Regulatory Developments & Industry Impact

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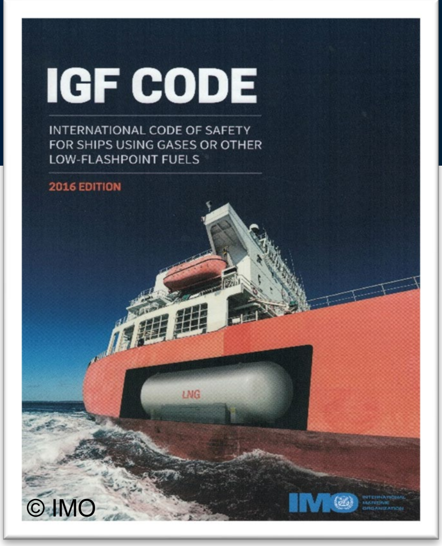
IMO Developments

IMO Decarbonization Regulatory Agenda

	2023	2024	2025	2026	2027	2028
MEPC	80	81, 82	83, 83*	84, 85	86	87, 88
IMO GHG Strategy *Strategy is periodically revised each 5 years*	2023 IMO Strategy				Review Initiation →	2028 IMO Strategy Adoption
Mid-Term Measures *Technical (GFS)* *Market-based (Carbon pricing)*	Phase III – Measures prioritization →	Finalization of Basket of measures →	Approval of Mid-Term Measures → Adoption →		Entry into force	
Comprehensive Impact Assessment (CIA) *Mid-Term measures Impact Assessment on States (SIDS & LDCs)*	Initiation of CIA →	Interim Report → Finalized Report				
Lifecycle Analysis Guidelines *Under continuous review (WtT, TtW, WtW factors & fuel pathways)*	CG → Further Develop LCA Framework					
Short-term measures *To be reviewed by 1 Jan 2026 (phase 1) and ongoing (phase 2)*	Review of the CII (Phase 1) Data gathering	Data analysis		Phase 2 →		

Regulatory Framework for Alternative Fuels



International Code of Safety for Ships using Gases or Other Low-Flashpoint Fuels – IGF Code

- Adopted on June 2015 – MSC.391(95), Enter into force 1 Jan 2017
- **Contains detailed requirements for methane (LNG) only**
- **Other Low-Flashpoint fuels by 'Alternative Design' under 2.3**
  - Meet the **goals and functional requirements** of the IGF Code and **provide an equivalent level of safety**

Interim Guidelines for the Safety of Ships using Alternative Fuels

- Subject to flag, the 'Alternative Design' approach shall not be necessary where fuel specific guidelines **exist**

	CCC 6 Sep 2019	MSC 102 Nov 2020	CCC 7 Sep 2021	MSC 105 Apr 2022	CCC 8 Sep 2022	MSC 107 Jun 2023	CG	CCC 10 Sep 2024
LPG			Establishment of CG		Agreement of Interim Guidelines	Adoption of Interim Guidelines	Under Review	Under Review
Methanol	Agreement on Interim Guidelines	Adoption of Interim Guidelines		Under Review	Under Review	Under Review		
Ammonia					Establishment of CG to initiate development of Interim Guidelines		Prepared draft Guidelines to be considered by CCC 9	Finalized Interim Guidelines
Hydrogen			Establishment of WG to initiate development of Interim Guidelines		Establishment of CG to further develop the draft Interim Guidelines		Prepared draft Guidelines to be considered by CCC 9	Further Development
Fuel Cells			Agreement on Interim Guidelines	Adoption of Interim Guidelines		Under Review	Under Review	

Revised 2023 IMO GHG Reduction Strategy

Revised GHG Strategy

With Respect to **2008** Levels

Carbon Intensity of the Ship

Decline through further phases of the EEDI

Carbon Intensity of international Shipping

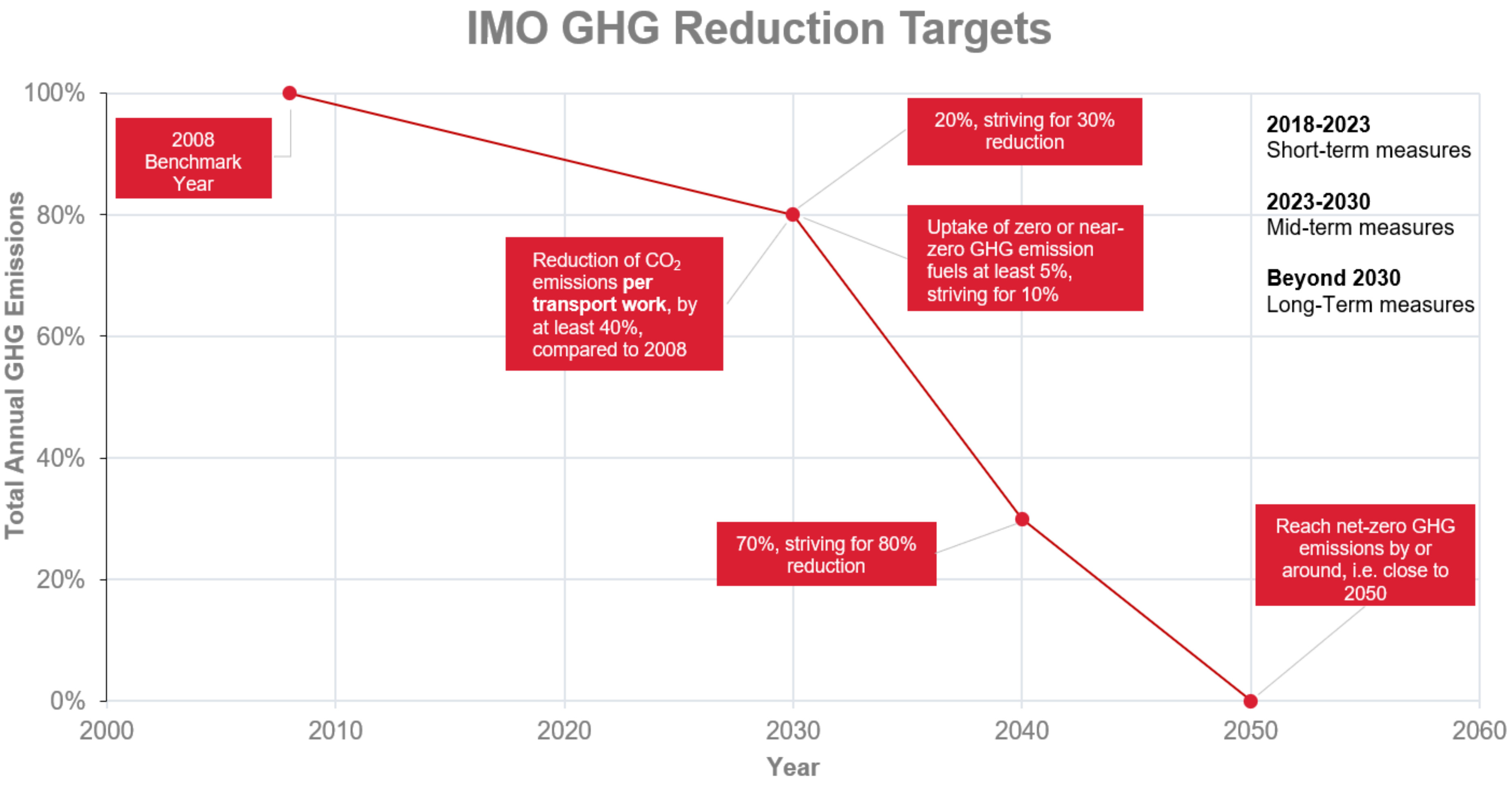
40% reduction by 2030

Uptake of (near) zero GHG emission technologies/fuels

5%, striving for 10% by 2030

Total Annual GHG Emissions

- 20%, striving for 30% by 2030
- 70%, striving for 80% by 2040
- Net zero by or around, i.e. close to 2050



MARPOL IV Ch. 5 — Regulations on the IMO Net-Zero Framework

MARPOL IV Chapter 5 – Net-Zero Framework

Development of the basket of candidate mid-term GHG reduction measures

Goal of Chapter 5

To reduce the GHG emissions from international shipping as soon as possible, in line with the 2023 IMO GHG Strategy

Greenhouse Gas fuel intensity (GFI)

$$GFI_{attained} = \frac{\sum_{j=1}^{J} EI_j x Energy_j}{Energy_{total}}$$

Well-to-Wake GHGIE
Or
Adjusted Tank-to-Wake GHGIE

Table X1 – Reduction factors for the [target][required] annual GFI relative to the GFI reference value[40]

Year	[Z factor-base]	[Z factor- strive]
2027	[3]	[7.5]
2028	[6.5]	[13]
2029	[8.5]	[19.5]
2030	[12]	[24.5]
2031	[17]	[30]
2032	[22.5]	[35.5]
2033	[28]	[41]
2034	[33.5]	[46]
2035	[38.5]	[51.5]
2036		

Table X1 – Reduction factors (in percentage) for the [target][required] annual GFI relative to the GFI reference value

Year	Z[43]
2028-2029	[X]
2030-2034	[X]
2035-2039	[X]
2040-2044	[X]
2045-2049	[X]
2050-	[X]

Economic measure

- Implemented in the GFI - Surplus/Remedial/Deficit units or Surcharge **(U.S. $18.75 per tonne of CO_{2e} and to scale up)**, or
- Standalone (e.g., Levy/contribution concept)

Chapter 1 – General
1. Definitions (regulation 2)

Chapter 2 – Survey, Certification and Means of Control
2. Surveys (regulation 5)
3. Certificates and Statements of Compliance (regulation 6)
4. Form of Certificates and Statements of Compliance (regulation 8)
5. Duration and validity of Certificates and Statements of Compliance (regulation 9)
6. Port State Control and operational requirements (regulation 10)

Chapter 4 – Regulations on the Carbon Intensity of International Shipping
7. SEEMP (regulation 26)
8. Data Collection System (regulation 27)

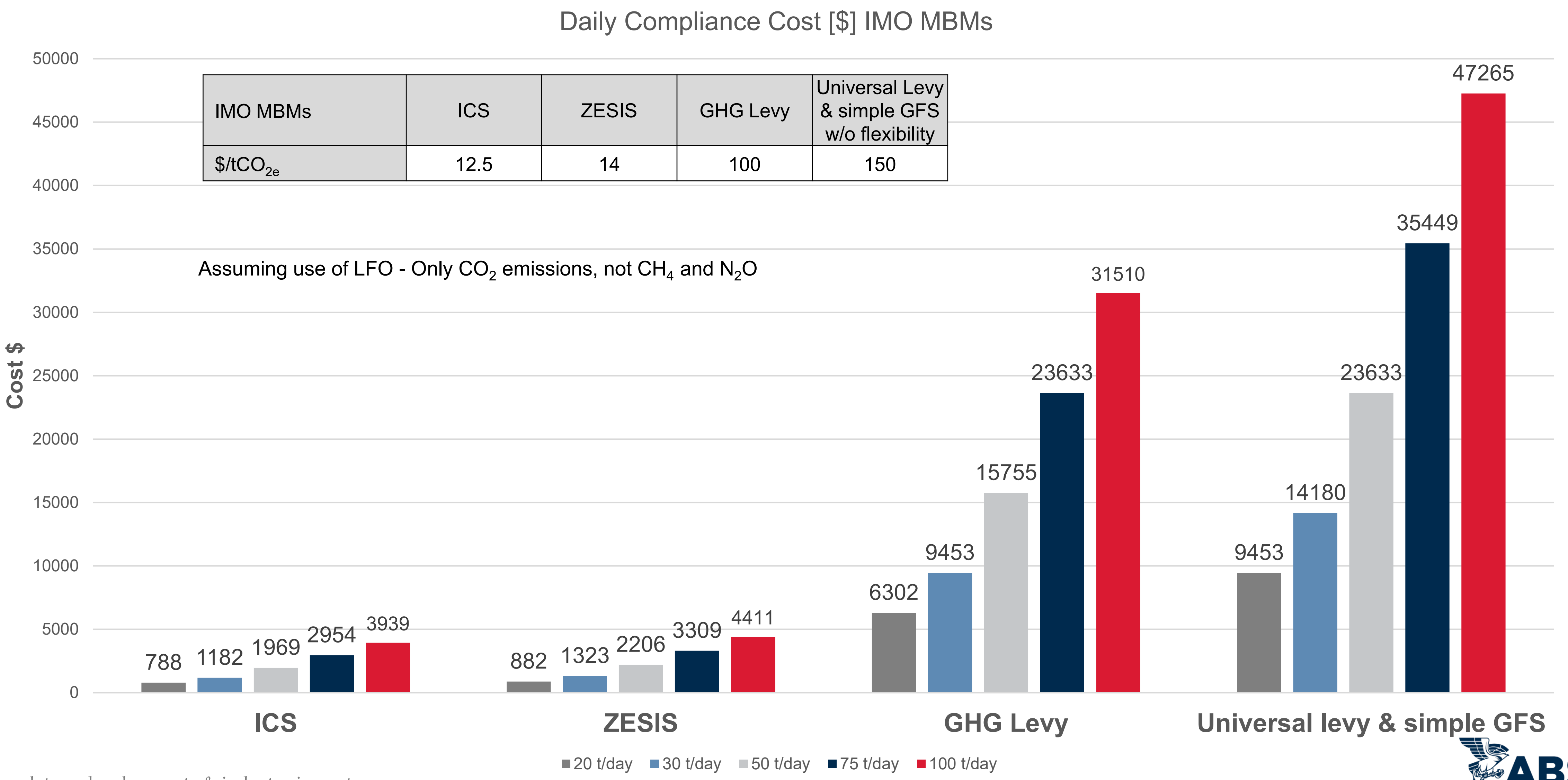
New Chapter 5 – Regulations on the IMO Net-Zero Framework
9. **New Chapter 5.1: Goal-Based Marine Fuel Standard Regulating the Phased Reduction of the Marine Fuel's GHG Intensity**
   1. Application (regulation X)
   2. Goal (regulation X)
   3. Functional requirements (regulation X)
   4. Attained annual GHG fuel intensity (GFI) (regulation X)
   5. Target/equired GFI (regulation X)
   6. GFI data collection and reporting (regulation X)
   7. Alternative compliance approaches (regulation X)
   8. IMO GFI Registry (regulation X)
   9. Uptake of zero or near-zero GHG emissions technologies, fuels and/or energy sources (ZNZs) (regulation X)
   10. Synergies with existing measures (regulation X)
10. **Economic Mechanism(s) to Incentivize the Transition to Net-Zero (Regulation X) (Options for Calculation, Collection of Contributions by Ships)**
   1. Review and Ratchet of the Levy and Surcharge (regulation X)
   2. Collection of economic contribution by ships (regulation X)
   3. Central management/oversight of collected revenue (regulation X) **(Options for the Funds)**
   4. The Research, Development and Deployment Committee (regulation X)
   5. Distribution of Revenue (regulation X) **(Options for the Distribution of Revenues)**
11. **Dates of Implementation (regulation X)**

Adoption by end of 2025; EiF 16 months later (2027)

ABS

Mid-term Measures – Daily Compliance Cost [$]

IMO MBMs	ICS	ZESIS	GHG Levy	Universal Levy & simple GFS w/o flexibility
$/tCO$_{2e}$	12.5	14	100	150

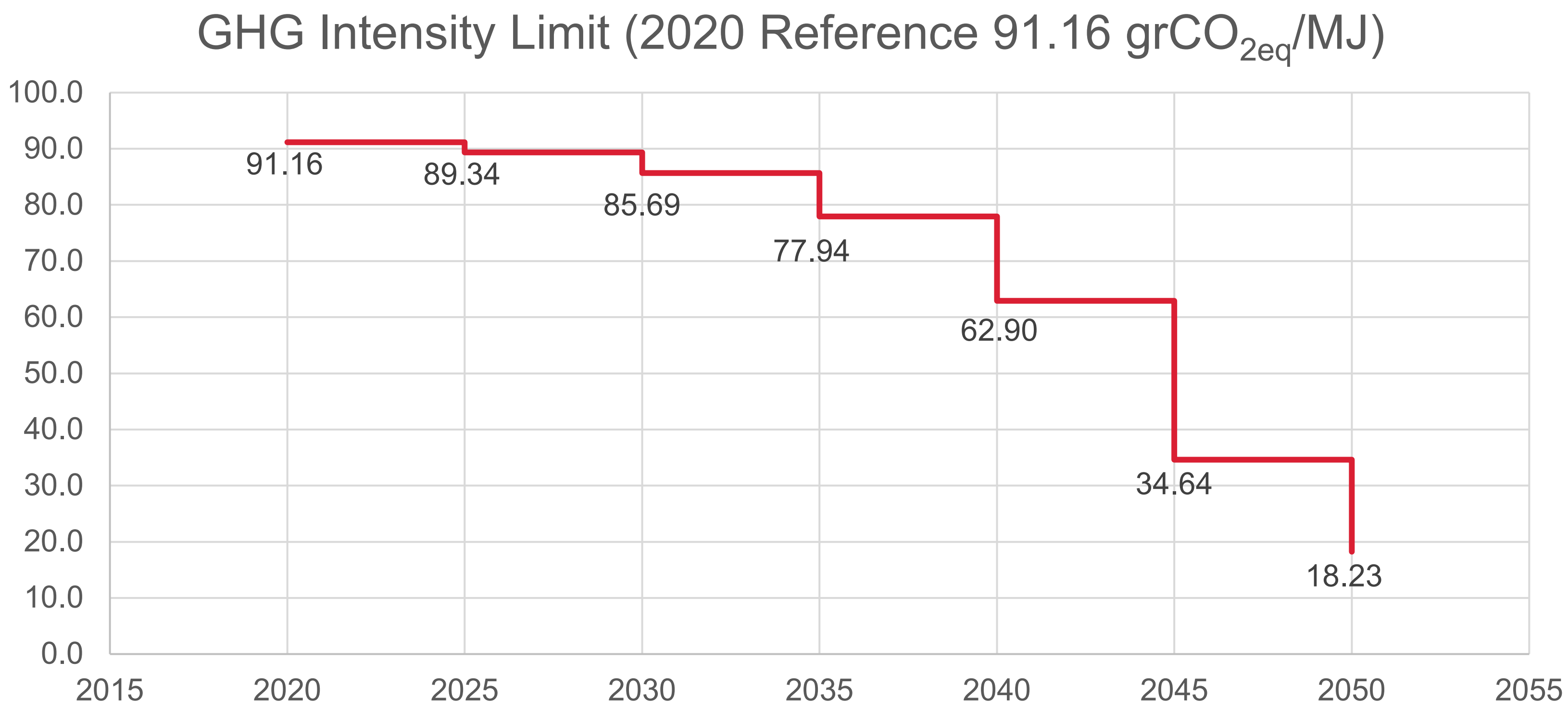


Regional Developments

FuelEU Maritime Regulation

GHG Intensity Limit

GHG Intensity limit to be gradually decreased based **on 2020 average fleet GHG** intensity (MRV Data).

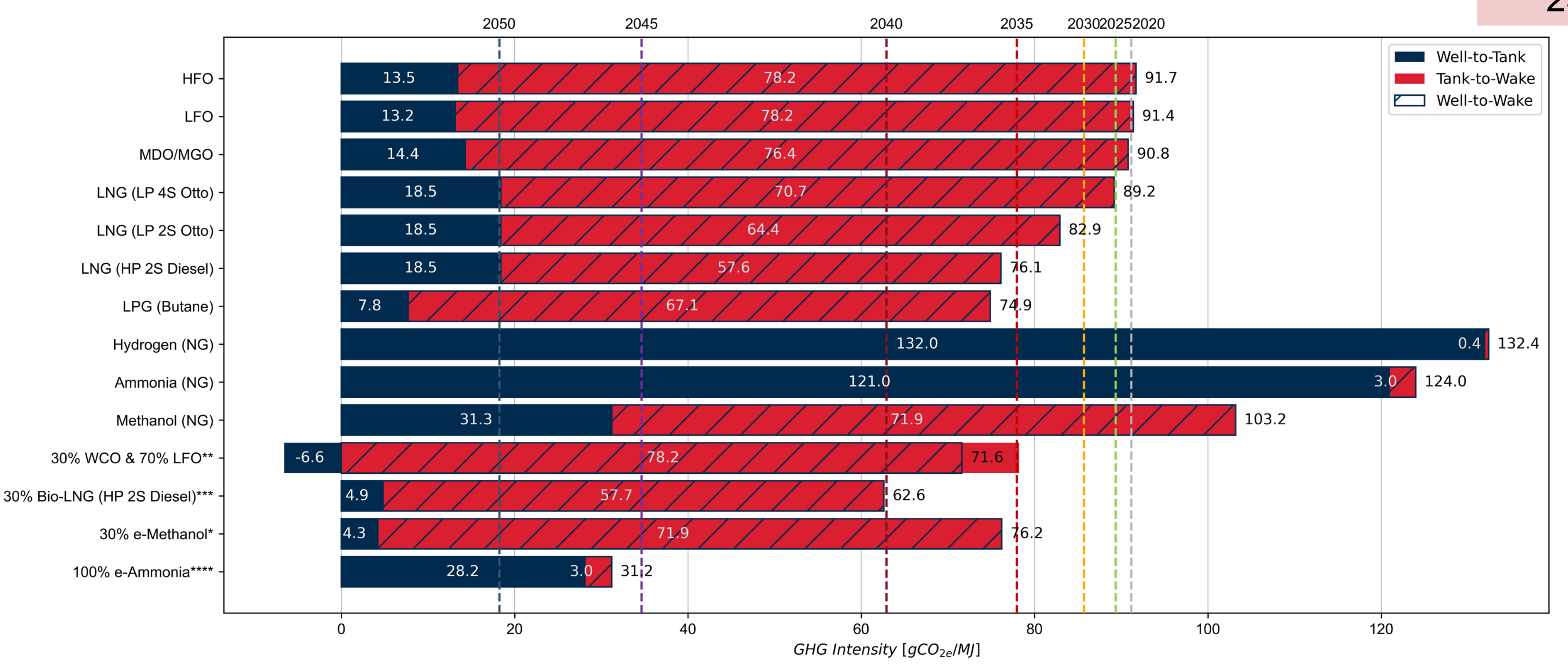


Year	Reduction
2020	Reference
2025	2%
2030	6%
2035	14.5%
2040	31%
2045	62%
2050	80%

FuelEU Maritime Regulation

GHG intensity limit and most common fuels

GWP_{CH4}	GWP_{N2O}
25	298



* e-Methanol produced from black-liquor gasification integrated with pulp mill (89% GHG reduction).

** Hydrotreated oil from waste cooking oil (80% GHG reduction).

*** Biomethane for transport (Open digestate, no off-gas combustion) (69% GHG reduction).

**** Green Ammonia based on the minimum allowed GHG reduction as per RED II (70% GHG reduction).

FuelEU – Fleet Pooling

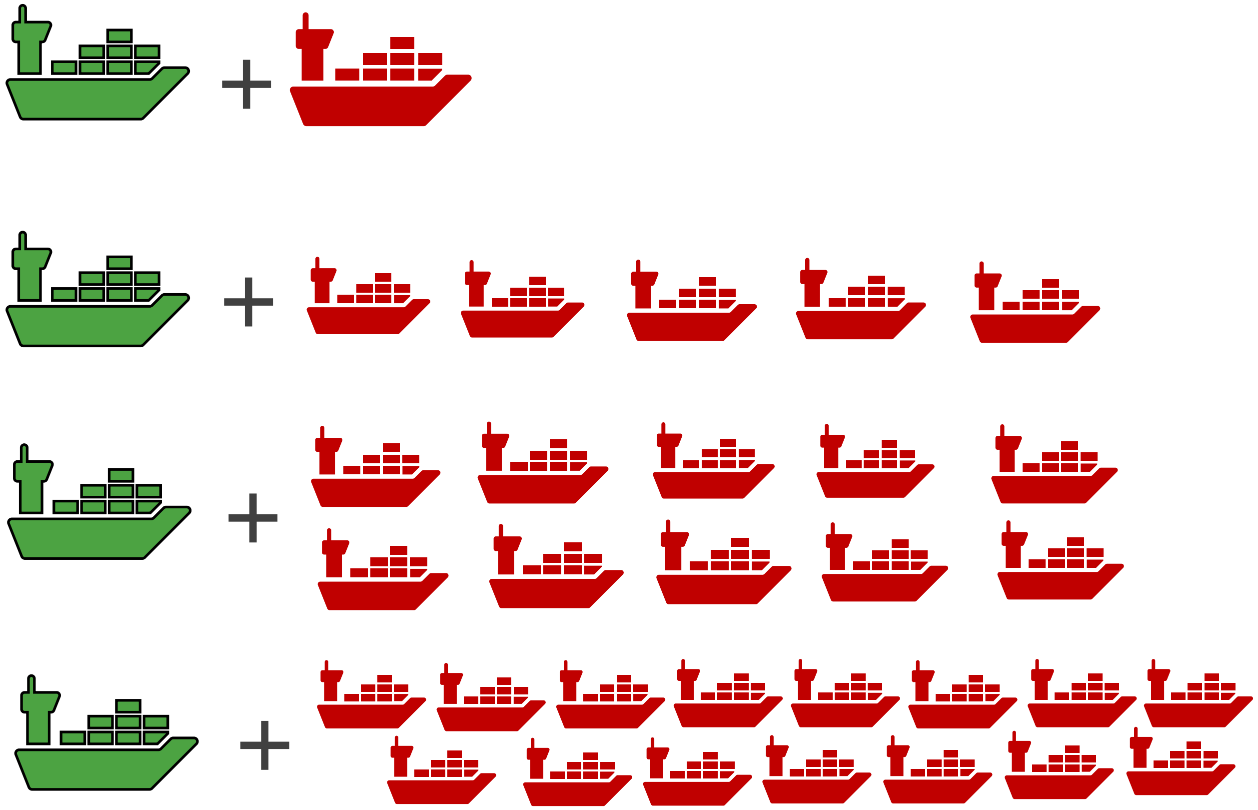
2025 GHG target, $GHGIE_{actual}$ = 89.34 gCO_{2e}/MJ - LFO $GHGIE_{actual}$ = **91.4 gCO_{2e}/MJ - 30 MT/day LFO** ($1.23 \cdot 10^6$ MJ)

Scenario 1: LFO & WAP (0.95 f_{wind})
LFO WAP $GHGIE_{actual}$ = **86.8 gCO_{2e}/MJ**

Scenario 2: LFO & LNG 0.2% Methane slip
LNG & LFO $GHGIE_{actual}$ = **78.2 gCO_{2e}/MJ**

Scenario 3: LFO & 30% Biofuel
30% Biofuel* $GHGIE_{actual}$ = **68.8 gCO_{2e}/MJ**

Scenario 4: LFO & 30% e-Methanol
30% e-Methanol** $GHGIE_{actual}$ = **58.6*** gCO_{2e}/MJ**



* Used Cooking Oil (UCO) WtW GHGIE = 16.2 gCO_{2e}/MJ
** e-Methanol produced from black-liquor gasification integrated with pulp mil, WtW = 13.1 gCO_2/MJ
*** Using a Reward factor of 2 (RWD = 2) for the case of **RFNBO (e-Methanol), until 31 December 2033**

Thank You

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