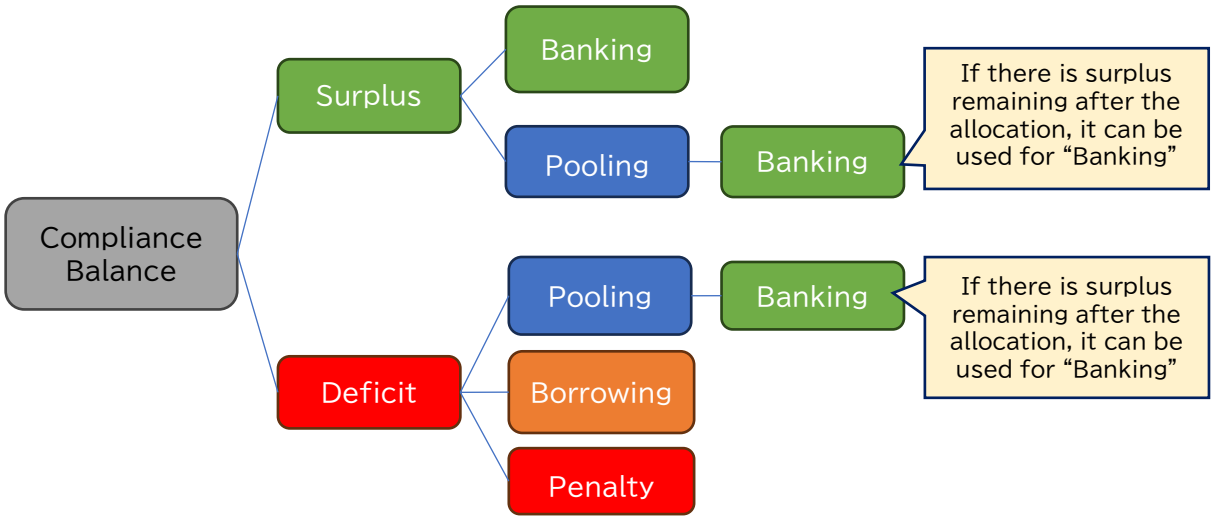
To use the pooling, the following should also be noted:

- A ship cannot be included in more than one pool.
- The sum of the compliance balance of all ships in a pool is configured to be equal or positive. (Pooling is not allowed when the pool’s total compliance balance is negative.)
- A ship that uses “borrowing” cannot be included in a pooling.
- A ship with a compliance deficit will never increase that deficit by joining a pool.
- A ship with a compliance surplus should not have a compliance deficit by joining in the pool.
- A ship that still has a compliance surplus as a result of the allocation within the pool can use that surplus for “banking”.

When pooling is used, shipping companies must register the following information in the FuelEU database, for the verification of the pool:

- Compliance balance of each ship in the pool.
- Allocation of the compliance balance for all ships in the pool.
- Information of the verifier assessing that allocation.

Options for a ship with compliance surplus or compliance deficit



Q2-3. How to calculate GHG intensity when biofuels or RFNBOs are used?

In the FuelEU Maritime, “biofuels” means “liquid fuel for transport produced from biomass.” Also, “biomass” means the biodegradable fraction of products, waste and residues from biological origin from agriculture, forestry, fisheries, aquaculture and related industries.

While the FuelEU Maritime does not identify the default emission factor for the biofuels, if a ship uses biofuel that is certified under the scheme recognized by the European Commission (Directive (EU) 2018/2001, RED), the GHG intensity of the fuel can be obtained based on the lifecycle GHG intensity value identified in the relevant document (**Proof of Sustainability** certificate or similar documents).

Specifically, since the lifecycle (well-to-wake) GHG intensity value certified under RED scheme does not consider Tank-to-Wake CH4 and N2O emissions, the GHG intensity value used for the FuelEU Maritime should be newly calculated by adding the Tank-to-Wake CH4 and N2O emissions.

> As an example, if the lifecycle GHG intensity value identified in the **Proof of Sustainability** certificate for a biofuel (giving Biodiesel as a sample) certified under RED scheme is 14.9[gCO2eq/MJ], the GHG intensity value of that fuel under the FuelEU Maritime is 16.38[gCO2eq/MJ].

Please note that the above example is based on 100% biofuel (B100). For blended oils such as B24, the GHG intensity value of the blended oil is calculated by weighting the GHG intensity of the biofuel component and the fossil fuel component according to their respective energy content.

In the cases where biofuels are not certified under the RED certification scheme, or where they are produced from food and feed crops, the GHG intensity calculations for these biofuels shall use the same emission factors as the least favourable fossil fuel pathway for that type of fuel, in accordance with the FuelEU Maritime.

Like biofuels, RFNBOs may also have their GHG intensity calculated in accordance with the FuelEU Maritime, based on the lifecycle GHG intensity value identified in the **Proof of Sustainability**, provided that the RFNBO is certified under RED scheme.

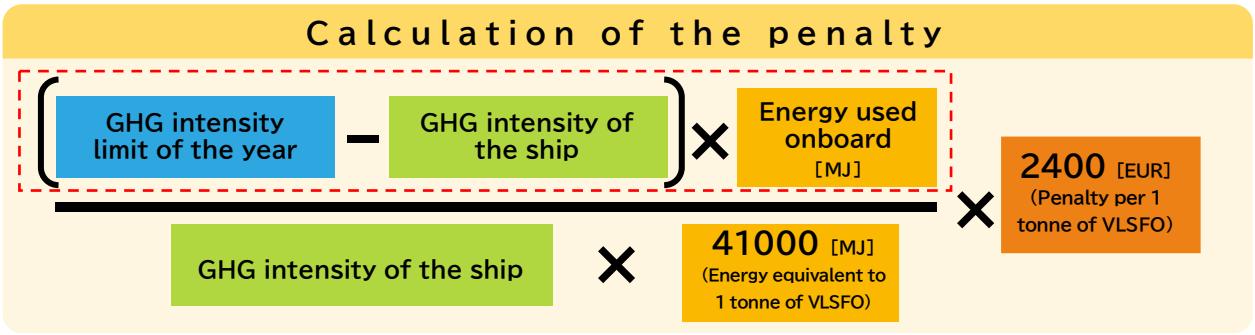
As an example, if the lifecycle GHG intensity value of e-methanol identified in the **Proof of Sustainability** certificate under RED III is 10.0[gCO_2eq/MJ], the GHG intensity value of that e-methanol under the FuelEU Maritime would be 12.95[gCO_2eq/MJ].

Calculation examples for the GHG intensity of biofuels and RFNBOs are provided in the "Report of ESSF SAPS on Calculation methodologies under FuelEU".

Q2-4. How is the penalty calculated for GHG intensity provisions?

Under GHG intensity provision, if the GHG intensity of the fuel used on board exceeds the GHG intensity limit for the year in question, a penalty should be paid. The amount of the penalty is determined according to the type of fuel and the amount of the fuel used, etc.

The formula to determine the amount of the penalty for a ship is outlined below.



The part surround in red means a compliance balance. If the calculation result of the formula is negative, the penalty will be incurred being converted to the absolute value of it. If multiple fuels are used, the "GHG intensity of the ship" in this calculation formula is the weighted average GHG intensity of the fuels used. (Refer also to Q2-6.)

For ships that have failed to achieve the GHG intensity limit for two or more consecutive years, the amount of the penalty is multiplied by $1+(n-1)/10$, where n is the number of years to which the penalty applies. For example, a ship that needs to pay the penalty for two consecutive years, the amount of the penalty for the second year will be 1.1 times of the amount calculated using the formula above.

If no voyages subject to FuelEU Maritime take place in a given year (e.g. year Y), and penalties are imposed in both the preceding year (Y-1) and the following year (Y+1), this will not be considered a "consecutive occurrence. Therefore, the increased penalty mentioned above will not apply. For example, if penalties are imposed in 2025 and 2026, no EU/EEA voyages occur in 2027, and a penalty is imposed again in 2028, the "consecutive" condition will be reset in 2028, and the increased penalty will not apply in 2028.

Furthermore, this penalty increase applies to ships managed by the same ISM company. Accordingly, if a penalty is imposed in year Y under the management of Company A, and another penalty is imposed in year Y+1 under the management of Company B, this is not

considered a “consecutive” penalty under the same management company. As such, the increased penalty will not apply to that ship for year Y+1.

Q2-5. What is the provision for ice-class ships?

The FuelEU Maritime allows ships with ice class IC, IB, IA or IA Super or an equivalent ice class to exclude the additional energy consumption due to sailing in ice conditions from the total energy use applicable under the FuelEU Maritime, until 31 December 2034.

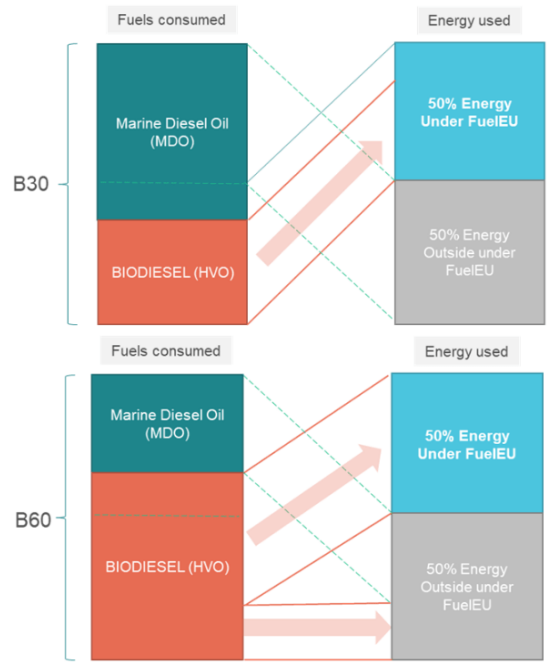
In addition, ships with ice class IA or IA Super or an equivalent ice class are also allowed to deduct additional energy consumption resulting from their technical characteristics from the total energy use applicable under the FuelEU Maritime, which specifically allows for the exclusion of 5% of the total energy used.

Q2-6. In which order is the fuel allocated in the GHG intensity calculation?

The GHG intensity requirements under the Fuel EU Maritime Regulation apply to the energy used on board ships during the following voyages and port stays (Refer also to Q2.):

- Voyages between EU/EEA and non-EU/EEA ports :50% of energy used
- Voyages within EU/EEA ports :100% of energy used
- Berthing in EU/EEA ports :100% of energy used

In the Q&A on the FuelEU Maritime Regulation issued by the European Commission, when multiple types of fuel are used, it was clarified that, for the calculation of GHG intensity of a 50% voyage as described above, the fuel with the lower GHG intensity can be prioritized in the calculation, up to a maximum of 50% of the energy used during that voyage. In the Q&A, the following examples are given for the use of fuels where marine diesel oil (MDO) and biodiesel (HVO) blended as B30 and B60, respectively.



Use of bio-blend B30
(30% biodiesel + 70% fossil diesel)

The entire HVO and part of the MDO can be used as fuel for the calculation of the annual average GHG intensity.

In this case, the amount of MDO is adjusted so that the total energy content of HVO and MDO used in the calculation is 50% of the total energy content for the voyage concerned.

Use of bio-blend B60
(60% biodiesel + 40% fossil diesel)

HVO can be used as fuel for the calculation of the annual average GHG intensity up to 50% of the total energy content of the voyage concerned.

Example of GHG intensity calculations for the use of biofuels during a voyage between ports in EEA Member States and non-EEA Member States
(Source: Questions and Answers on Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC)

This calculation method, which prioritizes the use of low GHG intensity fuels, helps lower the GHG intensity of the corresponding voyage.

Moreover, the overall calculation methodologies under the FuelEU Regulation, efforts are ongoing within the European Sustainable Shipping Forum (ESSF), a working group that

includes EU/EEA Member States, industry stakeholders, and verifiers.

In the practical guidance titled "Report of ESSF SAPS on Calculation methodologies under FuelEU" published by the ESSF in May 2025, it is further clarified that the annual GHG intensity can be calculated by prioritizing the allocation of fuels with lower GHG intensity. This approach is not limited to 50% voyages or to low-carbon fuels such as biofuels or RFNBOs, but can be applied to all fuels used.

GHG Intensity Calculation Prioritizing Fuels with Lower GHG Intensity (Annual Basis)

Q2-7. What are the benefits of installing wind-assisted propulsion systems?

Under the FuelEU Maritime GHG intensity calculation, ships equipped with wind-assisted propulsion systems that have undergone the required verification may apply a reward factor (f_{wind}) allowing for up to a 5% reduction in the annual average GHG intensity, regardless of whether the system is actually used.

<Ship without Wind-assisted propulsion system>

GHG intensity [gCO2eq/MJ] = (Well to Tank GHG intensity + Tank to Wake GHG intensity)

<Ship with Wind-assisted propulsion system>

GHG intensity [gCO2eq/MJ] = f_{wind} x (Well to Tank GHG intensity + Tank to Wake GHG intensity)

Reward factor for wind-assisted propulsion (f_{wind})	P_{Wind} / P_{Prop}
0.99	0.05
0.97	0.1
0.95	≧ 0.15

The reward factor (f_{wind}) is determined using other factors P_{wind} and P_{Prop}. P_{wind} represents the available effective power delivered by the specified wind assisted propulsion system (i.e., the reduction in propeller thrust), and P_{Prop} represents 75% of the rated installed power (MCR) of the main engine(s).

For GHG intensity calculation, P_{wind} shall use values verified in accordance with “2021 guidance on treatment of innovative energy efficiency technologies for calculation and verification of the attained energy efficiency design index (EEDI) and energy efficiency existing ships index (EEXI) (MEPC.1/Circ.896)”, and P_{Prop} shall use those verified in accordance with the 2022 Guidelines on the method of calculation of the attained energy efficiency design index (EEDI) for new ships and the 2021 Guidelines on the method of calculation of the attained Energy Efficiency Existing Ship Index (EEXI), respectively.

Q2-8. How are methane slip emission factors determined?

In GHG emissions calculations under the FuelEU Maritime, when LNG fuel is used, the methane slip is accounted for as CH4 emissions. The methane slip emission factors (i.e., methane slip rates relative to LNG-fuel consumption) are set to the following default values, depending on the combustion system of LNG-fueled engine.

Combustion system of LNG-fueled engine	Methane slip emission factor (default value) [% of gFuel]
LNG: for LNG Otto (dual fuel medium speed)	3.1
LNG: for LNG Otto (dual fuel slow speed)	1.7
LNG: for LNG Diesel (dual fuel slow speed)	0.2
LNG: for Lean-Burn Spark-Ignited (LBSI)	2.6
LNG: boiler, Gas Combustion Unit	0

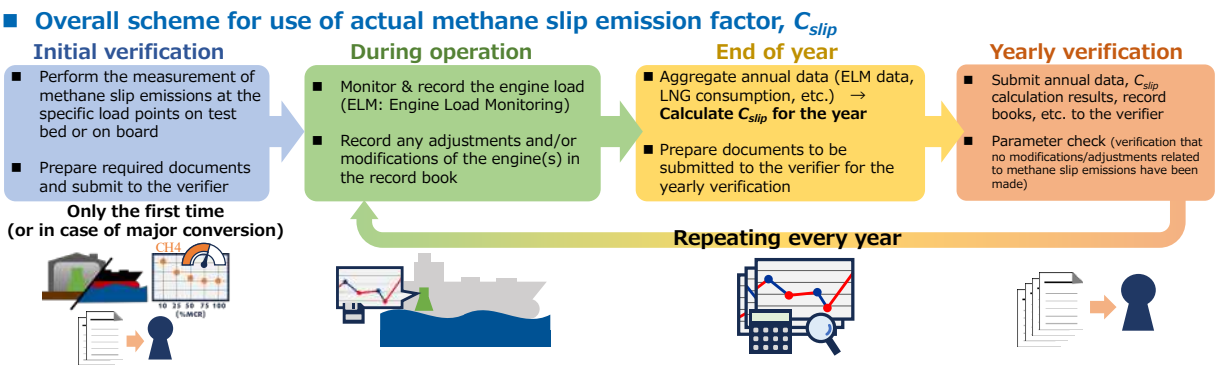
When using actual values instead of the default values, verification must be carried out in accordance with the guidelines issued by the European Commission in October 2025: "Guidelines for Reporting and Verification of Actual Methane Slip Tank-to-Wake Emission Factors from Marine Diesel Engines under the Scope of FuelEU Maritime Regulation".

As methane slip varies with engine load (generally increasing at lower loads), actual methane slip emission factors are determined by calculating the weighted average of (1)"methane slip rate at each representative load points" using (2)"rates of operation time at each load during the ship's operation in the year" (note that the measurement of (2) is required every year). In practice, (1) the methane slip rates at representative load points are first determined through measurement tests, etc. Then, (2) during operation, the engine load is continuously monitored & recorded throughout the year (referred to as ELM: Engine Load Monitoring). Finally, the annual methane slip emission factor for the year is calculated from these data at the end of the reporting period.

In addition, it is necessary to prepare a technical document related to methane slip (referred to as "Methane File"), as well as to amend the monitoring plan, to prepare and maintain relevant record books, and to submit the data and records related to methane slip in the annual verification, in accordance with the guidelines.

Materials summarizing the guidelines can be downloaded from the following:

https://www.classnk.or.jp/hp/ja/authentication/eumrv/index.html



Q3. What is an overview of the provisions of the use of on-shore power supply?

◆Overview of provisions requesting the use of on-shore power supply (OPS) or zero-emission technology in port(containerships and passenger ships only)

From 1 January 2030, containerships and passenger ships are required to use an on-shore power supply (OPS) for all electricity while moored in designated EU/EEA ports.

The ports subject to this provision are defined as TEN-T maritime ports, specifically, TEN-T core maritime ports and TEN-T comprehensive maritime ports defined under the EU Alternative Fuels Infrastructure Regulation (AFIR) (Regulation (EU) 2023/1804).

The specific port names are listed in the table in Annex II of the Regulation on Union guidelines for the development of the trans-European network (Regulation (EU) 2024/1679), where the column “MARITIMEPORT” indicates either “Core” or “Comprehensive.” Ports marked as such are designated as TEN-T maritime ports.

In addition, from 1 January 2035, ships moored at the quayside which is not covered by the above-mentioned ports will also be required to connect to OPS, where the port is equipped with available OPS. Further, EU/EEA Member States may also apply this provision in ports under their jurisdiction from January 2030 to December 2034, other than the aforementioned ports, by notifying the European Commission one year in advance.

However, the obligation to use OPS shall not apply to ships that:

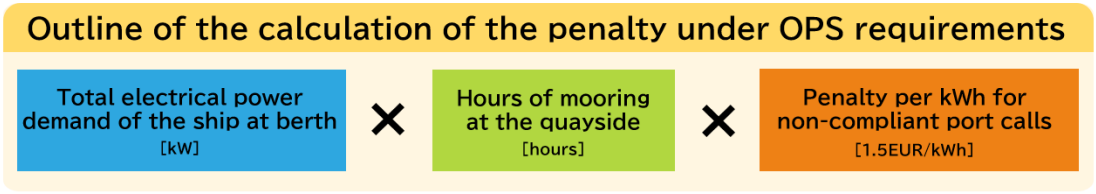
- are moored at the quayside for less than two hours;
- use zero-emission technologies, such as fuel cells, batteries, wind or solar power, for all their electrical power demand at berth, while moored at the quayside;
- have to make an unscheduled port call for reasons of safety or saving life at sea;
- are unable to connect to OPS due to the unavailability in a port;
- are unable to connect to OPS because exceptionally the electrical grid stability is at risk;
- are unable to connect to OPS because the shore installation at the port is not compatible with the onboard on-shore power equipment;
- for a limited period of time, require the use of onboard energy generation, under emergency situations representing immediate risk to life, the ship or the environment or for other reasons of force majeure; or
- while remaining connected to OPS, for a period of time limited to what is strictly

necessary, require the use of onboard energy generation for maintenance tests or for functional tests carried out at the request of an officer of a competent authority or the representative of a recognised organization undertaking a survey or inspection.

◆Penalties for the failure to comply with provisions requesting the use of OPS

Failure to comply with this provision is, by paying a penalty based on the amount of power, etc. during the mooring, deemed to be in compliance with the requirement.

The formula for calculating the penalty is as follows:



([hours] should be rounded up to the nearest whole hour)

Q4. What is an overview of the provisions of the use of RFNBO?

◆Overview of provisions requesting the use of RFNBO

This provision will be introduced from 1 January 2034, if the share of RFNBO use in 2031 of the total energy used on board all ships covered by the FuelEU Maritime is less than 1%. RFNBO refers to Renewable Fuels of Non-Biological Origin, such as ammonia produced using hydrogen from renewable energy sources.

This provision requires each ship to use RFNBO as 2% of the total energy used in a year. As with the GHG intensity provision, banking, borrowing and pooling can also be used to comply with this provision.

◆Ship to be covered

Ships over 5,000 GT arriving at or departing from ports under the jurisdiction of EU/EEA Member States are covered.

◆Energy used on board ships to be covered

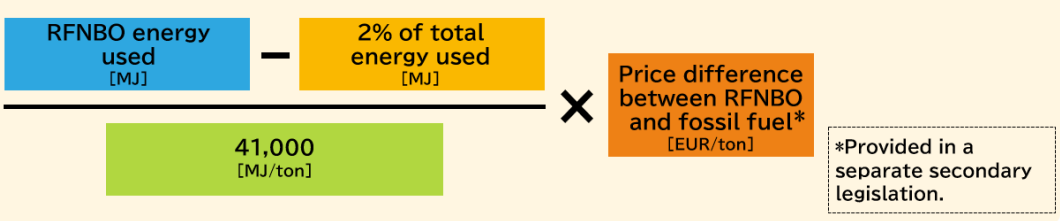
The energy used in the scope is same as GHG intensity provision and are as follows:

- Voyages between EU/EEA and non-EU/EEA ports :50% of energy used
- Voyages within EU/EEA ports :100% of energy used
- Berthing in EU/EEA ports :100% of energy used

◆Penalties for the failure to comply with provisions requesting the use of RFNBO

Failure to comply with this provision is, by paying a penalty based on the energy used, etc., deemed to be in compliance with the requirement.
The formula for calculating the penalty for a ship is outlined below.

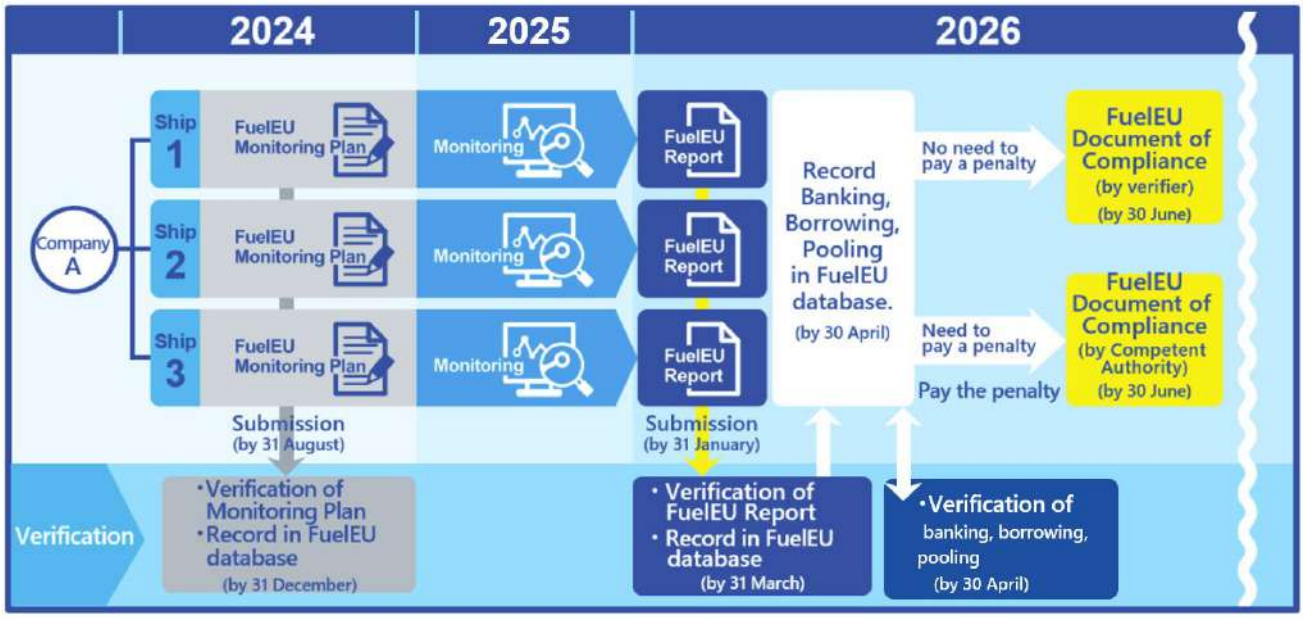
Outline of the calculation of the penalty under RFNBO requirements



Q5. What should I do for the FuelEU Maritime?

The specific preparations and their timelines required for shipping companies are as follows.

Timeline for the compliance with the FuelEU Maritime



◆By 31 August 2024 (for ships calling at a port of an EU/EEA Member State for the first time after that date, within two months of that port call)

A shipping company is requested to submit a FuelEU Monitoring Plan to the verifier via "THETIS-MRV" operated by the European Maritime Safety Agency (EMSA), which sets out the methods for monitoring and reporting the amount of energy (fuel type and consumption) used by ships during voyages and at berth.(Refer also Q5-1)

For ships calling an EU/EEA port for the first time after 31 August 2024 are requested to submit a FuelEU Monitoring Plan to the verifier within 2 months of that port call.

The FuelEU Monitoring Plan is assessed for the conformity with the requirements and then recorded in the FuelEU database (a module within "THETIS-MRV") by the verifier.

◆On or after 1 January 2025

For each ship, the data and information identified in the FuelEU Monitoring plan should be monitored and recorded.

◆By 31 January 2026 (thereafter, by 31 January every year)
The data and information that are monitored and recorded for the previous reporting year should be submitted to the verifier as a FuelEU Report for each ship.

◆By 31 March 2026 (thereafter, by 31 March every year)
The report submitted will be assessed by the verifier, and the GHG intensity and compliance balance of ships concerned calculated by the verifier are recorded in the FuelEU database by 31 March.

◆By 30 April 2026 (thereafter, by 30 April every year)
A shipping company can record banking, borrowing, and pooling, as necessary, on the FuelEU database after the FuelEU Report is verified and recorded in the FuelEU database by the verifier, no later than 30 April. In addition, a shipping company/companies using pooling, the shipping company/companies should select a verifier that verifies the composition of the pool and allocation of the total pool compliance balance to each individual ship by 30 April.

◆By 30 June 2026 (thereafter, by 30 June every year)
Based on the information recorded in the FuelEU database, the shipping company receives a FuelEU Document of Compliance of the ship, issued by the verifier, if the shipping company meets both the provisions of the GHG intensity and the use of OPS, i.e., in case no need to pay a penalty.

On the other hand, if a shipping company did not meet the GHG intensity limit or there was a non-compliance with the use of OPS, necessary amount of the penalty should be paid by this date. Upon the confirmation that the penalty has been paid, the shipping company will receive a FuelEU Document of Compliance issued by the competent authority.

> Note: Penalties should be paid to the Administering State; however, as the specific bank accounts and payment methods vary by Administering State, please contact the relevant competent authority for inquiries.
> Contact information for each competent authority is provided in the "List of Administering States Competent Authorities FuelEU Maritime".

Please note that the FuelEU Document of Compliance is valid for a period of 18 months after the end of the reporting period or until a new FuelEU Document of Compliance is issued.

Q5-1. What is the FuelEU Monitoring Plan and the FuelEU Report?

In accordance with the timeline identified in Q5, shipping companies should prepare a FuelEU Monitoring Plan and have it assessed by a verifier before the start of the monitoring year. once the monitoring year ends, a FuelEU Report should be prepared for submission to the verifier. The FuelEU Monitoring Plan and FuelEU Report should include the following info.

◆FuelEU Monitoring Plan

The FuelEU Monitoring Plan should include relevant information, such as:

- Ship's type/name/IMO number/shipowner and information of the shipping company (ISM company);
- Sources of Energy to be used on board while in navigation and at berth;
- Procedures for monitoring the fuel consumption of each fuel type;
- Procedures for monitoring the WtT and TtW emission factors of energy to be used;
- Standards and characteristics of OPS or a zero-emission technology (only for containerships and passenger ships); and
- Value of the established total electrical power demand of the ship at berth (only for containerships and passenger ships); and
- Information on the ship's ice class (if applicable); and
- Information on the ship's wind assisted propulsion systems (if applicable).

At the end of July 2024, implementing regulations setting out the template for the FuelEU Monitoring Plan was published. The FuelEU Monitoring Plan should be submitted to a verifier (ClassNK) electronically on TEHTIS-MRV in accordance with the specified format.

In this connection, a modification was made to allow the submission of FuelEU Monitoring Plans on THETIS-MRV. Videos on how to submit the FuelEU Monitoring Plan and its workflow, and the comparison table between EU-MRV Monitoring Plan and FuelEU Monitoring Plan are available on the following website of EMSA:
https://emsa.europa.eu/reducing-emissions/news-activities/item/5281-emsa-releases-the-first-building-block-of-the-fueleu-maritime-in-thetis-mrv.html

Please pay a special attention to that the responsible entity for the FuelEU Maritime Regulation is always the ISM company of the ships concerned. Therefore, FuelEU Monitoring Plan should also be submitted by the ISM company. This is different from the EU-ETS, where either the registered owner or the ISM company is the responsible entity. (The mandate document required under the EU-ETS is not required under the FuelEU Maritime Regulation.)

Please also note that the verifier shall carry out site visits in order to gain sufficient understanding of the ISM company and the FuelEU Monitoring Plan and reporting system as described in the plan.

The FuelEU Monitoring Plan is required to be updated and assessed by a verifier as appropriate when changing shipping companies or using new types of fuel, etc.

◆FuelEU Report

The FuelEU Report should include relevant information, such as:

- Departure and arrival ports (including date and time);
- For each type of fuel used while at berth and at sea, the Well-to-Tank、Tank-to-Wake、Well-to-Wake emission factors:
- Amount of fuels used while at berth and at sea;
- Amount of electricity supplied to the ship through the OPS;
- The ship's ice class, the date, time and position when entering and leaving the ice condition, the amount of each type of fuel used, the distance travelled when sailing in ice conditions (if applicable).

Based on the information provided in the FuelEU Report, the verifier makes necessary calculations, including:

- Yearly average GHG intensity of the energy used on board by the ship concerned;
- Amount of the yearly energy from the RFNBO used on board by the ship;
- GHG emissions for which the GHG intensity limit was achieved or not achieved;
- Number of non-compliant port calls for the use of OPS.

In the event of a change in the ship's shipping company during a monitoring year, the previous shipping company should promptly submit the necessary data for the period under its control to the verifier. The verification is then completed by the verifier within one month after the change, and the data is recorded by the verifier in the FuelEU database.

In addition, the responsibility for compliance with the FuelEU Maritime requirements for the entire monitoring period rests with the shipping company that manages the ship as of 31 December of the year.

Q6. Who pays the penalties in the FuelEU Maritime?

In the FuelEU Maritime, a "company" which is defined as follows, should comply with regulations:

'company' means the shipowner or any other organization 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.

In addition, the following provisions are also included in the FuelEU Maritime.

The *company* shall remain responsible for the payment of the FuelEU penalties, without prejudice to the possibility for the company to conclude contractual agreements with the commercial operators of the ship that provide for the liability of the commercial operators to reimburse the company for the payment of the FuelEU penalties, when the responsibility for the purchase of the fuel or the *operation of the ship* is assumed by the commercial operator. For the purposes of this provision, *operation of the ship* shall mean determining the cargo carried, the route and the speed of the ship.

Penalties for failure to meet the respective provisions should be paid to the Administering State of the shipping company to which the FuelEU Maritime applies.

Q6-1. How are the revenues from the FuelEU Maritime used?

Revenues from the penalty of the FuelEU Maritime will be used to support the introduction and promote the use of renewable and low-carbon fuels in the maritime sector. It is envisaged to encourage the production of more renewable low-carbon fuels in the maritime sector, facilitate the construction of on-shore power supply facilities in ports and support the development, testing and implementation of innovative technologies to achieve significant GHG emission reductions.

【Relevant Information】

EU-MRV and EU-ETS for shipping

EU-MRV regulations require the monitoring, reporting and verification of fuel consumptions used onboard ships etc. during EU-related voyages which have been implemented since 2018. Ships of 5,000 GTs and above calling at EU ports are required to prepare a monitoring plan for their fuel consumptions and an emission report containing the records of their CO2 emissions for verification by an EU-accredited verifier.

ClassNK provides verification services as an accredited verification body under EU-MRV regulations.
https://www.classnk.or.jp/hp/en/authentication/eumrv/

ClassNK also published "FAQs on the EU-ETS for Shipping", which outlines the content of the EU-ETS and detailed regulations of EU-ETS for shipping, to provide support to maritime stakeholders.

The FAQs can be downloaded from the following:

FuelEU Maritime and the IMO's candidate mid-term measures

IMO, at MEPC 80 in July 2023, adopted the 2023 IMO Strategy on Reduction of GHG Emissions from Ships, having the levels of ambition to reach net-zero GHG emissions by or around, i.e., close to 2050. Subsequently, at MEPC 83 in April 2025, draft amendments to MARPOL Annex VI were approved. These included mid-term measures consisting of a technical element, namely the reduction of fuels' life-cycle-based GHG intensity similar to the FuelEU Maritime (i.e., GFI regulations), and an economic element, the IMO Net-Zero Fund. However, at the second Extraordinary Session of MEPC (MEPC/ES.2) in October 2025, it was decided to postpone the adoption of the draft amendments for one year.
It remains unclear whether the current EU regulations will be terminated upon the entry into force of the IMO mid-term measures, so it is necessary to closely monitor the EU's actions.

Verification and management tools related to FuelEU Maritime

ClassNK offers a system “ClassNK MRV Portal” for monitoring and verification of data required under EU-MRV and IMO-DCS regulations. For FuelEU Maritime, preparations of FuelEU Monitoring Plan and FuelEU report are needed. ClassNK provides guidance on how to prepare these documents in the user guide for MRV Portal users. FuelEU Monitoring Plan that are to be created and submitted in the FuelEU database, which is THETIS-MRV operated by EMSA(European Maritime Safety Agency).

In addition, ClassNK released ClassNK ZETA (Zero Emission Transition Accelerator) in 2022 to efficiently manage GHG emissions from ships and CII ratings.

ClassNK ZETA, linked to the ClassNK MRV Portal storing various data provided by ships, is equipped with the functions to enable the constant monitoring of CO2 emissions and CII ratings for individual ships as well as for the entire fleet, and to simulate how CO2 emissions and CII ratings are changed with slow steaming, etc. Currently, ClassNK ZETA is serving more than 7,500 ships.

In relation to the introduction of the FuelEU Maritime regulation from 2025, ClassNK ZETA deployed FuelEU Maritime function that calculates the GHG intensity and compliance balance, etc., required under the FuelEU Maritime for effective management of banking, borrowing and pooling. Please utilize ClassNK ZETA for the compliance with the EU-ETS for shipping.

ClassNK ZETA as a cloud service is accessible immediately with only a simple application. Please place the application from “ClassNK ZETA application form” in the following website:
https://www.classnk.or.jp/hp/en/info_service/ghg/nk-zeta.html

※ The use of ClassNK ZETA does not guarantee the issuance of EU-MRV certification or any other verification results by ClassNK.

BIMCO clause for the FuelEU Maritime regulations

BIMCO (Baltic and International Maritime Council) has published the "BIMCO Time Charter Party (FuelEU) Clause", which stipulates the responsibilities concerning FuelEU Maritime compliance, including penalties for ships operating within the scope of the regulation and the handling of the Compliance Balance (CB). The clause includes the following key provisions:

- The **method of compliance with FuelEU Maritime** shall be determined by the **charterer**, taking into account the duration of the charter period.
- The ship owner shall notify the charterer, on a monthly or per-voyage basis, of the accumulated CB (Compliance Balance) at that time during the reporting period.
  - ✓ If the CB is negative (i.e., a deficit), the charterer shall pay the owner an amount equivalent to the penalty as a surcharge.
  - ✓ If the CB turns from negative to positive (i.e., becomes a surplus), the owner shall refund the difference between the total surcharges received and the improved CB value to the charterer.
- If the CB deficit is reduced or eliminated through borrowing or pooling (as instructed by the charterer), the owner shall refund the difference between the previously received surcharges and the actual penalty amount to the charterer.
- If the final CB for the reporting period is positive (i.e., a surplus), the owner shall pay the charterer a pre-agreed amount per tonne of surplus CB, no later than 30 June or the redelivery date, whichever is earlier.
- The clause also includes provisions for off-hire periods.

List of regulations and guidance documents related to FuelEU Maritime

◆FuelEU Maritime regulation

- FuelEU Maritime regulation: Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC (Text with EEA relevance)

◆Supporting regulations related to the FuelEU Maritime

- Implementing Regulation on the templated of the FuelEU Monitoring Plan: Commission Implementation Regulation (EU) 2024/2031 of 26 July 2024 on the template for monitoring plans pursuant to Regulation (EU) 2023/1805 of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC
- Implementing Regulation on verification activities of FuelEU Maritime : Commission Implementation Regulation (EU) 2024-2027 of 26 July 2024 on verification activities pursuant to Regulation (EU) 2023/1805 of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC
- Delegated Regulation on the accreditation of verifiers: Commission Delegated Regulation (EU) 2025/192 of 9 September 2024 on procedures for the accreditation of verifiers pursuant to Regulation (EU) 2023/1805 of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC of the European Parliament and of the Council
- Implementing Regulation on identifying neighbouring container transshipment ports: Commission Implementing Regulation (EU) 2025/1127 of 6 June 2025 laying down rules for the application of Regulation (EU) 2023/1805 of the European Parliament and of the Council as regards of identifying neighbouring container transhipment ports
- Regulation on Union guidelines for the development of the trans-European transport network (The applicable ports are listed as ”Core” and “Comprehensive” in the MARITIMEPORT column of Annex II.) : Regulation (EU) 2024/1679 of the European Parliament and of the Council of 13 June 2024 on Union guidelines for the development of the trans-European transport network, amending Regulations (EU) 2021/1153 and (EU) No 913/2010 and repealing Regulation (EU) No 1315/2013 (Text with EEA relevance)
- Guidelines on the reporting and verification of actual Tank-to-Wake methane slip emission factors: Guidelines for Reporting and Verification of Actual Methane Slip Tank-to-Wake Emission Factors from Marine Diesel Engines under the Scope of FuelEU Maritime Regulation

◆Guidance documents on FuelEU Maritime

- Guidance on the FuelEU Maritime Regulation: Guidance on the FuelEU Maritime Regulation
- Guidance on Fuel Certification: Report of ESSF SAPS WS on Fuel Certification
- Guidance on overall Calculation methodologies for FuelEU: Report of ESSF SAPS on Calculation methodologies under FuelEU

ClassNK
CHARTING THE FUTURE

FAQs on the FuelEU Maritime (5th Edition) [English]

NIPPON KAIJI KYOKAI
Business Assurance Division
Green Certification Department

4-7 Kioi-cho, Chiyoda-ku, Tokyo 102-8567, JAPAN
Tel : +81-3-5226-3025
E-mail : dcs@classnk.or.jp

www.classnk.com

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