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WORKING DOCUMENT

From: To:	General Secretariat of the Council Working Party on Shipping
N° Cion doc.:	10327/21 ADD 1-3
Subject:	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 - Comments from Member States - Finland

Delegations will find, attached, comments from **Finland** on the above subject.

Written comments by Finland to FuelEU Maritime Presidency compromises ST 07601/22 (Articles 3 and 5-30) and WK 03260/22 REV01 (Annexes I and II)

13 April 2022

ARTICLES

Article 3
Definitions

Finland can accept the proposed amendments.

However, in point r3, our view is that the terms “kilowatts” and “main generators of the ship” would be more suitable in this context than “kilowatt-hours” and “main engines”.

Electric load balance or electric load study is a calculation to estimate maximum electric power in kilowatts during different operation modes of a ship, e.g. at sea, during maneuvering, loading and unloading cargo, etc. Because the maximum available power of a shore connection is a limiting factor for systems, which a ship can use at harbor, we assume that term used in r(3) should be 'kilowatt' instead of the used 'kilowatt-hour'. Kilowatt-hour indicates amount of used energy. Electric power onboard is produced by diesel generators, which are also called auxiliary engines, gensets or generators. In marine English a main engine is a motor which propels the ship. We assume that the correct wording would be 'main generators of the ship' instead of 'main engines of the ship'.

In addition, for clarity, we suggest the following addition to point ff. Unless it is specified, there can be a confusion that reference is made to Article 3(w) of the FuelEU Regulation.

(ff) ‘administering State’ means the administering authority in respect of a shipping company as defined in Article 3(w) of Directive 2003/87/EC of the European Parliament and of the Council and as determined in accordance with Article 3gd of the aforementioned Directive;

In addition, Finland notes that the proposal to include definitions related to navigation in ice conditions have not been included in the Presidency compromise. We reiterate our request to do so. Our proposed amendments can be found in document WK 2672/2022. We include them also here below.

In definition (n), the following provisions are added:

(n) ‘energy use on-board’ means the amount of energy, expressed in mega joules (MJ), used by a ship for propulsion and for the operation of any on-board equipment, at sea or at berth without the additional energy used due to technical characteristics of a ship having the ice class IA or IA Super

or an equivalent ice class[1] and the additional energy used by a ship having the ice class IC, IB, IA or IA Super or an equivalent ice class[2] due to sailing in ice conditions;

(dd)[3] 'sailing in ice conditions' means sailing of an ice-classed ship in a sea area within the ice edge.

(ee)[4] "ice edge" is defined by paragraph 4.4. of the WMO Sea-Ice Nomenclature, March 2014 as the demarcation at any given time between the open sea and sea ice of any kind, whether fast or drifting.

Article 5

Additional zero-emission requirements of energy used at berth

We can support the proposed amendments to paragraphs 1 and 3.

Finland does not support the proposed 2bis. Finland would prefer amending the regulation later provided that the technology is there. Technology neutrality is key here. In addition, off-shore power supply at anchorage would be very difficult to arrange in many northern Baltic Sea ports. Ships may have more efficient means to seek emission reductions at anchorage, e.g. batteries, and building off-shore power supply may not be the most cost efficient or even most environmentally friendly solution.

On 3bis, Finland supports making information on the zero-emission technologies of ships available. However, we think that the transfer of data should be done as part of the notifications under Article 4 of Directive 2002/59/EC. Therefore, in our view an amendment of that Directive is necessary to ensure that the data on the zero-emissions is submitted.

In addition, as pointed out before, there are no designated port authorities in Finland. Therefore, we suggest that that those two words (port authority) in paragraph 3bis are removed. Advance notifications are not directed at any specific authority so it is not necessary to mention any authorities in this paragraph.

Finally on 3bis, we think that an exception would be needed for those ships that call certain ports regularly according to a fixed schedule as has been done for instance with advance waste notifications.

On 3ter, Finland thinks that the recording of the information should be automated to avoid unnecessary administrative burden. In the Presidency proposal, there is no requirement for any authorities to check or validate the information. Therefore, we think that the data should be transferred automatically from the national single windows to the FuelEU Database. This should be done as part of the Single Window build-up.

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[1] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

[2] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

[3] The ordinal may need to be updated to reflect other drafting suggestions to the Commission's proposal.

[4] The ordinal may need to be updated to reflect other drafting suggestions to the Commission's proposal.

We would like to see paragraph 4 (or the definition in Article 3) further specified to ensure technology-neutrality and that the decisive factor in composition of the list are the emissions, not technology. In our view, Annex III as proposed by the Commission did not fulfil this principle. But we welcome the replacement of delegated acts by implementing acts to better ensure Member States' possibility to impact the final list of technologies.

In paragraph 5, it is very important for Finland to choose option 2 and refer to competent authorities or duly authorized entities. This is because there are no designated port authorities in Finland.

Finland does not support the proposed amendments to Paragraph 6 but would rather keep it as proposed by the Commission.

We can support the proposed paragraph 7 but remain of the view that this must be a voluntary option.

Article 6

Common principles for monitoring and reporting

We can support the proposed amendments. We think it is important not to require physical fuel samples and that documentation can be handled in electronic form.

Article 7

Monitoring plan

Finland can support the proposed amendments. However, on para 3, point d2, it might be more suited to refer to the EU regulation 391/2009 rather than the RO Code.
In addition, we note that our proposed amendment relating to navigation in ice conditions has not been included. We reiterate the need to take navigation in ice conditions into consideration in this Regulation.

In addition, Finland notes that the proposal to include definitions related to navigation in ice conditions have not been included in the Presidency compromise. We reiterate our request to do so. Our proposed amendments can be found in document WK 2672/2022. We include them also here below.

in Article 7, paragraph 3, the following points are added:[5]

(m) information on the ice class of the ship, if the additional energy due to the ship's ice class is to be left out from the scope of the energy used on-board;

(n) a description of the procedure for monitoring the distance travelled for the whole voyage and when sailing in ice conditions, the date and time when sailing in ice conditions, the fuel consumption and the energy provided by substitute sources of energy or a zero emission technology as specified in Annex III when sailing in ice conditions, if the

[5] For full alignment with Regulation 2015/757, amendments may be needed to that Regulation as well.

additional energy due to sailing in ice conditions is to be left out from the scope of the energy used on-board.

Article 8
Modifications to the monitoring plan

Finland can accept the proposed amendments.

Article 9
Certification of biofuels, biogas, renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels

Finland can support the idea behind the proposed amendment to paragraph 2. We agree that the WtT part of the fuel's emission intensity calculation should be based on the information given in the BDN. However, the GHG emission intensity mentioned in this paragraph cannot be calculated only on the basis of the Bunker Delivery Note as the BDN does not cover TtW emissions. In Finland's view, it would be necessary to change the wording "GHG emission intensity" to "well-to-tank emissions of the fuel". According to our understanding, the GHG intensity of a fuel is not required for the monitoring or reporting. We have also a comment to Article 14.1 that relates to this.

On paragraph 3, as we commented on the VTC meeting on 5 April, we would like to have more information on the ISO test standards to be able to comment paragraph in detail. After the meeting, our technical experts have commented that for instance ISO 8178 (parts 1 and 4) could be relevant. We would also welcome information that other delegations may have on the standards. In addition, we wonder if the "appropriate ISO test standards" would be linguistically more correct than "ISO appropriate test standards".

In addition Finland reiterates its view to better align the Regulation with the RED. Therefore, propose the following drafting to paragraph 1, point c:

(c) biofuels and biogas that do not comply with point (a) or that are produced from food and feed crops **with high indirect land-use change-risk as defined in Article 26(2) of the same Directive (EU) 2018/2001** shall be considered to have the same emission factors as the least favourable fossil fuel pathway for this type of fuel;

Article 10
~~Verification activities~~Assessment of the monitoring plan

Finland can accept the proposed amendments.

Article 11
General obligations and principles for the verifiers

Finland can support the proposed amendments. As we support the voluntary extension of the OPS mandate to ships at anchorage, we support also the inclusion of off-shore in paragraph 2, point d.

Article 12
Verification procedures

Finland can accept the proposed amendments.

Article 13
Accreditation of verifiers

Finland does not share the view expressed by some Member States on the need for the proposed amendments. However, we do not object to them.

It should be noted that the Finnish National Accreditation Body has concerns as to the ad hoc nature of the requests. A request to a National Accreditation Body to assess, *at any time*, a verifier's activities related to one or several identified ships within the scope of this Regulation is not a procedure that is a part of general accreditation process and possible implementation requires an update of the approved procedure.

Article 14
Monitoring and recording

Finland can support the proposed amendments. However, the deadline for the notification under paragraph 3bis could be clarified.

In addition, Finland would like to know what the well-to-wake emission factor of a fuel means in the context of paragraph 1d. According to our understanding, Annex I does not include a well-to-wake emission factor. It would be possible to calculate for instance the GHG intensity index of each fuel, but it is not needed for the calculation of the GHG intensity index of the energy used on-board a ship. Hence, Finland proposes that the paragraph 1d is replaced with "for each fuel the well-to-tank GHG emission factor, the tank-to-wake GHG emission factors by combusted fuel and tank-to-wake emission factors of slipped fuel". Further, Finland notes that the term "WtT GHG emission factor of fuel *i*" is used in the first table of Annex I, while the term "WtT CO_2eq emissions values" is used for the same parameter in Annex II. The same term should be used in all parts of the proposal, also in Article 14.1d.

In addition, Finland notes that the proposal to include definitions related to navigation in ice conditions have not been included in the Presidency compromise. We reiterate our request to do so. Our proposed amendments can be found in document WK 2672/2022. We include them also here below.

in Article 14, paragraph 1, the following provision is added:[6]

(f) the ship's ice class, if the additional energy due to ship's ice class is to be left out from the scope of the energy used on-board;

[6] For full alignment with Regulation 2015/757, amendments may be needed to that Regulation as well.

(g) the date and time when sailing in ice conditions, the amount of each type of fuel consumed when sailing in ice conditions, the amount of each type of substitute source of energy consumed when sailing in ice conditions, the distance travelled when sailing in ice conditions, the distance travelled during the voyage, the amount of each type of fuel consumed at sea, the amount of each type of substitute source of energy consumed at sea, if the additional energy due to sailing in ice conditions is to be left out from the scope of the energy used on-board;

Article 15
Verification and calculation

Finland can support the proposed amendments.

However, as a linguistic note, we think that in paragraph 1 wording such as "as set out in Articles 10 to 12" would be more suited that "laid down in Articles 10 to 12" as the reference is to verification and not rules related to verification.

In addition, "port call not in compliance with the requirements set in Article 5" would in our view read better than "port call non-compliant with the requirements set in Article 5".

Article 15bis
Additional checks by a competent authority

Finland does not think this Article is needed in the Regulation. However, we do not oppose to its inclusion.

Article 15ter
Supporting tools and guidance

Finland welcomes the supporting role of EMSA but would like to ensure the proposed Article does not duplicate EMSAs current mandate as stipulated elsewhere.

Article 16
~~Compliance~~ FuelEU database and reporting

Finland can support the proposed amendments otherwise but we need to see the inclusion of "competent authorities" in the list of entities paragraph 1 who are entitled to access to the database as there are no designated port authorities in Finland.

In addition, have a practical fear that there may be too many notifications based on paragraph 1bis. Hence, the amendment can be supported as long as the entities can choose what information to receive.

Article 17
Banking and borrowing of compliance surplus between reporting periods

Finland can support all the proposed amendments to Article 17. However, we wonder if the references to Article 15(2) should be further specified to Article 15(2)(b).

Article 18
Pooling of compliance

Finland can support the proposed amendments. However, we think that the proposed new para 4 and para 7 that both relate to the FuelEU document of compliance can be read as being in controversy with each other. In our view, it should be specified which year's compliance the document of compliance covers.

Article 19
FuelEU ~~certificate~~ document of compliance

Finland can support the proposed amendments.

Article 20
Remedial penalties

Of all the compromise, Article 20 is the most difficult for us due to legal issues. With the current formulation, it is unacceptable to us. As noted before, because of constitutional requirements, the penalty under Article 20 has to be imposed by a national authority through a decision that can be appealed in court.

OPTION 1:
Therefore, we propose the following changes to paragraph 1 (for better readability, we have not included the Presidency's markings on changes to previous versions):

1. **[A competent authority of the administering state] [The administering state] shall evaluate by 1 June if** ~~Where~~ on 1 May of the reporting year the ship has a compliance deficit**. If the evaluation confirms a compliance deficit**, the **[competent authority] [administering state]** ~~company~~ shall **impose** ~~pay~~ a remedial penalty **on the company**. The [**competent authority] [administering state]** ~~verifier~~ shall calculate the amount of the remedial penalty on the basis of the formula specified Annex V Part B. When a ship has a compliance deficit for two consecutive reporting periods or more, that amount shall be multiplied by 1 + (n-1)/10, where n is the number of consecutive reporting periods for which the company is subject to a remedial penalty for this ship.

The reference will have to be "administering state", not MS, because also ships under registers in third countries have to be allocated somehow to Member States. There is a definition already suggested in the ETS proposal:

> *'administering State' means the administering authority in respect of a shipping company as defined in Article 3(w) and as determined in accordance with Article 3gd of Directive 2003/87/EC of the European Parliament and of the Council.*

OPTION 2:
As a compromise, Finland can accept that the verifier calculates the amount of the penalty (difference to option 1 highlighted in yellow):

1. **[A competent authority of the administering state] [The administering state] shall evaluate by 1 June if** ~~Where~~ on 1 May of the reporting year the ship has a compliance deficit**. If the evaluation confirms a compliance deficit**, the **[competent authority] [administering state]** ~~company~~ shall **impose** ~~pay~~ a remedial penalty **on the company**. The verifier shall calculate the amount of the remedial penalty on the basis of the formula specified Annex V Part B. When a ship has a compliance deficit for two consecutive reporting periods or more, that amount shall be multiplied by 1 + (n-1)/10, where n is the number of consecutive reporting periods for which the company is subject to a remedial penalty for this ship.

OPTION 3:

Finally, as a second compromise, we accept a solution where Member States could choose whether to engage national authorities in Article 20(1). However, this approach may need further development, such as provisions on the allocation of ships and companies to Member States.

[1 paragraph as proposed by the Presidency]

1bis. Member States may decide whether to delegate to the imposition of the remedial penalties to national authorities or if the payment shall be done automatically in accordance with Paragraph 1.

For paragraph 2, we can support the higher factor for consecutive compliance deficits.

In Finland's view, paragraphs 2bis, 2ter and 2quater are not needed. What matters is only the possibility of imposing the penalties by a national authority.

We also do not see any added value in paragraph 3bis. However, we do not oppose to its inclusion.

Article 21

Allocation of penalties to support renewable and low-carbon fuels in the maritime sector

Finland appreciates the view of the Council Legal Service on this paragraph. Our final position will be determined after the CLS gives its written opinion.

However, we still want to see the modalities of payment described at least on general level in the Article. We do not think the modalities should be fully determined in implementing acts.

Article 22

Obligation to ~~carry~~ detain a valid FuelEU document ~~certificate~~ of compliance ~~on board~~

Finland can support the proposed amendments but from a linguistic point of view we did prefer the terminology of "carrying a document board" instead of "detaining" on.

Article 23

Enforcement

Finland can support the proposed amendments to Article 23.

Article 23b
Derogations

Finland can support the inclusion of the proposed Article 23b.

Finland has no comments for the rest of the Articles.

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ANNEXES

Annex I

Finland can support the amendments proposed in WK 3260/2022 REV I, but we have the following comments.

Annex I, $C_{engineslip\ j}$

Finland notes that the symbol for the non-combusted fuel coefficient as a percentage of the mass of fuel I consumed by fuel consumer unit j [%] is $C_{engineslip\ j}$ in Annex I (Equation 1 and Table), while the symbol for the part of fuel lost as fugitive and slipped emissions measured as % of mass of fuel used by the specific energy converter is C_{slip} in Annex (Column 9 in Table). Finland propose that the symbol C_{slip} is used both in Annex I and Annex II and the same terms are used.

Annex I, Fuel Bunker Delivery note (BDN)

Finland proposes that the unit of WtT GHG emission factor CO_2eq to be given in the fuel bunker delivery note is [gCO_2eq/MJ] instead of [gCO_2eq/gFuel]. The unit [gCO_2eq/MJ] would be in line with RED II. Further, the first table in Annex I and the table in Annex II of FuelEU Maritime proposal refer to the unit [gCO_2eq/MJ].

Finland notes that, it is not clear what the well-to-tank greenhouse gas emission factor CO_2eq means in the case of the liquid biofuels. In the case of the FuelEU Maritime proposal, the well-to-tank emissions value of a liquid biofuel defined in Annex II depends on tank-to-wake CO_2 emissions factor, which can be a ship or an engine specific value. In Finland's view, the well-to-tank emission factor of liquid biofuels to be given in the bunker delivery note should not depend on the tank-to-wake CO_2 emission factor. In Finland's understanding, it would be appropriate that the bunker delivery note would give the value *E* defined in Directive (EU) 2018/2001, Annexes V and VI.

Annex I, Methods for determining the reward factors linked to substitute sources of energy: wind propulsion

Finland notes that the presidency welcomes additional suggestions on the values of the factors f_{wind}. Finland is planning to conduct further analysis to learn more about the adequate level of the reward factor f_{wind}. Unfortunately, it is likely that this will take some months as the necessary data is not yet available. The number of cases that we could consider is also still open.

In general, Finland is open for lowering the values of factors f_{wind} in order to better reflect the effect of wind propulsion.

Further, Finland underlines that it is important that the effect of wind propulsion is fully acknowledge, because the wind power, which is produced onboard a ship, provides clean energy. It has a good efficiency ratio if compared for instance to hydrogen based synthetic fuels, whose efficiency ratio is typically quite poor.

Finland considers that the reward factor given in Annex I might not be the most suitable way of taking into account the effect of wind propulsion in the context of the FuelEU Maritime. In Finland's view, it would be necessary to consider an alternative way of taking into account the energy provided by the wind propulsion system in the same way as the electricity delivered to the ship in the equation 1 of Annex I.

The following amendments are proposed for the Annex I of the FuelEU Maritime proposal:

The wind energy (E_{wind}) would be added to the denominator of Equation 1. The wind energy can be calculated by multiplying the power P_{wind} calculated as now proposed in Annex I with the total time when the wind propulsion equipment has been used.

We propose to add the following text after the current text under the heading "Methods for determining the reward factors linked to substitute sources of energy":

> "Alternatively, in case of wind power, the energy developed by the wind propulsion system can be approximated using the following equation:

$E_{wind} = P_{wind} * t_w$,

where P_{wind} is calculated as proposed above and t_w is the total time when the wind propulsion equipment has been used during the year.

The ship GHG intensity index is then calculated by adding E_{wind} to the denominator of Equation (1)."

Consequently, E_{wind} would be added to the table below Equation (1) in Annex I: E_{wind} is the energy generated by the wind propulsion system [MJ]

The time of using the wind propulsion would have to be monitored and verified. This means that the following point should be added to Article 7.3: "(m) a description of procedures for monitoring the time when the wind propulsion equipment is used".

The following point should be added to Article 14.1: "(f) the total time when the wind propulsion equipment has been used".

In addition, Finland notes that the proposal to include definitions related to navigation in ice conditions have not been included in the Presidency compromise. We reiterate our request to do so. Our proposed amendments can be found in document WK 2672/2022. We include them also here below.

in the first table, the following parameter is added:

$M_{i,j\,A}$	Adjusted mass of the specific fuel *i* oxidized in consumer *j* [gFuel] due to sailing in ice conditions in the case of a ship having the ice class IC, IB, IA or IA Super or an equivalent ice class [7] and due to technical properties of a ship having the ice class IA or IA Super or an equivalent ice class. The adjusted mass $M_{i,j\,A}$ is used in Equation (1) instead of the mass $M_{i,j}$ when appropriate.

in Section *Method for determining [Mi]*, the following provision is added:

The ~~[M_i]~~ mass of fuel [M_i] shall be determined using the amount reported in accordance with the framework of the reporting under Regulation (EU) 2015/757 for voyages falling within the scope of this Regulation based on the chosen monitoring methodology by the company. The adjusted mass of fuel [$M_{i\,A}$] may be used instead of the mass of fuel [M_i] for a ship having the ice-class IC, IB, IA or IA Super or an equivalent ice class[8]. The adjusted mass [$M_{i\,A}$] is defined in Annex X.

We propose the following Annex to be added:

ANNEX X: Calculation of adjusted mass of fuel is applied

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[7] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

[8] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

First, this annex describes how to calculate the adjusted mass of fuel using the additional energy due to technical characteristics of a ship having the ice class IA or IA Super or an equivalent ice class [9] and the additional energy used by a ship having the ice class IC, IB, IA or IA Super or an equivalent ice class due to sailing in ice conditions. Second, it describes how to calculate the additional energies.

Adjusted mass [$M_{j\,A}$]

The [$M_{i\,A}$] adjusted mass of fuel is calculated on the basis of the additional energy used for sailing in ice conditions and the additional energy used due to technical properties of a ship having an ice class IA or IA Super or and equivalent ice class. The company may choose to which fuel *i* the additional energy is allocated. The selected fuel *i* must be one of the fuels that the ship has consumed during the reporting period. The amount of the energy corresponding to the consumed mass of the fuel *i* may be lower than the amount of the additional energy.

The [$M_{i\,A}$] adjusted mass of fuel *i* is calculated as follows

$$M_{i\,A} = M_{i\,total} - M_{i\,additional\ due\ to\ \ ice\ class} - M_{i\,additional\ due\ to\ ice\ conditions}\,, \quad \text{(Ax.1)}$$

where $M_{i\,total}$ denotes the total mass of fuel *i*, $M_{i\,additional\ due\ to\ ice\ class}$ the mass of fuel due to additional energy consumption of a ship having the ice class IA or IA Super or an equivalent ice class and $M_{i\,additional\ due\ to\ ice\ conditions}$ the mass of fuel due to additional energy consumption due to sailing in ice conditions.

The mass of fuel *i* representing the additional energy consumption due to technical characteristics of a ship having the ice class IA or IA Super or an equivalent ice class is calculated with

$$M_{i\,additional\ due\ to\ ice\ class} = \frac{E_{additional\ due\ to\ ice\ class}}{LCV_i}\,, \quad \text{(Ax.2)}$$

where $E_{additional\ due\ to\ ice\ class}$ is the additional energy consumption due to the technical characteristics of a ship having the ice class IA or IA Super or an equivalent ice class and LCV_i is the lower calorific value of the fuel *i*.

Similarly, the mass of fuel due to additional energy consumption due to sailing in ice conditions is calculated using

$$M_{i\,additional\ due\ to\ ice\ conditions} = \frac{E_{additional\ due\ to\ ice\ conditions}}{LCV_i}\,, \quad \text{(Ax.3)}$$

where $E_{additional\ due\ to\ ice\ conditions}$ is the additional energy consumption due to sailing in ice conditions.

Additional energy due to ice class and due to sailing in ice conditions

The additional energy consumption due to the technical characteristics of a ship having the ice class IA or IA Super or an equivalent ice class is calculated as follows

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[9] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

$$E_{additional\ due\ to\ ice\ class} = 0.05 \times \left(E_{voyages,\ total} - E_{additional\ due\ to\ ice\ conditions}\right), \text{(Ax.4)}$$

where $E_{voyages,\ total}$ denotes the total energy consumed for all voyages and $E_{additional\ due\ to\ ice\ conditions}$ additional energy consumption due to sailing in ice conditions.

The total energy consumed for all voyages is calculated using

$$E_{voyages,\ total} = \sum_{i=1}^{n\ fuel} M_{i,\ voyages,\ total} \times LCV_i + E_{elect.,\ voyages,\ total}, \quad \text{(Ax.5)}$$

where $M_{i,\ voyages,\ total}$ denotes the mass of fuel i consumed for all voyages within the scope of the regulation, LCV_i the lower calorific value of fuel i and $E_{elect.,\ voyages,\ total}$ the amount of the electricity delivered to the ship consumed for all voyages.

The mass of fuel i $M_{i,\ voyages,\ total}$ consumed for all voyages within the scope of the regulation is calculated with

$$M_{i,voyages,total} = M_{i,voyages\ between\ MS} + 0.5 \cdot \left(M_{i,voyages\ from\ MS} + M_{i,voyages\ to\ MS}\right), \text{(Ax.6)}$$

where $M_{i,\ voyages\ between\ MS}$ denotes the aggregated mass of fuel consumed during all voyages between ports under a Member State's jurisdiction, $M_{i,\ voyages\ from\ MS}$ the aggregated mass of fuel consumed during all voyages which departed from ports under a Member State's jurisdiction and $M_{i,\ voyages\ to\ MS}$ the aggregated mass of fuel consumed during voyages to ports under a Member State's jurisdiction. The consumed amount of the electricity delivered to the ship $E_{elect.,\ voyages\ total}$ can be calculated in the same way.

The additional energy consumption due to sailing in ice conditions is calculated as follows

$$E_{additional\ due\ to\ ice\ conditions} = E_{voyages,\ total} - E_{voyages,\ open\ water} - E_{voyages,\ ice\ conditions,\ adjusted}, \quad \text{(Ax.7)}$$

where $E_{voyages,\ open\ water}$ denotes the energy consumed on voyages in open water and $E_{voyages,\ ice\ conditions,\ adjusted}$ the adjusted energy consumed in ice conditions.

The energy consumed for voyages that include sailing in open water only is calculates as follows

$$E_{voyages,\ open\ water} = E_{voyages,\ total} - E_{voyages,\ ice\ conditions} \quad \text{(Ax.8)}$$

where $E_{voyages,\ ice\ conditions}$ denotes energy consumed for sailing in ice conditions, which is calculated as follows

$$E_{voyages,\ ice\ conditions} = \sum_{i=1}^{n\ fuel} M_{i,voyages,\ ice\ conditions} \times LCV_i + E_{elect.,\ ice\ conditions} \quad \text{(Ax.9)}$$

where $M_{i,\ voyages,\ ice\ conditions}$ denotes the mass of fuel i consumed for sailing in ice conditions and $E_{elect.,\ voyages,\ total}$ denotes the amount of the electricity delivered to the ship consumed when sailing in ice conditions.

The mass of fuel i consumed for sailing in ice conditions is defined as follows

$$M_{i,\ voyages,\ ice\ cond.} = M_{i,voyages\ between\ MS,ice\ cond.} + 0.5 \cdot \left(M_{i,voyages\ from\ MS,ice\ cond.} + M_{i,voyages\ to\ MS,ice\ cond.}\right), \quad \text{(Ax.10)}$$

where $M_{i,\ voyages\ between\ MS,\ ice\ cond.}$ denotes the aggregated mass of fuel consumed by an ice-classed ship when sailing in ice conditions between ports under a Member State's jurisdiction, $M_{i,\ voyages\ from\ MS}$ the aggregated mass of fuel consumed by an ice-classed ships when sailing in ice conditions during all voyages which departed from ports under a Member State's jurisdiction and $M_{i,\ voyages\ to\ MS}$ the aggregated mass of fuel consumed by an ice-class ship when sailing in ice conditions during voyages to ports under a Member State's jurisdiction. The consumed amount of the electricity delivered to the ship E_{ice} conditions can be calculated in the same way.

The adjusted energy consumed in ice conditions is calculated using

$$E_{voyages,\ ice\ conditions,\ adjusted} = D_{ice\ conditions} \times \left(\frac{E}{D}\right)_{open\ water} \quad \text{(Ax.11)}$$

with the distance travelled when sailing in ice conditions $D_{ice\ conditions}$ and energy consumption per distance travelled in open water $\left(\frac{E}{D}\right)_{open\ water}$.

The distance travelled when sailing in ice conditions $D_{ice\ conditions}$ is calculated as follows

$$D_{ice\ cond.} = D_{voyages\ between\ MS,ice\ cond.} + 0.5 \cdot \left(D_{voyages\ from\ MS,ice\ cond.} + D_{voyages\ to\ MS,ice\ cond.}\right), \quad \text{(Ax.12)}$$

where $D_{voyages\ between\ MS,\ ice\ cond.}$ denotes the aggregated distance travelled when sailing in ice conditions between ports under a Member State's jurisdiction, $D_{voyages\ from\ MS}$ the aggregated distance when sailing in ice conditions during all voyages which departed from ports under a Member State's jurisdiction and $D_{voyages\ to\ MS}$ the aggregated distance when sailing in ice conditions during voyages to ports under a Member State's jurisdiction.

The latter is defined as follows:

$$\left(\frac{E}{D}\right)_{open\ water} = \frac{E_{voyages,\ total} - E_{voyages,\ ice\ conditions}}{D_{total} - D_{ice\ conditions}}, \quad \text{(Ax.13)}$$

where $E_{voyages,\ ice\ conditions}$ denotes the energy consumption when sailing in ice conditions and D_{total} the total annual distance travelled.

The total annual distance travelled is calculated as follows

$$D_{total} = D_{voyages\ between\ MS} + 0.5 \cdot \left(D_{voyages\ from\ MS} + D_{i,voyages\ to\ MS}\right), \quad \text{(Ax.14)}$$

where $D_{voyages\ between\ MS}$ denotes the aggregated distance travelled between ports under a Member State's jurisdiction, $D_{voyages\ from\ MS}$ the aggregated distance travelled during all voyages which departed from ports under a Member State's jurisdiction and $D_{voyages\ to\ MS}$ the aggregated distance travelled during voyages to ports under a Member State's jurisdiction.

Annex II

Finland notes that the term "WtT CO_2eq emissions values" is used for the parameter in column 4 of the table in Annex II. In Annex I, the term "WtT GHG emission factor of fuel *i*" is used for the same parameter. Finland proposes that the term "WtT GHG emission factor" is used also in Annex II.

Finland reiterates its proposal to define WtT CO_2eq emissions values CO_2eqWtT of liquid biofuels in column 4 as *E* and accordingly to set the tank-to-wake CO_2 emission factor C_f for of liquid biofuels in column 6 as zero.

Detailed reasoning for the constant 5% reduction of energy used from voyages in open water for ships having an ice class IA or IA Super or an equivalent ice class

According to research, on the average an increase of 5% in energy consumption of ice-strengthened ships having an ice class IA or IA Super, when sailing in open water, reflects quite well the average range of the increase of fuel oil consumption compared to a ship of similar size designed to sail only in open water. In addition, a correction factor of 5% is used for ice-strengthened ships having ice class IA or IA Super in the IMO's energy efficiency regulations (EEDI and EEXI).

It is clear that the increased energy consumption of an ice-classed ship depends on many design parameters, for example ship type, ice class, type of the propulsion system, hull form etc., which makes it difficult to develop a simple formula to take the increased energy consumption into account. However, we consider that a simplified approach to be preferable in this case. We propose a 5% reduction to the annual energy consumption of ships having an ice class IA or IA Super or equivalent[10] to take into account the additional energy consumption of these ice-strengthened ships, on average, compared to ships designed to sail only in open water.

A memorandum "Estimate on the additional power of ships with ice class" written by Professor Kaj Riska in 2012 (available in Finnish only) was utilized as a basis for our proposal. It describes three sources for the additional power used by ships with the ice class IA Super when operating in open water in comparison to ships designed only for sailing in open water:

- The propeller efficiency is worse due to ice strengthening of the propeller. This increases the use of power by 2 %.
- The resistance of the ship increases due to hull form. The effect of hull form increases the use of power
  - 0 % when the ship has a bulb
  - 3 % when the ship has an ice bulb
  - 7 % when the ship has a "light" ice bow (stem angle 40^o)
  - 13 % when the ship has an ice bow
- As the capacity of the ice-strengthened ship is smaller due to ice strengthening of the hull, the ice-strengthened ship must be longer in order to have the same capacity as a similar ship

[10] For further information on correspondence between ice classes, see HELCOM Recommendation 25/7 at http://www.helcom.fi.

designed for open water only. This increases its use of power. The memorandum gives a formula to estimate the increase of power.

Using the above-mentioned information, the memorandum estimates that 45 cargo and passenger ships with the ice class IA Super use on average 4.5 % more power than open water ships.

In a recent study of Aker Arctic (Saisto et al., 2019[11]), the propulsion efficiency of ice-strengthened ships was analysed for two types of ships, a bulk carrier and a roro ship, concerning the Finnish-Swedish ice classes IC, IB, IA and IA Super. The following results were presented:

- For the vessel 1, the single screw vessel of bulk carrier type, the relative delivered power increase, due propeller strength demands, at optimization point compared to open water propeller is 102.8% for IC and IB ice class, 103.3% for IA and 104.3 % for IAS ice class.
- For the vessel 2, the twin-screw RoRo or ferry, the relative delivered power increase, due propeller strength demands, at optimization point compared to open water propeller is 100.2 % for IC and IB ice class, 100.9 % for IA and 101.4 % for IAS ice class.

The increase of energy consumption depends on many factors: ship type, type of the propulsion system, ice class etc. However, based on these sources (analysis made by Professor Riska and the study of Aker Arctic), on the average an increase of about 5% in energy consumption of ice-strengthened ships having ice class IA or IA Super, when sailing in open water, reflects quite well the average range of the increase of energy consumption compared to a ship of similar size designed to sail only in open water.

Finally, it should be noted that in the EEDI and EEXI regulations of IMO, an ice class correction factor, f_m, which has a constant value of 1.05, is applied when the EEDI and EEXI index values are calculated for a ship having an ice class IA or IA Super, see resolution MEPC.322(74). This ice class correction factor has a similar kind of effect on the attained EEDI and EEXI values compared to the proposed constant 5% reduction of energy used from voyages of ships having an ice class IA or IA Super or equivalent ice class in FuelEU Maritime.

[11] Saisto Ilkka and Turunen Taisto (2019), Effect of the FSICR to propeller efficiency, Aker Arctic Technology Inc, 2019.