



## ENERGY EFFICIENCY OF SHIPS

### Comments on document MEPC 84/6/6

#### Submitted by CSC

#### SUMMARY

*Executive summary:* This document comments on term of reference (ToR) 2 contained in the report of the Correspondence Group on Measurement and Verification of Non-CO<sub>2</sub> GHG Emissions and Onboard Carbon Capture and Storage (MEPC 84/6/6). Drawing from a recent publication, it presents regulatory needs to accurately account for the abatement potential of OCCS, and suggests key priorities for further work.

*Strategic direction,  
if applicable:* 3

*Output:* 3.2

*Action to be taken:* Paragraph 19

*Related document:* MEPC 84/6/6

#### Introduction

1 This document is submitted in accordance with the provisions of paragraph 6.12.5 of the *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.6) and provides comments on document MEPC 84/6/6 (Norway), in particular, on the reported progress on term of reference (ToR) 2 for the Correspondence Group (CG) on Measurement and Verification of Non-CO<sub>2</sub> GHG Emissions and Onboard Carbon Capture and Storage concerning the development of a regulatory framework for the use of onboard carbon capture and storage (OCCS), supplementing a recently published inventory of public OCCS projects to highlight significant performance and system uncertainties for environmentally sound operations.

#### Background

2 The prioritization of task 1.2.1 under ToR 2, i.e. testing, survey and certification of OCCS, provided a productive first step to develop robust technical certification of OCCS systems. Nevertheless, further regulatory work and new certification schemes are needed, given persistent uncertainty over OCCS systems' climate and environmental benefits.

3 Generally, the cautious approach during the CG, as is further highlighted in the report, should guide its further work on environmental risks (task 1.1), safe and permanent disposal (task 1.2.3), and robust assessment of potential GHG savings, as well as their certification (task 1.4). An insufficiently robust and comprehensive regulatory framework may lead to overestimation of captured CO<sub>2</sub>, insufficient downstream chain of custody, and lasting damage to the marine environment, while locking in CO<sub>2</sub>-intensive fuel pathways without appropriate means for abatement.

### **Certification of OCCS must prioritize performance data recording as a design principle**

4 While the stated purpose of the draft certification guidelines, set out in annex 4 to document MEPC 84/6/6, sufficiently captures the relevant dimensions of OCCS operations, it is essential that performance data recording is sufficient to enable compliance with different reporting requirements under current and future IMO measures. At a minimum, as recognized in appropriate granularity in annex 4 of the said document, compliance with various GHG reduction measures requires sufficient accounting of:

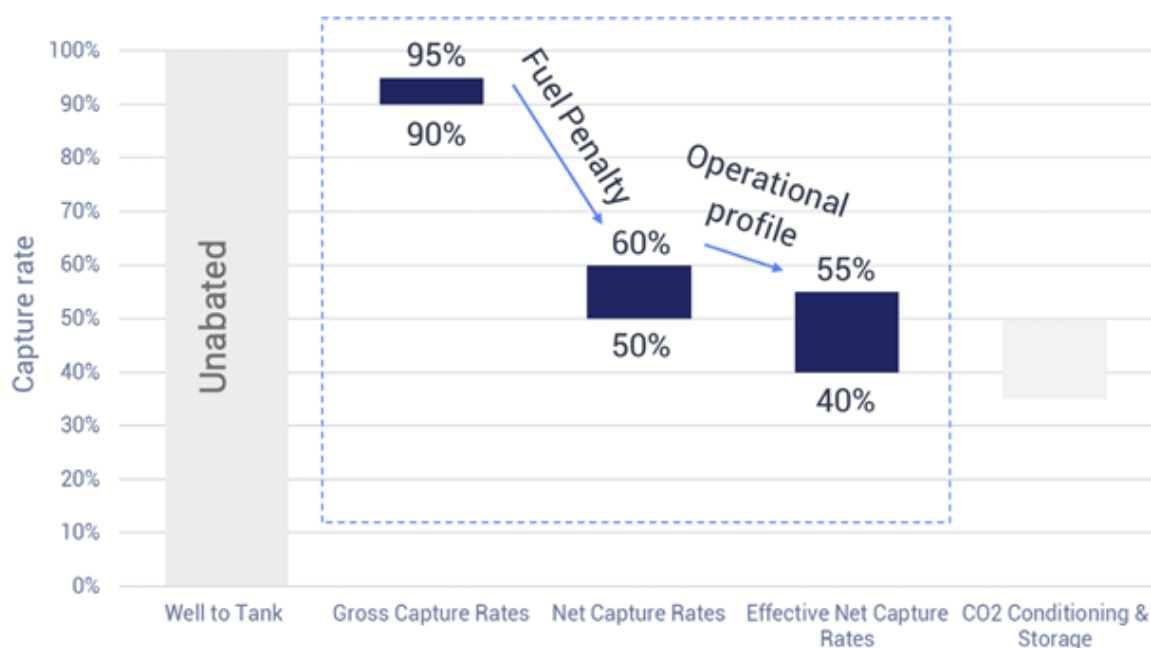
- .1 actual absolute capture rate;
- .2 additional primary energy demand, both in terms of electrical demand and additional heat generation, expressed in additional fuel consumption;
- .3 additional primary energy demand from auxiliary systems necessary for the operation of OCCS, including storage installations of captured CO<sub>2</sub>, expressed in additional fuel consumption;
- .4 volume of captured CO<sub>2</sub> prior to offloading events; and
- .5 volume of CO<sub>2</sub> confirmed by reception facilities.

5 Such data must be appropriately granular to deliver information on both absolute volumes of CO<sub>2</sub> captured, stored, and offloaded, and implications for the carbon intensity of the corresponding fuel mix, including under different operational conditions. Collection and reporting of real performance data is not an optional afterthought, but essential to correctly assess the potential of OCCS systems to reduce GHG emission reduction performance.

6 Further, it should be noted that OCCS can only address tank-to-wake (TtW) emissions, leaving a substantial amount of emissions unaddressed. For example, not considering slippage, operational profiles, and fuel penalties, a 90% TtW capture rate becomes ~75.7% on a well-to-wake (WtW) basis when applied to MGO emissions. For LNG, the same 90% TtW capture rate yields only ~68.1% WtW abatement due to higher WtT emissions.

7 This effect needs to be considered in addition to accounting for the additional energy demand. It is essential to correctly assess the impact of LCA/WtW GHG emissions, as increased fuel demand has a disproportionate effect on associated upstream emissions. Due to these complexities, and the different data points that may be required for different purposes (e.g. the CII regulation, IMO GHG studies, GFI Registry, other potential mid-term measures), reporting standards and data requirements should be developed in a unified workstream to ensure alignment, independent of their future integration in different reporting guidelines.

8 Due to the inherent interactions of OCCS technologies with different ship system components, type approval cannot be considered a replacement for real performance data at this time. While component-based type approval may be appropriate to assure safety standards and for key elements, system performance can only be assessed for individual installations.



**Figure 1: Overview of capture-to-abatement potential at different LCA scopes, in %**

**Emissions associated with operation of OCC systems ( $e_{cc}$ ) cannot rely on default factors**

9 The complex interactions of both operational parameters and system integration, as well as the low number of existing fully scaled OCCS systems in operation, make default factors poorly suited to assess additional energy demand and associated emissions.

10 The CG report proposes two alternative schemes for the calculation of  $e_{cc}$ . Yet, significant concerns remain regarding the use of default values due to the risk of underestimating emissions or insufficiently accounting for specific circumstances. Specifically, accurate calculation of  $FC$  (Fuel Consumption from OCCS systems) requires synchronized monitoring of engine load and capture rates, separately for auxiliary and main generators, as well as monitoring of captured  $CO_2$  at the same granularity as engine load and capture rate monitoring. While these combinations may be tested and assigned default factors according to operational timestamps, this method adds complexity and risks substantial inaccuracies.

11 Hence, default values may be appropriate in other circumstances, and can be considered at a later date should the number of installed systems and their standardization increase. Until then, the development of standards for OCCS systems offers a unique opportunity to introduce standardized data collection requirements.

**Acceptable means of disposal and the need for standardized verification of downstream handling and sequestration of captured  $CO_2$  (task 1.3)**

12 While onboard performance data is essential for assessing system operations, downstream emissions, e.g. from leakage from pipelines or during transfer, energy demand from transport by barge or truck, and other additional energy expenditure can incur significant abatement losses. A robust LCA framework must account for these losses.

13 While some national certification standards and accounting frameworks address these emissions, a level playing field demands that the Committee develop minimum standards and reporting criteria for downstream handling and sequestration of CO<sub>2</sub>. Without such a standard or minimum criteria, sequestration in a permanent storage site remains uncertain.

14 Considering downstream handling, annex 1 of the London Protocol, including its regulation on sequestration of captured CO<sub>2</sub> in sub-seabed geological formations and certification standards, must be followed.

15 Similarly, the CG discussed whether OCCS-related discharges fall under the definition of "normal operation" of ships, which would exclude such wastes from the London Convention/London Protocol (LC/LP). As OCCS is not necessary for the operation of the ship nor for reducing GHG emissions, and as options for disposal are available, it cannot be considered as such. Consequently, any discharges are included under article III of the LC, and article I of the LP.

16 Therefore, a cautionary approach is essential to prevent amendments to MARPOL Annex VI and guidelines from inadvertently promoting the certification of new OCCS system types that may cause widespread discharge of environmentally harmful solvents, dissolvable CO<sub>2</sub>, or other chemicals into the ocean. Any way forward requires an assessment of any direct disposal method by the London Convention and relevant IMO bodies as well as a consideration of the release of captured carbon and any further potential impacts on the marine environment.

17 Highlighting the threat of redundant and potentially misaligned regulation, any amendments to IMO instruments concerning overboard discharge of captured CO<sub>2</sub> need to be linked directly to the London Protocol to ensure legal certainty.

### **Conclusions and recommendations**

18 In order to facilitate the further development of comprehensive guidelines on the certification, use, and accounting of OCCS systems, CSC recommends:

- .1 maintaining a cautionary approach and refraining from (optional) use of default factors for reported OCCS performance over real-life data collection;
- .2 streamlining the development of reporting guidelines to align the draft data collection specifications for OCCS technical certification as closely as possible with outstanding reporting guidelines for compliance under different MARPOL measures;
- .3 beginning work on a comprehensive and standardized downstream certification framework to ensure consistency between captured, offloaded, and abated CO<sub>2</sub>; and
- .4 enshrining the London Protocol and London Convention as the primary treaties for maritime CO<sub>2</sub> disposal, and preventing any overruling or conflicting IMO rules.

### **Action requested of the Committee**

19 The Committee is invited to take into account the information and advice provided in this document, in particular the conclusions and recommendations in paragraph 18, and take action as appropriate.