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Delegations will find attached document SWD(2021) 137 final.

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COMMISSION STAFF WORKING DOCUMENT

Union submission to the seventh session of the International Maritime Organization's Sub-Committee on Carriage of Cargoes and Containers commenting on the CCC 7/3 Report from the Correspondence Group and proposal for developing guidelines for the use of ammonia and hydrogen as a fuel

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PURPOSE

This Staff Working Document contains a draft Union submission to the seventh session of the International Maritime Organization's (IMO) Sub-Committee on Carriage of Cargoes and Containers (CCC 7). The IMO has indicatively scheduled CCC 7 from 6 to 10 September 2021.

The draft submission comments on the report of the IMO Correspondence Group on ships using low-flashpoint fuels. With most low- and zero-emission fuels falling into this category, the groups is tasked with developing draft interim guidelines for the safety of ships using fuel cell power installations. The report of the Correspondence Group includes a draft work plan and timeline.

The draft Union commenting paper details that due to the COVID-19 pandemic, the work plan should be further revised to ensure that it remains realistic. The draft submission proposes to adapt the timing for interim guidelines on safety of ships using ammonia and hydrogen.

It suggests that the interim guidance be prepared using a previously developed document on safety of methyl/ethyl alcohol fuels as a basis. In its annex, the draft commenting paper provides further details on ammonia and hydrogen as used in shipping and the hazards linked to them.

EU COMPETENCE

Directive 2009/45/EC lays down safety rules and standards for passenger ships[1]. Article 6(2)(a)(i) of the Directive concerns the safety requirements for passenger ships on domestic voyages. The reference framework for those requirements is the International Convention for the Safety of Life at Sea (SOLAS Convention)[2], notably regarding Class A passenger ships.

The IMO's International Code of Safety for Ship Using Gases or Other Low-flashpoint Fuels (IGF Code) is a mandatory Code under the SOLAS Convention. It is therefore also applicable for passenger ships under Directive 2009/45/EC. In addition, Commission Delegated Regulation (EU) 2020/411 amending Directive 2009/45/EC[3] includes two provisions related to ships using low-flashpoint fuels:

- Regulation II-1/G/1: applicable to New Class B, C and D and existing Class B ships—"Ships, irrespective of the date of construction, converted to using or which undertake to use gaseous or liquid fuel having a flashpoint lower than otherwise permitted under Regulation II-2/A/10, subparagraph.1.1, shall comply with the requirements of the IGF Code, as defined in SOLAS II-1/2.28."; and

[1] Directive 2009/45/EC of the European Parliament and of the Council of 6 May 2009 on safety rules and standards for passenger ships; OJ L 163, 25.6.2009, p. 1.

[2] International Convention for the Safety of Life at Sea (SOLAS), International Maritime Organization, 1974, as amended.

[3] Commission Delegated Regulation (EU) 2020/411 of 19 November 2019 amending Directive 2009/45/EC of the European Parliament and the Council on safety rules and standards for passenger ships, as regards the safety requirements for passenger ships engaged on domestic voyages; OJ L 83, 19.3.2020, p. 1.

- Regulation II-1/G/57: Requirements for ships using low-flashpoint fuels - "ships using gaseous or liquid fuel having a flashpoint lower than otherwise permitted under Regulation II-2/4.2.1.1 shall comply with the requirements of the IGF Code, as defined in SOLAS II-1/2.28."

In the light of all of the above, the present draft Union submission falls under EU exclusive competence.[4] 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 11 June 2021.[5]

[4] 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).

[5] 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.

SUB-COMMITTEE ON CARRIAGE OF CARGOES AND CONTAINERS
7th session
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AMENDMENTS TO THE IGF CODE AND DEVELOPMENT OF GUIDELINES FOR LOW-FLASHPOINT FUELS

Comments on CCC 7/3 Report from the Correspondence Group and proposal for developing guidelines for the use of ammonia and hydrogen as a fuel

Submitted by European Commission on behalf of the European Union

SUMMARY

Executive summary:	This document comments on progress made in the report from the Correspondence Group on Development of Technical Provisions for the Safety of Ships using Low-flashpoint Fuels and proposes to develop guidelines for the safety of ships using ammonia and hydrogen as fuel.
Strategic direction, if applicable:	2
Output:	2.3
Action to be taken:	Paragraph 17
Related documents:	CCC 7/3

Introduction

1 This document is submitted in accordance with paragraph 6.12.5 of the document on Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies (MSC-MEPC.1/Circ.5/Rev.1) and comments on document CCC 7/3.

2 The report from the Correspondence Group on Development of Technical Provisions for safety of Ships using Low-flashpoint Fuels shows the progress made in the group in accordance with the Terms of References agreed at CCC 6 in general and the progress made in developing draft interim guidelines for the safety of ships using fuel cell power installations (CCC 7/3, Annex 1).

3 At MSC 102, the Committee approved changing the target completion year of the existing output on "Amendments to the IGF Code and development of guidelines for low-flashpoint fuels" to "continuous", taking into account the work plan for the next phase of the development of the IGF Code set out in Annex 2 of CCC 6/14.

4 In this context, the Committee noted that the work on low-flashpoint fuels should be accelerated and prioritised through the provision of additional resources, taking into account the existing regulatory framework established by the IGF Code and the urgent need to rapidly develop safety provisions for alternative fuels to pave the way for the decarbonisation of shipping.

Work plan for the next phase of the development of the IGF Code

5 The work plan for the next phase of the development of the IGF Code is set out in Annex 2 of CCC 6/14. This includes the approval of the interim guidelines on methyl/ethyl alcohol at MSC 102, finalisation of the *i*nterim guidelines for the safety of ships using fuel cell power installations and IGF Code amendments on low flash point oil fuels and further development of the LPG guidelines at CCC 7.

6 Due to the Covid 19 pandemic, the year of completion in the work plan needs to be further revised. Furthermore, the implementation of the Initial IMO Strategy on reduction of GHG emissions from ships (MEPC.304(72)) necessitates the effective and timely uptake of sustainable low-carbon and zero-carbon fuels in international shipping.

7 When developing the fuel cell guidelines as reported in CCC 7/3, the need to prioritise the consideration of low- and zero-carbon fuels, and hydrogen in particular, has arisen due to a number of reasons:

a. Fuel cells use hydrogen in their electrochemical reaction, irrespective of the primary fuel used onboard.

b. Certain fuel cell power installations use a process of fuel reforming to develop a reformed fuel for use in the fuel cell. This reformed fuel is rich in hydrogen.

c. Reformed fuels may require additional safety considerations.

d. There is a need to better understand the possible detection and fire extinguishing risk control options associated with the primary and reformed fuels, including further amendments to the FSS Code in this respect.

8 Whilst the work developed for the fuel cell guidelines represents an important progress with a view to consider these energy converters as part of the options for on-board clean power production, there is still a considerable effort needed on low- and zero-carbon fuels as primary fuels. This implies a firm commitment to address hydrogen and ammonia as fuel.

9 In addition to the use of low- and zero-carbon fuels as primary fuels for fuel cell power installations, where both hydrogen and ammonia as a hydrogen carrier can play an important role, their use in internal combustion engines needs to be also considered to support the ongoing efforts form engine manufacturers and operators to convert existing installations from traditional fossil based oil fuels towards alternative fuels.

10 Accordingly, it should be considered to include and prioritise further development of interim guidelines for the safe use of ships using sustainable low- and zero-carbon fuels, in particular hydrogen and ammonia, in the CCC's work plan and the Terms of Reference of the Correspondence group.

Discussion

11 The need to address hydrogen as fuel can be directly related to the ongoing work on the draft interim guidelines on safety of ships using fuel cell power installations. Fuel Cells use hydrogen as process fuel, either primary or reformed, and relevant provisions for the possible storage, preparation, distribution, bunkering and use of hydrogen should be developed as a matter of priority.

12 Ammonia also represents an important option for a zero-carbon fuel, which can be either used directly as fuel in internal combustion engines or as a chemical carrier for hydrogen to be used in fuel cell applications. Ammonia should be considered in particular for applications in deep sea shipping, where the uptake of hydrogen as fuel could be impaired by the low energy density and specific energy of the fuel and low specific power of the fuel cell energy converters.

13 Given the limited resources of the Correspondence Group, it is necessary to prioritise its tasks in accordance with the priorities of the Organization and the most urgent regulatory needs. To this end, there is a need to address hydrogen as fuel to pave the way for its use as primary fuel in fuel cell power installations, where storage, preparation, distribution, bunkering and use of hydrogen as fuel need to be considered.

14 Since hydrogen and ammonia are not competitors but rather complementary solutions, the work on ammonia should be initiated in parallel, with a view to developing interim guidelines for the safety of ships using ammonia either directly or as a hydrogen chemical storage option.

15 On this basis, the proposed way forward is to include the development of interim guidelines on safety of ships using hydrogen and ammonia as fuel in the work plan for the next phase of the development of the IGF Code and the terms of reference for the Correspondence Group if re-established.

16 The structure of such guidelines could be based on the interim guidelines for the safety of ships using methyl/ethyl alcohol as fuel, amending each chapter with special consideration given to the specific additional safety risks posed by the onboard storage, preparation, distribution, bunkering and use of hydrogen and ammonia onboard ships.

Proposal

17 The following way forward is proposed:

.1 The development of guidelines on safety of ships using hydrogen and ammonia as fuel is included in the Work Plan and Terms of Reference for the Correspondence Group on Development of Technical Provisions for the Safety of Ships using Low-flashpoint Fuels.

.2 The Work Plan for the IGF Working/Correspondence Group should reflect the need to prioritise the development of the guidelines mentioned, in accordance and consistency with other work streams under the Organization, remarkably those linked to decarbonisation.

.3 Using the structure of interim guidelines for the safety of ships using methyl/ethyl alcohol (MSC.1/Circ.1621) as a basis, with due consideration

for specific safety hazards associated to hydrogen and ammonia, for storage, preparation, distribution, bunkering and use onboard.

Action requested by the Committee

18 The Committee is invited to consider the proposal in paragraph 17 and take action as appropriate.

Annex

Ammonia

- Ammonia (NH_3) is one of the potential fuels considered by the industry and as well as in many relevant studies covering the use of this option as fuel for shipping. The technology required to propel and power ships with ammonia as fuel is still immature and extensive development and policy measures are needed for its use on a larger scale.

- Ammonia can be used as fuel as well as hydrogen carrier for applications in which hydrogen is used as fuel, such as in fuel cells.

- Several engine manufacturers are currently looking into the challenges of using ammonia in their engines, and most of them aim having engines available with such technology by 2023 – 2024. Fuel cell technology using ammonia as a fuel is also under development, with both Direct Ammonia Fuel Cells (DAFC) and Proton Exchange Membrane (PEM) with ammonia reforming as possible technologies.

- Ammonia is a toxic chemical and it is important that the additional safety challenges be thoroughly addressed before considering ammonia as a marine fuel. The maritime industry of today has experience with carriage of ammonia in gas carriers and the use of ammonia as refrigerant for cooling. However, introduction of ammonia as fuel will create new challenges related to the ships and crew's safety. This includes safe ammonia fuel bunkering, storage, supply and consumption for different ship types and propulsion systems.

- Ammonia is today transported in bulk in IGC carriers and the IGC code chapter 16 describe how the cargo can be used as fuel. However, in accordance with 16.19.2, the use of toxic products is not permitted in IGC Code ships.

Hydrogen

- Hydrogen (H_2) represents today a central energy carrier option in the context of decarbonisation in different business sectors, remarkably in transport, with the highest potential for zero-emissions, especially if produced from renewable resources. Without prejudice to the different aspects related sustainability of hydrogen as fuel, its use onboard represents an important opportunity for clean power production, also associated however to important implementation challenges.

- Provisions for safe carriage of hydrogen in bulk has been recently subject to work of the Organization, resulting in the publication of Resolution MSC.420(97) (adopted on 25 November 2016) on *Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk.* Several important aspects related to the carriage of hydrogen in bulk can be considered in further development of the use of hydrogen as fuel, in a similar way to what has been done with other fuels such as LNG.

- Several pilot projects and practical applications of hydrogen as fuel have been deployed, or are under evaluation, where either compressed or liquefied hydrogen solutions are used, together with fuel cell power installations. Despite hydrogen's

lower energy density, the practical application associated with specific ship's operating profiles represents a key option to achieve decarbonisation in some shipping sectors.

- It is also important to consider that reformed fuel, as defined in CCC 7/3, Annex 1, will be a "hydrogen-rich gas" or, in practice, also hydrogen. Since hydrogen is, as such, the fuel used by fuel cells in its electrochemical reaction, it is considered important to further substantiate the relevant aspects of use of hydrogen as fuel, otherwise not covered in the interim guidelines on fuel cells. These should entail containment, distribution, bunkering and use of hydrogen as fuel.

- The different hydrogen storage options for practical application onboard ships dictate largely the feasibility of hydrogen as fuel for both short and deep-sea shipping. Liquefied and compressed hydrogen storage are market available solutions which may be applied onboard ships, but other options exist which may also be considered from a safety guidelines perspective, allowing for a wider perception on the engineering options for deployment of hydrogen as fuel.

- The hazards related to hydrogen as fuel are low ignition energy, a wide flammability range, low visibility of flames in case of fire, high flame velocity which may lead to the detonation with shockwave, low temperature and liquefaction/solidification of inert gas and constituents of air which may result in an oxygen-enriched atmosphere, high permeability, low viscosity, and hydrogen embrittlement including weld metals. Depending on the containment/ storage options, additional specific hazards may have to be considered in particular.