



SHIPPING AND FIT FOR 55:

Managing compliance and optimising operations under the EU's new regime

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In

Introduction



From 1 January 2024, shipowners, operators and charterers will be subject to the world's first carbon price on shipping, with the inclusion of the maritime sector in the EU Emissions Trading System (ETS). In September 2025, the company mandated with the responsibility for EU ETS compliance will need to surrender sufficient EU Allowances, traded via the European Energy Exchange, to cover 40% of their fleets' 2024 tank-to-wake (TtW) carbon dioxide (CO₂) emissions. By 2027 they will need to surrender allowances for all emissions – not only of CO₂ but also methane (CH₄) and nitrous oxides (N₂O). Now EU ETS is in force, failure to surrender sufficient allowances each September will result in a penalty being accrued, in addition to the owed EU allowance.

Alongside that regime will run FuelEU Maritime, with 'shipping company' fleets having to meet stepped improvements in the lifecycle greenhouse gas (GHG) emissions intensity of the energy they use, or face penalties. The first penalties, to be paid by June 2026, will be for those who fail to reduce GHG emissions intensity in 2025 by at least 2% compared to 2020.

Further FuelEU requirements begin in 2030, with the requirement for container and passenger vessels to use onshore power supply (OPS) or a zero-emission alternative when berthed at major European ports. That requirement will be extended to a wider range of ports from 2035, by which time all shipping companies will be subject to penalties if their annual GHG intensity is not 14.5% lower than it was in 2020.

Combined, the GHG pricing under ETS and the penalty-driven performance standard under FuelEU represent new demands on shipping stakeholders around administration, reporting and verification, contractual relationships and cost forecasting (see chart). As always with new regulatory regimes, there is also potential for competitive advantage for those that can optimise compliance. As well as considering investment in decarbonisation solutions – covered in several other Lloyd's Register (LR) publications including the

[Fuel For Thought](#) series and the [Engine Retrofit Report](#) – shipping companies will need to consider effective fleet utilisation, routing, charter agreements, pricing, emissions trading and more to minimise exposure to carbon prices and penalties.

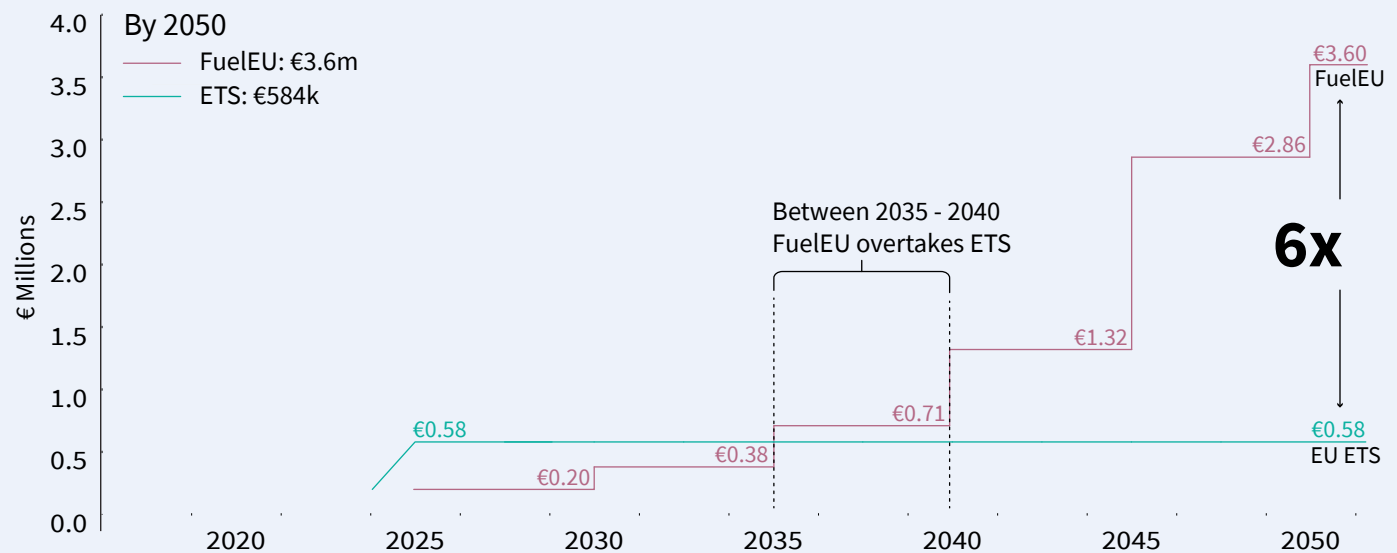
Those considerations will need to be made in the context of wider changes to Europe's emissions regime. FuelEU and the inclusion of shipping in the EU ETS reform are just two elements of Europe's 'Fit for 55' package, which aims to drive a 55% reduction in EU emissions by 2030. Other elements include:

- **The Alternative Fuels Infrastructure Regulation (AFIR), setting targets for the deployment of supply networks to support the uptake of renewable fuels in the road, air and waterborne transport sectors.**

- A revised Renewable Energy Directive (RED III), facilitating and setting both overall and industry-specific targets for the proportion of Europe's energy demand to come from renewable sources.
- The Carbon Border Adjustment Mechanism (CBAM), which aims to prevent internal EU measures from increasing emissions outside EU borders by certifying emissions related to a range of imported goods and materials.

This report draws on the wide cross-sectoral expertise of LR's regulatory affairs, advisory and vessel segment teams to highlight key steps for compliance and identify key strategic considerations for optimising exposure to Europe's emerging emissions regime.

EU ETS and FuelEU Maritime cost comparison



Note: EUA and FuelEU penalty costs for vessel emitting 9,725 tonnes of CO₂ equivalent (CO₂eq) on voyages to and from the EU, and 1,399 CO₂eq tonnes on intra-EU voyages or at berth in EU ports; excludes EUA price changes, potential impact of FuelEU penalties and penalty multipliers for non-compliant port calls without using onshore power supply or failing to meet 2% RFNBO usage.

1

The EU Emissions Trading System



Background

In 2013, the European Commission (EC) adopted a strategy for progressively integrating maritime transport emissions into the European Union’s (EU) policy for reducing GHG emissions. As a first step, in 2015 the EU established a system for the monitoring, reporting and verification (MRV) of emissions from maritime transport^[4], with 2018 as the first year of reporting. The MRV was to be followed by GHG emissions reduction targets for maritime transport and the application of a market-based measure.

Shipping’s inclusion in the EU ETS^[4] from 1 January 2024 fulfils the latter commitment. The EU ETS is a cap-and-trade system where a limit is put on how many GHG emissions are permitted to be released into the atmosphere from industries. Companies falling under the scope of EU ETS are able to trade emission rights and must surrender purchased allowances, equivalent to their emissions each year. Those that report emissions in excess of those covered by their purchased allowances must pay a financial penalty into the ETS system.

As a result of shipping’s inclusion into the EU ETS, and noting that a functional MRV scheme is fundamental for the application of ETS to the maritime sector, an update to the EU MRV scheme^[4] was adopted in June 2023. This expands the monitoring and reporting requirements within MRV to include methane (CH₄) and nitrous oxide (N₂O) in addition to carbon dioxide (CO₂).

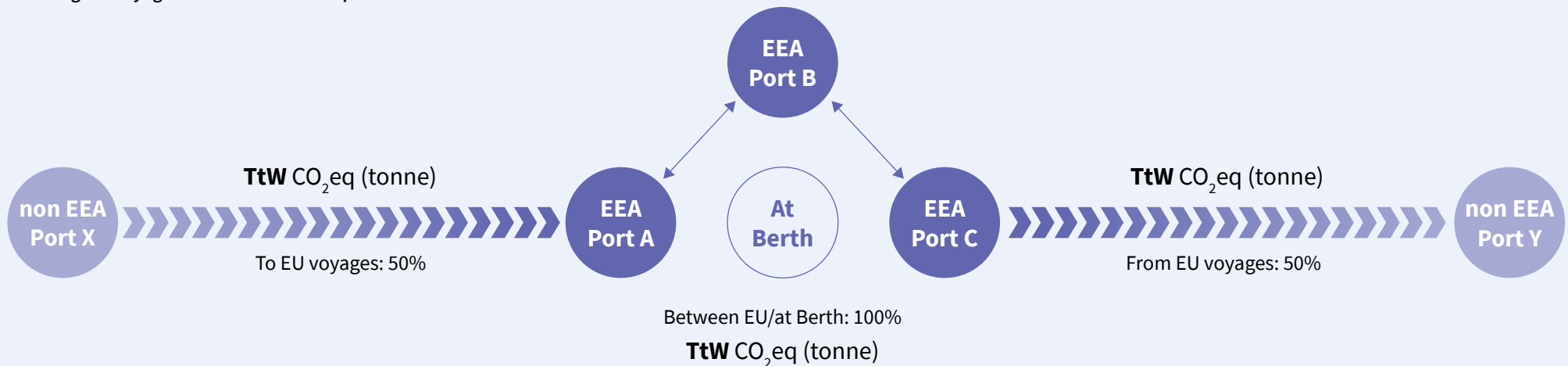
Application

Tank-to-wake (TtW) CO₂ emissions from cargo and passenger ships of 5,000GT and above, reported under the MRV system in 2024, will be subject to the ETS in 2025. For offshore ships and general cargo ships of 400GT to 5000GT, and for offshore ships of 5000GT and above, MRV reporting will be applicable from 2025. A review of the subsequent inclusion of offshore ships of 5,000GT and above is intended by December 2026, for inclusion in the ETS from 2027. A review of the system in 2026 will consider whether emissions should be considered on a Well-to-Wake (WtW) instead of TtW basis.

Those vessels in scope of the ETS will need to buy EU Allowances (EUA) to cover half of their GHG emissions to and from EU, Norwegian and Icelandic (EEA) ports, and all emissions for intra-EEA voyages and while at berth at EEA ports.

In 2024, 40% of reported eligible CO₂ emissions will be subject to the ETS, ramping up to 100% of reported eligible emissions in 2026, with EUA’s to be paid by 30 September the year after the reporting year. CH₄ and N₂O emissions will be included in MRV from 2024, for reporting in 2025, and will be included in ETS from 2026.

Percentage of voyage emissions in ETS scope



EU ETS maritime introduction timeframe

	2023	2024	2025	2026	2027	2028+
Ship sizes and types	MRV Review		ETS Review			
Cargo/Passenger ships* (5,000 + GT)			First surrendering year on 2024 emissions			
Offshore ships (5,000 + GT)	-	-				First surrendering year on 2027 emissions
Offshore and general cargo ships (400 - 5,000 GT)	-	-			Inclusion in the EU ETS to be considered as part of the ETS review	
Greenhouse gases						
Carbon dioxide (CO ₂)						
methane (CH ₄) and Nitrous Oxide (N ₂ O)	-					
Phase in						
% of emissions to be surrendered as per the EU ETS Directive	0%	40%	70%	100%	100%	100%

*Ships already covered today by the EU MRV regulation

— Under MRV scope — Under MRV and EU ETS scope

Regulation (EU) 2023/2895 includes derogations for specific ship types and voyages. Each is valid until 31 December 2030:

- Ships of ice class IA, IA Super or an equivalent ice class may surrender 5% fewer allowances than their verified emissions.
- Voyages by passenger and ro-pax ships (except cruise vessels) between an EU island with a population of less than 200,000 permanent residents – and no road or rail link to the mainland – and a port in the same country. Voyages between a port located in an outermost region of an EU member state and a port located in the same country, including voyages between ports within an outermost region or in different outermost regions of the same state.
- Voyages by passenger and ro-pax vessels fulfilling transnational public service obligations (or transnational public service contracts) between two EU member states, one having no land border with another EU member state and the other being the closest.

Polluter pays

Under the EU ETS regulation, “member states must ensure that if another entity other than the shipping company, under a contract, takes over buying fuel or running the ship, the shipping company can be reimbursed for the costs of giving up allowances.”

How this will be enforced by individual member states remains to be seen and, therefore, it would be preferable for express provision to be included in a charter party, clearly allocating liability for the cost (and provision) of allowances.

Preparing for EU ETS compliance

1

Decide who has responsibility for ETS and MRV

Within the EU MRV and ETS the shipping company is responsible for overall compliance. Under MRV this involves the development of a monitoring plan, data collection, verification and reporting of emissions at ship and fleet level. Within EU ETS this includes surrender of ETS fleet emissions allowances.

In both ETS and MRV, the shipping company is defined as the shipowner or any other organisation or person – such as the manager or the bareboat charterer – that has assumed the responsibility for the operation of the ship and, for EU ETS, has agreed to take over all the duties and responsibilities imposed by the ISM Code.

Responsibility for MRV and ETS compliance must be contractually delegated to the same responsible entity. Shipowners may choose to retain this responsibility or delegate it. If no mandate has been provided, the shipowner will be the default responsible entity.

2

Find out which AA is responsible for your company

Each shipping company will be associated with the Administering Authority (AA) of one EU member state. The AA will be allocated in accordance with the rules spelled out in the EU ETS Directive. The list of attributed AA's available from 1 February 2024 onwards. It will then be updated every two years to reattribute (where necessary) shipping companies registered in an EU member state, and every four years for shipping companies registered in a non-EU member state.

If a shipping company is not on the list (e.g. a new company), it will have to register for THETIS-MRV with the THETIS-MRV helpdesk.

3

Open an account in the Union Registry

Each shipping company must request a Maritime Operator Holding Account (MOHA) within the Union Registry from its designated AA. The MOHA is essential for shipping companies to register annual GHG emissions at company level by 31 March each year, surrender EU Allowances by 30 September each year and transfer Allowances. The latter point means it is not necessary for a shipping company to have a trading account within the Union Registry.

Requests for the MOHA must be made within 40 working days of a shipping company being included on the published list of attributed member states. For those shipping companies not on the list an application for a MOHA must be made within 65 days of the first port of call of a voyage covered by the EU ETS.

For more information, see [FAQ – Maritime transport in EU Emissions Trading System \(ETS\) \(europa.eu\)](#).

4

Update the ship's monitoring plan and submit it to the verifier and the AA

Shipping companies must prepare the MRV monitoring plan (MP) according to the Implementing Regulation (EU) 2023/2449. Those that already have an MP in place must have it updated and uploaded to the THETIS-MRV system, adding in the newly required additional information.

Shipping companies should have confirmed when their chosen verifier needs to receive the MP in order to verify and submit by 1 April 2024.

Key compliance dates

 From
  By
  On

2023

2024

1 Oct
2023

Mid Dec
2023

End
2023

1 Jan
2024

31 Jan - Mid Mar
2024

1 February
2024

Shipowners, ship managers or contractually mandated shipping companies must prepare the monitoring plans (MP) according to the Regulation 2023/2449. Shipowners and ship managers with ships that have a MP already in place must have it updated, adding in the newly required additional information.

Shipowners, ship managers or contractually mandated shipping companies should send the ship's MP to verifiers for assessment as soon as prepared.

Shipowners, ship managers or contractually mandated shipping companies should have agreed on the responsible entity for both ETS and MRV obligations.

Requirements for ETS and expanded scope of MRV compliance begins⁽¹⁾. Shipowners, ship managers or contractually mandated shipping companies to prepare and submit ship level emission reports for verification of 2023 CO₂ emissions data as per the 2015 MRV requirements⁽²⁾, and start monitoring voyages, fuel consumption and CH₄, N₂O and CO₂ emissions for reporting and verification in 2025.

Verifiers will undertake verification and site visit activities to assess the MP for conformance with the amended Regulation EU 2015/757 MRV requirements. A site visit may be physical, or can be virtual if there is sufficient understanding of the monitoring and reporting systems in place; the complexity of the ship allows for a virtual visit; and information can be obtained remotely. Site visits cannot be waived in the event of the development of a new MP or a modification to an existing one.

The European Commission will publish the first Administering Authority (AA) list (to be updated every two years), indicating the EU member state that will be the attributed AA for each shipping company. It is expected that companies will be able to open a Union Registry Maritime Operator Holding Account (MOHA) in 2024 after publication of the list of responsible AAs.

Key compliance dates *continued*

 From
  By
  On

2024

2025

1 Apr
2024

Updated MRV MP, assessed by accredited verifier, as compliant with ETS requirements, to be submitted to the AA. This submission must be via THETIS-MRV.

1 month before 31 Mar
2025

And every year thereafter: Shipowners, ship managers or contractually mandated shipping companies need to prepare and submit ship and company level emission reports (ER) to the verifier for assessment. As part of the verification, each company should receive a physical site visit at least once every four years. Site visits in intervening years may be virtual or waived (if conditions allow), but may not be waived for three consecutive periods. The ER verification, including site visit, must be completed before the submission deadline.

31 Mar
2025

And every year thereafter: Shipowners, ship managers or contractually mandated shipping companies need to submit the verified ER to the AA. Note that an AA may request this submission from 28 February, but this would need to be specifically stipulated by the AA ahead of the deadline for ER submission.

6 Jun
2025

AAs are to approve the MP submitted by 1 April 2024 for compliance with MRV requirements.

30 Sep
2025

And every year thereafter: Shipowners, ship managers or contractually mandated shipping companies are to surrender sufficient EU Allowances to cover the verified emissions as per the verified ER data at company level. This should be completed through a Union Registry MOHA (see [EU's ETS FAQ](#) for more details).

2

FuelEU Maritime



Background

While the inclusion of shipping in the EU ETS delivers a market-based measure that promotes improvements in energy efficiency, the European Commission understood that some instruments – such as carbon pricing or targets for the carbon intensity of activity – are not suited to bring about a significant shift towards renewable and low-carbon fuels, in the short and medium term.

Increasing the supply and distribution of such fuels is addressed by the EU Renewable Energy Directive⁽⁴⁾ (RED III) and Alternative Fuels Infrastructure Regulation⁽⁵⁾ (AFIR), the European Commission recognised that a tool that establishes increasing levels of demand for renewable and low-carbon maritime fuels was also necessary.

The FuelEU Maritime⁽⁶⁾ initiative is part of the Fit for 55 package aiming to enable the EU to reduce its net GHG emissions by at least 55% by 2030, compared to 1990 levels, and to achieve climate neutrality in 2050. The regulation lays down uniform rules imposing:

- A limit on the GHG intensity of energy used on board by a ship arriving at, staying within or departing from ports under the jurisdiction of an EEA country; and
- An obligation to use onshore power supply (OPS) or zero-emission technology in ports under the jurisdiction of a member state.

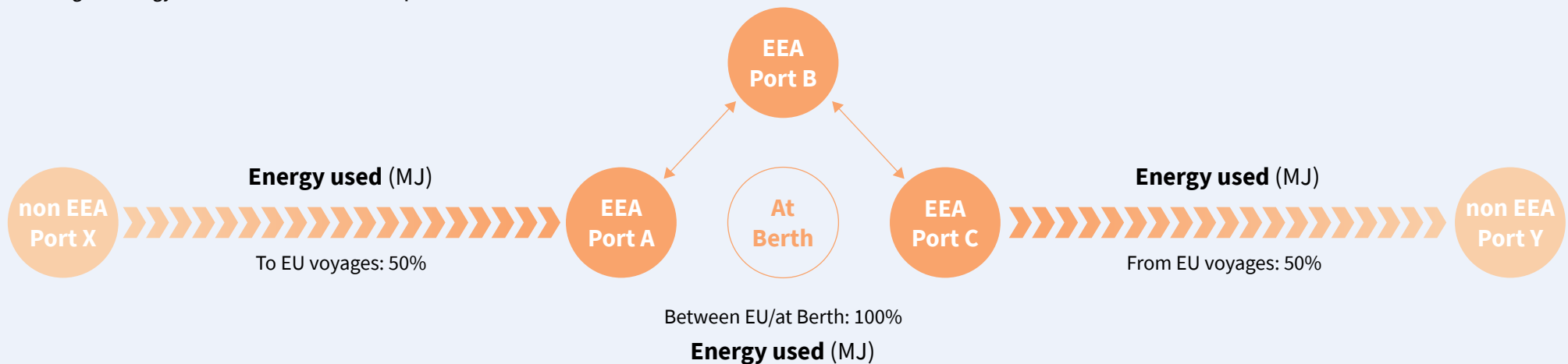
The FuelEU regulation was passed into law on 25 July 2023 and applies from 1 January 2025, with the exception of articles related to the required monitoring plan, which apply from 31 August 2024.

Application

To incentivise the use of renewable and low-carbon fuels on ships over 5,000GT, FuelEU sets targets that reduce the GHG intensity of energy used on ships, based on 2020 reference levels. The energy use within the scope of FuelEU is similar to the scope of emissions covered under the EU ETS: half of energy use on voyages to and from EEA ports, and all emissions for intra-EEA voyages and while at berth at EEA ports.

The reduction required in the lifecycle GHG intensity of fuels under FuelEU – measured based on reported fuel consumption similar to EU MRV and the emission factors of the fuels used on a well-to-wake basis – will gradually increase over time, by 2% in 2025 to 80% by 2050. There will be a financial penalty for each quantum of energy used above the reference level.

Percentage of energy used in FuelEU Maritime scope



The regulation includes a special incentive regime to support the uptake of so-called Renewable Fuels of Non-Biological Origin (RFNBO) with a high decarbonisation potential. It also excludes both fossil fuels and biofuels (or biogas) produced from food or feed crops from the regulation's certification process (see Chapter 4), allocating them the least favourable fossil fuel equivalent emission factors.

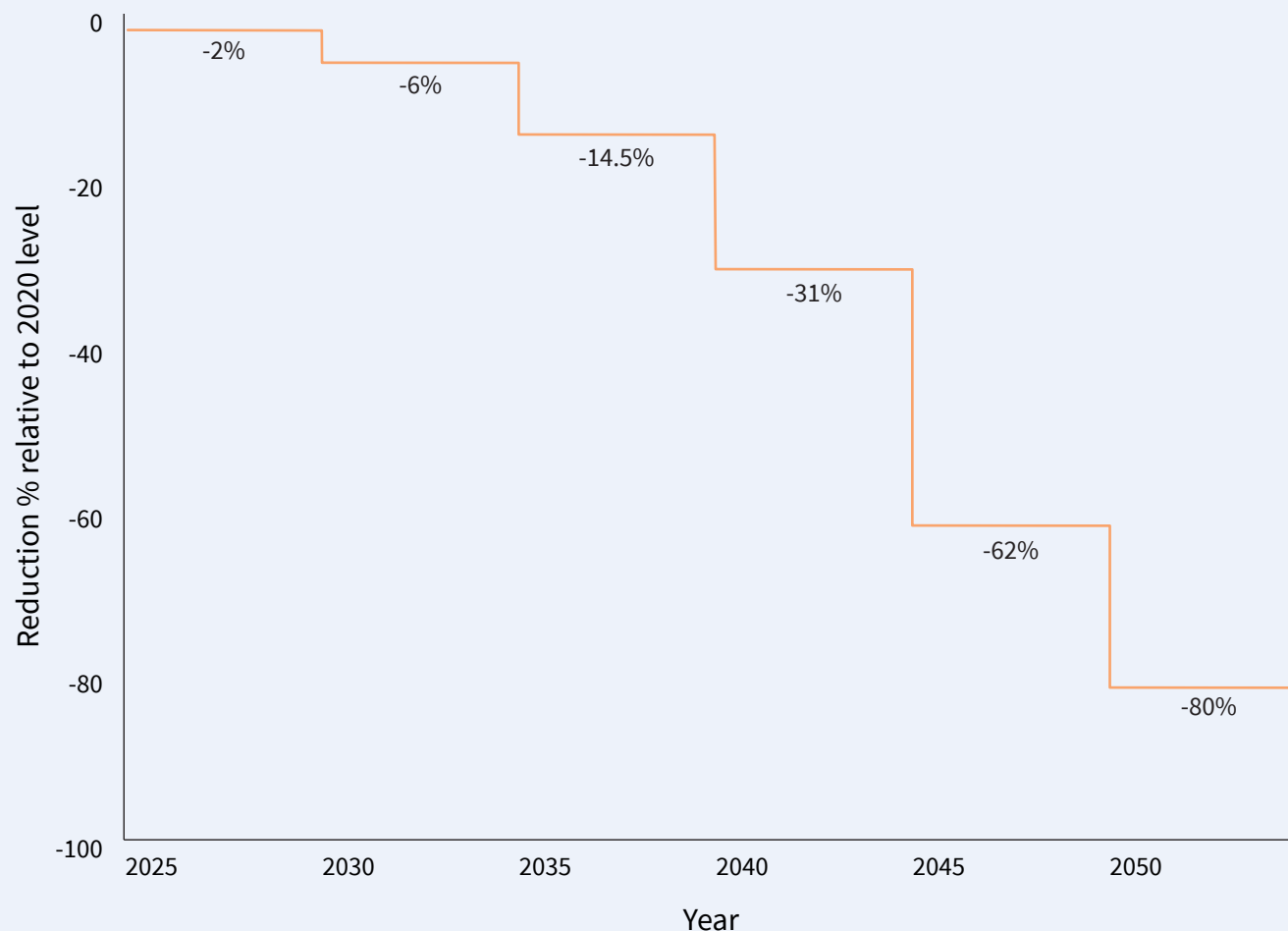
To incentivise zero-emission port stays, passenger ships and container ships will be required to connect to onshore power supplies at major EU ports (TEN-T ports required to provide shore power under Article 9 of AFIR) from 2030 and all EU ports with onshore power supply from 2035. This will not be the case for stays of under two hours or if the ship uses zero-emission technology whilst at berth, amongst other derogations. Any port contraventions will also be subject to financial penalties.

FuelEU includes a voluntary pooling mechanism, under which ships will be allowed to pool their compliance balance with one or more other ships. See Chapter 4 for more details on how pooling can help operators to optimise exposure to FuelEU penalties.

Like the EU ETS, FuelEU will also offer time-limited exceptions for the specific treatment of the outermost regions, small islands, and areas economically highly dependent on their maritime connectivity.

At the time of publishing there remain several unknown details around FuelEU compliance. Up to a total of 14 delegated and implementing acts are under development and will clarify specific elements of FuelEU Maritime.

FuelEU Maritime Reduction Factor



FuelEU Maritime: Steps for compliance

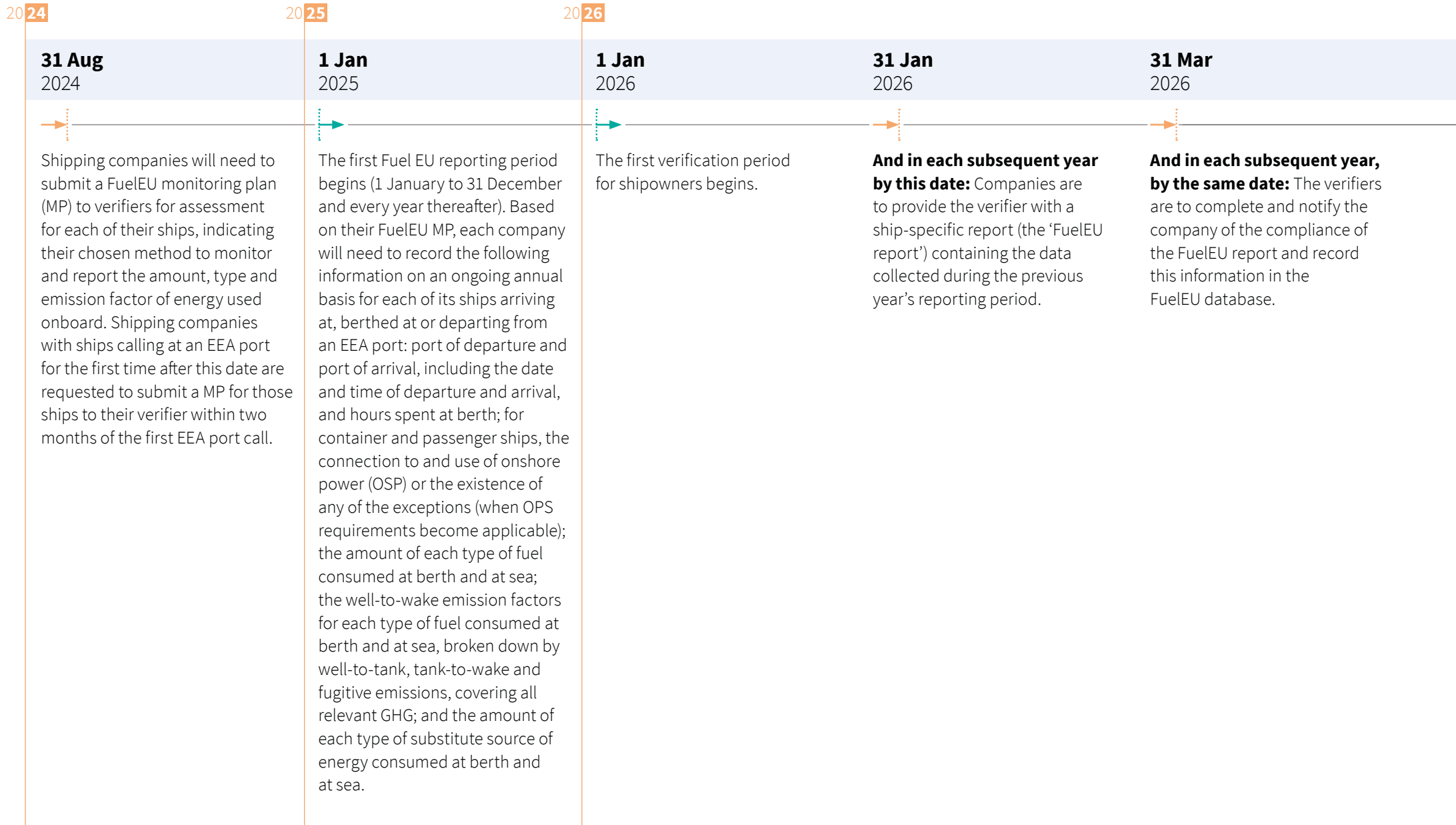
The first step for FuelEU Maritime compliance begins with filing a monitoring plan with the verifier before 31 August 2024. The standardised template required for this plans has not yet been finalised, and is due to be published in Q1 2024. The templates are among 14 implementing and delegating acts that will provide additional details to facilitate compliance.

Once FuelEU comes into effect on **1 January 2025**, shipping companies should be aware of a very tight annual timeframe for compliance. As indicated in the table below, companies will have one month to submit reports, less than four months to get pooling arrangement ready and only two months to get penalty payments transferred.

Annual deadline	Event	Description
By January 31	 FuelEU Report submission	Shipping companies submit ship-specific FuelEU reports to the verifier.
By March 31	 Ship-specific FuelEU reports verified	Submitted reports will be assessed and recorded in the FuelEU database by the verifier.
By April 30	 Banking, borrowing and pooling request	Shipping companies can bank, borrow or pool vessels and record it in the Fuel EU database subject to approval by it's verifier.
	 Request approved/record updated	The selected verifier shall record in the FuelEU database the definitive composition of the pool and allocation of the total pool compliance balance to each individual ship.
By June 30	 FuelEU penalties payment	Shipping companies shall pay FuelEU penalties to the administering authority resulting from 1) GHG intensity limit applicable to that year of data 2) non-compliant OPS port calls (from 2030 onwards), and/or 3) RFNBO multiplier.
	 FuelEU document of compliance issued	The verifier shall issue a FuelEU document of compliance (DoC) for ships without a compliance deficit (i.e. not needing to pay any FuelEU penalties). Administering authority shall issue a FuelEU DoC for ships with a compliance deficit, provided that an amount equal to the FuelEU penalties has been paid.
	 A valid FuelEU DoC onboard	Ships calling at an EEA port, arriving at, staying within or departing from an EEA port, or which have carried out voyages during the corresponding reporting period, shall hold a valid FuelEU document of compliance.

Key compliance dates

 From
  By
  On



Key compliance dates *continued*

 From
  By
  On

2026

30 Apr
2026

From 2026, and in each subsequent year, by 30 April, the company has to record the use of any advance compliance surplus – banked from the previous reporting period – following approval by its verifier, in the compliance database. Once a FuelEU certificate of compliance is issued (by June 30) surplus banking or use of an advanced surplus cannot be changed.

From 2026, and in each subsequent year, by 30 April, the verifier has to record the use of a pool in the compliance database, after which the composition of the pool cannot change.

1 May
2026



From 2026, before 1 May of the verification period the verifier shall record in the FuelEU database the compliance balances of the ship.

1 Jun
2026



From 2026, and in each subsequent year from 1 June, if the ship has a compliance deficit the company will need to pay a penalty for both the compliance deficit and, once applicable from 2030, any non-compliant port calls.

30 Jun
2026



From 2026, and in each subsequent year by 30 June, the verifier will issue a FuelEU document of compliance for any ship which does not hold a compliance deficit, valid until 30 June in the subsequent year. For any ship with a compliance deficit, the company must ensure that all penalties, as calculated by the verifier based on the compliance deficit, have been paid prior to the Administering Authority issuing the FuelEU document of compliance. Ships entering an EEA port will have to carry a valid certificate of compliance.

A document of compliance cannot be issued if the ship has a compliance deficit or non-compliant port calls for which the penalty has not been paid. Failure to present a FuelEU document of compliance for two or more consecutive reporting periods could result in a ship being banned from the EU.

2030

1 Jan
2030



Passenger ships and container ships calling at major TEN-T ports, with the noted minimum port calls for those ship types over the last three years (as defined in the EU Alternative Fuel Infrastructure Regulation, see Chapter 8), should connect to OPS. There are several exceptions to the requirements, which include using zero-emission technology onboard whilst at berth. Other ports not meeting the port call requirements of AFIR may also be included at EU member state discretion before 2035.

2035

1 Jan
2035



Passenger ships and container ships calling at all ports in a member state to connect to OPS.

3

Verification



Verification of monitoring plans (MP) and annually collected data is a core component of both EU ETS (via EU MRV), and FuelEU.

The MP and annual emissions reports required under EU MRV (and from 2025 FuelEU) outlined in the previous two chapters all need to be verified. The MRV regulation has now largely been updated with requirements for monitoring of CO₂, CH₄ and N₂O, and verification of data on individual ship and aggregated company level outlined in the secondary legislation. All secondary legislation detailing FuelEU compliance is pending at the time of publication.

The emissions data collection compliance picture is complicated further as the updated MRV regulation must be managed alongside reporting for IMO measures, including the Data Collection System^(viii) and Carbon Intensity Indicator^(viii), as well as current and prospective regional measures. For example, the UK's own MRV regulation^(ix) is already in place and a UK Domestic ETS^(x), having been consulted upon, could potentially come into force from 2026.

Voyage verification

While annually verified emissions reports are the 'single source of truth' for compliance with the new European regulations, verification of emissions on a voyage-by-voyage basis will enable optimised compliance the regulations, helping shipowners, operators and charterers to better understand their exposure to carbon prices and penalties.

LR holds existing accreditation from the Hellenic Accreditation System (E.SY.D) for the 2015 MRV regulation, through its wholly-owned subsidiary Hellenic Lloyd's in Greece. In addition, LR has applied to E.SY.D for accreditation under the 2023 revised MRV regulation for the extended scope of work.

Lloyd's Register Emissions Management

LR provides verification services that use the proprietary Emissions Verifier digital application, designed to cover the growing needs of the maritime industry in emissions monitoring, reporting and verification. Existing and upcoming regulatory requirements – including CII, MRV, UK MRV and EU ETS – are supported by the tool as applicable to allow timely preparation for compliance with the requirements. Emissions Verifier offers the following functionality for compliance with EU MRV:

- Annual emissions verification.
- Integration with reporting systems (VPMS).
- Generation of Monitoring Plans.
- Cloning of vessel Monitoring Plans across a company or pool.
- Creation of .xml files for direct upload in THETIS-MRV.
- Voyage Emissions Report validation.

LR offers a range of verification services related to MRV and EU ETS:

Monitoring Plan Assessment

As an accredited and experienced verifier we can perform monitoring plan assessments as required by the regulation. We will work with you to assess your monitoring plans to ensure they comply. The outcome of our assessment will be presented in an Assessment of Monitoring Plan Report.

Emissions Report Verification

We can perform the required annual emissions and partial verification for your vessel and we will work with you to verify your data and information so that a DoC can be issued. Once the verification is successfully completed the final Verification Report and Document of Compliance (DoC) will be available to your company. Per voyage validation is also supported.

Pre-Verification Gap Analysis

We can provide a beneficial gap analysis against either your monitoring plans or your emissions report data, or both. This can be tailored to your specific needs. For example, we can focus on specific areas of concern or take a general overall approach. This will identify any gaps, provide confidence in your approach, and smooth the path to compliance.

Commercial operator insights:



Luke Shu,
Technical Advisory Manager,
Maritime Commercial Markets,
Lloyd's Register



Charterers will be very familiar with commercial freight operation, but will need a more thorough understanding of the technical elements of MRV, EU ETS and FuelEU Maritime and their cost implications. For example, owners and managers have already been reporting on MRV for more than five years, doing noon reporting to feed data into MRV on a daily basis, and so will know the regulatory emission reporting mechanism inside out. For commercial operators, if they want to build the EU ETS economic model into their daily operation, it could be for the first time.

Commercial operators on time charters will also need to take care that they are not overpaying for emissions. Shipowners responsible for EU ETS might think it sensible to make a conservative estimate of the emissions attributable for a voyage when calculating their annual allowance needs, which could result in charterers paying more for a single voyage or multiple voyages over a period of time. While the annual verified emissions report is the single source of truth for regulators, for shipowners and charterers, using timely voyage

verification – alongside charterparty clauses and supported by evidence such as copies of documents validating the remaining on-board (ROB) fuel quantities – would help to avoid any disputes over any significant discrepancies.

Another challenge for commercial operators could be that, if a shipowner delegates responsibility for EU ETS to a third party technical manager (ISM company distinct from the shipowner), then the charterer could end up being removed from the party, ultimately liable for surrendering allowances. This would make allocating emissions liability for a charter more complex and possibly outside the scope of a contract between shipowner and charterer.

Visit <https://www.lr.org/en/services/classification-certification/fit-for-55/> to learn more about how LR is helping charterers and other maritime stakeholders understand exposure to EU ETS and FuelEU Maritime, and their potential for optimising compliance costs.



4

Fuel choices



Both the EU ETS and FuelEU Maritime have the goal of encouraging uptake of cleaner fuels, and therefore fuel choice is the most direct means of minimising the carbon price placed on ship operations and avoiding penalties for not meeting GHG intensity reductions.

FuelEU sets limits for the yearly average GHG intensity of the energy used onboard by a ship during a reporting period. Penalties, calculated based on the extent of under- or over-performance against the target for the year, are to be paid for each ship with a compliance deficit (and, from 2030, for each non-compliant port call).

Any compliance surplus compared to the annual reference value can be banked until the following reporting period. The chart below shows how, under FuelEU, use of fossil methanol leads to increasing deficits and penalties, while use of green methanol delivers substantial surpluses initially.

Any compliance deficit compared to the annual reference value may borrow an advance compliance surplus from the subsequent reporting period. But it will be subtracted from that subsequent reporting period (for an amount exceeding by more than 2% the limit set out in Article 4(2), multiplied by the energy consumption of the ship calculated in accordance with Annex I), at 1.1x the advanced compliance surplus. Once a FuelEU certificate of compliance is issued surplus banking or use of an advanced surplus cannot be changed.

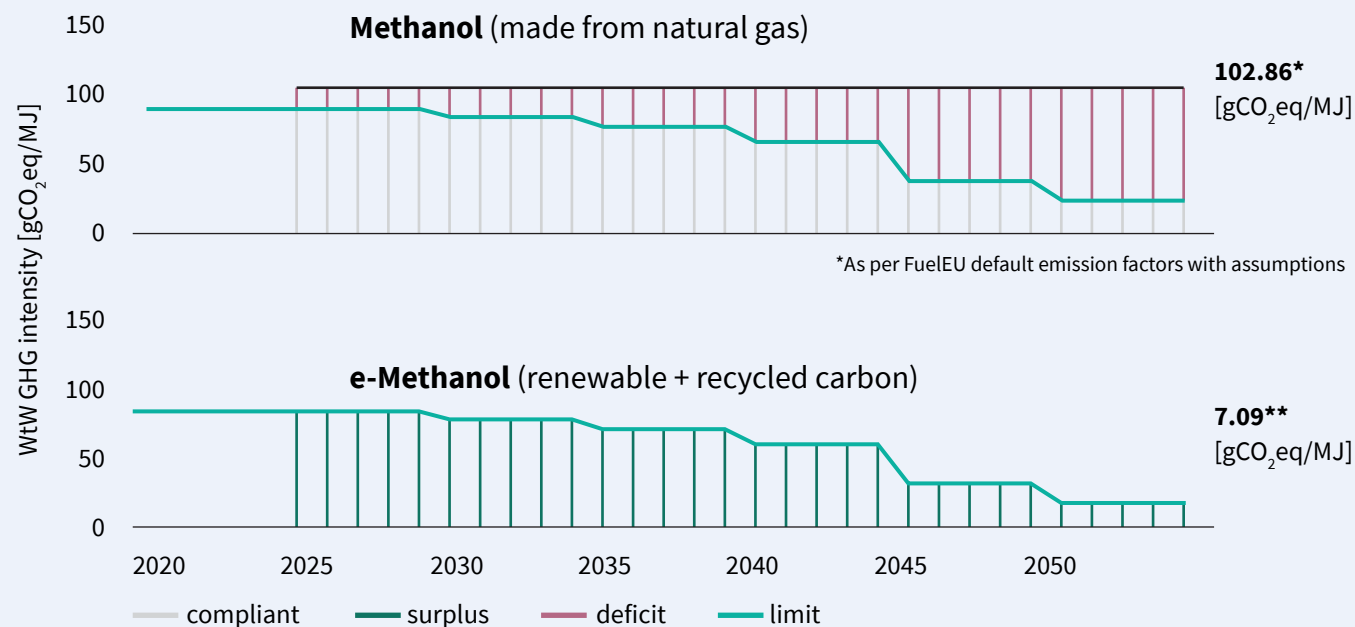
In order to stimulate demand for certain types of fuels, an additional reward factor has been included in the FuelEU calculation. Renewable Fuels of Non-Biological Origin (RFNBO), otherwise known as e-fuels, are those synthetic fuels produced from renewable electricity. Use of RFNBOs between 1 January 2025 and 31 December 2034 will be incentivised with a reward factor of 2x included in the calculation of the GHG intensity of energy used on board.

If RFNBO use equates to less than 1% of the overall fuel mix during 2031 and less than 2% in 2033, then a new subtarget will be introduced from 2034 so that they make up a minimum 2% of yearly energy used onboard a ship. Use of equivalent non-RFNBO fuels (such as biofuels), with a similar or higher potential to decarbonise, may also count towards this subtarget.

While FuelEU's progressive GHG intensity regime (combined with pooling opportunities described in the next chapter) make it a strong driver for uptake of clean fuels, the EU ETS is a more subtle driver motivating energy efficiency. Operators calculating carbon prices exposure through EU ETS will need to consider that:

- EU Allowances purchased from 2026 will need to take account of not only CO₂ emissions, but also CH₄ and N₂O.
- EU ETS exposure for shipping is currently on a TtW basis, rather than the WtW lifecycle basis for FuelEU. The EU ETS TtW approach is scheduled for review by 2026.

FuelEU deficits and surpluses, fossil vs green methanol



Shipowners will need to consider fuel choices and related technology investments – and subsequent exposure to carbon price and penalties – based on both regulatory approaches. The table to the right indicates the difference in fuel emissions factors between a TtW, CO₂-only approach and a WtW lifecycle analysis covering all GHG emissions.

RFNBOs are expected to remain both scarce and costly for several years. While penalties under FuelEU remain relatively low, it is anticipated that many operators will seek to reduce exposure through operational measures and the installation of energy saving devices. However, for operators with the ability to invest in new fuel technologies and a supply of low-carbon fuels, early over-compliance could deliver a clear competitive advantage.

The wind advantage

Users of wind-assisted propulsion technologies gain a double advantage under the new European regime. The initial benefit is that such solutions reduce fuel consumption and therefore the number of EU Allowances that need to be surrendered for each voyage under EU ETS. But a further reward is supplied by FuelEU Maritime, which offers up to a 5% reduction on the GHG intensity calculation of energy used onboard for those vessels where wind assisted propulsion accounts for 15% or more of the energy used for propulsion. A reward factor is available for vessels with a minimum of 5% of propulsion energy from wind, offering a 1% discount on the GHG intensity calculation. These reward factors are ‘subject to the availability of a verifiable method for monitoring and accounting of wind propulsion energy’.

FuelEU Maritime TtW and WtW factors, selected fuels and pathways

Fuel Class	Pathway name	WtT	TtW			
		CO ₂ equivalents emissions (gCO ₂ eq/MJ)	CO ₂ emissions factor (gCO ₂ /gFuel)	Methane emissions factor (gCH ₄ /gFuel)	Nitrous oxide emissions factor (gN ₂ O/gFuel)	Fuel slip (% of mass of fuel)
Fossil	HFO	13.5	3.114	0.00005	0.00018	-
	MDO	14.4	3.206	0.00005	0.00018	-
	MGO					
	ISO 8217 Grades DMX to DMB					
	LNG	18.5	2.750	0	0.00011	0.2
LPG	7.8	3.030 Butane 3.000 Propane	TBM	TBM	N/A	
Biofuels	Fatty Acid Methyl Ester (FAME)	Directive (EU) 2018/2001)	2.834	TBM	TBM	-
	Hydrotreated Vegetable Oil (HVO)		3.115	0.00005	0.00018	-
e-Fuels	e-methanol	N/A	1.375	TBM	TBM	-
	e-H ₂		0	0	TBM	-
	e-NH ₃		0	N/A	TBM	N/A

Notes: Emissions factors given for engine consumers only, and only LNG diesel dual-fuel slow speed engines for LNG; HFO refers to ISO 8217 Grades RME to RMK; MDO/MGO refers to ISO 8217 Grades DMX to DMB; Directive (EU) 2018/2001 refers to calculation methodology for WtT emissions factors for biofuels and RFNBO with an organic feedstock; TBM = to be measured; see appendices for full list of FuelEU emissions factors

Gas vessel insights:



Panos Mitrou,
Gas Segment Director,
Lloyd's Register



The dual-fuel LNG market has been given a boost by the decision to allow pooling of vessels under FuelEU Maritime, so that one high-performing vessel can offset penalties for several others. Even fossil LNG fuelled vessel can contribute a lot to offsetting these penalties, and to reducing EU ETS exposure, while for other alternative fuels you would need to be certain of our green fuel supply or risk actually increasing exposure. For the gas carrier market, it will still make commercial sense under EU ETS and FuelEU to use the cargo as fuel, with the later possibility of adding bio-methane to the mix or deploying carbon capture to further reduce emissions.

There is some advantage given to renewable fuels of non-biological origin (RFNBO) under both regulations. While that makes sense, we should continue to challenge the regime to ensure that LNG and biofuel can contribute to regional goals. For example, we need to ensure that mass balancing – gradually replacing fossil fuels with lower-carbon biofuel – is encouraged and that lifecycle improvements in methane emissions are accounted for in LNG emission factors. A rigorous regime will encourage the swift uptake of best practices and innovative technologies in these areas, further contributing to the EU climate goals.

Ship management insights:



Tobias Groeger,
Maritime Advisory,
Lloyd's Register

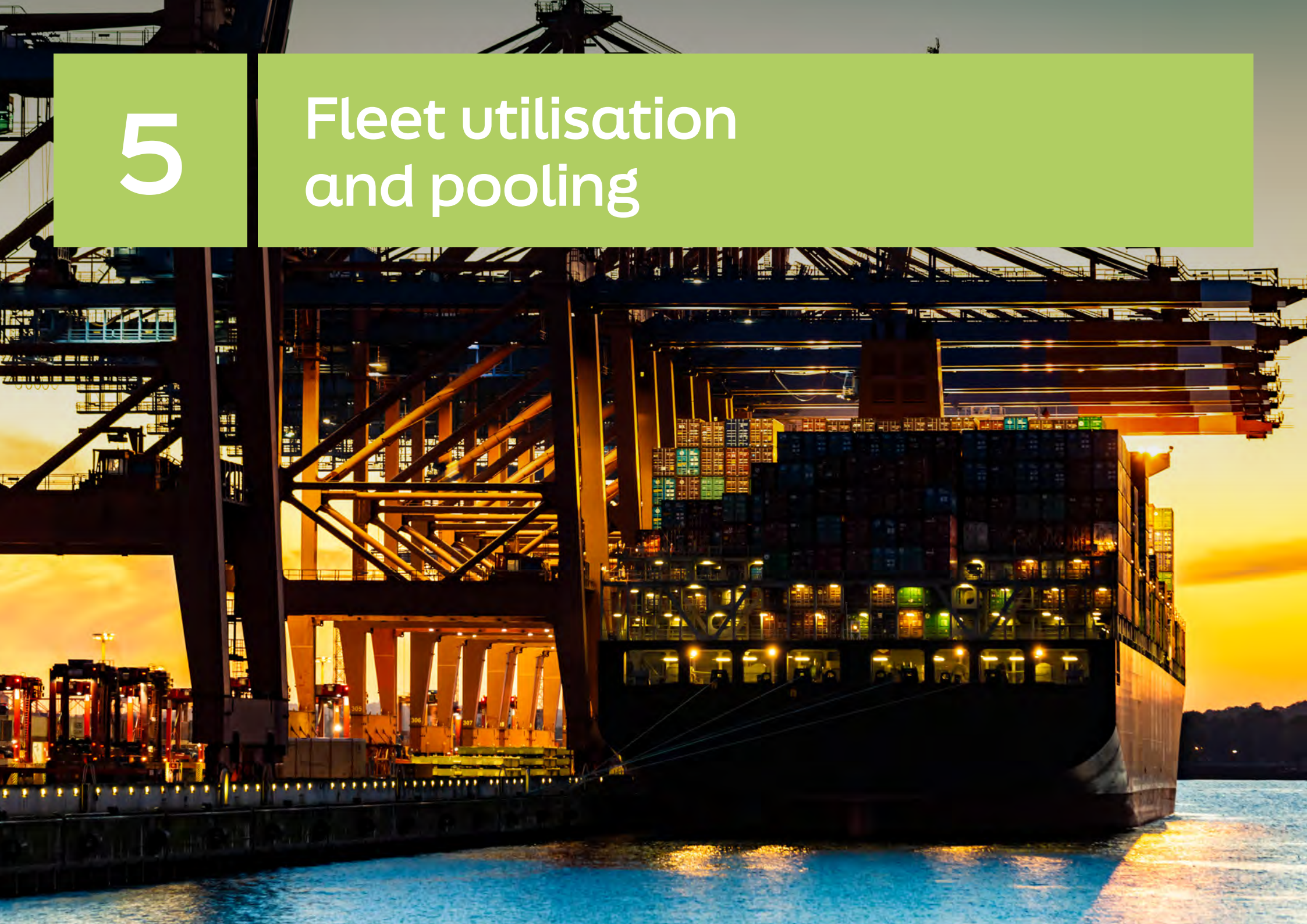


There's a big opportunity for ship managers with the EU ETS and FuelEU Maritime, in that they are most often the holders of the International Safety Management (ISM) document of compliance (DoC), making them responsible for the MRV regulation. For EU ETS, through bilateral agreements managers can be mandated by owners to be the registered 'shipping company'. That means that they would be responsible for registering with the administering authority and buying and surrendering EU Allowances, instead of the shipowner. This means ship managers have an opportunity to improve their service to shipowners by taking some of that administrative burden.

Under the FuelEU regulation, they can provide even more value. Shipowners rely on the technical competency of their ship managers to run the vessel in the best way possible, making operations more efficient and getting involved in discussions about ship and fuel technology. With the significant energy and GHG intensity reduction demands under FuelEU, ship managers that can deliver a long-term perspective on alternative fuels, FuelEU banking and pooling compliance, technologies and cost implications across the vessel lifecycle will have a real advantage in their service offering. So far, it appears that while many ship managers are ready for MRV and EU ETS compliance, several of those do not yet understand the finer implications of FuelEU Maritime that can have a real impact on value for their customers.

5

Fleet utilisation and pooling

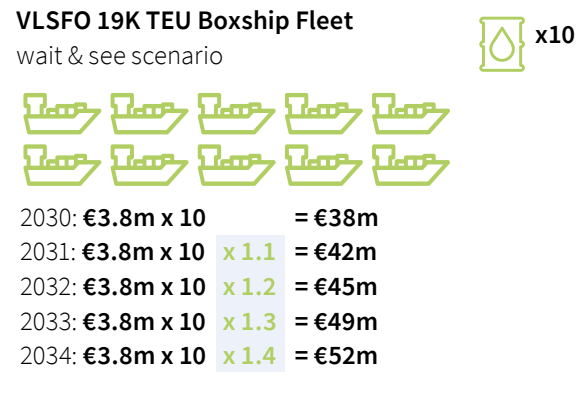


As the EU ETS demands immediate improvement in energy efficiency to reduce carbon tax exposure from 1 January 2024, it is unsurprising that several shipowners and operators are considering the deployment of their fleet to reduce the impact of carbon pricing. More efficient vessels used on European voyages will mean lower emissions and carbon costs on those routes.

While this measure will be easier for vessel segments that use fixed routes and schedules, for example container lines and passenger services, efficient fleet utilisation can also support those operating in global tramp and spot market. To maximise the potential savings of using efficient vessels, the routing implications of EU ETS and FuelEU Maritime, covered in the next chapter, also need to be considered.

There are other opportunities too for those that grasp the full implications of the FuelEU measures. One example is the potential to offset an entire fleet or pool's penalties with just a few over-performing vessels. Pooling can be done regardless of shipping companies, meaning it applies to a company's fleet or to pools of vessels owned and/or chartered by several companies.

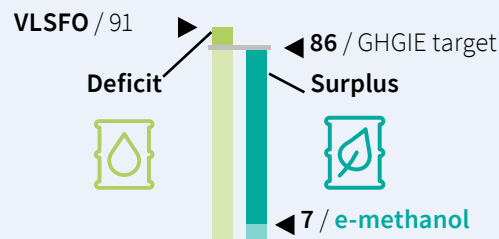
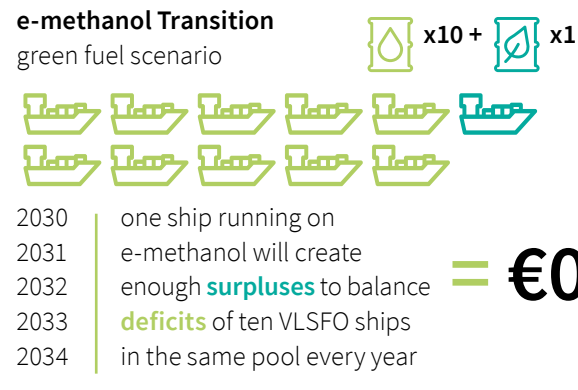
The ability to pool emissions penalties and surpluses has important consequences. For example, a pool of ten boxships with identical in-scope energy consumption could avoid around €277 million in FuelEU penalties in five years (2030-2034) if they are joined by a single vessel fuelled with e-methanol. That saving far outweighs the likely cost of building the methanol-fuelled containership.



As per Article 23(2) there is a multiplier of:

$$1 + (n - 1)/10$$

Where **n** is the number of consecutive reporting periods for which the company is subject to a remedial penalty for this ship.



The pooling option in FuelEU means that companies investing in a low-carbon fuel capable ship could not only reduce their own exposure, but would also be in a very strong bargaining position when offering to pool with other non-compliant vessels. However, depending on the type of charter party agreement the vessels were under, and especially where charterers are responsible for buying the fuel, care will be needed.

The regulation does not define whether it is the shipowner or charterer who owns the surplus associated with a vessel, meaning that parties entering into such arrangements will need to be sure that they understand the implications to maximise their advantage.

Note: Figures are illustrative and can vary depending on several factors including fuel price, recorded emissions and vessel operating profile.

Container vessel insights:



Nick Gross,
Global Containership
Segment Director,
Lloyd's Register

Feedback from many of the container lines is that they are confident they can gain a competitive advantage from the investments they've made in the energy efficient technology for their existing fleet as well as newbuild tonnage capable of burning alternative fuel. More generally, the liner network also means it is easier to anticipate fuel use and emissions to control cost exposure. It appears that the majority of carriers with dual fuel methanol ships on order have already tied up contracts with fuel suppliers to ensure they can obtain a "green" ticket both from a compliance and commercial perspective.

For more regional European lines, particularly those that are asset light, there could be more of a cost challenge around chartering in tonnage. Shipowners' exposure to ETS and FuelEU Maritime may mean that they prefer to simply charter out their vessels in non-European trades, or if not will certainly want to put a premium on European charters. That is as well as any discussions around responsibility for reporting and surrendering allowances.

Emissions verification on a voyage-by-voyage basis, beyond the required annual reporting, will help shipowners and charterers to understand their exposure better. When you are required to work out how many allowances to buy initially, it's safe to over-allocate emissions for a voyage, but no one will want to pay that extra and in container shipping there are several factors beyond operators' control that could affect actual voyage emissions, from seasonal volumes to port strikes and extreme weather.

Tanker operator insights:



Nikos Michas,
Global Tanker
Segment Director,
Lloyd's Register

The major oil tanker charterers are all involved in energy trading and will be familiar with hedging against their carbon exposure. For shipowners, the big question will be how they handle that and how complicated the global picture becomes – what will happen when other regimes come in around the world and what impact will that have on their carbon costs?

There are some operational measures that could initially help operators to reduce the carbon taxation cost. For example, you will see the most efficient vessels operating on European routes, and it is easier than for other segments to adjust routing to minimise the amount of EUA exposure they have on non-EEA legs. This will be a temporary measure and does not provide a solution towards decarbonisation.

But in other ways there are more challenges too. It is still early to see how contracts will be affected and whether charterers will be willing to pay to reduce the carbon bill. There is a low orderbook for tankers at the moment and the number of alternative fuel capable vessels is small, so in order to become more efficient there will be feasibility studies on what energy saving technologies can achieve, not only from the FuelEU Maritime and EU ETS perspective but also taking into account CII. The selection of Alternative Fuels especially for the bigger tankers will be more evident the years to come.

6

Routing



Much of the focus of the regulatory drafting around shipping's inclusion in the EU ETS and FuelEU Maritime has been on minimising 'carbon leakage' and 'evasive routing'. The potential for these issues lies in the fact that shipping companies will be liable to pay EU Allowances on – and include in their FuelEU GHG intensity calculation – half of the emissions incurred on a voyage between an EEA port and a non-EEA port.

As the voyage into or out of the EEA is calculated from the first or last port of call outside the EEA, reducing the distance between EEA and non-EEA ports of call therefore means reducing carbon costs and penalties associated with that voyage. For ship operators that can consider minimising port stays within the EEA, or planning voyages that stop close to the EEA and so reduce the non-EEA leg exposure to ETS, such routing make sense.

It should be noted that carbon leakage – when a measure increases GHG emissions outside the regulated area more than it decreases emissions within the area – is not a necessary consequence of routing to minimise exposure to carbon penalties. The case of transshipment of container traffic under the EU ETS provides an example.

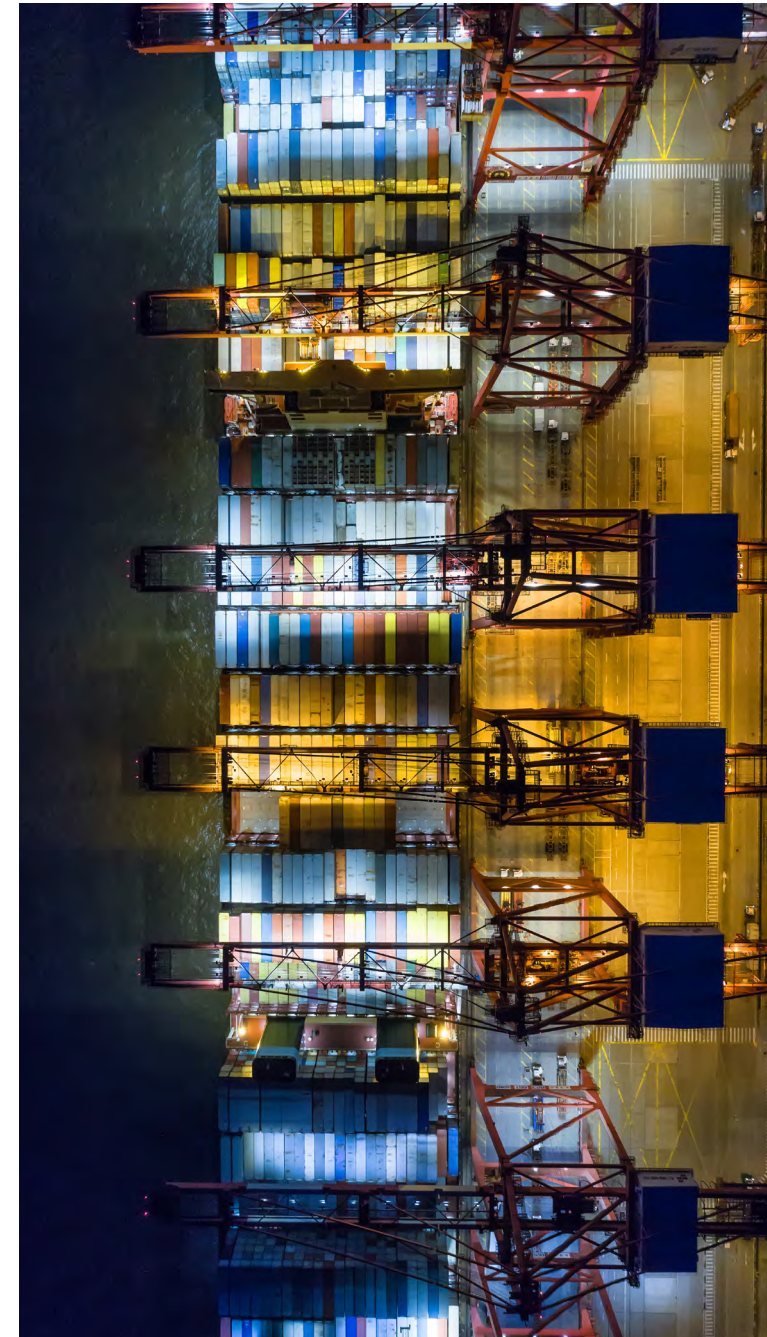
Transshipment rule

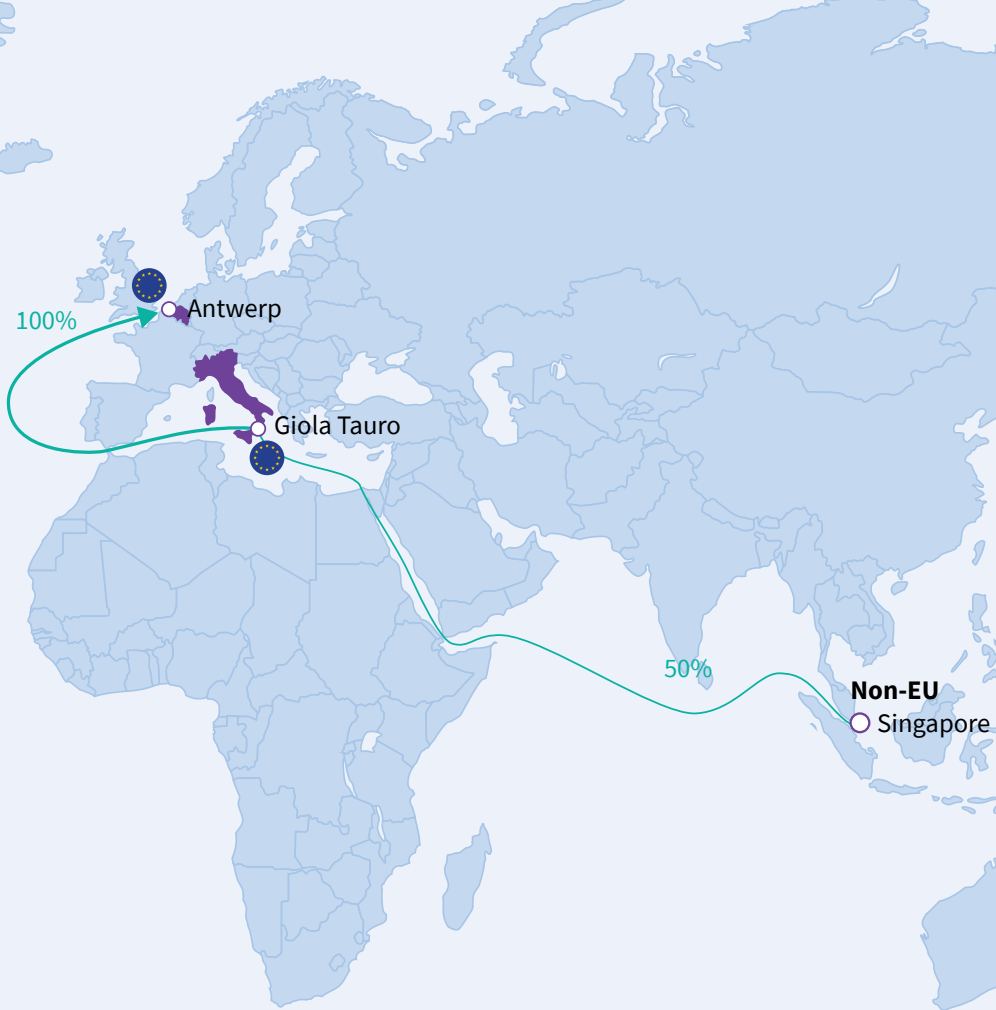
The competitive risk to European ports from vessels opting to stop at ports closer to the EEA, in order to minimise the distance of voyages into the EEA, was identified early in the development of the EU ETS. To avoid this risk, the regulation excludes certain neighbouring transshipment ports as ports of call for container vessels. Such ports must fulfil both these requirements:

- **The share of transshipment of containers at the port exceeded 65% of its total container traffic during the most recent 12-month period for which relevant data are available.**
- **The port is located outside the EU but less than 300 nautical miles of a port under the jurisdiction of a member state.**

Currently only two ports, Port Said and Tangiers-Med, have this designation. This in effect means that a container ship stopping at a transshipment port during a voyage to or from an EEA country, will not be considered to have broken its journey from its port of origin. As such 50% of the emissions from the port of origin will be counted in EU ETS liability.

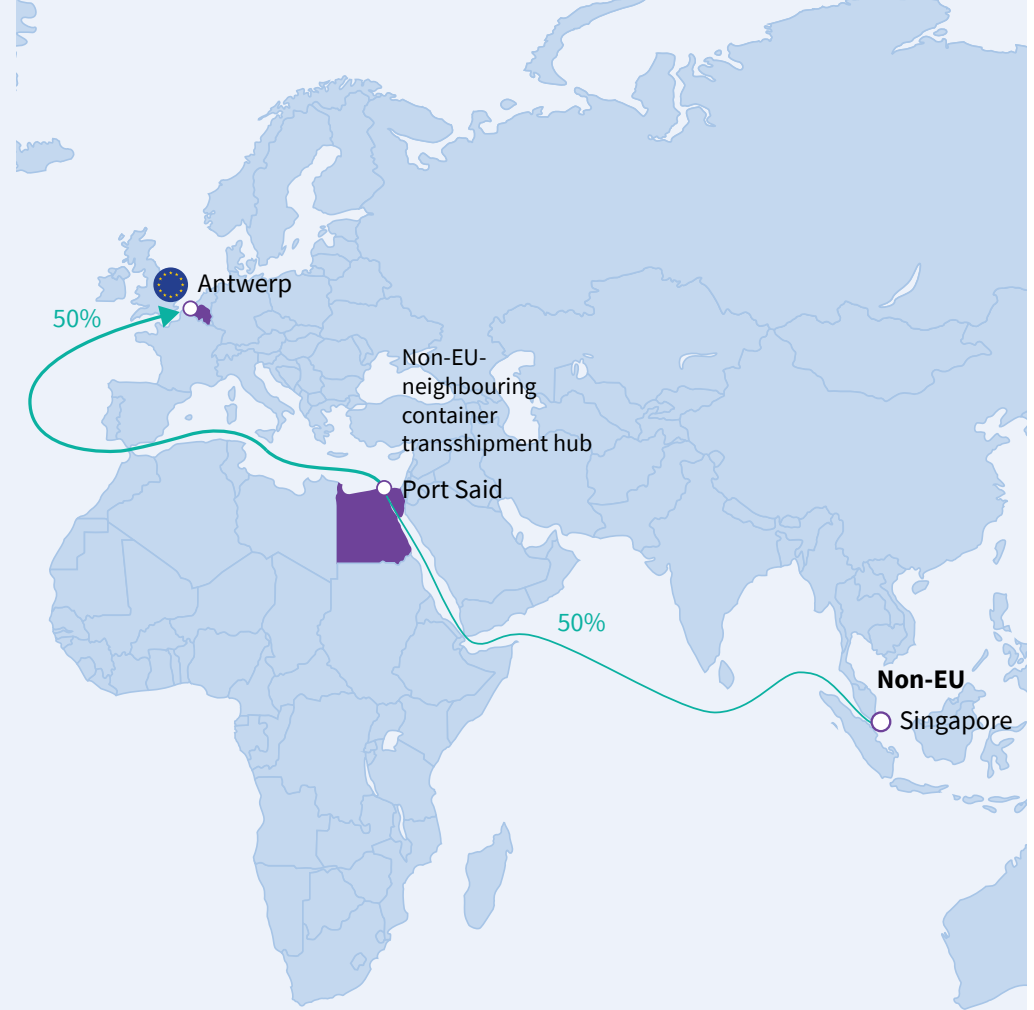
The decision was intended to reduce evasive port calls by containerships to ports outside of the EEA, but has been criticised by those hubs as instead exacerbating their competitive disadvantage. In feedback on the transshipment rule, Medcenter Container terminal noted: "Shipping companies that choose North African ports for transshipment services will achieve substantial savings."





Leg	Nautical miles	ETS Level
1	6036	50%
2	2451	100%
Tot	8487	

As an example, the Medcenter proposal presents the case of a container ship traveling from Singapore to Gioia Tauro in Italy and continuing to Antwerp. Under EU ETS, the shipping line will pay for 50% of its CO₂ emissions from Singapore to Gioia Tauro and 100% of CO₂ emissions from Gioia Tauro to Antwerp.



Leg	Nautical miles	ETS Level
1	5073	50%
2	3340	50%
Tot	8413	

By contrast, if the shipping line scales in Port Said it will pay 50% of its emissions from Singapore to Port Said and 50% of CO₂ emissions from Port Said to Antwerp.

The impact on competitiveness is more pronounced when EEA ports can be totally avoided by non-EEA transshipment, meaning no exposure to the EU ETS or FuelEU. Medcenter notes of a Singapore to Rotterdam voyage with non-EEA rather than EEA transshipment: “The economic difference between an operation via Gioia Tauro and Port Said or Tanger can amount to around €700 million per year.”

Under the transshipment rule, container vessels can generate savings on goods destined for the EU, while the competitiveness of EEA ports may be affected. However, in line with the EU ETS goals of reducing emissions in Europe, it should be noted that non-EEA transshipment eliminates intra-European emissions related to that voyage. Non-EEA transshipment can also reduce overall emissions – as in the Singapore-Port Said-Antwerp example, where total emissions are reduced by around 3% – meaning that carbon leakage does not occur.

Ballast leg exposure

There are other routing implications that will take careful consideration in order to minimise unplanned costs related to EU ETS or FuelEU. According to a frequently asked questions document for EU MRV published by DG CLIMA: “Ballast voyages, from the last port of call where the ships has discharged cargo or disembarked passengers to the next port of call where cargo is loaded or passengers embark, also serve the purpose of transporting cargo and are therefore subject to the regulation.”

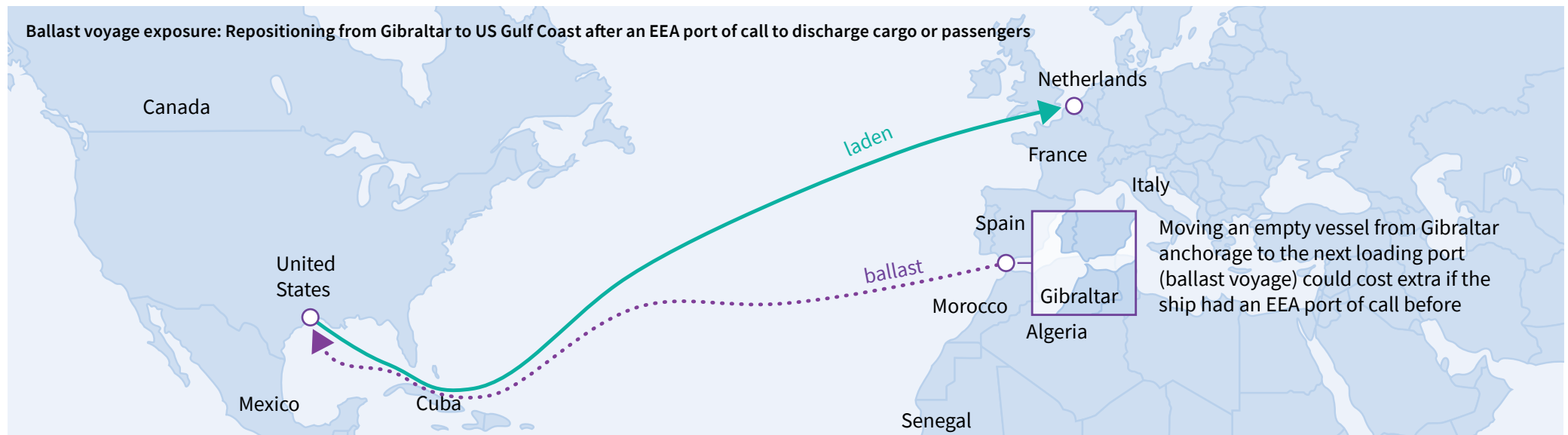
This stipulation, which is expected to apply to the EU ETS, could cause some practical challenges for both shipowners and charterers. It means, for example, that moving an empty vessel from Gibraltar anchorage to the next loading port (ballast voyage) could cost extra if the ship had an EEA port of call before. The map below illustrates that a repositioning from Gibraltar anchorage to the US Gulf Coast on a ballast voyage, immediately prior to a laden voyage to Northern Europe would therefore be liable for 50% of ballast leg emissions if the port call prior to Gibraltar

anchorage was in the EEA, as would the laden voyage. Charterers traditionally pay a premium for repositioning, but who pays the additional cost that the EU ETS adds to the ballast leg will need to be further negotiated.

The ballast leg issue presents other practical challenges and potential opportunities. For example, knowing where a vessel is sailing from before an upcoming fixture will be needed for an accurate estimation of EU Allowances needed for that voyage, while there may be opportunity for tactical ballast legs (for example, an extra stop loading or unloading cargo around EU) in order to minimise ETS exposure.

Onshore power supply

The FuelEU requirement for container and passenger vessels to use onshore power at major European ports from 2030 – expanding to other ports from 2035 – also needs to be considered as a routing issue. Onshore power supply may be limited or only available at high cost, and operators will need to factor this into their scheduling plans. See the following ‘passenger vessel insights’ box for more details.



Charterer insights:



Alberto Perez,
Global Head,
Maritime Commercial Markets,
Lloyd's Register



One challenge for commercial operators is the lack of alignment between shipping's commonly used commercial terms and the language in the ETS and FuelEU Maritime to date. The definition of a voyage for those regulations has nothing to do with how a charterer would describe a voyage, for example. And where there are vague definitions, there are loopholes.

There are some generic ETS and FuelEU charter clauses under development and also some of the big chartering houses are also working on their own clauses to address these issues. Where there is complexity, there is opportunity for competitive advantage for some. But for others – for example those already specialising in particular regions or trade flows that do not necessarily include Europe – this might also mean stopping trading within Europe as a result of the extra cost and uncertainty.

Passenger vessel insights:



Michele Landro,
Global Cruise
Segment Director,
Lloyd's Register



While 46% of cruise vessels operated by Cruise Lines International Association (CLIA) partners are ready for onshore power supply – and 78% will be by 2028 – many ports are not ready. On the other hand, we see several ports and terminals beginning to use shore connections as a competitive lever, which could change how vessels plan their routes and port stays.

Cruise operators will need to understand plans at ports where they stop – or are considering stopping – in time for planning their future itineraries, as well as exploring the feasibility of potentially more affordable zero-emission alternatives allowed under FuelEU Maritime.

One issue might be the cost of electricity. It can cost significantly more to connect to shore power than to produce electricity on board, and consequently, it will also significantly impact cruise operators' costs, which might need to be factored into cruise ticket prices.

Today 29 cruise ports worldwide have at least one berth with onshore power, with supply at 20 additional ports planned or funded by 2025. In several regions, major cruise ports are beginning to consider the challenges of delivering power that is affordable and sustainable, at the scale that will be needed under regulations including FuelEU.

7

Emissions trading



For most shipowners, the requirement to buy and sell emissions allowances under EU ETS will represent a first step into carbon trading. For many of their customers, particularly the commodities and energy trading houses that dominate the bulk and tanker segments, it will not.

In 2024, 40% of a shipping company's emissions from that same year must be covered by purchased EU Allowances (EUAs) to be surrendered in 2025, rising to 100% for 2026 emissions (being surrendered in 2027). Unlike other sectors under the EU ETS, shipping does not have a free allocation of EUAs, and shipping companies must buy enough to cover their own emissions. After each year, the shipping company must surrender enough EUAs to cover its own ships' emissions, otherwise heavy fines are imposed.

If sufficient emission allowances are not surrendered each year to cover emissions made during the preceding year, the shipping company contractually mandated with responsibility for compliance will be liable to pay a penalty. This penalty will be €100 per tonne of CO₂ equivalent emitted per emission allowance not surrendered. Additionally, the missing emission allowances must be surrendered by the shipping company in the following reporting period.

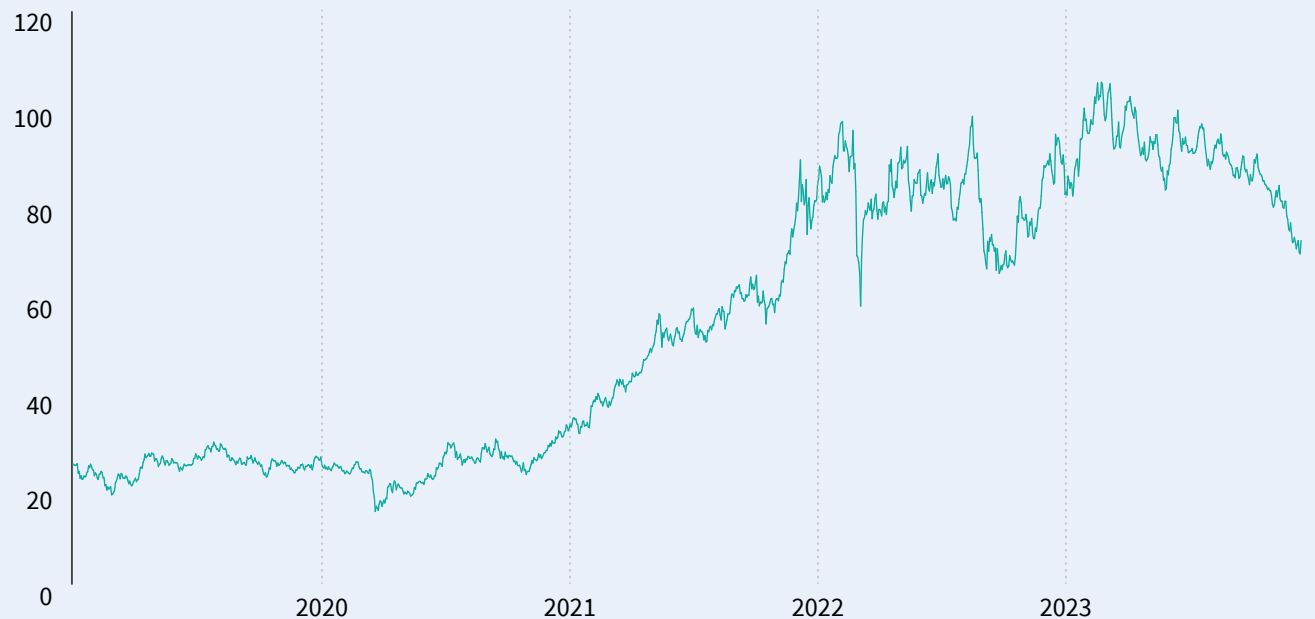
Where a shipping company has failed to comply with the emission allowance surrender requirements for two or more consecutive reporting periods, an expulsion order may be issued to the shipping company by the competent authority of the member state of the port of entry. As a result, any ships operating under that company will be refused entry to any EEA port other than that of the EEA member state whose flag the ship is flying. If the ship enters the port of an EEA member state whose flag it is flying, the ship may be detained. This expulsion order will remain until the company fulfils its emission allowance surrender obligations.

EUAs can be purchased from the European Energy Exchange (EEX) at auction, via trading (brokers) and futures markets (banks), or directly from other EU-ETS participants. From February 2024 the EU will assign shipping companies with Administrative Authorities, to which EUAs must be surrendered. Meanwhile, companies can already purchase EUAs in advance for use in 2024-2025.

One of the key challenges of the FuelETS Maritime regulation will be to manage EUA exposure between buying and surrendering allowances. As the chart below shows, EUA price fluctuates widely but has been on a strong increasing trend in the last five years. Buying EUAs early may therefore

seem like a wise decision, but if shipping companies find themselves with an excess of EUAs – i.e., more than are needed to be surrendered – and the price drops, they may not be able to recover funds used buying the EUAs at their original value. Conversely, shipping companies that do not buy enough EUAs to cover their emissions initially may find themselves having to buy them at inflated prices at a later date.

EU Carbon Permit daily closing price, December 2018-2023



Before buying EUAs, it will be important for a shipping company to understand the amount of GHG emissions they will likely be responsible for in the coming year and how many allowances will be needed to offset those emissions. To optimise their EUA trading and exposure, shipping companies will need to understand several factors that will influence the cost of allowances. For example:

- Spare EUAs can be kept to cover future needs or sold to another company.
- The cost of purchasing EUAs increases as demand increases.
- The amount of EUAs issued decreases annually.
- EUAs are made available on the market through weekly auctions.

As shipowners can delegate their responsibility for EU ETS compliance, some may prefer to minimise their risk by mandating that a long-term charterer or ship manager takes responsibility for buying and surrendering EUAs. The mandate needs to be documented for submission if

requested. Contractual clauses with the information listed in the related delegated regulation will be accepted as evidence of a mandate.

EUA purchasing strategy

For shipowners or other entities mandated responsibility for the purchase and surrendering of EUAs, the key challenges will be first to optimise ship operations to minimise the number of allowances needed and then to optimise their purchase. This will not be as simple as waiting until the ETS Emissions Report is prepared and then buying allowances. There is a short time-frame to surrendering allowances once reports are submitted and market fluctuations mean that later purchases could be more costly. Balancing uncertainties around actual emissions and allowance pricing will therefore be critical.

The optimal way to achieve this is to integrate voyage emissions forecasting and monitoring with purchasing. The purchase plan should start from the most accurate available projection of annual emissions, based on forecasted voyage

operations. Then as actual emissions from voyages are recorded, annual allowance exposure projections can be tweaked and the buying strategy refined.

Further, allowance exposure will need to be factored into both vessel and route optimisation strategies, so that operators can take an informed perspective on the costs or savings associated with potential investments or deployments.

For both allowance purchasing and for business and operational planning, accurate forecasts and high-quality data on voyage-by-voyage emissions will be essential. Lloyd's Register's Emissions Management portfolio aims to support customers in both understanding their EU Allowance exposure and optimising their business around it.

To learn more about Lloyd's Register's Emissions Management solution, visit [EU Fit for 55: Navigate emissions management | LR](#).

Bulk carrier insights:



Nikos Kakalis,
Global Bulk Carriers
Segment Director,
Lloyd's Register



The pricing of EU Allowances is a central part of the discussion; shipowners and operators need to develop understanding and monitor how the prices will vary, the risks involved and how they can hedge against those risks. It is a common theme across segments, but it is more pronounced in the bulk segment because the margins are thinner. Of course, the cost can be passed on to charterers via the 'polluter pays' principle but this will only mean that commercial operators keep an even closer eye on which ships are more efficient and better suited for the trade.

Since the introduction of IMO's Carbon Intensity Indicator, charterparty agreements have had to be reworked, and this will also be the case with the EU ETS and FuelEU. More generally, as the European regulations becoming more complex, ship operators and charterers will need to work together more closely. Some of the bigger charterers are used to having this kind of dialogue, but for smaller commercial operators it will bring a new way of working.

8

Operating in context: AFIR, RED III and CBAM



While the EU ETS and FuelEU Maritime will have a direct impact on the way that shipping business is conducted, three other instruments within the Fit for 55 package will affect the landscape in which shipping operates – including which alternative fuels are incentivised, the availability of fuel supply infrastructure and the costs associated with GHG emissions on products and materials.

Renewable Energy Directive (RED III)

RED III^(xxii) strengthens European provisions for renewable energy targets by 2030, setting a new EU target of 42.5% (aiming for 45%) of regional energy supply should come from renewable sources by 2030. The directive is accompanied by new sectoral targets. For transport, member states can choose between the following binding targets:

- **14.5% reduction of GHG intensity in transport from the use of renewables by 2030, or**
- **At least 29% share of renewables within the final consumption of energy in the transport sector by 2030.**

Additionally, RED III sets a binding combined sub-target of 5.5% for advanced biofuels (generally derived from non-food-based feedstocks) and renewable fuels of non-biological origin (mostly renewable hydrogen and hydrogen-based synthetic fuels) in the share of renewable energies supplied to the transport sector by 2030. Within this, there is a minimum requirement on member states with maritime ports to endeavour to ensure that, from 2030, the share of RFNBOs in the total amount of energy supplied to the maritime transport sector is at least 1.2%. The Directive notes that ‘the achievement of those targets should be ensured by obligations on fuel suppliers’ as well as requirements under FuelEU.

A derogation under RED III allows member states to cap their calculation of energy supplied to the maritime transport sector at 13% of the state’s gross final energy consumption (or 5% for Malta, Cyprus and insular states where energy consumption for maritime transport represents more than a third of that of road and rail). This cap means that states may have to replace less maritime fuel than they would had the calculation been based on actual maritime energy supply, although the minimum sub-targets for advanced biofuels and RFNBOs still apply.

To further encourage renewable fuel use in maritime, a 1.2x multiplier is applied to advanced biofuels and biogas supplied in the aviation and maritime transport modes, while RFNBO will receive a 1.5x multiplier. The cap on the proportion of maritime energy consumption attributed to states’ total energy consumption, combined with these multipliers, recognises both the importance of deploying biofuels and RFNBOs, as well as the technological and regulatory constraints on deploying those fuels in shipping.

RED III was passed by the European Council on 9 October 2023 and its requirements will have to be incorporated into member state legislation by April 2025.



Alternative Fuel Infrastructure Regulation (AFIR)

AFIR^(xxii) sets requirements for expanding the EU’s network of recharging and refuelling stations for alternative fuels, across all transport modes. For maritime, it sets targets for shore-side electricity supply in maritime ports and inland waterways, supply of liquefied methane in maritime ports and hydrogen refuelling infrastructure. It also sets out technical specifications for electricity supply, liquefied methane refuelling points and bunkering of hydrogen, methanol and ammonia for maritime transport and inland navigation.

The new rules were published in the official EU journal on 22 September 2023, entering force 20 days later. It will apply from 13 April 2024.

Shore-side electricity supply targets

By 31 December 2029, member states will need to take necessary measures to ensure that TEN-T core maritime ports and TEN-T comprehensive maritime ports will need to provide shore-side electricity supply for at least 90% of port calls from specific vessel types if they meet minimum traffic requirements, as shown in the table below.

Vessel type	Minimum size (GT)	Minimum traffic requirement (port calls per year)
Seagoing container ships	5,000	100
Seagoing ro-ro passenger and high-speed passenger ships	5,000	40
Other seagoing passenger ships (e.g., cruise vessels)	5,000	25

The calculation of minimum port calls excludes calls from specific ships, such as those calling from EU islands or outermost regions, and ports within these areas that do not have electricity supplied from mainland Europe are exempted from the shore-side supply requirements.

Shore-side electricity supply requirements are different for inland waterway ports. By 31 December 2024 at TEN-T core inland waterway ports, and by 31 December 2029 at TEN-T comprehensive inland waterway ports, at least one connection must be supplied.

Liquefied methane supply

Member states will need to designate TEN-T core maritime ports that provide access to refuelling points for liquefied methane and ensure that an appropriate number of refuelling points for liquefied methane are deployed at those ports by 31 December 2024, cooperating with neighbouring member states where necessary.

Carbon Border Adjustment Mechanism (CBAM)

CBAM aims to ensure that EU emissions reduction efforts within the EU are not offset by increasing emissions outside its borders through the relocation of production to non-EU countries where emissions policies are less ambitious, or through increased imports of carbon-intensive products.

CBAM targets imports of products in carbon-intensive industries and is designed to function in parallel with the EU ETS, as well as to mirror and complement its functioning on imported goods. It will gradually replace existing EU mechanisms to address the risk of carbon leakage, in particular the free allocation of EU ETS allowances.

Certain goods imported to EU (including aluminium, steel, fertilisers, hydrogen and cement) will have to have their carbon emissions certified. Certificates correspond to 1 tonne of CO₂ equivalent and can be purchased through an auctioning system. Importers of these goods will have to surrender certificates annually, with penalties to be paid if not surrendered.

There will be no direct impact on ship operators as emissions from transport – although this could be reviewed in 2026 – and the administrative burden falls on the ‘declarant’ placing the goods on the European market. However, there will likely be indirect impact given the intended flow of trade both into and out of the EU, and the impact on goods and materials produced outside the EU as well as those produced in the EU that use materials from the non-EU market.

The mechanism will be phased in, starting with data collection in 2023, with new tariffs being introduced from 2026.

RED III, AFIR and CBAM will have diverse impacts on ship operations into, out of and within the European Union, as well as affecting the availability and pricing of fuels, power, technologies, services and other materials. LR has the wide sectoral and regulatory expertise to help your business understand these effects, how they will impact on your compliance with EU ETS and FuelEU Maritime, and options for optimising your business and operations.

To find out more about the services LR can offer to visit lr.org or [contact us](#)





Glossary and references



Glossary

AA – Administering Authority

AFIR – Alternative Fuels Infrastructure Regulation

RED III – Renewable Energy Directive III

CBAM – Carbon Border Adjustment Mechanism

CII – Carbon Intensity Indicator

DCS – Data Collection System

DoC – ISM Document of Compliance

EEA – European Economic Area

EET – Energy Efficiency Technologies

EEX – European Energy Exchange

ER – Emissions Report

ETS – Emissions Trading System

EU – European Union

EUA – European Union Allowance

GHG – Greenhouse gas

IMO – International Maritime Organization

ISM – International Safety Management Code

LNG – Liquefied natural gas

MP – Monitoring Plan

MRV – Monitoring, Reporting and Verification Regulation

OPS – Onshore power supply

RFNBO – Renewable Fuel of Non-Biological Origin

TEN-T – Trans-European Transport Network

THETIS-MRV – The EU MRV system to report CO₂ emissions from ships

TtW – Tank-to-wake

VLSFO – Very low sulphur fuel oil

WtW – Well-to-wake

References

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

ⁱⁱ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

ⁱⁱⁱ Regulation (EU) 2023/957 of the European Parliament and of the Council of 10 May 2023 amending Regulation (EU) 2015/757 in order to provide for the inclusion of maritime transport activities in the EU Emissions Trading System and for the monitoring, reporting and verification of emissions of additional greenhouse gases and emissions from additional ship types.

^{iv} Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast).

^v Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

^{vi} 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.

^{vii} IMO Resolution MEPC.278(70) adopting Data Collection System.

^{viii} IMO Resolution MEPC.328(76) adopting Carbon Intensity Indicator.

^{ix} The Merchant Shipping (Monitoring, Reporting and Verification of Carbon Dioxide Emissions) (Amendment) (EU Exit) Regulations 2018.

^x Developing the UK Emissions Trading System, Main Response: A joint response of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland (pp100-131).

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Annex

FuelEU Maritime well-to-tank and tank-to-wake emissions factors

Fuel Class	Pathway name	LCV [$\frac{MJ}{g}$]	WtT	TtW	C_{fCO_2} [$\frac{gCO_2}{gFuel}$]	C_{fCH_4} [$\frac{gCH_4}{gFuel}$]	C_{fN_2O} [$\frac{gN_2O}{gFuel}$]	C_{slip} As % of the mass of the fuel used by the engine	
			$CO_{2,eq}$ WtT [$\frac{gCO_2eq}{MJ}$]	Fuel Consumer Unit Class					
Fossil	HFO ISO 8217 Grades RME to RMK	0.0405	13.5	ALL ICES	3.114	0.00005	0.00018	-	
	LFO ISO 8217 Grades RMA to RMD	0.041	13.2	ALL ICES	3.151	0.00005	0.00018	-	
	MDO MGO ISO 8217 Grades DMX to DMB	0.0427	14.4	ALL ICES	3.206	0.00005	0.00018	-	
	LNG	0.0491	18.5	LNG Otto (dual fuel medium speed) LNG Otto (dual fuel slow speed) LNG Diesel (dual fuel slow speed) LBSI	2.750	0	0.00011	3.1 1.7 0.2	
	LPG	0.046	7.8	ALL ICES	3.030 Butane 3.000 Propane	TBM	TBM	N/A	
	H2 (natural gas)	0.12	132	Fuel Cells ICE	0 0	0 0	- TBM	-	
	NH3 (natural gas)	0.0186	121	Fuel Cells ICE	0 0	N/A N/A	TBM TBM	N/A N/A	
	Methanol (natural gas)	0.0199	31.3	ALL ICES	1.375	TBM	TBM	-	
	Biofuels	Ethanol Production Pathways of Directive (EU) 2018/2001	Value as set out in Annex III of Directive (EU) 2018/2001	$E - \frac{C_{fCO_2}}{LCV}$	ALL ICES	1.913	TBM	TBM	-
		Bio-diesel Production Pathways of Directive (EU) 2018/2001			ALL ICES	2.834	TBM	TBM	-
Hydrotreated Vegetable Oil (HVO) Production Pathways of Directive (EU) 2018/2001		ALL ICES			3.115	0.00005	0.00018	-	
Liquefied Bio- methane as transport fuel (Bio-LNG) Production Pathways of Directive (EU) 2018/2001		LNG Otto (dual fuel medium speed) LNG Otto (dual fuel slow speed) LNG Diesel (dual fuels) LBSI			2.750	0	0.00011	3.1 1.7 0.2 2.6	
Bio-methanol Production Pathways of Directive (EU) 2018/2001		ALL ICES			1.375	TBM	TBM	-	
Other Production Pathways of Directive (EU) 2018/2001		ALL ICES			3.115	0.00005	0.00018	-	
Bio-H2 Production Pathways of Directive (EU) 2018/2001		N/A			Fuel Cells ICE	0 0	0 0	0 TBM	-

FuelEU Maritime well-to-tank and tank-to-wake emissions factors *continued*

Fuel Class	Pathway name	LCV [$\frac{\text{MJ}}{\text{g}}$]	WtT	TtW	$C_{f\text{CO}_2}$ [$\frac{\text{gCO}_2}{\text{gFuel}}$]	$C_{f\text{CH}_4}$ [$\frac{\text{gCH}_4}{\text{gFuel}}$]	$C_{f\text{N}_2\text{O}}$ [$\frac{\text{gN}_2\text{O}}{\text{gFuel}}$]	C_{slip} As % of the mass of the fuel used by the engine
			$\text{CO}_{2,\text{eq}}$ WtT [$\frac{\text{gCO}_2\text{eq}}{\text{MJ}}$]	Fuel Consumer Unit Class				
Renewable Fuels of Non-Biological Origin (RFNBO)	e-diesel	0.0427	Ref. to Directive (EU) 2018/2001	ALL ICES	3.206	0.00005	0.00018	-
	e-methanol	0.0199	Ref. to Directive (EU) 2018/2001	All ICES	1.375	TBM	TBM	-
e-Fuels	e-LNG	0.0491	Ref. To Directive (EU) 2018/2001	LNG Otto (dual fuel medium speed)	2.750	0	0.00011	3.1
				LNG Otto (dual fuel slow speed)				1.7
				LNG Diesel (dual fuels)				0.2
				LBSI				2.6
	e-H2	0.12	Ref. to Directive (EU) 2018/2001	Fuel Cells	0	0	0	-
				ICE	0	0	TBM	-
	e-NH3	0.0186	N/A	Fuel Cells	0	N/A	TBM	N/A
ICE				0	N/A	TBM	N/A	
e-LPG	N/A	N/A		N/A	N/A	N/A	N/A	
e-DME	N/A	N/A		N/A	N/A	N/A	-	



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