

Maritime Emissions Compliance

EU ETS, FuelEU Maritime &
the IMO Global Fuel Standard

Maritime Emissions Compliance

A Practical Guide for Shipowners, Operators & Compliance
Officers

Bunkering101

First Edition — 2026

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Preface

Maritime Emissions Compliance: EU ETS, FuelEU Maritime & the IMO Global Fuel Standard is written for the people responsible for keeping ships compliant — not climate policy analysts, not lobbyists, but the compliance officers, chartering managers, technical superintendents, and shipowners who face real financial penalties if they get this wrong.

This book covers three regulatory frameworks that are transforming maritime operations simultaneously:

1. **EU ETS** — the carbon market that expanded to cover shipping in January 2024
2. **FuelEU Maritime** — the EU’s fuel GHG intensity regulation, effective January 2025
3. **IMO GHG Strategy** — including the existing CII framework and the forthcoming Global Fuel Standard (GFS)

Each is complex on its own. Together, they create a compliance landscape where decisions made for one regulation affect the others. Buying biofuel helps with FuelEU but does not exempt you from EU ETS surrender obligations. Pooling vessels under FuelEU generates surpluses that mean nothing under CII. The IMO GFS, when it arrives, will overlap with both EU regimes.

This book maps that landscape with worked examples, calculation templates, and decision trees.

What this book covers:

- The mechanics of each regulation — scope, thresholds, timelines, penalties
- Step-by-step worked calculations for every compliance scenario
- How the three frameworks interact and where they conflict
- Cost optimization strategies — biofuel, LNG, e-fuels, carbon credits, or pay the penalty

- Documentation, reporting, and verification requirements
- Real-world case studies of compliance done right and wrong
- Ready-to-use calculation worksheets and checklists

How to use this book:

Chapters 1-7 explain the regulations. Chapters 8-9 show you how to navigate them strategically. Chapter 10 covers documentation. Chapter 11 is case studies — read these early, because the lessons are expensive to learn firsthand. The appendices contain calculation templates designed to be copied into spreadsheets and used on the job.

If you are a compliance officer, read the whole book. If you are a shipowner making investment decisions, focus on Chapters 9 and 11. If you are a chartering manager, Chapters 3 and 5 have the calculations you need for voyage estimating. If you are a chief engineer, Chapter 10 explains what documentation you need to maintain.

A note on regulation: EU ETS and FuelEU Maritime are live and the rules cited here reflect the state of implementing legislation as of early 2026. The IMO GFS is under negotiation; Chapter 7 reflects the latest MEPC outcomes and the expected shape of the final regulation, with clear markers where details remain unresolved. Use the frameworks and calculation methods — verify specific thresholds against current regulation before making compliance decisions.

For questions, corrections, or feedback: contact@bunkering101.com

Chapter 1

The Three Regimes

What this chapter covers: An overview of the three major regulatory frameworks governing maritime greenhouse gas emissions — EU ETS, FuelEU Maritime, and the IMO GHG Strategy (including CII and the forthcoming Global Fuel Standard). How they overlap, where they differ, and why the maritime industry must navigate all three simultaneously.

Prerequisites: General familiarity with the maritime industry and marine fuel types (VLSFO, LSMGO, LNG, biofuels).

Key takeaway: These three frameworks were designed independently but operate on the same vessels, burning the same fuel, on the same voyages. A compliance strategy that addresses only one regulation in isolation will overpay or underperform. The cost-optimal approach requires understanding all three and how they interact.

1.1 Why Three Frameworks?

For most of shipping's history, vessel emissions were regulated by a single body: the International Maritime Organization (IMO), through MARPOL Annex VI. The IMO set sulfur limits, nitrogen oxide tiers, and energy efficiency standards. One global framework, one set of rules.

That changed in the 2020s. Frustrated by what it perceived as slow progress at the IMO, the European Union introduced two regulations that apply specifically to shipping:

1. **EU Emissions Trading System (EU ETS)** — a carbon pricing mechanism that expanded to cover maritime CO2 emissions from January 2024 (Directive 2003/87/EC, as amended by Directive 2023/959)
2. **FuelEU Maritime** — a fuel GHG intensity regulation effective from January 2025 (Regulation (EU) 2023/1805)

Meanwhile, the IMO was not standing still. In July 2023, the Marine Environment Protection Committee (MEPC 80) adopted a revised GHG Strategy with net-zero targets for 2050 and indicative checkpoints for 2030 and 2040. Two implementing measures — a Global Fuel Standard (GFS) and an economic mechanism (broadly expected to be some form of carbon pricing) — are under active negotiation, targeting entry into force around 2027.

The result: shipowners, operators, and compliance officers now face **three overlapping regulatory frameworks** with different scopes, methodologies, and compliance mechanisms, all operating on the same fleet.

Table 1.1: The Three Frameworks at a Glance			
Dimension	EU ETS	FuelEU Maritime	IMO GHG Strategy
Type	Carbon pricing (cap-and-trade)	Fuel GHG intensity limit	Multi-measure strategy (CII now, GFS + economic mechanism coming)
Status	Live (shipping included Jan 2024)	Live (Jan 2025)	CII live (2023); GFS under negotiation
Scope	EU-related voyages, vessels ≥5,000 GT	EU-related voyages, vessels ≥5,000 GT	All vessels ≥5,000 GT (CII); all vessels (GFS, details TBD)
Emissions basis	Tank-to-wake CO2 (expanding to CH4, N2O in 2026)	Well-to-wake GHG (CO2, CH4, N2O)	Tank-to-wake CO2 (CII); well-to-wake (GFS, expected)
Compliance mechanism	Surrender EU Allowances (EUAs) for each tonne CO2	Maintain compliance balance (GHG intensity ≤ limit) or pay penalty	Meet CII rating ≥ C; future: meet fuel GHG intensity limit
Penalty	EUR 100/tonne CO2 + name and shame	EUR 2,400/tonne VLSFOe excess	CII rating D/E → mandatory SEEMP review; future penalties TBD
Geographic	EU/EEA only	EU/EEA only	Global

1.2 Timeline: How We Got Here

Understanding why these regulations exist and why they overlap requires a brief history.

1.2.1 The IMO's Early Efforts (2011–2018)

- **2011:** IMO adopts the Energy Efficiency Design Index (EEDI) for newbuilds — the first mandatory GHG regulation for any sector.
- **2016:** IMO agrees to a data collection system (DCS) for fuel consumption of ships ≥5,000 GT, effective 2019.
- **2018:** IMO adopts the Initial GHG Strategy, targeting at least 50% reduction in total annual GHG emissions by 2050 compared to 2008.

1.2.2 The EU Breaks Rank (2019–2023)

- **2019:** EU adopts the MRV Regulation (2015/757, operational since 2018) requiring monitoring and reporting of CO₂ emissions from ships calling at EU ports. The data collected under MRV becomes the foundation for EU ETS.
- **2021:** European Commission proposes “Fit for 55” package — includes bringing shipping into EU ETS and creating FuelEU Maritime.
- **2023:** EU ETS Directive amended (Directive 2023/959) to include maritime transport. FuelEU Maritime adopted as Regulation 2023/1805.

1.2.3 The IMO Responds (2023–2026)

- **July 2023 (MEPC 80):** IMO adopts Revised GHG Strategy — net-zero by or around 2050, with indicative checkpoints of 20–30% reduction by 2030 and 70–80% by 2040 (vs. 2008).
- **2023:** CII framework enters Phase 1 (2023–2026). Vessels rated A–E based on annual operational carbon intensity.
- **2024–2025 (MEPC 81–83):** Negotiations intensify on mid-term measures: a Global Fuel Standard setting maximum GHG intensity for marine fuels, and an economic mechanism (levy or trading) to fund the transition and address inequity.

- **2025–2026:** MEPC expected to finalize mid-term measure text for adoption, with entry into force targeted for 2027 (with probable default implementation in 2028).

Table 1.2: Regulatory Timeline		Year	EU Action	IMO Action
2018	MRV operational	Initial GHG Strategy	2019	DCS operational
2021	"Fit for 55" proposal	2023	EU ETS amendment adopted (Directive 2023/959); FuelEU Maritime adopted (Reg. 2023/1805)	Revised GHG Strategy (MEPC 80); CII Phase 1 begins
2024	EU ETS applies to shipping (CO2 only, 40% phase-in)	MEPC 81: mid-term measure negotiations continue	2025	FuelEU Maritime applies (100% from day one); EU ETS phase-in reaches 70%
MEPC 82–83: mid-term measure text development	2026	EU ETS expands to CH4 and N2O; 100% phase-in	MEPC 84: expected adoption of GFS framework	2027
Target: GFS enters into force (likely 2028 in practice)	2030	FuelEU: 6% GHG intensity reduction	IMO: 20–30% GHG reduction checkpoint; CII Phase 3	

1.3 Scope Comparison: Which Vessels, Which Voyages?

1.3.1 Vessel Coverage

All three frameworks use similar but not identical vessel thresholds:

- **EU ETS and FuelEU Maritime:** Vessels $\geq 5,000$ GT, regardless of flag. Both cover cargo and passenger ships; **EU ETS** additionally brings offshore vessels $\geq 5,000$ GT into scope from 2027, whereas **FuelEU excludes offshore vessels**. Warships, naval auxiliaries and fishing vessels are excluded.
- **IMO CII:** Vessels $\geq 5,000$ GT, all types covered by MARPOL Annex VI.
- **IMO GFS (expected):** Likely to cover vessels $\geq 5,000$ GT initially, with potential expansion to smaller vessels. Details under negotiation.

Table 1.3: Voyage Scope — EU vs. IMO				Voyage Type	EU ETS	FuelEU
Maritime	IMO (CII, GFS)	----- ---	----- -----	Intra-EU (e.g., Rotterdam–Piraeus)	100% of emissions	100% of energy used
					100% (global)	

| | EU port to non-EU port (outgoing) | 50% of emissions | 50% of energy used | 100% (global) | | Non-EU port to EU port (incoming) | 50% of emissions | 50% of energy used | 100% (global) | | Non-EU to non-EU (outside EU) | Not covered | Not covered | 100% (global) | | At berth in EU port | 100% of emissions | 100% of energy used | 100% (global) |

The critical implication: **a vessel trading between Asia and Europe is subject to all three frameworks simultaneously** — EU ETS and FuelEU for the EU-leg portions, and IMO CII/GFS for the full voyage. A vessel trading purely intra-Asia faces only the IMO framework.

This geographic asymmetry creates both a compliance burden and a strategic opportunity. Vessels that can adjust their trading patterns to minimize EU exposure – while maintaining IMO compliance – face lower costs. But the IMO GFS, when it arrives, will close much of this gap by applying globally.

1.4 Emissions Accounting: Tank-to-Wake vs. Well-to-Wake

One of the most consequential differences between the frameworks is **where they draw the system boundary** for emissions accounting.

1.4.1 Tank-to-Wake (TtW)

TtW counts only the emissions released at the ship's exhaust — the CO₂, methane (CH₄), and nitrous oxide (N₂O) produced during fuel combustion on the vessel.

- **EU ETS (2024–2025):** Counts only TtW CO₂. Expanding to include CH₄ and N₂O from 2026.
- **IMO CII:** Counts TtW CO₂ using fuel-specific carbon conversion factors (CFCFs).

Under TtW accounting, the fuel's production pathway does not matter. A tonne of VLSFO made from crude oil and a tonne of HVO made from used cooking oil both produce the same TtW CO₂ when burned. The “savings” from

biofuels under TtW accounting come from the fact that biofuels are considered carbon-neutral at combustion because the biogenic carbon was absorbed from the atmosphere during biomass growth.

1.4.2 Well-to-Wake (WtW)

WtW counts the full lifecycle: feedstock extraction, fuel processing, transport to the bunker port, and combustion on the vessel. It includes upstream methane slip, refinery energy use, land-use change emissions, and transport emissions.

- **FuelEU Maritime:** Uses WtW accounting. This is why biofuels receive favorable treatment under FuelEU — their WtW GHG intensity is significantly lower than fossil fuels, reflecting the biogenic carbon credit.
- **IMO GFS (expected):** Will use WtW accounting, aligned with the IMO's LCA guidelines currently under development.

1.4.3 Why This Matters

Fuel	TtW CO ₂ (gCO ₂ /g fuel)	WtW GHG (gCO ₂ eq/MJ)	Implication
VLSFO	~3.114	~91.0	Baseline under both methods
LSMGO	~3.206	~89.0	Similar to VLSFO
LNG (boil-off)	~2.750	~75–80	Lower TtW CO ₂ , but upstream methane matters under WtW
B30 (FAME from UCO)	~2.21	~65–70	TtW credit for biogenic CO ₂ ; WtW credit for low upstream emissions

Fuel	TtW CO2 (gCO2/g fuel)	WtW GHG (gCO2eq/MJ)	Implication
HVO100 (from UCO)	~0 (biogenic)	~20–30	Large WtW advantage; TtW = ~0 if biogenic CO2 counted as zero
E-methanol	~1.375 (TtW)	~5–10 (if green H2)	Very low WtW if renewable electricity used

Table 1.4: Illustrative emissions accounting by fuel type — TtW vs. WtW

A vessel running B30 biofuel gets limited credit under EU ETS (which is TtW CO2 — and biofuels’ biogenic CO2 is counted as zero under EU ETS from 2024, but verification requirements apply). Under FuelEU Maritime (WtW), the same B30 gets a much larger compliance benefit because the full lifecycle saving is recognized.

This difference in accounting methodology is the single most important factor driving biofuel adoption in EU-trading vessels: **biofuels are more valuable under FuelEU than under EU ETS.**

1.5 Compliance Mechanisms: How Each Framework Enforces

1.5.1 EU ETS: Carbon Pricing

EU ETS is a cap-and-trade system. The EU sets a declining cap on total emissions from covered sectors, and entities must surrender one EU Allowance (EUA) for each tonne of CO2 emitted.

For shipping: - The shipping company (defined as the ISM company or registered owner, depending on implementation) is the “responsible entity.” - EUAs must be surrendered by 30 September each year for the preceding year’s emissions. - EUAs are purchased on the open market (current range: EUR 50–100/tonne CO₂ depending on market conditions — see Chapter 2 for detailed pricing analysis). - If a company fails to surrender sufficient allowances, a penalty of EUR 100/tonne CO₂ applies, plus the obligation to surrender the missing allowances in the following year.

Key characteristic: EU ETS is a cost mechanism. It does not mandate any specific fuel or technology — it makes emitting CO₂ expensive and lets the market find the cheapest way to reduce.

1.5.2 FuelEU Maritime: Fuel Intensity Standard

FuelEU Maritime sets a maximum average GHG intensity (measured in gCO₂eq/MJ on a WtW basis) for the energy consumed by a vessel on EU-related voyages. The limit declines over time.

For shipping: - Each vessel calculates its average GHG intensity for the compliance period (calendar year). - If the vessel’s GHG intensity is below the limit, it generates a **surplus** (expressed as “compliance surplus” in gCO₂eq/MJ). - If above the limit, it generates a **deficit**. - Deficits can be covered by: (a) banking surpluses from previous years, (b) pooling with other vessels that have surpluses, or (c) paying a financial penalty. - The penalty is EUR 2,400 per tonne of VLSFO-equivalent excess energy consumption.

Key characteristic: FuelEU is a fuel standard. It rewards using lower-GHG fuels (biofuels, e-fuels, LNG) and penalizes using higher-GHG fuels (VLSFO, HFO). Unlike EU ETS, it does not price CO₂ directly — it prices fuel GHG intensity.

1.5.3 IMO CII: Operational Intensity Rating

CII rates vessels A–E based on their annual operational carbon intensity (grams of CO₂ per deadweight-tonne-nautical mile). It is a performance benchmark, not a prescriptive standard.

- Ratings are relative to vessel-specific reference lines (based on ship type and size).
- Vessels rated D for three consecutive years or E for a single year must develop a corrective action plan in their Ship Energy Efficiency Management Plan (SEEMP).
- There is no financial penalty under CII itself — the consequence is procedural (SEEMP revision) and reputational (rating visible in databases).

Key characteristic: CII is the weakest of the three frameworks in terms of direct financial consequence. Its impact comes from charter market expectations (charterers prefer A/B-rated vessels) and the implicit threat that persistent poor ratings will lead to stronger IMO measures.

1.5.4 IMO GFS: The Missing Piece

The Global Fuel Standard, when adopted, will likely look structurally similar to FuelEU Maritime — a maximum GHG intensity limit for marine fuels on a WtW basis, applied globally. The key differences from FuelEU will be: - Global scope (not just EU voyages) - Possibly different thresholds and timelines - An associated economic mechanism (levy or trading) to generate revenue for the transition

1.6 The Phase-In Problem

EU ETS is phasing in gradually:

Year	% of emissions requiring allowance surrender
2024	40%
2025	70%
2026	100%

Table 1.5: EU ETS maritime phase-in schedule

FuelEU Maritime has no phase-in — the regulation applies at 100% from January 1, 2025, though the initial GHG intensity reduction target is modest (2% below the 2020 reference value).

IMO CII is in Phase 1 (2023–2026), with the rating thresholds tightened for Phase 2 (2027–2030).

Practical implication: The compliance cost is ramping up. A vessel that ignored biofuels in 2024 because EU ETS only covered 40% of emissions will face a much higher bill in 2026 when 100% of emissions require allowances — and simultaneously face FuelEU Maritime requirements. Early adopters who locked in biofuel supply agreements in 2024–2025 will have a significant cost advantage over those who waited.

1.7 Who Is the “Responsible Entity”?

A critical practical question: **who pays?**

Under EU ETS and FuelEU Maritime, the “shipping company” is the responsible entity. The EU defines this as:

- **Default:** The ISM Document of Compliance (DOC) holder — typically the technical manager or ship management company.
- **If no DOC holder:** The registered shipowner.
- **Under the “clawback” mechanism (FuelEU Maritime, from 2028):** The entity actually responsible for the fuel purchase (the time charterer, in most cases) can be held liable via contractual provisions. However, the regulatory liability remains with the DOC holder.

This creates a commercial tension: the ISM company holds the regulatory risk, but the time charterer typically controls the fuel choice. This tension is being addressed through charterparty clauses (BIMCO ETS clauses, FuelEU Maritime clauses) that pass compliance costs through to the party controlling fuel procurement.

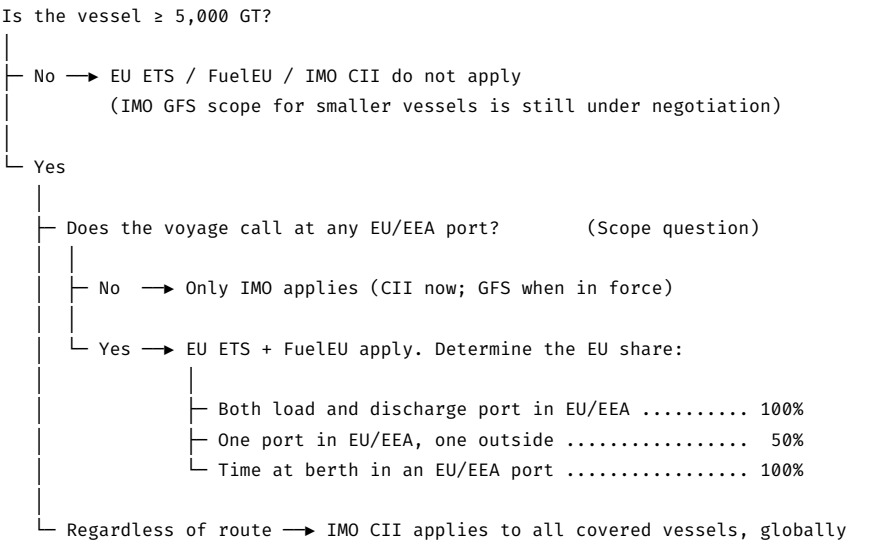
Under IMO frameworks, the flag state enforces compliance against the vessel’s registered owner or operator.

Table 1.6: Responsibility Matrix	Framework	Regulatory “Company”	Practical Cost Bearer	Key Contractual Mechanism
EU ETS	ISM DOC holder	Time charterer (via BIMCO ETS clauses)	BIMCO ETS Clause 2023	FuelEU Maritime
ISM DOC holder	Time charterer (via FuelEU clauses, from 2028)	BIMCO FuelEU Maritime Clause	IMO CII	Flag state / registered owner
Registered owner / operator	SEEMP compliance	IMO GFS (expected)	Flag state / registered owner	To be determined
To be developed				

1.8 A Scope Decision Framework

Before analysing cost, answer a simpler question: **which frameworks apply to this vessel and these voyages?** Getting scope wrong is the most common and most expensive compliance error — companies either over-comply (wasting money on unnecessary allowances or fuel upgrades) or under-comply (accumulating penalties and detentions).

The decision follows directly from the thresholds in Table 1.1 and the voyage scope in Table 1.3:



Two nuances trip people up:

1. **Port of call, not flag.** EU scope depends on the ports visited, not the vessel's flag. A Panamanian-flagged bulk carrier calling Rotterdam and Singapore is caught by EU rules for the EU-leg portion.
2. **"Port of call" has a narrow definition.** A mere anchorage stop, a bunkering-only call, or a canal transit is generally *not* a port of call for EU ETS/FuelEU purposes — but a cargo operation or embarkation/disembarkation is. The distinction matters for ships that call at EU anchorages for orders.

Table 1.7: Common Trading Patterns and Their Exposure

Trading pattern	EU ETS	FuelEU	IMO CII	Typical annual cost driver
Intra-EU feeder (e.g., Rotterdam–Hamburg)	100% of emissions	100% of energy	Yes	Highest EU cost per tonne carried
EU ↔ Asia (e.g., Rotterdam–Shanghai)	50% each leg	50% each leg	Yes	Large absolute exposure (long voyages)
EU ↔ non-EU short sea (e.g., Algeciras–Casablanca)	50%	50%	Yes	Moderate
Non-EU to non-EU (e.g., Singapore–Santos)	None	None	Yes	Only IMO CII (GFS later)
At berth in EU port	100%	100%	Yes	Small but not negligible

Table 1.8: Voyage patterns and regulatory scope — use this as a screening tool; detailed calculations follow in Chapters 2–5.

1.9 Worked Example: One Round Trip, Three Regimes

The best way to see how the frameworks interact is to run one voyage through all three. The example below uses a mid-size product tanker on a European round trip with one intra-EU leg, one outbound and one inbound extra-EU leg, and a berth call — the pattern that exercises every scope rule at once.

Vessel and voyage assumptions

- Vessel: 50,000 DWT product tanker, 30 MT/day VLSFO consumption
- Fuel: VLSFO throughout (carbon factor 3.114 tCO2 per tonne; energy content 41.0 MJ/kg; WtW GHG intensity 91.0 gCO2eq/MJ)
- EUA price: EUR 75/tonne CO2 (allowance — see Chapter 2 for pricing)
- Year: 2026 (EU ETS at 100% phase-in)

Table 1.9: Voyage legs and scope

Leg	Route	Fuel (MT)	Scope rule	Covered fuel (MT)
1	Rotterdam → Algeciras (intra-EU)	120	100% intra-EU	120
2	Algeciras → Singapore (EU out)	750	50% extra-EU	375
3	Singapore → Rotterdam (EU in)	720	50% extra-EU	360
4	At berth, Rotterdam (3 days)	30	100% at berth	30
Total		1,620		885

Step 1 — EU ETS exposure (TtW CO2)

EU ETS charges one allowance per tonne of CO2 on the *covered* portion of emissions:

Covered fuel	= 885 MT
CO2 per MT VLSFO	= 3.114 tCO2/MT
Covered emissions	= 885 × 3.114 = 2,755.9 tCO2
EUA cost	= 2,755.9 × EUR 75 = EUR 206,693

So a single round trip generates roughly **EUR 207,000** of EU ETS cost. Note that the *uncovered* 735 MT of fuel still emits CO2 — it simply falls outside EU scope (it remains within IMO scope).

Step 2 — FuelEU Maritime exposure (WtW GHG intensity)

FuelEU converts the vessel's covered energy to GHG intensity and compares it with the annual limit. For a VLSFO-only ship, the intensity is simply the VLSFO value, 91.0 gCO₂eq/MJ, against a 2025 limit of 89.34 gCO₂eq/MJ:

$$\begin{aligned}\text{Covered energy} &= 885 \text{ MT} \times 41,000 \text{ MJ/MT} = 36,285,000 \text{ MJ} \\ \text{Excess intensity} &= 91.0 - 89.34 = 1.66 \text{ gCO}_2\text{eq/MJ} \\ \text{Excess GHG} &= 1.66 \times 36,285,000 = 60,233,100 \text{ g} = 60.23 \text{ tCO}_2\text{eq}\end{aligned}$$

Convert to VLSFO-equivalent energy:

$$\begin{aligned}60,233,100 \text{ g} \div 91.0 \text{ g/MJ} &= 661,902 \text{ MJ} \\ 661,902 \text{ MJ} \div 41,000 \text{ MJ/MT} &= 16.14 \text{ t VLSFO-equivalent}\end{aligned}$$

$$\text{Penalty (illustrative)} = 16.14 \times \text{EUR } 2,400 \approx \text{EUR } 38,700$$

The exact FuelEU penalty mechanics (compliance balance, banking, pooling, multipliers) are covered in Chapters 4–5; the figure here is an order-of-magnitude illustration. The key point: **FuelEU and EU ETS are separate costs, and FuelEU's penalty rate is deliberately punitive** — it is often cheaper to fix the fuel than to pay it.

Step 3 — IMO CII

CII does not create a direct cash cost, but it rates the vessel A–E on operational carbon intensity. A VLSFO-burning tanker of this size typically rates **C or D**. A D rating triggers a mandatory corrective action plan in the SEEMP; in the charter market it can cost real money through reduced hire and vetting friction.

Step 4 — Combined cost stack for the round trip

Table 1.10: Combined compliance cost stack (rounded)

Cost element	Basis	Estimated cost
EU ETS allowances	2,755.9 tCO ₂ × EUR 75	EUR 207,000
FuelEU penalty (illustrative)	16.1 t VLSFOe × EUR 2,400	EUR 39,000
CII consequences	Charter-market / procedural	Indirect

Cost element	Basis	Estimated cost
MRV/verification/admin	Monitoring, reporting, verification	EUR 5,000–15,000
Total (direct, illustrative)		EUR 246,000–261,000

Over a year, a vessel making six such round trips faces roughly **EUR 1.5 million** in direct regulatory cost — before any fuel-price or operational changes. That is the number compliance strategy exists to reduce.

What changes the answer? Three levers move these figures more than anything else:

1. **Fuel choice** — a certified biofuel blend (e.g., B24) cuts FuelEU intensity sharply and reduces (or zero-rates) the EU ETS CO₂, but costs more per tonne.
2. **Trading pattern** — shifting a leg from intra-EU (100%) to extra-EU (50%) halves the covered share, at the cost of longer voyages and more IMO exposure.
3. **Contract structure** — who pays is a commercial negotiation (see below), but it does not change the regulatory total.

1.10 The Cost of Getting It Wrong

Compliance failures are not symmetric. Under-reporting costs far more than over-reporting, because the frameworks layer penalties, name-and-shame, and future obligations on top of the underlying cost.

Table 1.11: Penalty exposure by framework

Framework	Failure	Consequence
EU ETS	Failure to surrender sufficient EUAs	EUR 100/tCO ₂ penalty plus surrender of the shortfall the following year (you pay twice)
EU ETS	Non-compliance, repeated	Name-and-shame publication; possible expulsion order and detention
FuelEU	Deficit not covered	EUR 2,400 per tonne VLSFO-equivalent energy (roughly 10–20× the fuel cost differential)
FuelEU	Repeated non-compliance	Penalty multiplier increases with consecutive years of deficit
IMO CII	D for 3 years, or E for 1 year	Mandatory corrective action plan; rating public
IMO GFS (expected)	TBD	Expected levy/penalty mechanics, likely substantial

The asymmetry has a practical consequence: **it is rational to build in a compliance margin**. A ship that plans to exactly meet the FuelEU limit has no buffer for a bad-weather voyage, an off-spec stem, or a verification challenge. The cost of a modest margin is small; the cost of a shortfall is large.

1.11 Common Misconceptions

Most compliance mistakes trace back to one of a handful of false assumptions.

Table 1.12: Common misconceptions

Misconception	Reality
“EU ETS and FuelEU are the same thing.”	Different instruments: EU ETS prices TtW CO ₂ ; FuelEU sets a WtW fuel-intensity limit. A ship can comply with one and fail the other.
“We don’t call at EU ports, so none of this applies.”	IMO CII applies globally to ≥5,000 GT vessels, and the GFS will extend a fuel standard worldwide.
“Biofuels are free under EU ETS.”	Biogenic CO ₂ is zero-rated, but only certified sustainable biofuels qualify and verification is required. WtW treatment differs under FuelEU.
“The charterer pays for everything.”	Regulatory liability sits with the ISM company. Whether it is recovered depends entirely on the charterparty wording.
“CII is only a rating — ignore it.”	Ratings are public and affect charter rates, financing and vetting. CII is also the on-ramp to the GFS.
“The phase-in means we can wait.”	EU ETS reaches 100% in 2026, FuelEU applies in full from 2025, and penalties are retrospective. Waiting compounds cost.
“One fuel decision fixes all three.”	A biofuel blend helps FuelEU and EU ETS but may not improve CII, and could raise OPEX. Optimisation is a portfolio problem.

1.12 Case Study: The Charter That Forgot the ETS

Situation. A ship manager operated twelve Supramax bulk carriers on time charter to a European commodity trader. The charterparties were on the manager's standard form, which predated the EU ETS extension. No clause allocated emissions costs.

The problem surfaces. In early 2025, the manager received EU ETS surrender invoices for 2024 emissions (40% phase-in). Under the regulations, the manager — as ISM DOC holder — was the responsible entity. Under the charter, however, the time charterer had exclusive control of the vessel's trading and fuel purchases. The manager had no contractual mechanism to recover the cost.

Analysis. Two positions emerged:

- **The manager's view:** the charterer controlled the emissions and should bear the cost; the charter's "all costs of the vessel" language was never intended to cover a tax that did not exist when the form was drafted.
- **The charterer's view:** the hire rate was agreed on the basis of the regulations then in force; any new regulatory cost was a risk the owner accepted.

With no clause, the dispute was heading to arbitration with an uncertain outcome. The manager's exposure across the fleet was material — roughly EUR 1.2 million per year at 2026 phase-in, based on the trading pattern.

Resolution. The manager revised its chartering strategy rather than litigate twelve charters individually:

1. **New fixtures** adopted the BIMCO ETS clause, passing 100% of EU ETS cost to the time charterer, with the EUA price referenced to a published monthly average.
2. **Existing charters** were renegotiated at renewal in return for a modest hire concession — cheaper than arbitration.
3. **Fuel strategy** shifted to biofuel blends where FuelEU deficits would otherwise arise, sharing the benefit between owner and charterer through a revised pass-through formula.

Lessons.

- **Regulatory liability and commercial cost are different things.** The regulation tells you who *surrenders*; the charterparty tells you who *pays*. If the charter is silent, the responsible entity absorbs the cost.
 - **Silence is a decision — usually a bad one.** Pre-ETS charter forms do not allocate ETS costs by accident; they simply never contemplated them.
 - **Standard clauses exist — use them.** BIMCO ETS and FuelEU clauses are market-tested and far cheaper than arbitration.
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1.13 Your First 90 Days

A practical sequence for a fleet that has not yet organised for these regulations.

1. **Inventory scope (weeks 1–2).** For every vessel $\geq 5,000$ GT, list the previous 12 months of port calls. Classify each leg as intra-EU, extra-EU, or non-EU. This defines your covered energy and emissions.
2. **Confirm your responsible entity (week 2).** Identify the ISM DOC holder for each vessel and map it against current charterparties. Where the DOC holder and the fuel decision-maker differ, flag the gap.
3. **Audit monitoring and reporting (weeks 3–5).** Verify MRV data quality against Bunker Delivery Notes, noon reports and fuel flow meters. Bad input data is the single biggest source of verification failure.
4. **Model the cost (weeks 4–6).** Run the Chapter 2–5 calculations for your actual trading pattern. Establish the baseline EU ETS and FuelEU cost per vessel per year.
5. **Fix the contracts (weeks 5–8).** Adopt BIMCO ETS and FuelEU clauses. Decide the pass-through basis (actual cost, monthly average, or fixed surcharge) and the documentation deadlines.
6. **Evaluate fuel and pooling options (weeks 6–10).** Compare biofuel blending, LNG (where capable), and FuelEU pooling across the fleet. Model the net cost, not the headline fuel price.
7. **Set a compliance calendar (weeks 8–12).** Diarise monitoring-plan updates, verification windows, EUA purchase windows, and surrender deadlines. (See Appendix D.)

1.14 Key Terms in This Chapter

- **EU ETS** — EU Emissions Trading System; a cap-and-trade scheme requiring surrender of allowances (EUAs) for covered emissions.
- **EUA** — EU Allowance; the tradable permit representing one tonne of CO₂.
- **MRV** — Monitoring, Reporting and Verification; the data backbone of the EU system.
- **FuelEU Maritime** — EU regulation setting a declining limit on the WtW GHG intensity of energy used on board.
- **GHG intensity** — grams of CO₂-equivalent per megajoule of energy (gCO₂eq/MJ).
- **Compliance balance / surplus / deficit** — the difference between a vessel's GHG intensity and the applicable limit over the compliance period.
- **Pooling** — combining vessels' balances so surpluses offset deficits within a group.
- **RFNBO** — Renewable Fuel of Non-Biological Origin (e-fuels); eligible for FuelEU multipliers.
- **Tank-to-Wake (TtW)** — emissions from fuel combustion on board only.
- **Well-to-Wake (WtW)** — full lifecycle emissions, including production and transport.
- **CII / AER** — Carbon Intensity Indicator / Annual Efficiency Ratio; the IMO's operational rating metric.
- **SEEMP** — Ship Energy Efficiency Management Plan.
- **GFS** — Global Fuel Standard; the IMO's forthcoming fuel-intensity measure.
- **LCA** — Life Cycle Assessment; the IMO framework for WtW accounting.

1.15 Chapter Summary

- **Three overlapping frameworks** now govern maritime emissions: EU ETS (carbon pricing), FuelEU Maritime (fuel GHG intensity), and IMO GHG Strategy (CII now, GFS coming).

- **Each uses a different methodology:** EU ETS is TtW CO₂ pricing; FuelEU is WtW GHG intensity; CII is TtW operational intensity rating.
- **Geographic scope differs:** EU regulations cover EU-related voyages; IMO covers global operations.
- **The cost is real and ramping up:** EU ETS phase-in reaches 100% in 2026; FuelEU penalties apply from 2025; IMO GFS will add a global cost layer around 2027–2028.
- **Biofuels are treated differently** under each framework — favorably under FuelEU (WtW), partially under EU ETS (biogenic CO₂ exemption), and uncertainly under CII (pending IMO LCA guidelines).
- **The responsible entity is the ISM company** under EU regulations, but costs are contractually passed to time charterers via BIMCO clauses.

Next: Chapter 2 — EU ETS for Shipping: The Mechanics

Get the Full Guide

This is a **free sample chapter** from *Maritime Emissions Compliance: EU ETS, FuelEU Maritime & the IMO Global Fuel Standard*.

The full edition includes:

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