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COVER NOTE

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To:	Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union
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Subject:	COMMISSION STAFF WORKING DOCUMENT Union submission to the International Maritime Organization's 11th Intersessional Working Group on Reduction of GHG Emissions from Ships on Updated Draft Lifecycle GHG and Carbon Intensity Guidelines for marine fuels

Delegations will find attached document SWD(2022) 5 final.

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SWD(2022) 5 final

COMMISSION STAFF WORKING DOCUMENT

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PURPOSE

This Staff Working Document contains a draft Union submission to the International Maritime Organization's (IMO) 11th Intersessional Working Group on Reduction of GHG Emissions from Ships. The IMO has indicatively scheduled ISWG-GHG 11 from 14 to 18 March 2022.

The draft submission suggests draft lifecycle and carbon intensity guidelines for marine fuels, building upon the existing position[1] related to life cycle guidelines and further develop their technical elements. The suggested guidelines envisage two distinct methodologies to estimate the fuels' lifecycle greenhouse gas emissions, comprising carbon dioxide, methane and nitrogen oxide:

- A Well-to-Wake methodology on a full life-cycle analytical assessment (LCA), which enables the evaluation of fuel pathways and can be used for reporting all relevant greenhouse gas emissions, as per IPCC methodology.
- A Tank-to-Wake methodology in line with the IPCC principles set out in the IPCC Guidelines for National Greenhouse Gas Inventories, which enables accounting of GHG emissions while avoiding double counting across sectors.

The text details robust methods for well-to-wake emission calculations and tank-to-wake emission calculations according to IPCC principles. The two methodologies are coherently designed to deliver the consistent results.

EU COMPETENCE

Regulation (EU) 2015/757[2] (EU MRV Regulation) establishes the legal framework for an EU system to monitor, report and verify (MRV) CO_2 emissions and energy efficiency from shipping. The regulation aims to deliver robust and verifiable CO_2 emissions data, inform policy makers and stimulate the market uptake of energy efficient technologies and behaviours. It does so by addressing market barriers such as the lack of information. It entered into force on 1 July 2015.

Any IMO measure on addressing GHG emissions, which will require the monitoring, verification and reporting of GHG emissions from shipping, would affect the EU MRV Regulation. Therefore, the EU has exclusive competence for GHG emissions in shipping.

In addition, on 14 July 2021, the Commission adopted the *Fit for 55* package of legislative proposals to reduce GHG emissions. *Fit for 55* includes a number of Commission's proposals that specifically target the shipping sector, such as the revision of the EU Emission Trading System (ETS) to include the maritime transport sector (and the corresponding amendments to the EU MRV Regulation)[3] but also the FuelEU maritime proposal[4], which focuses on the use of renewable and low-carbon fuels in the maritime sector and mandates the uptake thereof by the ships calling EU ports. Under the case-law[5], the risk of affectation concerns not only the rules as they stand, but also their foreseeable future development. These legislative initiatives further lead to the exclusive competence of the EU for GHG

[1] Commission Staff Working Document: 'Union submission to the seventh meeting of the Intersessional Working Group on Reduction of GHG Emissions from Ships of the IMO in London from 23 to 27 March 2020 on the introduction of lifecycle guidelines to estimate well-to tank greenhouse gas (GHG) emissions of sustainable alternative fuels to incentivise the uptake of sustainable alternative fuels at global level' SWD(2019)456 final;

[2] 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, OJ L 123, 19.5.2015, p. 55–76

[3] COM(2021) 551 - Proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757

[4] COM(2021) 562 - Proposal for a regulation of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC.

[5] Opinion 1/03 of the Court of Justice of 7 February 2006, Lugano Convention, point 126.

emission in shipping.[6]

In light of all of the above, the present draft Union submission falls under EU exclusive competence.[7] This Staff Working Document is presented to establish an EU position on the matter and to transmit the document to the IMO prior to the required deadline of 28 January 2022.[8]

[6] See in particular Commission proposal COM(2021) 551 referred to in footnote 3. It introduces a reporting and review provision (Article 3 ge) into Directive 2003/87 regarding possible amendments in relation to the adoption by the International Maritime Organization of a global market-based measure to reduce greenhouse gas emissions from maritime transport. The existence of such a review provision confirms the existence of a risk of affectation of the existing and foreseeable EU acquis.

[7] An EU position under Article 218(9) TFEU is to be established in due time should the IMO Maritime Safety Committee eventually be called upon to adopt an act having legal effects as regards the subject matter of the said draft Union submission. The concept of '*acts having legal effects*' includes acts that have legal effects by virtue of the rules of international law governing the body in question. It also includes instruments that do not have a binding effect under international law, but that are '*capable of decisively influencing the content of the legislation adopted by the EU legislature*' (Case C-399/12 Germany v Council (OIV), ECLI:EU:C:2014:2258, paragraphs 61-64). The present submission, however, does not produce legal effects and thus the procedure for Article 218(9) TFEU is not applied.

[8] The submission of proposals or information papers to the IMO, on issues falling under external exclusive EU competence, are acts of external representation. Such submissions are to be made by an EU actor who can represent the Union externally under the Treaty, which for non-CFSP (Common Foreign and Security Policy) issues is the Commission or the EU Delegation in accordance with Article 17(1) TEU and Article 221 TFEU. IMO internal rules make such an arrangement absolutely possible as regards existing agenda and work programme items. This way of proceeding is in line with the General Arrangements for EU statements in multilateral organisations endorsed by COREPER on 24 October 2011.

INTERSESSIONAL MEETING OF THE WORKING GROUP ON REDUCTION OF GHG EMISSIONS FROM SHIPS
11th session
Agenda item 2

ISWG-GHG 11/2/XX
28 January 2022
Original: ENGLISH
Pre-session public release: ☒

REDUCTION OF GHG EMISSIONS FROM SHIPS

Updated Draft Lifecycle GHG and Carbon Intensity Guidelines for marine fuels

Submitted by the European Commission on behalf of the European Union

SUMMARY

Executive summary:	This document suggests draft lifecycle and carbon intensity guidelines for marine fuels on the basis of document MEPC77/WP.6
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 5
Related documents:	ISWG-GHG 9/2, ISWG-GHG 9/2/3, ISWG-GHG 9/WP.1/Rev.1, MEPC77/WP.6

Background and purpose

1 This document provides draft lifecycle and carbon intensity guidelines for marine fuels. It is based on Annex I of the report of the ninth meeting of the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG 9) in document MEPC77/WP.6. It further builds on documents ISWG-GHG 9/2 and ISWG-GHG 9/2/3.

2 The suggested draft Guidelines provides two distinct methodologies to estimate fuel lifecycle emissions (CO_2, CH_4 and N_2O):

(1) A Well-to-Wake (WtW) methodology on a full lifecycle analytical assessment, which enables the evaluation of fuel pathways and can be used for reporting all relevant greenhouse gas emissions, as per IPCC methodology.

(2) A Tank-to-Wake (TtW) methodology in line with the IPCC principles set out in the IPCC Guidelines for National Greenhouse Gas Inventories, which enables accounting of GHG emissions while avoiding double counting across sectors.

3 This document provides for robust methods for WtW emission calculations according to international LCA approach and TtW emission calculations consistently with IPCC principles.

4 The suggested draft Guidelines also envisage strong sustainability criteria for fuels to be applied to both methodologies as appropriate, verification and certification schemes, as well as an initial set of relevant priority fuels and their default emissions values.

5 Prioritization should be given to the identification of the most relevant initial subset of maritime fuels to establish default values and verify the functioning of the methodology.

6 It is considered that default values in the draft Guidelines should reflect, for each fuel, the higher end of the possible emissions range to cater for uncertainty thus encouraging the use of verified actual values.

7 The Organization is invited to consider the establishment of a scientific fuel expert panel to keep the certification schemes and emission factors under review.

8 Criteria for the use of certification schemes should be defined, encompassing biofuels, renewable fuels of non-biological origin (RFNBOs) and the use of carbon capture and storage (CCS) technologies.

9 Areas to be further developed are:

1. sustainability criteria and the definition of the Fuel Lifecycle Label (FLL)

2. establishment of a set of relevant priority fuels, their pathways and default emission factors,

3. how to best address the electricity GHG footprint in fuels production and processes, including consideration of national and regional variations.

4. criteria and instructions for verification and certification schemes.

10 Furthermore, the European Union suggests that ISWG-GHG 11 invites MEPC 78 to consider the establishment of a Correspondence Group (CG) to continue the detailed work on the draft Guidelines. ANNEX 2 to this document contains possible draft terms of reference for the suggested CG.

Action requested by the Group

11 The Group is invited to consider the proposal contained in paragraphs 6 to 10 of this document and take action as appropriate.

[ANNEX I

DRAFT LIFECYCLE GHG AND CARBON INTENSITY GUIDELINES FOR MARINE FUELS (LCA Guidelines)

CONTENTS

PART I: GENERAL

1 INTRODUCTION

1.1 These guidelines provide Well-to-Wake (WtW) and Tank-to-Wake (TtW) GHG emission factors for all fuels and electricity used on-board a ship and a methodology to estimate such emission factors for all relevant fuels, fuel feedstock and production pathways. The guidelines also define sustainability criteria for eligible marine fuels and contain provisions for applying a Fuel Lifecycle Label (FLL), which characterizes fuels per type, feedstock, production pathway, and relevant sustainability criteria.

2 ABBREVIATIONS AND DEFINITIONS

CH_4 – Methane
CO_2 – Carbon dioxide
CO_{2eq} – Carbon dioxide equivalent
CCS – Carbon Capture and Storage
CCU – Carbon Capture and Utilisation
DCS – Data Collection System
FLL – Fuel Lifecycle Label
GHG – Greenhouse gas
GWP – Global warming potential
ILUC – Induced Land Use Change
IPCC – International Panel on Climate Change
LCA – Life Cycle Assessment
NMVOC – Non-Methane Volatile Organic Compounds
N_2O – Nitrous oxide
RFNBO – Renewable Fuels of Non-Biological Origin
VOC – Volatile Organic Compounds
TtW – Tank-to-Wake
WtT – Well-to-Tank
WtW – Well-to-Wake

3 SCOPE

3.1 The scope of these guidelines is to address WtW and TtW GHG emissions and sustainability criteria related to all fuels used for combustion and energy conversion (e.g. fuel cells) as well as electricity, for propulsion and operation on-board a ship. The GHGs included are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These guidelines are not intended to provide guidance for a complete IMO GHG inventory for international shipping and does not cover, for example, emissions from cargo (VOC), or use of refrigerants. Other short-lived climate forcers and precursors such as NMVOC, SO_x, CO, PM and black carbon are also not included in the scope.

3.2 The GHG emissions are calculated as CO_2-equivalents (CO_{2eq}) using the Global Warming Potential over a 100-year horizon (GWP100), as given in the IPCC Sixth Assessment Report, for CO_2, CH_4 and N_2O.

3.3 These guidelines provide:

1. WtW GHG emission factors based on a full life-cycle analytical (attributional) methodology, which enables the evaluation of fuels on Global Warming

Potential (GWP) and can be used for reporting all relevant greenhouse gas emissions, as per IPCC methodology.

2. TtW CO_2, CH_4 and N_2O emission factors in line with the IPCC principles set out in the IPCC Guidelines for National Greenhouse Gas Inventories, which enables accounting of GHG emissions while avoiding double counting across sectors; and

3. Sustainability criteria for fuels capturing both the WtW GHG emissions and other sustainability aspects. (Section 6)

3.4 These guidelines define a Fuel Lifecycle Label (FLL) that characterizes fuels per type, feedstock, production pathway, and relevant sustainability criteria. The FLL enables documentation and sharing of necessary information about the fuel when delivered to the ship and further when reporting consumption through the fuel Data Collection System (DCS).

3.5 The figure below shows a generic WtW supply chain for a fuel. The bunkering marks the step between the Well-to-Tank (WtT) and the TtW phases.

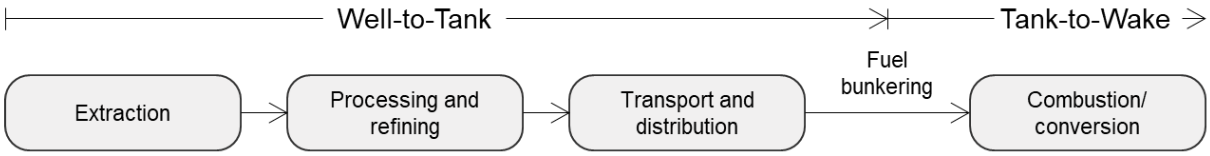

Figure 1 - Generic well-to-wake supply chain

4 LIFE CYCLE PRINCIPLES, WELL-TO-WAKE METHODOLOGY

4.1 A Lifecycle Assessment (LCA) offers a holistic examination for the product/service/system from cradle to grave based on data in relation to the specific activity. LCA or the WtW GHG emissions estimation approach is applicable across all geographical regions where emissions are released and estimates the actual GHG emissions over the entire supply chain. LCA is relevant to assess the overall GHG impact of shipping fuels given that shipping activity accounts for emissions in the fuel combustion but not from the fuel production.

4.2 WtT GHG emissions calculated using the LCA methodology aims to assess the total emissions of growing or extracting raw materials, producing, and transporting the fuel to the point of use. The TtW emissions, however, represent the total emissions from combustion or conversion (including leakage). The WtW emissions are the sum of the WtT and TtW emissions, and estimates the full lifecycle GHG emissions for a given fuel.

4.3 WtW methodology satisfies the IPCC principle of reporting all relevant emissions for information purposes[9].

4.4 The LCA methodology holistically follows the marine fuel from raw materials to its utilisation on-board of ships, and assesses the potential climate impact of its use in comparison with standard fuels and technologies. General principles and methodology can be found in ISO 14044:2006 Environmental management — Lifecycle assessment — Requirements and guidelines. ISO 14040:2006 Environmental management — Lifecycle assessment — Principles and framework sets the framework for the LCA, for the

[9] 2006 IPCC Guidelines for National Greenhouse Gas Inventories CHAP III Vol.2.1.1 CHOICE OF METHOD - Mobile Combustion

quantification of the environmental impact of products, processes and services in the supply chain. On this basis a specific LCA methodology can be tailored for its application to marine fuels.

5 IPCC ACCOUNTING PRINCIPLES, TANK-TO-WAKE METHODOLOGY

5.1 In order to avoid double-counting of the same emissions between the IMO's GHG inventory and national GHG inventories, IMO's GHG inventory for the international shipping sector should follow the principles laid out in the IPCC Guidelines for National Greenhouse Gas Inventories[10]. International water-borne navigation (international bunkers) is grouped under Mobile combustion under the Energy sector, but emission from fuel used by ships in international transport is not included in national totals in national GHG inventories and has to be covered by the IMO's GHG inventory.

5.2 According to the IPCC Guidelines, any non-combustion emissions including fugitive emissions should be accounted for in the sector(s) where the fuel is explored, produced, processed, refined, transported and distributed. IMO's GHG inventory for international shipping should only be concerned with GHG emissions from fuel used by ships, as the GHG emissions from exploring, producing, processing, refining, transporting and distributing the fuel they use should be accounted for in national GHG inventories[11].

5.3 To prevent any emissions from not being captured and not being counted, IMO's GHG inventory for the international shipping sector should estimate and report all emissions from fuel used by ships regardless of the source of the carbon.

5.4 However, to comply with IPCC Guidelines, any carbon in the fuel derived from biomass should be reported as an information item and not included in the sectoral or national totals to avoid double counting as the net emissions from biomass are already accounted for in the Agriculture Forestry and Other Land Use (AFOLU) sector.

5.5 In a TtW approach, zero-carbon energy carriers such as hydrogen and ammonia should have a carbon content of zero, regardless of whether it comes from electrolysis with renewable electricity or from reformed natural gas, with or without CCS. This also applies to electricity from onshore, used either directly by a shore connection or store in batteries. For energy carriers that contains carbon, such as diesel, methane and methanol, the source of the carbon is critical to the accounting,

5.6 When calculating the TtW GHG emissions according to the IPCC accounting principles a carbon source factor (S_F) should be applied. The factor determines if the TtW CO_2 emissions should be accounted for in IMO's GHG inventory for international shipping (S_F = 1) or not (S_F = 0) and should be multiplied with the CO_2 emission factor (C_F) for the specific fuel. CH_4 and N_2O emissions should be reported regardless of carbon source and are not affected by S_F. In this respect, S_F does not affect the WtT emissions and a fuel with S_F = 0 does not imply that the GHG WtT emissions are zero. For fuel blends, for example of bio and fossil methane, the S_F is the weighted average of the blended feedstocks.

6 SUSTAINABILITY CRITERIA

NOTE: This section provides a first draft with suggested criteria and should be thoroughly reviewed

[10] 2006 IPCC Guidelines for National Greenhouse Gas Inventories: https://www.ipcc-nggip.iges.or.jp/public/2006gl/ and the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html

[11] For the purpose of these guidelines, it is assumed that upstream (WtT) emissions are accounted for in national GHG inventories.

This section defines sustainability criteria for marine fuels.

6.1 For biofuels, biomass fuels, bioliquid fuels, and in general all fuels produced from food and feed crops, specific sustainability principles and criteria will need to be adopted.

6.2 Land with high biodiversity value, high carbon stock and indirect land-use change (ILUC) are considered in the upstream emissions. A minimum GHG reduction threshold compared to fossil fuels should be considered.

6.3 IPCC land usage cover categories (i.e. forestland, grassland, wetlands, settlements or other land, to cropland or perennial cropland) should be used as the basis to define feedstock production for which a direct land-use change occurred, as well as the relevant timing of such change.

6.4 The following sustainability criteria apply to a marine fuel:

1. The WtW GHG emissions should be [at least XX%] lower than for fossil low sulphur fuel oil (LSFO).
2. The carbon feedstock and production pathway should be verified and disclosed through the Fuel Lifecycle Label.
3. The fuel should not be made from biomass obtained from land with high carbon stock.
4. High ILUC-risk fuels should not be used.
5. Synthetic fuels require the use of renewable electricity including all associated process, such as desalination and CO2 capture.
6. The additional water demand for synthetic fuel production should not negatively affect the local water supply and water quality.
7. [further criteria to be added]

7 GHG EMISSIONS FACTORS BASED ON GWP100

7.1 This section provides the calculation methods for WtW and TtW emissions according to the principles stated in sections 4 and 5.

7.2 When calculating WtW emissions according to the principles stated in Section 4 for biofuels (i.e. according to Equation (1)), the carbon source factor (S_F) should always be 1 for the purpose of calculating GHG_{TtW} in Equation (3), as the TtW CO_2 emission is balanced by a credit in the WtT calculation method.

7.3 When calculating TtW emissions according to the principles stated in Section 5 (i.e. according to Equation (3)), the carbon source factor (S_F) assumes the values given in Table 1 Appendix 1 for the relevant Fuel Lifecycle Label. Equations (1) and (2) are not used in the TtW methodology.

7.4 The WtW GHG emissions factor (g CO_{2eq}/MJ fuel or electricity) is calculated as follows:

$$GHG_{WtW}\left[gCO_{2eq}/MJ\right] = GHG_{WtT} + GHG_{TtW} \quad (1)$$

where:

Term	Units	Explanation
GHG_{WtW}	gCO_{2eq}/MJ	Total well-to-wake GHG emissions per energy unit from the use of the

		fuel or electricity in a consumer on board the ship
GHG_{WtT}	gCO_{2eq}/MJ	Total well-to-tank GHG upstream emissions per energy unit of the fuel provided to the ship
GHG_{TtW}	gCO_{2eq}/MJ	Total tank-to-wake GHG downstream emissions per energy unit from the use of the fuel or electricity in a consumer on board the ship

7.5 The WtT GHG emissions factor (g CO_{2eq}/MJ fuel [or electricity]) is calculated according to Equation 2. Further specification of the methodology is given in Part II.

$$GHG_{WtT}\left[gCO_{2eq}/MJ\right] = e_{ec} + e_l + e_p + e_{td} - e_c - e_{sca} - e_{ccs} - e_{ccu} \quad (2)$$

where:

Term	Units	Explanation
e_{ec}	gCO_{2eq}/MJ	emissions from the extraction or from the cultivation of raw materials
e_l	gCO_{2eq}/MJ	annualised emissions from carbon stock changes caused by land-use change (over 20 years)
e_p	gCO_{2eq}/MJ	emissions from processing, including electrity generation
e_{td}	gCO_{2eq}/MJ	emissions from transport and distribution
e_c	gCO_{2eq}/MJ	emissions credits generated by biomass growth
e_{sca}	gCO_{2eq}/MJ	emission savings from soil carbon accumulation via improved agricultural management
e_{ccs}	gCO_{2eq}/MJ	emission savings from CO_2 capture and geological storage
e_{ccu}	gCO_{2eq}/MJ	emission savings from CO_2 capture and utilisation

7.6 The TtW GHG emission factors (gCO_{2eq}/MJ fuel) is calculated according to Equation 3. Further specification of the methodology is given in Part III:

$$GHG_{TtW} = \left[\left(1 - C_{slip}\right) \times \left(S_F \times C_{fCO_2} + C_{fCH_4} \times GWP_{CH_4} + C_{fN_2O} \times GWP_{N_2O}\right) + \left(C_{slip} \times GWP_{CH_4}\right) - e_{occs}\right] / LCV \quad (3)$$

Term	Units	Explanation
LCV	MJ/g fuel	Lower Calorific Value of the fuel (MJ/g fuel)
S_F	0 or 1	Carbon source factor
C_{slip}	% of fuel mass	Coefficient accounting for fuel (methane) slip (% of the total fuel in use)
C_{fCO_2}	gCO_2/g fuel	CO_2 emission conversion factor (g CO_2/g fuel)
C_{fCH_4}	gCH_4/g fuel	CH_4 emission conversion factor (g CH_4/g fuel)
C_{fN_2O}	gN_2O/g fuel	N_2O emission conversion factor (g N_2O/ g fuel)
GWP_{CH_4}	gCO_{2eq}/gCH_4	Global Warming Potential of methane over 100 set at 29.8 for fossil and at 27.5 for non-fossil methane (IPPC AR 6)
GWP_{N_2O}	gCO_{2eq}/gN_2O	Global Warming Potential of N_2O over 100 set at 273 (IPCC AR 6)
e_{occs}	gCO_{2eq}/MJ	emission savings from on-board CO_2 capture and geological storage
LCV	$MJ/g\ fuel$	Lower Calorific Value of the fuel (MJ/g fuel)

8 FUEL LIFECYCLE LABEL

8.1 To enable the application of the WtW and TtW methodologies and the sustainability criteria in these guidelines, a fuel delivered on board a vessel should include a Fuel Lifecycle Label (FLL) which categorizes the fuel per feedstock, production pathway and other sustainability aspects.

8.2 The FLL provides the necessary information for cross-checking and transparency and should be verified according to the criteria defined in Part IV of these guidelines. [The FLL could be documented in the Bunker Delivery Note and reported through the Data Collection System].

8.3 The FLL of a fuel should be based on a certification of the supplier and/or fuel according to internationally recognized [standards] [certification schemes] listed in the Appendix 3 and 4 to these guidelines. The accepted certification bodies are determined by the individual certification scheme. See Part IV of these guidelines for criteria and procedures for establishing a list of accepted standards. In case the FLL is not certified, the highest default WtT emissions factor for the given fuel type should be used and the carbon source factor (S_F) should be 1.

8.4 The FLL consists of four tiers:

.1 Tier I: Carbon content of the fuel
.2 Tier II: Feedstock Nature
.3 Tier III: Production pathway
.4 Tier IV: Fuel type

Tier I: Carbon content of the fuel

8.5 The first tier identifies whether the fuel is carbon-based or zero-carbon, which is linked to setting the C_f.

8.6 **Fuels that contain carbon**: For energy carriers containing carbon such as HFO, MGO, LNG and methanol, the carbon emissions factor (C_F) defines the CO_2 emissions based on the carbon content of the fuel (irrespective of the upstream carbon capture). Subcategories of carbon-based fuels should indicate the carbon source or feedstock (e.g. fossil or biogenic) and for the process for producing the fuel in the case of non-fossil fuels.

8.7 **Fuels that do not contain carbon:** For zero-carbon energy carriers such as hydrogen and ammonia, the carbon emissions factor (C_f) is zero. The IPCC guidelines do not address accounting methods for CO_2 emissions from combustion of such fuels ($S_F = 0$), while any CO_2 emissions from production and transport of such fuels are accounted for in national GHG inventories. Subcategories of non-carbon fuels should indicate the process for producing the fuel, e.g. electrolysis, natural gas reforming with or without carbon capture and storage. The default subcategory is natural gas reforming without carbon capture. Any other production method should be certified.

8.8 **Electricity:** Electricity can be delivered to the ship while in port to power auxiliary systems or to charge batteries. The carbon emissions factor (C_f) is zero. Subcategories should be established based on the varying GHG intensity of regional grids.

Tier II: Feedstock Nature

8.9 The second tier information qualifies the primary energy source used to produce the fuel which is used to determine the carbon source factor.

8.10 **Fossil:** The carbon from fossil fuels is not part of the natural carbon cycle and the CO_2 emissions from combustion should be accounted for by the ship (S_F = 1). This label includes synthetic fuels made from captured carbon from fossil sources [non-renewable electricity from regional grids. [Subcategories under the Fossil label should be established based on WtT GHG emissions.]

8.11 **Renewable:** This refers to fuel/energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

8.12 **Additional renewable electricity:** The electricity used to generate energy carriers, or for fuel processing, is considered renewable where the renewable capacity is additional to the existing renewable capacity. In other words, renewable energy should not redirect existing supplies to produce RFNBOs. New, additional renewable capacity may need to be built or financed by fuel producers, so as to minimize the adverse effect of displacing renewable electricity from existing uses to produce RFNBOs. The latter may result in an overall worsening of GHG emissions given the inherent energy inefficiency of the RFNBOs production processes.

8.13 **Biogenic**: In principle, fuels based on biogenic carbon are carbon neutral as the carbon comes from the natural cycle, but the IPCC Guidelines do not automatically consider it so. The IPCC Guidelines stipulate that CO_2 emissions from biomass combustion for energy should not be reported in sectors of national GHG inventories where the biomass was combusted, but should be reported as an information item for cross-checking purposes. The CO_2 emissions from biomass combustion are estimated and accounted for in the Agriculture, Forestry and Other Land Use (AFOLU) sector as net changes in the carbon stocks (S_F = 0). Subcategories of biofuels should indicate the feedstock used and whether they comply with sustainability criteria defined in these guidelines.

8.14 **Captured carbon from land-based sources** (and accounted in national inventories): IPCC guidelines state that any captured CO_2 for later uses should not be deducted in the sector where it is captured, unless it is accounted for elsewhere in national GHG inventories, while emissions associated with the CO_2 capture should be reported under the sector (e.g. stationary combustion or industrial activities). This means that regardless whether the CO_2 was captured directly from the atmosphere, from biogas, from reforming fossil methane, or any other process, if the captured CO_2 is to be accounted in national GHG inventories of any UNFCCC member countries, it should be reported by the IMO's GHG inventory for international shipping as carbon neutral (S_F = 0).

8.15 **Captured carbon from atmosphere** (Direct Air Capture - DAC), and NOT been accounted yet: The IPCC does not specifically mention how CO_2 directly captured from the atmosphere should be handled, but assuming that it is not counted as removal in the sector producing the fuel, it would be counted as carbon neutral. Although not mentioned specifically, the CO_2 emission from using these fuels should also be recorded for cross-checking. Subcategories of captured carbon should be based on carbon source and production processes.

Tier III: Production pathway

8.16 The third tier indicates which processes have been used to produce the fuels and is important for determining the WtT GHG emissions and sustainability aspects. This also include the use of CCS and CCU. Typical production pathways are:

Production pathway – non-exhaustive list

Production pathway – non-exhaustive list
Standard
Bio-oil: Biodiesel type oils - Main products / wastes / Feedstock mix
Bio-FA: Biodiesel fatty acids - Main products / wastes / feedstock mix
Bio-FAME: Biodiesel fatty acid methyl esters - Main products / wastes / Feedstock mix
HVO - Main products / wastes / Feedstock mix
Bio-Methanol and Bio-Ethanol
Bio-H_2 - Main products / wastes / Feedstock mix
…

Tier IV: Fuel type

8.17 The fourth tier indicates the fuel type or energy carrier which is combusted or converted on the ship. This information is important when determining the on-board TtW GHG emissions and the lower calorific value (LCV) of the fuel. Typical fuel types are:

Fuel type – non-exhaustive list
HFO
LFO
MDO/MGO
LNG/methane
LPG
Hydrogen
Methanol
Ethane
Ammonia
Biodiesel
….

Possible combinations of tier information to provide example FLLs:

Tier I		Tier II		Tier III	Tier IV	Additional Information
Carbon content	**C_f**	**Feedstock nature**	**S_F**	**Pathway**	**Fuel type**	**WtT (gCO_{2eq}/MJ)**
Carbonized	Actual carbon content	Fossil	1	Default fossil	HFO	
Decarbonized	0	Fossil	N/A	Reformed methane with 80% CCS	Ammonia	
Carbonized	Actual carbon content	Biogenic	0	Main products / wastes / Feedstock mix	LNG/methane, MGO, methanol	
Decarbonized	0	Renewable	N/A	Electricity grid /wind/solar	Electricity	

9 ESTABLISHMENT OF NEW FLLs

9.1 The pathway of each relevant marine fuel needs to be clearly described and the emissions of the fuels need to be calculated on the basis of the pathway. Specialisation of some pathways may be necessary with respect to the geographical area to take into account different efficiencies of the specific fuel's pathway depending on geographic regions as appropriate.

9.2 The method applied, including the accounting of co- and by-products, should guarantee adequate accuracy. Several tools for the calculation of GHGs are available and an average/best technically sound approach and values should be agreed by the experts. For petrol and diesel fuels the upstream emissions reduction are evaluated in accordance with ISO 14064-3, while the organisation verifying such emissions are accredited in accordance with ISO 14065 and ISO 14066. [The responsibility of the fuel supplier should also be clearly defined.]

PART II: WELL–TO–TANK EMISSIONS

10 HIGH LEVEL GUIDANCE AND METHODOLOGY

10.1 The aim of the WtT methodology is to evaluate the amount of upstream GHG emissions for the fuel. The WtT emissions should be calculated using Equation (2) as stated in Section 7.5, and reported below for simplicity.

$$GHG_{WtT}\left[gCO_{2eq}/MJ\right] = e_{ec} + e_l + e_p + e_{td} - e_c - e_{sca} - e_{ccs} - e_{ccu} \qquad (2)$$

10.2 The carbon feedstock and production pathway of a fuel should be identified in order to apply the WtW methodology and included as part of the FLL. The production steps to be included are:

Feedstock extraction/cultivation
Feedstock (early) processing/ transformation at source
Feedstock transport
Feedstock conversion to product fuel
Product fuel transport
Product fuel storage
Local delivery
Retail storage and dispensing

10.3 The WtT emissions in Equation 3 include emissions associated with raw materials extraction or cultivation, primary energy sources used for production of goods and utilities such as energy carriers (fuels and electricity), transport and distribution, land use change and changes in carbon stocks.

10.4 For carbon-based fuels, changes in carbon feedstocks can be either from a fossil origin, i.e. energy carriers produced from crude oil, coal or natural gas; or from a biological origin (crops and residues). Biogenic sources include energy carriers like biogas, bio-ethanol, biodiesel, hydro-treated vegetable oils (HVO).

10.5 For non-carbon fuels, such as electricity, the origin can also be renewables other than bioenergy, e.g. wind or solar energy, sometimes in combination with fossil fuels.

10.6 Early Processing embeds all the steps and operations needed for the extraction, capture or cultivation of the primary energy source. Process includes basic transformation at source and operations needed to make the resource transportable to the marketplace (e.g. drying, chemical/physical upgrade such gas-to-liquid, etc.).

10.7 Transportation, Processing and Distribution include transportation of the products in the fuel pathway to the place of transformation, conditioning (such as compression, cooling, etc.), distribution to the marketplace and eventual leakages.

10.8 Co-allocation method description - Allocation of emissions to co-products based on their energy content should be used as the most appropriate and reliable methodology [further work is needed].

10.9 Land use (direct and indirect) – Production of biofuels leads to land use change (LUC). LUC can be classified as direct LUC (dLUC) and indirect LUC (iLUC). ISO/TS 14067 defines dLUC as a change in the use or management of land within the product system being assessed. The dLUC impacts may comprise only the CO_2 emissions and sequestration resulting from carbon stock changes in biomass, dead organic matter and soil organic matters, evaluated in accordance with the IPCC Guidelines for National Greenhouse Gas Inventories. When available, sector or country-specific data on carbon stocks may be used; otherwise, IPCC's Tier 1 default values may be considered. The iLUC definition is based on ISO/TS 14067 (ISO, 2013), described as a change in the use or management of land which is a consequence of direct land use change, but which occurs outside the product system being assessed. The iLUC is caused by economic linkages among different economic sectors where commodity prices are affected by biofuel production. The iLUC cannot be directly measured or observed. Instead, it is projected with economic models. Due to the variability of assumptions underlying the evaluation of indirect effects, quantitative assessment of GHG effects of iLUC is subject to uncertainty.

10.10 Emissions e_c are emissions credits generated by biomass growth.

10.11 Emission saving from carbon capture (either of fossil or biological origin) and geological storage e_{ccs}, that have not already been accounted for in e_p (emissions from processing), shall be limited to emissions avoided through the capture and sequestration of emitted CO_2 directly related to the extraction, transport, processing and distribution of fuel.

10.12 Emissions savings from carbon capture and utilization, e_{ccu}, shall be limited to emissions avoided through the capture of CO_2 of which the carbon originates from biomass and which is used to replace fossil-derived CO_2 used in commercial products and services.

10.13 The proposed methodology suggests the use of default values for fossils fuels for the WtT established in such way to incorporate the overall uncertainties stemming from the averaging at global scale. Such default values for fossil fuels WtT shall not be subject to any certification scheme (whilst still complying with certain sustainability criteria [to be reviewed after the sustainability criteria are finalized]), as opposed to the actual values that for all other types of fuels can be subject to certification. Performers who believe to do better than default values should be given the opportunity to demonstrate their real performances through the application of a certification scheme.

11 BLENDING OF FUELS

11.1 A fuel batch may be a mix of various sources, (e.g. by blending 20% biodiesel into MGO). The S_F should be calculated as the weighted average of the mass of the various blended stocks. Each blended stock should be accompanied with a FLL.

[OR alternatively: 11.1 Blended fuels should be included in the certification schemes and relevant values determined in proportion to the mass of each fuel part of the blend.]

PART III: TANK-TO-WAKE EMISSIONS

12 HIGH LEVEL GUIDANCE AND METHODOLOGY

12.1 The aim of the TtW methodology is to evaluate the amount of CO_2, CH_4 and N_2O emitted including combustion/conversion and fugitive emissions. The TtW emissions should be calculated using Equation (3) as stated in section 7.6 and reported below for simplicity:

$$GHG_{TtW} = \left[\left(1 - C_{slip}\right) \times \left(S_F \times C_{fCO_2} + C_{fCH_4} \times GWP_{CH_4} + C_{fN_2O} \times GWP_{N_2O}\right) + \left(C_{slip} \times GWP_{CH_4}\right) - e_{occs}\right] / LCV \quad (3)$$

12.2 The actual emissions depend both on the properties of the fuel and on the efficiency of the energy conversion. For CO_2, the emission factors are based on the molar ratio of carbon to oxygen multiplied with the carbon mass of the fuel, assuming that all the carbon in the fuel is oxidised. The CH_4 and N_2O emissions factors are dependent on the combustion or conversion process in the energy converter.

12.3 C_{f_CO2} (gCO_2/g fuel) is a non-dimensional conversion factor between fuel consumption measured in grams and CO_2 emissions also measured in grams based on carbon content.
C_{f_CH4} and C_{f_N2O} are engine and fuel specific emission factors. Newer generations of engines are expected to reduce certain emissions and there may be a need to distinguish on the engine build year. For fuels and engines that are not developed yet, the default factors need to be developed at a later stage and also kept under review.

12.4 Fugitive emissions (such as those from methane) come from fuel that does not reach the combustion chamber and from fuel that is not burned in the combustion chamber (e.g. methane slip)] and which are lost, leaked, vented, boiled-off in the system. The slip factor C_{slip} is expressed as % of fuel mass. The fuel slip should also be deducted before the emission conversion factors are applied, as this fuel is not combusted or converted. The values of C_{slip} should be calculated at 50% of the engine load [(E2/E3 test cycle can also be considered as method of reference in the certification guidelines).]

12.5 [The same type of treatment could be done for the boil off emissions or any other fugitive emissions, depending on the on-board handling and/or energy converter technology. It should be noted, that this TtW approach may be opened for continuous (online) monitoring in exhaust pipes for all GHGs in case they can be measured sufficiently precisely. For future use of fuel cells with a reforming unit, also electro-chemical reactions forming GHGs can be taken into account by this TtW methodology.]

13 USE OF DEFAULT VALUES AND CERTIFIED ACTUAL VALUES

13.1 Default emission and slip factors per fuel type, engine/converter type and generation are given in Appendix 2. However, performers who claim to do better than default values should be given the opportunity to demonstrate their real performance through the application of certified actual values. Criteria for certification of the various factors are given in Part IV.
No default values are given for the use of on-board CCS (e_{occs}), and the amount of captured carbon per unit of energy should be specifically certified according to criteria in Part IV.

PART IV: REVIEW AND INCLUSION OF NEW FUEL LIFECYCLE LABELS AND EMISSION FACTORS

14 CRITERIA AND PROCEDURE FOR RECOGNIZING CERTIFICATION SCHEMES

14.1 A certification scheme ensures sustainability, traceability, feedstock identification and demonstration of correct claims. It includes separate book-keeping for the traceability of sustainable and non-sustainable feedstock used in the process. The certification of a FLL and specific WtT emission factors should be determined based on certification schemes addressing the fuel and bunker supplier [and recognized by the Organization].

14.2 Multiple certification [schemes] [standards] can map to the same FLL as long as they have similar scope. New fuel pathways and FLLs can be added as necessary, taking into account future technology development.

14.3 Approved certification schemes are listed in Appendix 4 to these guidelines. In case the standards and certificates contain specific information relevant for the labelling, this should also be listed under "Relevant parts of the standard".

14.4 The IMO should continuously identify and review international [certification scheme] [and standards] and map them to FLLs. Proposals should be submitted to the Committee for consideration and include an assessment of the following criteria:

1. Is the certification scheme international and have at least a regional reach?
2. Does the certification scheme have clear certification procedures performed by independent certification bodies?
3. Does the certification scheme audit authorised certification bodies in the frame of the certification process?
4. Does the certification scheme address the supply chain of the fuel and fuel supplier?
5. Can the certification scheme provide certified actual WtT values according to the methodology in PART II?
6. Does the certification scheme address the sustainability criteria in section 6?
7. Does the certification scheme map to existing fuel pathways and FLLs? If not, a justification for creating a fuel pathway and FLL should be provided.

14.5 A scientific fuel expert panel should be established to keep the [certification scheme] [and standards] and emission factors under review.

15 CRITERIA FOR VERIFICATION AND CERTIFICATION OF TANK-TO-WAKE EMISSION SLIP FACTORS AND ON-BOARD CCS

15.1 Default values for the relevant emissions and slip factors are provided in Table 2 Appendix 2 (except for on-board CCS). However certified values by mean of laboratory testing or direct emissions measurements should be allowed/encouraged, according to methodologies developed by the Organization.

15.2 ***Placeholder Criteria for certifying the amount of captured and stored carbon on-board to be defined.***

15.3 The following table summarizes the overall Verification and Certification needs and gaps.

Fuel	WtT	TtW
Fossil	Default values shall be used as provided in Table 1.	Resolution MEPC.308(73) CO_2 carbon factors shall be used for fuels for which such factors are provided

		For all other emissions factors, default values can be used as provided in Table 1 of Appendix I, alternatively certified values by mean of laboratory testing or direct emissions measurements (certification scheme to be defined) can be used.
Sustainable Renewable Fuels (Bio Liquids, Bio Gases,RFNBOs)	CO_{2eq} values as provided in Table 1 can be used, alternatively approved certification scheme can be used Approved certification schemes to audit the Verifiers and issue the certification of compliance of the Verifiers with the certification scheme. Verifiers to issue the certification for the fuel.	Emissions factors default values can be used as provided in Table 1 of this Regulation, alternatively certified values by mean of laboratory testing or direct emissions measurements (certification scheme to be defined) can be used.
Others (including electricity)	CO_{2eq} values as provided in Table 1 can be used, alternatively approved certification scheme can be used.	Emissions factors default values can be used as provided in Table 1, alternatively certified values by mean of laboratory testing or direct emissions measurements (certification scheme to be defined) can be used.

APPENDIX 1: DEFAULT WELL-TO-TANK EMISSION FACTORS

Well to Tank default emission factors (all values are preliminary and not all relevant pathways and feedstock are mapped)

Table 1

Tier I: Carbon content	Tier II: Feedstock Nature	Tier III: Production pathway	Tier IV: Fuel type	Region of the world	GHG_{CO2eq} [gCO_{2eq}/MJ]	S_F	Source
Carbon	Fossil	Default	MDO/MGO	Global	14.9	1	
Carbon	Fossil	Default	LFO	Global	13.2	1	
Carbon	Fossil	Default	HFO	Global	[9.6]/[14.1]	1	
Carbon	Fossil	Default	LPG	Global	-	1	
Carbon	Fossil	Default	LNG/methane	Global	18.5	1	
Carbon	Fossil	Default	Butane	Global	7.8	1	
Carbon	Fossil	Natural gas	Methanol	Global	31.3	1	RED II
Carbon	Biogenic	Main products / wastes / feedstock mix /rapeseed incl LUC	Diesel		115.1	0	Rapseed incl. LUC
Carbon	Biogenic	Main products / wastes / feedstock mix /palm incl LUC	Diesel		306.7	0	Palm incl. LUC
Carbon	Biogenic	Main products / wastes / Feedstock mix	Diesel	Region 1(*)		0	RED II
				Region 2			
				Region 3	-26.1		
				Region 4			
				Region 5			
Carbon	Biogenic	Main products / wastes / Feedstock mix	HVO		-20.7	0	RED II
Carbon	Biogenic	Main products / wastes / Feedstock mix	LNG/methane		-38.9	0	RED II
Carbon	Biogenic	Main products / wastes / Feedstock mix	Hydrogen			N/A	
Carbon	Captured carbon	Captured carbon/ Electrolysis/ electricity mix	Diesel		-47.6	0	RED RESD1 (fromRES)
Carbon	Captured carbon	Captured carbon/ Electrolysis/ electricity mix	Methanol		-67.1	0	RED REME1a (fromRES)
Carbon	Captured carbon	Captured carbon/ biomass gasification/ electricity mix	LNG/methane		-26.6	0	RED WFLG2

Carbon	Captured carbon	Captured carbon (**)	LNG/methane			97	0	
Zero-carbon	Fossil	Natural gas	Hydrogen			132	N/A	JEC
Zero-carbon	Fossil	Natural gas	Ammonia			121	N/A	
Zero-carbon	Biogenic	Sugarbeet	Ethanol			-33.2	0	RED sugarbeet
Zero-carbon	Fossil/renewable	Electrolysis/ electricity mix	Hydrogen			3.6		JEC
Zero-carbon	Fossil/renewable	Electrolysis/ electricity mix	Ammonia			0		SINTEF 2020
Zero-carbon	Fossil/renewable	electricity mix	Electricity			106.3		EU MIX 2020

(*) *The geographical scope can be applicable to each fuel. It is shows only on this entry for simplicity purpose.*

(**) *Only if the captured CO2 is to be accounted in national GHG inventories of any UNFCCC member countries, in alignment with the IPCC guidelines. If not, SF=1.*

Sources:

1: Resolution MEPC.308(73): 2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships.
2: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter
3: According to method and calculation in document MEPC 59/4/10.
4: Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, Annex III.

APPENDIX 2: DEFAULT TANK-TO-WAKE EMISSION AND SLIP FACTORS

Tank to Wake default emission factors

Table 2

Fuel type	Energy Converter	LCV $\left[\frac{MJ}{gFuel}\right]$	$C_{f\,CO_2}$ $\left[\frac{gCO2}{gFuel}\right]$	$C_{f\,CH_4}$ $\left[\frac{gCH_4}{gFuel}\right]$	$C_{f\,N_2O}$ $\left[\frac{gN_2O}{gFuel}\right]$	C_{slip} [% of fuel mass]
HFO ISO 8217 Grades RME to RMK	**ALL ICEs**	0.0402	3.114	0.00005	0.00018	-
	Gas Turbine					
	Steam Turbines and Boilers					
	Aux Engines					
LSFO [better HFO>0,5]	**ALL ICEs**	0.0412	3.114	0.00005	0.00018	-
	Gas Turbine					
	Steam Turbines and Boilers					
	Aux Engines					
LFO ISO 8217 Grades RMA to RMD	ALL ICEs	0.0412	3.151	0.00005	0.00018	-
MDO MGO ISO 8217 Grades DMX to DMB	ALL ICEs	0.0427	3.206	0.00005	0.00018	-
LNG	LNG Otto (dual fuel medium speed)	0.0480	2.75	[0]	0.00011	Built before 200X 3,1 Built after 200X ???
	LNG Otto (dual fuel slow speed)					Built before 200X 1,7 Built after 200X ???
	LNG Diesel (dual fuel slow speed)					Built before 200X 0.2 Built after 200X ???
	LBSI					N/A
LPG	All ICEs	0.0463 Buthane 0.0457 Propane	3.03 Buthane 3.00 Propane	TBM	TBM	
Hydrogen	Fuel Cells	0.120	0	0	-	-
	ICE		0	0	TBM	
Methanol	All ICEs	0.0199	1.375	TBM	TBM	-
Ammonia	No engine	0.0186	0	0	TBM	-
Ethanol E100	All ICEs	0.0268	1.913	TBM	TBM	-

FAME						
Bio-diesel	ALL ICEs	0.270 – 0.0372	2.834	0.00005	0.00018	-
HVO	ALL ICEs	0.044	3.115	0.00005	0.00018	-
Electricity	OPS		-	-	-	-

Sources:

To provide consistency, the values from Resolution MEPC.308(73) are retained, including the carbon content. The list has been extended with other relevant maritime fuels. The lower calorific value (LCV) and conversion factors (CF) are based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1: Table 1.2 provides the LCV, while the C_F is calculated by multiplying the LCV with the CO2 emission factors in Table 1.4. For DME, HVO and FAME, the LCV is taken from Annex III of Directive (EU) 2018/2001.

CH_4 emissions factors for fossil fuels (such as HFO, MDO and LNG) are contained in the 4th and 3rd IMO GHG studies. In particular this factor, which is relevant for methane and LNG fuels, should be established on the best available knowledge. N_2O emissions for HFO, MDO and LNG are also contained in the 4th and 3rd IMO GHG studies. This factor is believed to be relevant for certain type of fuels such as those on methane or for H_2 when consumed in ICE. For all other fuels this factor should be established on the best available knowledge. It is otherwise set to zero.

Some conversions factors

For total combustion:

- 1 kg of a fuel with C% carbon emits: 1 x C% / 100 / 12 x 44 = (0.0367 x C%) kg of CO_2;
- 1 MJ of a fuel with λ MJ/kg (LCV) and C% carbon emits: 1 / λ x C% / 100 / 12 x 44 = (0.0367 / λ x C%) kg of CO_2;
- 1 KWh (($kg \cdot m^2 \cdot s^{-3}$) ·s) = 3,6 MJ ($kg \cdot m^2 \cdot s^{-2}$)

APPENDIX 3: LIST OF RECOGNIZED STANDARDS

Certificates from the following standards and parts of the standards are recognized as documentation for the specified label and sub-category:

Standard	Relevant parts of the standard	Main label	Sub-category

APPENDIX 4: LIST OF APPROVED CERTIFICATION SCHEMES

The following certification schemes are approved by the Organization:

Name	**URL**	**Scope**

[*For the purpose of providing an example, certification schemes such as those provided for International Sustainability and Carbon Certification (ISCC) (https://www.iscc-system.org/), Roundtable on Sustainable Biomaterials (RSB) (https://rsb.org/) and REDCert (https://www.redcert.org/en/)], may be considered*]

APPENDIX 5: CALCULATION EXAMPLES

TBD

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ANNEX II - Suggested Correspondence Group (CG) on Maritime Fuel Life Cycle Analysis

Possible Terms of reference for the CG:

Using document ISWG-GHG 11/2/XX (this document) as the basis:

1 Identify priority fuels and their typical pathways for inclusion in the Fuel GHG/Carbon Intensity Guidelines,

2 Establish emissions default values for the identified fuels, including taking into account geographical differences,

3 Establish the methodology for the WtT estimation of CO_{2eq},

4 Establish the methodology for the TtW estimation of emissions factors and CO_{2eq},

5 Define sustainability criteria for fuels,

6 Define criteria for certification schemes for actual GHG emissions evaluation,

7 Develop examples of the calculation of the emissions as provided in document ISWG GHG 11/2/X, and

8 Report to MECP XX.