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MEPC.1/Circ.916
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METHODOLOGY FOR SUBMISSION, SCIENTIFIC REVIEW AND RECOMMENDATION OF PROPOSED DEFAULT EMISSION FACTORS BY GESAMP-LCA WG

1 The Marine Environment Protection Committee (MEPC), at its eighty-third session (7 to 11 April 2025), approved the *Methodology for submission, scientific review and recommendation of proposed default emission factors by GESAMP-LCA WG*, as set out in the annex.

2 Member Governments and international organizations are invited to bring the annexed Methodology to the attention of Administrations, industry, fuel producers, technology manufacturers, relevant shipping organizations, shipping companies and other stakeholders concerned.

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ANNEX

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

1 General

1.1 The Marine Environment Protection Committee (MEPC), at its eighty-first session (April 2024) adopted the *2024 Guidelines on life cycle GHG intensity of marine fuels* (2024 LCA Guidelines) (resolution MEPC.391(81)), and agreed to the establishment of a Technical Group under the auspices of GESAMP, the GESAMP Working Group on Life Cycle GHG Intensity of Marine Fuels (GESAMP-LCA WG), to review and provide scientific and technical advice on specific issues related to the implementation of the 2024 LCA Guidelines and advise the Committee accordingly.

1.2 Section 9 of the 2024 LCA Guidelines provides the general description of principles and the procedure for the determination of well-to-tank (WtT) and tank-to-wake (TtW) GHG default emission factors.

1.3 The GESAMP-LCA WG developed this Methodology to facilitate the submission, scientific review and recommendation of proposed default emission factors in a standardized and transparent way.

1.4 This Methodology should be suitable for use as technical guidance by Member States submitting proposed default emission factors to the GESAMP-LCA WG for review and recommendation to MEPC. A flow chart describing this process is provided in appendix 1.

1.5 The goal of this Methodology is to ensure proper assessment of the proposed default emission factors. As such, the Methodology will be updated as the state of knowledge and technology, as well as best practices, lessons learned and experience gained during the evaluation process, may require.

1.6 This Methodology complements, and does not pre-judge, the application of the 2024 LCA Guidelines.

2 Definitions

2.1 For the purposes of this Methodology, the following definitions are intended to facilitate a consistent evaluation of default emission factors:

.1 **GESAMP** is the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, an advisory and multidisciplinary body consisting of specialized experts. Experts working for GESAMP act independently in their individual capacity. For more information, see: http://www.gesamp.org/.

.2 **GESAMP-LCA WG** is the GESAMP Working Group on Life Cycle GHG Intensity of Marine Fuels, also referred to as GESAMP WG 46 or the Group.

.3 **Default emission factor** represents the outcome of the assessment of a specific marine fuel pathway or value chain for well-to-tank (WtT) and/or tank-to-wake (TtW) expressed in $gCO_{2eq}/MJ_{(LCV)}$ and recommended for approval by MEPC.

.4 **Proposal** means proposed default emission factors submitted by a Member State for scientific review and recommendation by the Group, along with supporting documentation.

.5 **Template** means the standardized layout for submission of proposed default emission factors based on appendices 4 (template for WtT default emission factor submission) and 5 (template for TtW default emission factor submission) of the 2024 LCA Guidelines. This template aims at collecting and presenting in a clear and structured manner the input data used to calculate a proposed default emission factor.

.6 **Excel tool** is a locked spreadsheet in Excel format developed by the Group to standardize the reporting of parameters and the calculation of proposed default emission factors, based on the templates in appendices 4 and 5 of the 2024 LCA Guidelines.

2.2 These definitions are aimed at harmonizing the process of submission and review of proposed default emission factors by GESAMP-LCA WG and should not be considered as an interpretation of the LCA Guidelines.

3 Submission of proposed default emission factors

3.1 Member States may submit WtT and/or TtW proposed default emission factors using the template and the Excel tool. The proposing Member State should check the quality and completeness of any application against the template before its formal submission; and clearly indicate in the submission whether the proposal is for a new default emission factor or for the revision of an existing default emission factor to reflect the latest scientific knowledge and reliable data availability.

3.2 Several proposed default emission factors for a given fuel pathway can be submitted simultaneously by one or more Member States. However, only one default emission factor should be proposed per template form (e.g. to submit two proposed default emission factors, two separate template forms should be filled). The template provides full coverage of all elements necessary to define a default emission factor. It can be adapted and complemented with additional information. Proposing Member States should clearly indicate when no information is provided for specific steps of the pathway or when a specific pathway is not applicable. Member States should use the Excel tool developed by the Group to standardize the reporting of parameters and the calculation of proposed default emission factors.

3.3 Alongside a filled template, additional details and relevant information (e.g. LCA model/tool and respective data, peer-reviewed literature, primary data, official statistics or scientific/engineering simulation used for establishment of proposed default emission factors) should be provided.

3.4 Submissions for scientific review and recommendation of proposed default emission factors and underlying data that need to be evaluated by GESAMP-LCA WG should be addressed to the Technical Secretary of the GESAMP-LCA Working Group, in digital format:

Contact details:
Ms. Laura Aguilera
Technical Secretary of the GESAMP-LCA Working Group
Tel.: +44 (0)20 7587 3127
Email: LAguiler@imo.org and ghg@imo.org

3.5 GESAMP-LCA WG aims to hold two in-person meetings per calendar year, well before the MEPC session is expected to decide on the approval of the proposed default emission factors. Consequently, a deadline of at least 28 weeks before the relevant MEPC session has been established for the submission of proposals for scientific review and recommendation. However, submissions of proposed default emission factors can be presented at any time. GESAMP-LCA WG may also work by correspondence and hold virtual meetings, as necessary. An indicative timeline used for planning the activities related to the GESAMP-LCA WG meetings is shown in appendix 2.

3.6 If due to time constraints GESAMP-LCA WG is not able to evaluate all the proposals for scientific review and recommendation submitted by the deadline (see paragraph 3.5), an additional meeting of GESAMP-LCA WG may be convened.

4 Procedure for review of proposed default emission factors

4.1 The review of proposed default emission factors should adhere to the following steps:

Step 1 Upon receipt of the submission of proposed default emission factors, the Technical Secretary and the Chair of GESAMP-LCA WG should determine whether all the data elements required in the template(s) are filled. GESAMP-LCA WG may ask proposing Member States to provide further information before the proposed default emission factors are further considered by the Group. For the WtT part, the Group should assess if the pathway description corresponds to the given fuel pathway code, and if it corresponds to an existing fuel pathway code or if it is a new one.

Step 2 If a large number of proposals are submitted, the Group may have to prioritize its work by evaluating the relevance/urgency of assessing a fuel pathway. The prioritization may be done following guidance provided by the Committee or by using criteria such as: the technology readiness level (TRL) of the proposed fuel pathway, current market availability of the proposed fuel for international shipping, expected volumes, etc.

Step 3 For each proposed WtT default emission factor, the Group should assess the quality of data used for the calculation in terms of relevance, adequacy, completeness, consistency, reliability, transparency, and accessibility.

The Group may also identify any missing information and ask the proposing Member State to provide further information. Proposing Member States may submit additional information, such as the underlying LCA calculations and the pedigree matrix.

Step 4 The Group should assess whether, for a specific pathway code, at least three separate analyses/studies have been performed for WtT and TtW, respectively.

Step 5 The Group should analyse the reliability of the proposed values by verifying the accuracy of entries in the filled Excel tool and the calculated proposed default emission factors, as well as the completeness of the background information provided.

4.2 Clarification of certain aspects of a proposal identified during the preparation for, or in the process of, an evaluation of a proposal may be requested by the Group via email communication. The clarifications should be received in a timely manner so that the Group is able to take the information into account during the review process. Member States may wish to designate a technical representative to provide clarifications on request during the Group's review meeting. Additionally, one or more contacts from the proposing Member State will be copied on all communications. Member States are requested to provide names and email addresses of all these contacts in electronic copy to the Technical Secretary at the time of their submission, specifying technical and administrative representatives.

5 Identification and recommendation of default emission factors

5.1 Having reviewed and validated the submitted proposals for default emission factors, GESAMP-LCA WG should identify which proposals fulfilled all the steps described in section 4.

5.2 WtT default emission factors should be calculated using representative and conservative assumptions, which encompass variable performance of feedstock-fuel pathways across world regions and States. To establish a WtT default emission factor for a fuel pathway, at least three reference values from three different, representative analyses/studies should be considered. To ensure conservativeness, among the three (or more) emission factors considered, the highest value should be selected as default and recommended to the Committee to be added to the LCA Guidelines. The range of available values should be provided for informative purposes.

5.3 TtW default emission factors should be calculated using representative and conservative assumptions, which encompass variable conditions on board the ships and performance of energy converters. To establish a TtW default emission factor for a fuel pathway (with the exception of C_{fCO2}), at least three reference values, from three different representative analyses/studies, should be considered among the three (or more) emission factors to be considered; to ensure conservativeness the highest value should be selected as default and recommended to the Committee to be added to the LCA Guidelines. The range of available values should be provided for information purposes.

5.4 After completion of the GESAMP-LCA WG report, relevant annexes containing the outcome of the review of proposed default emission factors should be sent to the respective Member State for information and to check if any confidential information appears in the report. Unless the Member State advises otherwise before the deadline indicated in the request for confirmation (normally one week), the Technical Secretary will assume that the respective evaluation does not contain any confidential information and can be processed along with the report according to the indicative timeline shown in appendix 2.

5.5 The report of GESAMP-LCA WG should be peer-reviewed by GESAMP. If GESAMP provides comments on the findings of the Group, the Chair of GESAMP-LCA WG, in consultation with the members of the Group, as appropriate, will address the respective comments. GESAMP will provide confirmation of peer review and approval to the Technical Secretary, for the information of MEPC.

5.6 Any supplementary data regarding a proposal that was submitted to GESAMP-LCA WG after the completion of its review meeting will be considered as a new proposal, subject to a new deadline for evaluation according to the procedure described in this Methodology.

5.7 On the basis of the report of GESAMP-LCA WG, MEPC will be invited to consider the recommended default emission factors for approval and to determine how to reflect them in the LCA Guidelines, as appropriate.

6 Confidentiality issues and disclosure of information

6.1 The proprietary data, information, materials, notes and reports obtained or generated in carrying out the work of GESAMP-LCA WG should be treated as confidential. However, all information related to safety and environmental protection should be treated as non-confidential.

6.2 The confidential information in submitted documents should be clearly identified by the proposing Member State.

6.3 Reports to MEPC, including recommended default emission factors, should be made publicly available.

6.4 After evaluation by the Group, information and materials obtained or generated in carrying out the work of the Group should be safely stored by the Technical Secretary.

6.5 The Organization and the members of GESAMP-LCA WG will make every reasonable effort to prevent the disclosure of information which is clearly and prominently identified as being subject to an intellectual property right, subject to the condition that sufficient detail must be provided to MEPC to enable it to perform its functions and, in particular, to approve the recommended default emission factors.

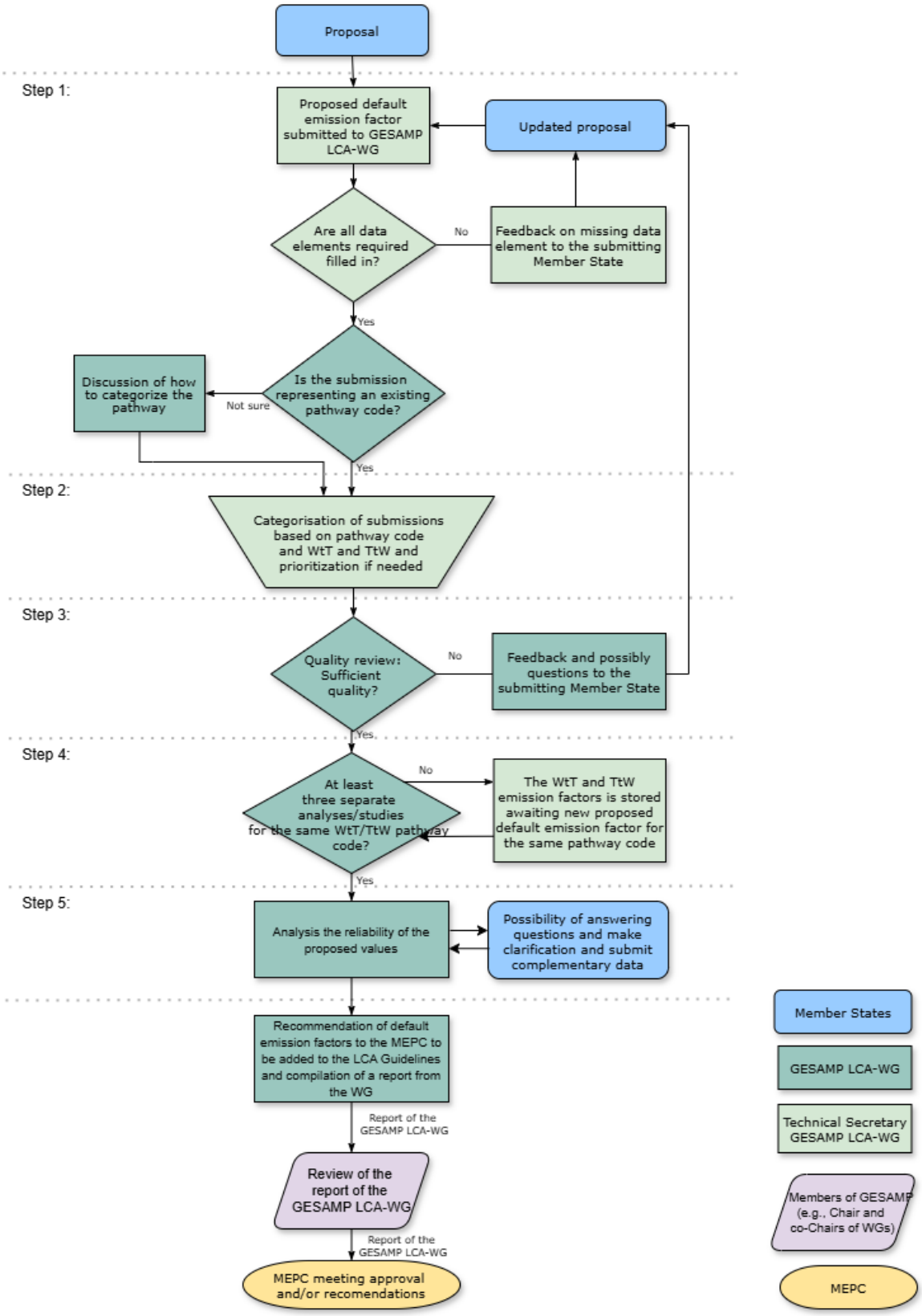
Appendix 1 Flow chart describing the submission, scientific review and recommendation process of default emission factors

Appendix 2 Timeline for activities related to GESAMP-LCA WG meetings

Appendix 3 Illustrative screenshots of the Excel tool

APPENDIX 1

Flow chart describing the submission, scientific review and recommendation process of default emission factors



APPENDIX 2

Indicative timeline for activities related to GESAMP-LCA WG meetings*

Timeline	Activity
At least 28 weeks before the MEPC	Deadline for submission of proposed default emission factors to be reviewed by GESAMP-LCA WG
(Eight weeks)	Preparation of the review meeting, including circulation of any relevant information among Group members
At the latest 20 weeks before the MEPC	GESAMP-LCA WG review meeting
(One week)	Editing and completion of the draft report of the review meeting on recommended default emission factors
(Three weeks)	Review and approval of the report by GESAMP, including response/ clarification by the Group
(One week)	Proposing Member State to confirm that no confidential data are contained in the report
(One week)	Produce the final report addressing the comments by the GESAMP
Thirteen weeks before the MEPC	Submission of the report of the review meeting of GESAMP-LCA WG in accordance with the 13-week deadline (bulky documents) for MEPC

* MEPC 83 noted that the IMO Secretariat, in consultation with GESAMP and GESAMP-LCA WG, would review the timeline for the preparation, conduct and reporting of the meetings, so as to allow for the timely review of proposals for default emission factors.

APPENDIX 3

Illustrative screenshots of the Excel tool

GESAMP-LCA WG developed an Excel tool to standardize the reporting of parameters and the calculation of proposed default emission factors, based on the templates in appendices 4 and 5 of the 2024 LCA Guidelines.

The **Instructions** tab (figure 1) presents the description of the spreadsheet and a list of the tabs with cross-references to the 2024 LCA Guidelines, when applicable.

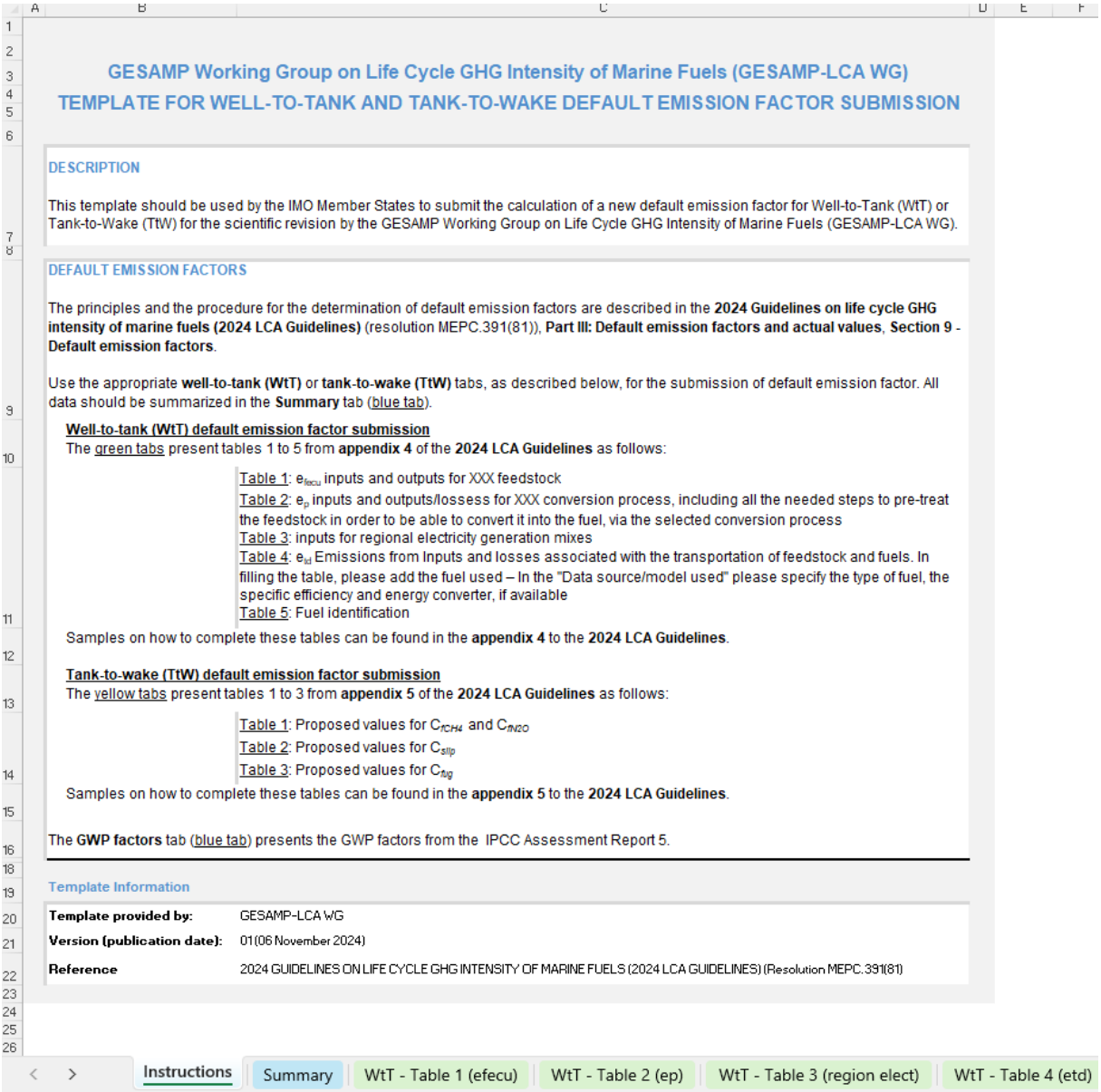


Figure 1: Instructions tab

The appropriate WtT or TtW tabs should be used for the submission of the default emission factor. A full list of the tabs is presented in figure 2. Samples on how to complete the tables can be found in appendices 4 and 5 to the 2024 LCA Guidelines.

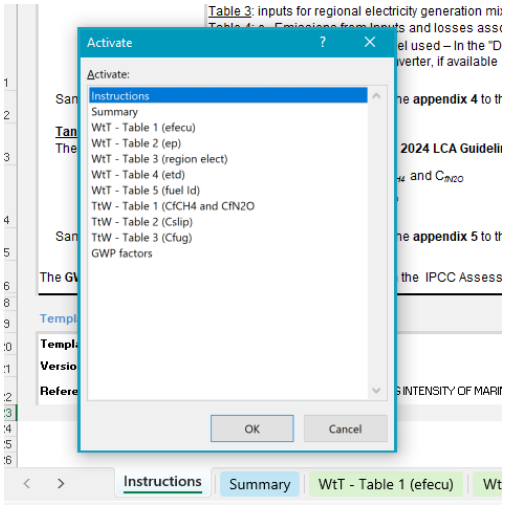
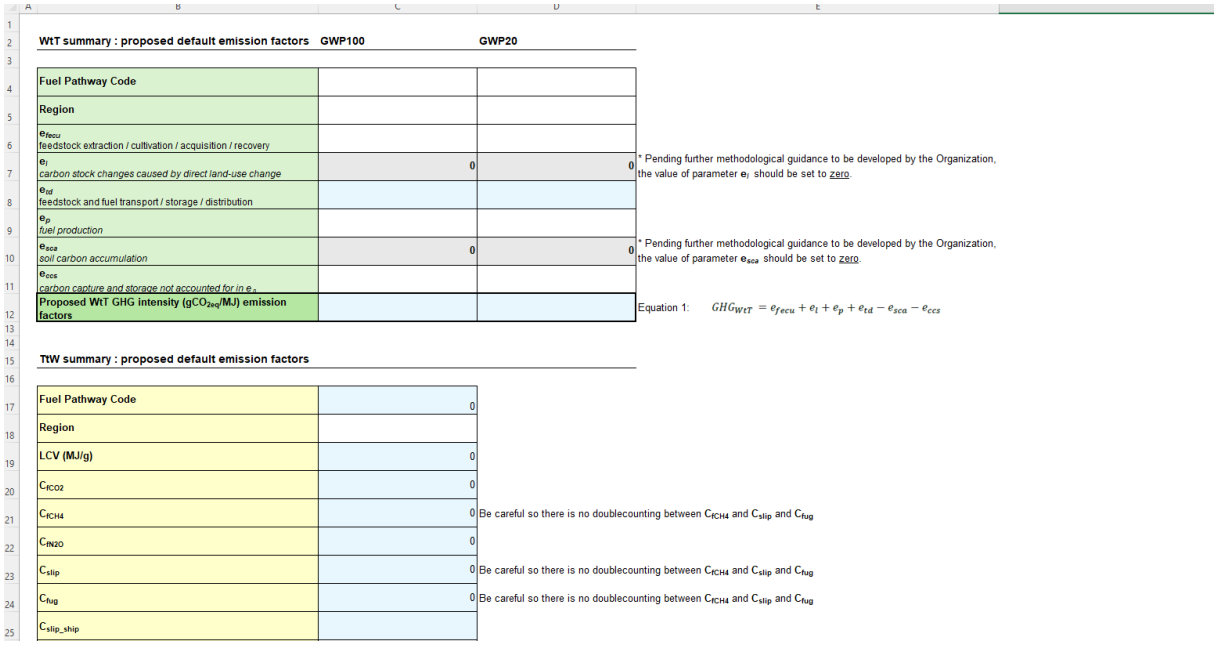


Figure 2: Full list of tabs in the Excel tool

All data is summarized in a **Summary** tab (see figure 3).

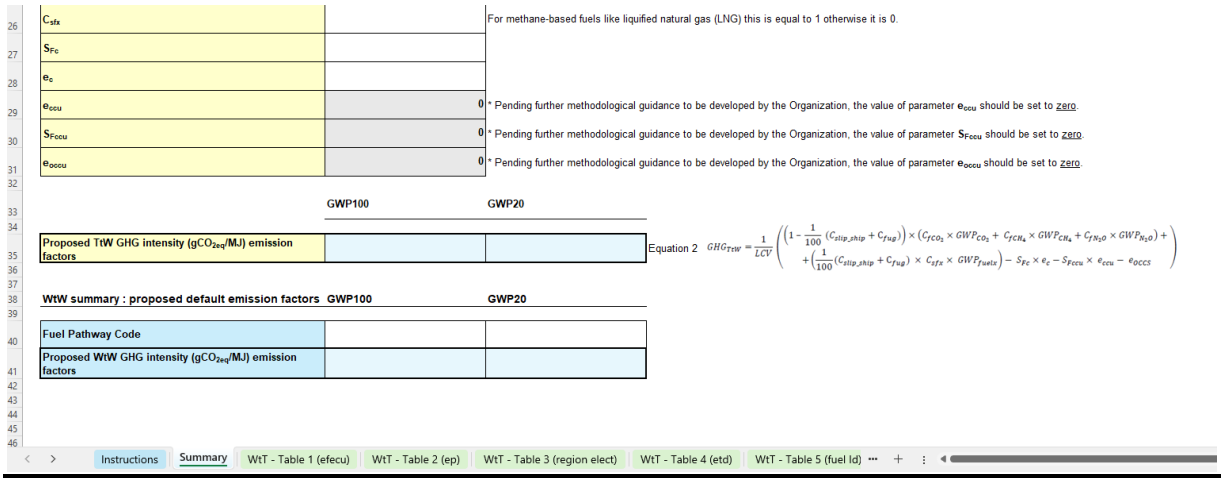


WtT summary : proposed default emission factors

	GWP100	GWP20	
Fuel Pathway Code			
Region			
e_{fecu} feedstock extraction / cultivation / acquisition / recovery			
e_l *carbon stock changes caused by direct land-use change*	0	0	* Pending further methodological guidance to be developed by the Organization, the value of parameter e_l should be set to zero.
e_{td} feedstock and fuel transport / storage / distribution			
e_p *fuel production*			
e_{sca} *soil carbon accumulation*	0	0	* Pending further methodological guidance to be developed by the Organization, the value of parameter e_{sca} should be set to zero.
e_{ccs} *carbon capture and storage not accounted for in* e_p			
Proposed WtT GHG intensity (gCO_{2eq}/MJ) emission factors			Equation 1: $GHG_{WtT} = e_{fecu} + e_l + e_p + e_{td} - e_{sca} - e_{ccs}$

TtW summary : proposed default emission factors

Fuel Pathway Code	0	
Region		
LCV (MJ/g)	0	
C_{fCO2}	0	
C_{fCH4}	0	Be careful so there is no doublecounting between C_{fCH4} and C_{slip} and C_{fug}
C_{fN2O}	0	
C_{slip}	0	Be careful so there is no doublecounting between C_{fCH4} and C_{slip} and C_{fug}
C_{fug}	0	Be careful so there is no doublecounting between C_{fCH4} and C_{slip} and C_{fug}
C_{slip_ship}		



C_{sfx}		For methane-based fuels like liquified natural gas (LNG) this is equal to 1 otherwise it is 0.
S_{Fc}		
e_c		
e_{eccu}	0	* Pending further methodological guidance to be developed by the Organization, the value of parameter e_{eccu} should be set to zero.
S_{Fccu}	0	* Pending further methodological guidance to be developed by the Organization, the value of parameter S_{Fccu} should be set to zero.
e_{occu}	0	* Pending further methodological guidance to be developed by the Organization, the value of parameter e_{occu} should be set to zero.

	GWP100	GWP20
Proposed TtW GHG intensity (gCO_{2eq}/MJ) emission factors		

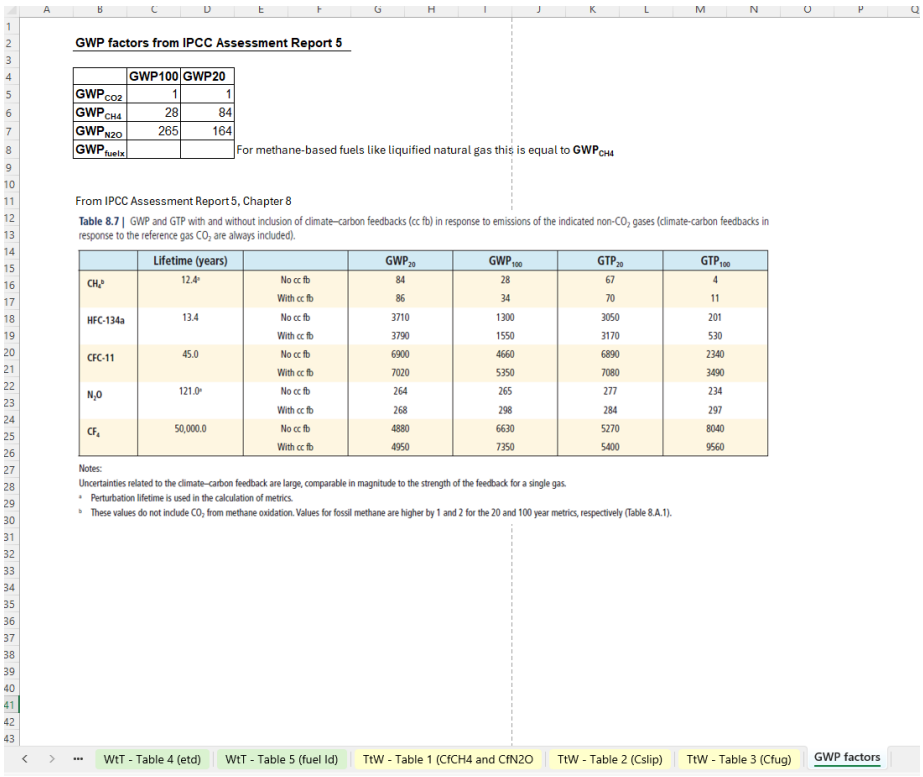
Equation 2 $GHG_{TtW} = \frac{1}{LCV}\left(\begin{matrix}\left(1-\frac{1}{100}(C_{slip\_ship}+C_{fug})\right)\times(C_{fCO_2}\times GWP_{CO_2}+C_{fCH_4}\times GWP_{CH_4}+C_{fN_2O}\times GWP_{N_2O})+\\ +\left(\frac{1}{100}(C_{slip\_ship}+C_{fug})\times C_{sfx}\times GWP_{fuelx}\right)-S_{Fc}\times e_c-S_{Fccu}\times e_{eccu}-e_{OCCS}\end{matrix}\right)$

WtW summary : proposed default emission factors	GWP100	GWP20
Fuel Pathway Code		
Proposed WtW GHG intensity (gCO_{2eq}/MJ) emission factors		

Instructions | Summary | WtT - Table 1 (efecu) | WtT - Table 2 (ep) | WtT - Table 3 (region elect) | WtT - Table 4 (etd) | WtT - Table 5 (fuel ld) ...

Figure 3: Summary tab

The **GWP factors** tab (see figure 4 below) presents the GWP factors from the IPCC Assessment Report 5.



GWP factors from IPCC Assessment Report 5

	GWP100	GWP20
GWP_{CO2}	1	1
GWP_{CH4}	28	84
GWP_{N2O}	265	164
GWP_{fuelx}		

For methane-based fuels like liquified natural gas this is equal to GWP_{CH4}

From IPCC Assessment Report 5, Chapter 8

Table 8.7 | GWP and GTP with and without inclusion of climate–carbon feedbacks (cc fb) in response to emissions of the indicated non-CO_2 gases (climate-carbon feedbacks in response to the reference gas CO_2 are always included).

	Lifetime (years)		GWP_{20}	GWP_{100}	GTP_{20}	GTP_{100}
CH_4[b]	12.4[a]	No cc fb	84	28	67	4
		With cc fb	86	34	70	11
HFC-134a	13.4	No cc fb	3710	1300	3050	201
		With cc fb	3790	1550	3170	530
CFC-11	45.0	No cc fb	6900	4660	6890	2340
		With cc fb	7020	5350	7080	3490
N_2O	121.0[a]	No cc fb	264	265	277	234
		With cc fb	268	298	284	297
CF_4	50,000.0	No cc fb	4880	6630	5270	8040
		With cc fb	4950	7350	5400	9560

Notes:
Uncertainties related to the climate–carbon feedback are large, comparable in magnitude to the strength of the feedback for a single gas.
[a] Perturbation lifetime is used in the calculation of metrics.
[b] These values do not include CO_2 from methane oxidation. Values for fossil methane are higher by 1 and 2 for the 20 and 100 year metrics, respectively (Table 8.A.1).

WtT - Table 4 (etd) | WtT - Table 5 (fuel ld) | TtW - Table 1 (CfCH4 and CfN2O | TtW - Table 2 (Cslip) | TtW - Table 3 (Cfug) | GWP factors

Figure 4: GWP factors tab

The editable Excel tool is available on the IMO website at: https://www.imo.org/en/OurWork/Environment/Pages/Lifecycle-GHG---carbon-intensity-guidelines.aspx.