

FOBAS Bulletin

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IMO publishes interim guidance on the calculations of biofuel carbon conversion factor (C_F) for IMO DCS and CII calculations

MEPC 80 concluded last week where GHG emissions from shipping was a top agenda item. One of the key issues under consideration was to provide clarity on the conversion factor (C_F) for marine biofuels blends. MEPC 80 came up with an interim guidance (MEPC.1/Circ.905) addressing this aspect.

As per MEPC.1/Circ.905, biofuels will be considered 'sustainable' that have been certified by a sustainability certification scheme (e.g., [ISCC](#) or [RSB](#)), and providing a well-to-wake GHG emissions reduction of at least 65% compared to the well-to-wake emissions of fossil MGO of 94 gCO_{2e}/MJ (i.e., achieving an emissions intensity not exceeding 33 gCO_{2e}/MJ). The well-to-wake GHG emissions value of the fuel mentioned on the sustainability certificate (expressed in gCO_{2eq}/MJ) is multiplied by its lower calorific value (LCV, expressed in MJ/g) for the purpose of regulations 26, 27 and 28 of MARPOL Annex VI to determine a C_F value. For blends, the C_F should be based on the weighted average of the C_F for the respective amount of fuels by energy.

Biofuels not certified as 'sustainable' or not fulfilling the well-to-wake emission factor criterion should be assigned a C_F equal to the C_F of the equivalent fossil fuel type. Please see below (Appendix A) few examples which explains the calculation methodology.

Please note that the application date of this circular has been recorded as 1st October 2023. In view of current variants between flag administrations on the calculation of the C_F value, ships should check with their respective flag as to their planned adoption of the MEPC.1/Circ.905. Moreover, this interim guidance will be rescinded upon operationalization of a well-to-wake GHG methodology through the IMO LCA Guideline which is currently under development.


We trust you will find this guidance document useful and if you are planning to use biofuel blends on your ships, FOBAS can provide further advisory support and comprehensive fuel quality testing service to characterise biofuels to ensure smooth ship operations.

If you require any further information about this Bulletin, please contact us at fobas@lr.org or speak to one of our consultants on +44 (0)330 414 1000 (Southampton UK), +44 (0)1642 440991 Redcar (UK), +65 3163 0888 (Singapore), +30 211 990 7732 (Greece). For anything urgent, please contact us via our out of office number, +44 (0)1642 425660.

Appendix A (C_F calculation examples)

Due to the significant oxygen content of FAME and its blends, the Lower Calorific Value (or Net Specific Energy Value) cannot be calculated using the formulae as given in the Annex H to ISO 8217 but must instead be determined by testing – i.e., ASTM D240. However, for those biofuels such as HVO which are compositionally indistinguishable from high grade petroleum fuels the distillate formula as given in ISO 8217 can be used.

Example using the ISCC Certificate sample that should accompany your bio blend BDN:

Supplier		Recipient	
Proof of Sustainability (PoS) for Biofuels, Bioliquids and Biomass Fuels V2.3 Applies under the Renewable Energy Directive (EU) 2018/2001 (RED II)			
Unique Number of the PoS:	EU-ISCC-Cert-DE105-88445402-2066052.0		
Date of Issuance of the PoS:	08-May-23		
		 www.iscc-system.org	
1. General information			
Type of Product:	Biodiesel		
Type of Raw Material	Used cooking oil (UCO) entirely of veg. origin		
Additional Information (voluntary):			
Country of Origin (of the raw material):	China		
Quantity:	140.570	m ³ /15°C	<input checked="" type="checkbox"/> m ³ <input type="checkbox"/> metric tons
Energy content (MJ):	4,638,810 MJ		
EU RED Compliant material ¹	<input checked="" type="checkbox"/> Yes		
ISCC Compliant material (volunt.) ²	<input type="checkbox"/> Yes		
Chain of custody option (voluntary)			
2. Scope of certification of raw material			
The raw material complies with the relevant sustainability criteria according to Art. 29 (2) - (7) RED II ³ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
The agricultural biomass was cultivated as intermediate crop (if applicable) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
The agricultural biomass additionally fulfills the measures for low ILUC risk feedstocks (if applicable) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
The raw material meets the definition of waste or residue according to the RED II ⁴ <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
3. Greenhouse Gas (GHG) emission information			
Total default value according to RED II applied <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
$E = E_{ec} + E_i + E_p + E_{td} + E_u^5 - E_{sca} - E_{ccs} - E_{ccr} = 9.6 \text{ gCO}_2\text{eq/MJ}$			
GHG emission saving⁶:			
89.8%	Biofuels for transport	94.8%	Biomass fuels for the production of electricity
94.8%	Bioliquids for electricity	88.0%	Biomass fuels for the production of useful heat, as well as for the production of energy for heating and/or cooling
88.0%	Bioliquids for the production of useful heat, as well as for the production of energy for heating and/or cooling	92.3%	Biomass fuels for the production of useful heat, in which a direct physical substitution of coal can be demonstrated
Date when the final biofuel, bioliquid or biomass producer started operation ⁷ 20.08.2012			
For biogas supply chains: Were incentives/subsidies received for the production of the biogas? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, please specify			

GHG Emission
RED II
EI= 9.6 gCO₂eq/MJ



Case example 1

Ship received 350MT of 100% biofuel FAME (B100).

1. Certified by either ISCC or RSB as having an Emissions Intensity (EI) of 18 gCO₂e/MJ and a Lower Calorific Value (LCV) of 37.7 MJ/kg – 0.0377 MJ/g
2. That Emissions Intensity value does not exceed 33 gCO₂e/MJ hence the fuel can be considered as being 'sustainable' for the purposes of MEPC.1/Circ.905. This EI value is given in terms of CO₂e – CO₂ equivalence – however for the purposes of the application of this Interim Guidance that can be taken simply as CO₂.
 $C_F \text{ value} = EI \times LCV = 18 \times 0.0377 = 0.6786 \text{ g CO}_2/\text{g fuel}$
3. In the EEDI Guidelines – MEPC.364(79) – the C_F values are given in terms of tonnes of CO₂ per tonne of fuel and to a precision of 3 decimal places. Consequently, the C_F value to be used in either EEXI calculations or the DCS returns in respect of the use of that fuel should be expressed as: C_F = 0.679 t- CO₂/t-fuel
4. In completing the DCS returns, in accordance with the current SEEMP Guidelines – MEPC.346(76) - this quantity of biofuel would be entered under '**Other**' as:
'Other (sustainable biofuel) 350 MT – C_F 0.679 in accordance with MEPC.1/Circ.905'

The sustainability documentation received with this fuel should be retained onboard in the same way as the Bunker Delivery Note – regulation 18.6 of MARPOL Annex VI.



Case example 2

Ship received 350MT of VLSFO grade B30 biofuel – where the biofuel component is given as FAME.

1. The sustainability documentation received with this fuel gives details of the FAME component which is stated as 103 MT – hence 247 MT of VLSFO as the other part of that blend
2. Certified by either ISCC or RSB as having an Emissions Intensity (EI) of 18.8 g CO₂e/MJ and a Lower Calorific Value (LCV) of 37.5 MJ/kg – 0.0375 MJ/g
3. That Emissions Intensity value does not exceed 33 hence the FAME component of the fuel can be considered as being ‘sustainable’ for the purposes of the Circular. The FAME C_F value is determined as in Example 1 above: FAME C_F value = EI x LCV = 18.8 x 0.0375 = 0.705 t- CO₂/t-fuel
4. In the EEDI Guidelines – MEPC.364(79) – the three liquid petroleum derived fuels are distinguished in terms of their ISO 8217 grades. In this case, the VLSFO residual blend component has been assumed to be low viscosity and hence fall into the category of RMD80 corresponding to the ‘Light Fuel Oil’ with assigned C_F value of 3.151 t- CO₂/t-fuel and a LCV of 41,200 kJ/kg (41.2 MJ/kg)
5. C_F value for a blend should be determined on the basis of the weighted average of energy contents of the components rather than on a weight basis. On that energy basis, the overall C_F value for the whole of the fuel as delivered is determined as follows:

	LCV	Fuel	Energy	Energy Fraction	C _F	
	MJ/kg	kg	MJ		t-CO ₂ /t-fuel	Blend
FAME	37.5	103000	3862500	0.275	0.705	0.194
VLSFO	41.2	247000	10176400	0.725	3.151	2.284
Total		350000	14038900			2.478

6. Hence the energy weighted average C_F of that blend is determined by multiplying the respective Energy Fractions by the corresponding C_F values for each component and then adding the results of those to obtain the shown overall value for the blend of 2.478 t- CO₂/t-fuel

As regards blends the Interim Guidelines do not give direction beyond establishing an overall value for the product as delivered. Therefore, no guidance is given as to how that is to be entered into the DCS returns. Since it gives that an overall value for the blend is to be determined it is assumed at this time that it is this blend data which is to be entered – rather than the component parts (i.e., FAME tonnage and C_F value to ‘Other (Biofuel)’ and the VLSFO tonnage to the ‘Light Fuel Oil’ category where the given C_F value is applied). On that basis the biofuel blend would be entered into the DCS under ‘Other’ as:
‘Other (sustainable biofuel-VLSFO blend) 350 MT – C_F 2.478 in accordance with MEPC.1/Circ.905’.

The sustainability documentation received with this fuel should be retained onboard in the same way as the Bunker Delivery Note – regulation 18.6 of MARPOL Annex VI.



Case example 3

Ship received 350MT of VLSFO grade B40 biofuel – where the biofuel component is given as FAME.

1. However, in this instance the ISCC or RSB certification gives that FAME blend component as having an Emissions Intensity of 38 g CO₂e/MJ – that is above the maximum 33 g CO₂e/MJ as allowed by the Interim Guidelines. Other scenario is that no such sustainability documentation is provided or unavailable from the supplier
2. In these instances, the Interim Guidelines give that biofuel component is not documented as being ‘sustainable’ as required and instead the C_F value as applicable to the equivalent fossil fuel type is to be used. Given that FAME generally has viscosity and density characteristics which correspond to those of the distillate grades in ISO 8217 then a C_F value of 3.206 t- CO₂/t-fuel would be assigned to that FAME fraction with the resulting calculation undertaken otherwise as given in Example 2 above. However, from a pragmatic perspective the total fuel consignment could instead be considered as a VLSFO and duly accorded the corresponding default C_F value of 3.151 t- CO₂/t-fuel
3. As above the Interim Guidelines do not give guidance as to how such a fuel should be entered in the DCS returns but on the basis of what is given it would seem that nevertheless such a biofuel blend would be still entered into the DCS under ‘Other’ but in this case as:
‘Other (not sustainable biofuel-VLSFO blend) 350 MT – C_F 3.151 t-CO₂/t-fuel - in accordance with MEPC.1/Circ.905’.

Such documentation as was received with this fuel should be retained onboard in the same way as the Bunker Delivery Note – regulation 18.6 of MARPOL Annex VI.