

Rio Innovation Week

Combustíveis Marítimos Sustentáveis: O Futuro da Descarbonização da Navegação

Diretoria de Portos e Costas (AM) - Secretaria Executiva da CCA-IMO

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DIRETORIA DE
PORTOS E COSTAS



MARINHA
DO BRASIL



Contextualização

- ✧ Organização Marítima Internacional
- ✧ Brasil - Estado Membro da IMO
- ✧ Signatário da Convenção MARPOL
- ✧ MARPOL – Anexo VI – prevenção da poluição aérea



Estratégias da IMO

Estratégia Inicial (2018) metas

RESOLUTION MEPC.304(72)
(adopted on 13 April 2018)

INITIAL IMO STRATEGY ON REDUCTION OF GHG EMISSIONS FROM SHIPS

.1 *carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships*

to review with the aim to strengthen the energy efficiency design requirements for ships with the percentage improvement for each phase to be determined for each ship type, as appropriate;

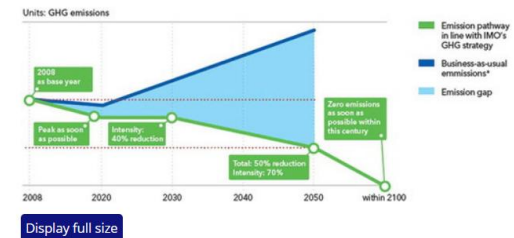
.2 *carbon intensity of international shipping to decline*

to reduce CO₂ emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008; and

.3 *GHG emissions from international shipping to peak and decline*

to peak GHG emissions from international shipping as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008 whilst pursuing efforts towards phasing them out as called for in the Vision as a point on a pathway of CO₂ emissions reduction consistent with the Paris Agreement temperature goals.

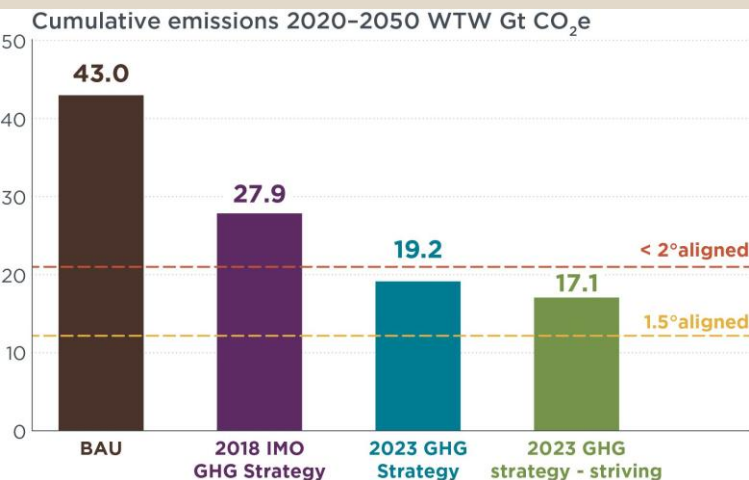
Figure 2. GHG emission gap between IMO GHG strategy and BAU emissions (DNV-GL [2019](#)).



Estratégias da IMO

Estratégia IMO 2023 - metas

Theiccct.org



3.3 Levels of ambition directing the 2023 IMO GHG Strategy are as follows:

.1 carbon intensity of the ship to decline through further improvement of the energy efficiency for new ships

to review with the aim of strengthening the energy efficiency design requirements for ships;

.2 carbon intensity of international shipping to decline

to reduce CO₂ emissions per transport work, as an average across international shipping, by at least 40% by 2030, compared to 2008;

.3 uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to increase

uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to represent at least 5%, striving for 10%, of the energy used by international shipping by 2030; and

.4 GHG emissions from international shipping to reach net zero

to peak GHG emissions from international shipping as soon as possible and to reach net-zero GHG emissions by or around, i.e. close to, 2050, taking into account different national circumstances, whilst pursuing efforts towards phasing them out as called for in the Vision consistent with the long-term temperature goal set out in Article 2 of the Paris Agreement.

MEPC 80/17/Add.1
Annex 15, page 1

ANNEX 15

RESOLUTION MEPC.377(80)
(adopted on 7 July 2023)

2023 IMO STRATEGY ON REDUCTION OF GHG EMISSIONS FROM SHIPS

Unanimidade

Estratégias da IMO

Estratégia IMO 2023 – princípios guia

Guiding principles

3.5 The principles guiding the 2023 IMO GHG Strategy include:

.1 the need to be cognizant of the principles enshrined in instruments already developed, such as:

.1 the principle of non-discrimination and the principle of no more favourable treatment, enshrined in MARPOL and other IMO conventions; and

.2 the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances, enshrined in UNFCCC, its Kyoto Protocol and the Paris Agreement;

.2 the requirement for all ships to give full and complete effect, regardless of flag, to implementing mandatory measures to ensure the effective implementation of this Strategy;

.3 the need to consider the impacts of measures on States, including developing countries, in particular on LDCs and SIDS, and their specific emerging needs, as recognized in the Revised Strategic Plan for the Organization (resolution A.1149(32)); and

.4 the need for evidence-based decision-making balanced with the precautionary approach as set out in resolution MEPC.67(37).



Medidas e Diretrizes

✧ Economic element

Tiers

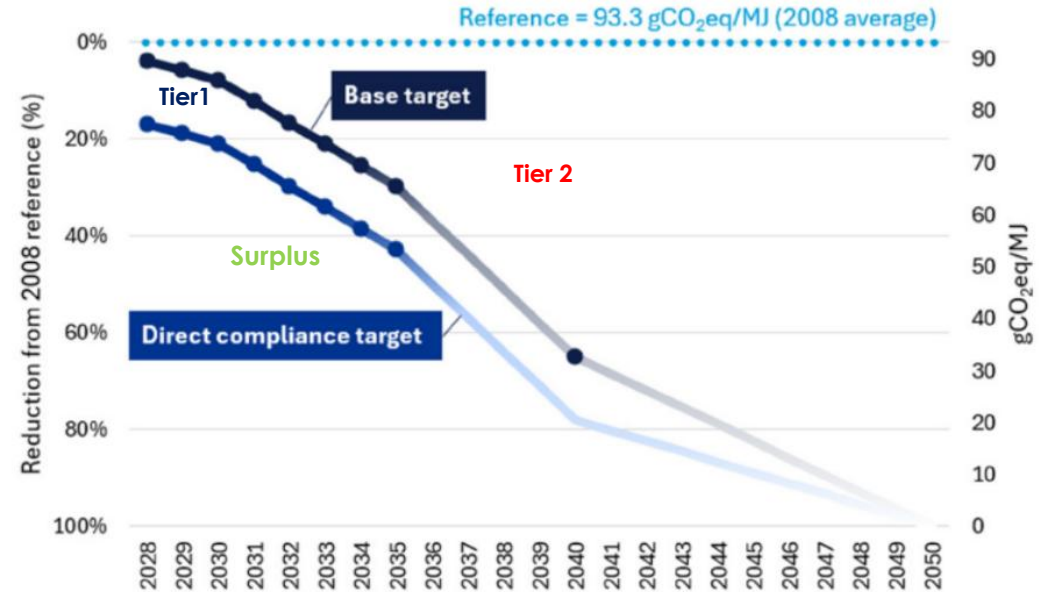
1 US\$ 100 TonCO₂eq

2 US\$ 380 TonCO₂eq

ZNZ

19gCO₂eq/MJ (2034)

Reward



Year	2028	2029	2030	2031	2032	2033	2034	2035
Base	4%	6%	8%	12.4%	16.8%	21.2%	25.6%	30%
Direct	17%	19%	21%	25.4%	29.8%	34.2%	38.6%	43%

Source DNV

IMO MEPC 83: GHG requirements approved, taking effect from 2028

Medidas e Diretrizes

4 Operational carbon intensity indicator (CII) of individual ships for use in implementing regulation 28 of MARPOL Annex VI

In its most simple form, the attained annual operational CII of individual ships is calculated as the ratio of the total mass of CO₂ (M) emitted to the total transport work (W) undertaken in a given calendar year, as follows:

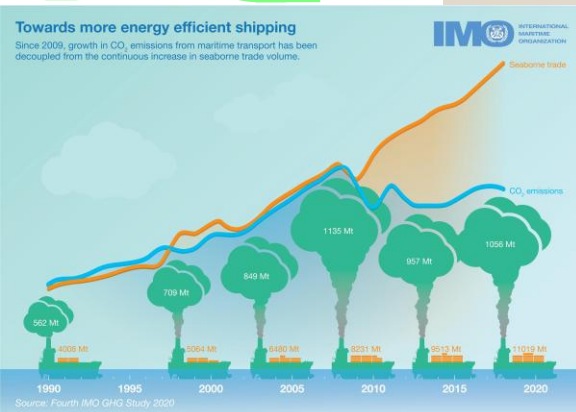
$$\text{attained } CII_{\text{ship}} = M / W \quad (1)$$

4 The reduction factors for the required annual operational CII of ship types

4.1 In accordance with regulation 28 of MARPOL Annex VI, the required annual operational CII for a ship is calculated as follows:

$$\text{Required annual operational } CII = (1 - Z / 100) \times CII_R$$

$$M = FC_j \times C_{Fj}$$



Imo.org

RESOLUTION MEPC.400(83) (adopted on 11 April 2025)

AMENDMENTS TO THE 2021 GUIDELINES ON THE OPERATIONAL CARBON INTENSITY REDUCTION FACTORS RELATIVE TO REFERENCE LINES (CII REDUCTION FACTORS GUIDELINES, G3) (RESOLUTION MEPC.338(76))

AMENDMENTS TO THE 2021 GUIDELINES ON THE OPERATIONAL CARBON INTENSITY REDUCTION FACTORS RELATIVE TO REFERENCE LINES (CII REDUCTION FACTORS GUIDELINES, G3)

4 The reduction factors for the required annual operational CII of ship types

1 Table 1 is replaced by the following:

"Table 1: Reduction factor (Z%) for the CII relative to the 2019 reference line

Year	Reduction factor relative to 2019
2023	5%
2024	7%
2025	9%
2026	11%
2027	13.625%
2028	16.250%
2029	18.875%
2030	21.500%

RESOLUTION MEPC.391(81)
(adopted on 22 March 2024)

2024 GUIDELINES ON LIFE CYCLE GHG INTENSITY OF MARINE FUELS
(2024 LCA GUIDELINES)

Medidas e
Diretrizes



21 Verification and certification methodologies would need further work to be established.

I:\MEPC\81\MEPC 81-16-Add.1.docx

4.13 A qualitative risk-based approach to ILUC includes consideration on the following:

- .1 Low-ILUC risk qualifies and characterizes biofuel production projects that supply additional feedstock without disrupting existing land uses. When productivity is increased on an area which is in agricultural production, only additional yields should be considered as low-ILUC rather than the entire production; and
- .2 High-ILUC risk qualifies and characterizes biofuel production projects based on, or displacing, food and feed crops resulting in a significant expansion of the feedstock production area shifting into land with high carbon stock.



APPENDIX 2
INITIAL DEFAULT EMISSION FACTORS PER FUEL PATHWAY CODE

Order	Fuel type	Fuel Pathway Code	Wt GHG intensity (gCO ₂ eq/MJ)	LCV (MJ/g)	Energy Converter	C ₁ CO ₂ (gCO ₂ /g fuel)	C ₁ CH ₄ (gCH ₄ /g fuel)	C ₁ N ₂ O (gN ₂ O/g fuel)	C _{bio} /C _{fuel} (mass %)	e _c qC O ₂ /q fuel	TW GHG intensity (gCO ₂ eq/MJ)	NOTE
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Medidas e Diretrizes



METHODOLOGY FOR SUBMISSION, SCIENTIFIC REVIEW AND RECOMMENDATION OF PROPOSED DEFAULT EMISSION FACTORS BY GESAMP-LCA WG

The members of the GESAMP-LCA Working Group, acting in their individual capacity, are from Bangladesh, Brazil, Canada, China, Finland, Italy, Japan, Malaysia, Singapore, Sweden, United Kingdom and United States.

Source: Imo

MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7
25 June 2025¹
Original: ENGLISH
Pre-session public release: ☑

REDUCTION OF GHG EMISSIONS FROM SHIPS

Well-to-tank and tank-to-wake default GHG emission factor for
intermediate crop corn-based ethanol production submission to GESAMP-LCA WG

Submitted by Brazil

SUMMARY

Executive summary: This document contains the non-confidential information for the scientific review and recommendation by GESAMP-LCA WG submitted in accordance with the *Methodology for submission, scientific review and recommendation of proposed default emission factors by GESAMP-LCA WG* (MEPC.1/Circ.916). This document presents the well-to-tank (WtT) and tank-to-wake (TtW) default GHG emission factors for intermediate crop corn-based ethanol production pathway for Brazil. The document considers three reference values from different and representative sources with life cycle (or WtW) GHG emission factors developed, and proposes the adoption of default GHG emission factors of Brazil intermediate crop corn ethanol pathway for incorporation into the table of default GHG emission factors of the 2024 LCA Guidelines (resolution MEPC.391(81)). The complete application dossier has been submitted to GESAMP-LCA WG for review in accordance with the Methodology.

Pathway description

Fuel:	Ethanol
Pathway:	Ethanol from intermediate crop ² corn
Feedstock Type:	Intermediate crop corn
Region:	Brazil
Fuel Pathway Code proposed:	EtOH_b_FR_intcrop_rCHP_

Medidas e Diretrizes

MARINE ENVIRONMENT PROTECTION
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MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7/7
14 November 2025
Original: ENGLISH
Pre-session public release: ☒

REDUCTION OF GHG EMISSIONS FROM SHIPS

**Well-to-tank and tank-to-wake proposed default GHG emission factors for biodiesel
(fatty acid ethyl ester – FAEE) from soybean produced in Brazil submission to
GESAMP-LCA WG**

MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7/9
14 November 2025
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REDUCTION OF GHG EMISSIONS FROM SHIPS

**Well-to-tank and tank-to-wake proposed default GHG emission factors for biodiesel
(fatty acid methyl ester – FAME) from soybean produced in Brazil submission to
GESAMP-LCA WG**

MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7/6
14 November 2025
Original: ENGLISH
Pre-session public release: ☒

REDUCTION OF GHG EMISSIONS FROM SHIPS

**Well-to-tank and tank-to-wake proposed default GHG emission factors for
sugarcane-based ethanol production submission to GESAMP-LCA WG**

MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7/8
14 November 2025
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REDUCTION OF GHG EMISSIONS FROM SHIPS

**Well-to-tank and tank-to-wake proposed default GHG emission factors for biodiesel
(fatty acid ethyl ester – FAEE) from beef tallow (bovine sebum) produced in Brazil
submission to GESAMP-LCA WG**

MARINE ENVIRONMENT PROTECTION
COMMITTEE
84th session
Agenda item 7

MEPC 84/7/10
14 November 2025
Original: ENGLISH
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REDUCTION OF GHG EMISSIONS FROM SHIPS

**Well-to-tank and tank-to-wake proposed default GHG emission factors for biodiesel
(fatty acid methyl ester – FAME) from beef tallow (bovine sebum) produced in Brazil
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O Futuro da Descarbonização da Navegação

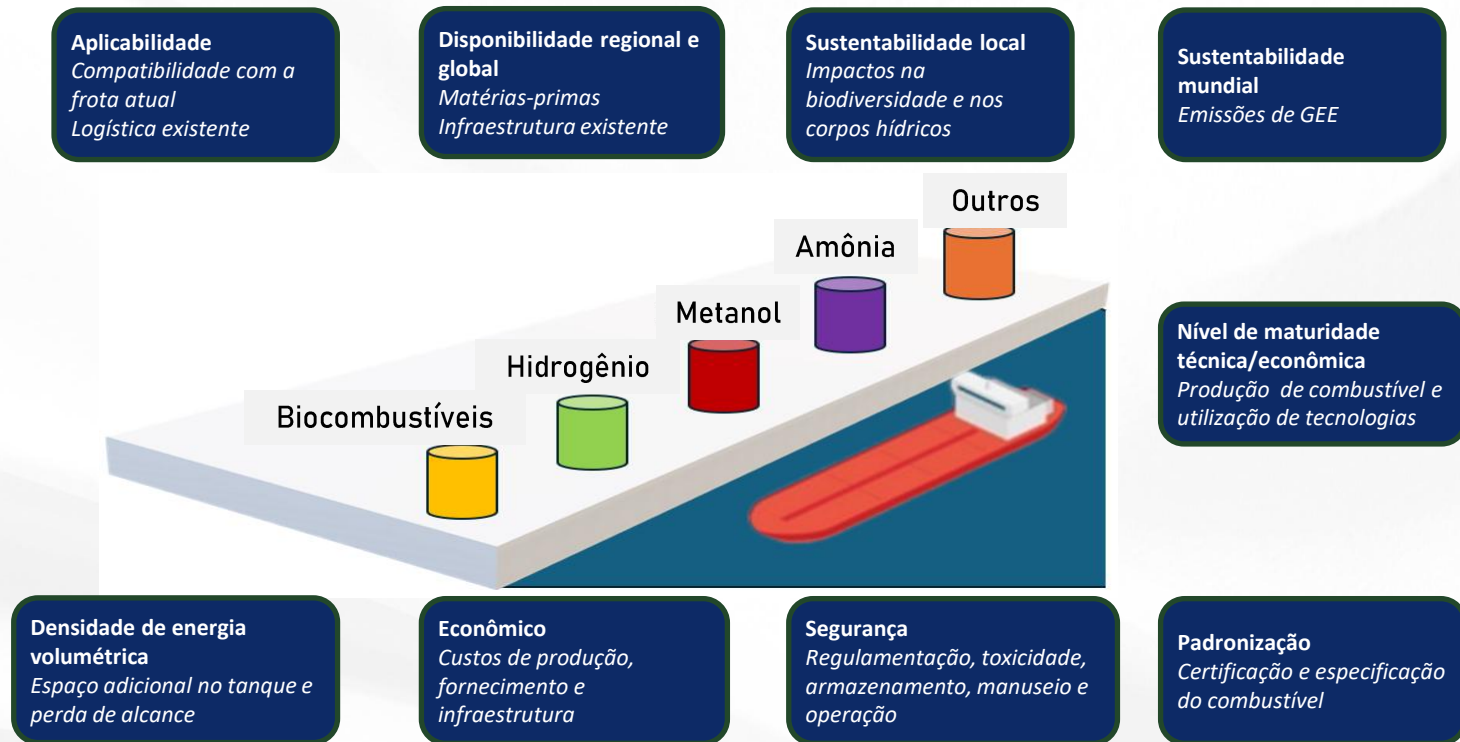
- ✧ Menos emissivos por tonelada/milha transportada
- ✧ Cesta de medidas – adoção/aceitação Dez 2026 (**medidas regionais unilaterais**)
- ✧ Combustíveis Sustentáveis (navios, indústria e logística)
- ✧ Ciclo de vida dos combustíveis marítimos (ILUC/fatores emissão/certificação)
- ✧ Aumento de custos (repassados aos fretes/operações)
- ✧ Desafios e oportunidades



IMO progresses work on ship emissions, pollution and ocean protection

Marine Environment Protection Committee "back on track" towards consensus on global shipping emissions

Soluções para descarbonização do transporte marítimo



O Futuro da Descarbonização da Navegação

Desafios e Oportunidades - biocombustíveis

- ✧ **BIOCOMBUSTÍVEIS – DROP IN**
- ✧ **MATURIDADES TECNOLÓGICAS E COMERCIAIS**
- ✧ **POTENCIAL PARA O AUMENTO DA OFERTA**
- ✧ **ABORDAGEM QUALITATIVA DO ILUC**
- ✧ **GRANULARIDADE X VALOR CONSERVADOR**
- ✧ **INFRAESTRUTURA DE DISTRIBUIÇÃO**
- ✧ **CERTIFICAÇÃO – VALORES DEFAULT E ACTUAL**



O Futuro da Descarbonização da Navegação

Frota Brasileira

- ✧ AUTORIDADE MARÍTIMA EXERCIDA PELA MARINHA DO BRASIL
- ✧ BRASIL SIGNATÁRIO DA MARPOL (Art. 19 do Anexo VI)
- ✧ DEFINIÇÃO DO CENÁRIO INTERNACIONAL
- ✧ AVALIAÇÃO DA CONJUNTURA NACIONAL
- ✧ DEFINIÇÃO DAS REGRAS INTERNAS (BANDEIRA BRASILEIRA/OPEREM EM NOSSAS ÁGUAS)
- ✧ ADEQUAÇÃO DA INDÚSTRIA, LOGÍSTICA E PORTOS
- ✧ COORDENAÇÃO NACIONAL



O Futuro da Descarbonização da Navegação

CONCLUSÃO

- ✦ SETOR COMERCIAL MARÍTIMO VIVE MOMENTO DECISIVO
- ✦ DECISÕES POLÍTICAS BASEADAS EM EVIDÊNCIAS TÉCNICAS
- ✦ INDEFINIÇÃO QUANTO À ADOÇÃO DE MEDIDAS
- ✦ CASO HAJA ADOÇÃO HAVERÁ IMPACTOS SOBRE OS CUSTOS
- ✦ CASO NÃO HAJA CONSENSO – MEDIDAS REGIONAIS UNILATERAIS E IMPACTOS DE INTENSIDADES INDEFINIDAS
- ✦ BRASIL ATUA EM PROL DO MEIO AMBIENTE E DE SEUS INTERESSES
- ✦ HAVERÁ REGRAS NACIONAIS
- ✦ PREPARO PARA OS DESAFIOS E OPORTUNIDADES
- ✦ RUMO ÀS METAS DA ESTRATÉGIA IMO GHG 2023



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