INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENTAL PROTECTION COMMITTEE
84th session
Agenda item 7

MEPC 84/7/48
6 March 2026
Original: ENGLISH
Pre-session public release: ☒

REDUCTION OF GHG EMISSIONS FROM SHIPS

Comments on the report of the third meeting of GESAMP-LCA Working Group

Submitted by Pacific Environment

SUMMARY

Executive summary:	This document presents comments and suggestions on the report of the third meeting of GESAMP-LCA WG (document MEPC 84/7/16.) While a mass-balance chain of custody system can enable scalable deployment of sustainable fuels, its environmental integrity depends heavily on how key design parameters are defined. Pacific Environment recommends prioritizing two critical elements of the mass balance chain-of-custody (CoC) framework: 1) balance period stringency; and 2) traceability requirements to ensure safeguards are established early in the design phase.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 16
Related document:	MEPC 84/7/16

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 84/7/16 (Secretariat), containing the report of the third meeting of GESAMP-LCA WG, with suggestions for further areas of focus in regard to chain-of-custody (CoC) models and traceability in the near term.

2 GESAMP-LCA WG, in its third report, recommended adopting mass balance as the appropriate CoC model to ensure that sustainability attributes of feedstocks and fuels are transmitted along the value chain, while maintaining a balance of stringency and ease of implementation. The Group also noted that future in-depth consideration of alternative CoC models may be warranted as implementation evolves.

3 This recommendation builds on established mass balance frameworks already in use in other fuel sectors. The IMO framework can draw on those lessons while addressing the unique characteristics of the global marine fuel supply chains. A well-designed mass balance

system can enable the scalable fuel deployment while maintaining environmental integrity. Early clarity on key design parameters will also help reduce implementation uncertainty for both regulators and industry.

4 GESAMP-LCA WG identified several CoC elements for further refinement, including stock management, balance periods, site definitions, and calculations of mass and energy losses and conversions, should the Committee request additional work. Within these elements, Pacific Environment recommends prioritizing further development of two specific aspects within a mass balance framework:

.1 the length and stringency of balance periods; and

.2 traceability requirements, including identity-preservation safeguards for high-risk feedstocks.

5 These elements are central to the credibility of any mass balance system and should be strengthened early in the design phase to ensure safeguards are implemented at the outset. Robust CoC rules are particularly important in the maritime sector because fuels may be produced, traded and consumed across multiple jurisdictions before reaching a ship. Ensuring traceability across this complex supply chain will be critical to maintaining confidence in sustainability claims associated with marine fuel, and retrospectively will be difficult to tighten as established commercial practices and supply chain infrastructure will have already formed around weaker standards.

Background

Approaches to CoC models

6 The three main CoC models are identity preservation, mass balance, and book-and-claim. A basic description of each one's features and limitations is set out below:

.1 Identity preservation (segregation): This model requires complete physical separation of sustainable and non-sustainable material throughout the supply chain. It provides the highest environmental integrity, ensuring one unit of certified sustainable fuel corresponds exactly to one unit delivered to the end user. However, complete segregation is often infeasible across geographically dispersed global fuel supply chains.

.2 Book-and-claim: This model decouples physical commodity flow from its sustainability attributes early on in the fuel production cycle. Credits are purchased independently of the physical fuel delivered and can exist over a longer time span for claiming emissions reductions beyond when the fuel is used. While administratively simple, book-and-claim systems do not preserve a direct physical link between the fuel consumed and the sustainability credentials claimed. Therefore, such systems require strong registry oversight to avoid systemic double-counting and maintain confidence in emission reduction claims through stringent traceability standards and robust certification systems.

.3 Mass balance: Mass balance operates between these two models. It accounts for physical flows (mass, energy and delivery) and sustainability attributes within a system boundary defined by geography and time span, but it does not require separation at each stage. Because fuel streams are co-mingled, robust traceability, transparency, stock accounting, and

verification are essential to maintain environmental integrity. The specific parameters to prioritize in developing a robust and accountable system are set out in the recommendations below.

7 The third report of GESAMP-LCA WG recommends mass balance to transmit sustainability attributes of marine fuels along the value chain and notes that additional examination of alternative CoC models may be warranted as implementation matures. Building on that direction, the mass-balance system should be designed with strict rules for stock management, balance periods, site definitions, and the accounting of mass and energy losses and conversions so that certified inputs cannot be overstated and claims remain auditable and verifiable throughout the value chain.

Recommendations

Prioritize balance-period stringency to preserve the environmental integrity of sustainability claims

8 Since mass balance allows co-mingling of certified and non-certified material within a defined boundary, its credibility depends on the tightness of temporal and traceability controls. Temporal balance periods should be set at every three months with monthly reconciliation required for high-risk categories; within each accounting window, the volume of certified products claimed by an operator cannot exceed the volume of certified inputs received during that same period. This time period is short enough to align outputs credibly with inputs and to prevent temporal arbitrage. Traceability rules must ensure that every claim can be matched to verifiable physical flows and audited records at each node of the supply chain. These parameters, alongside standardized documentation and verification protocols, are central to environmental integrity and require early specification.

Set conservative balance periods and consider higher frequency for high-risk feedstocks

9 Balance periods of three months or less are consistent with reconciliation intervals used in several established fuel sustainability certification systems, including schemes recognized under the EU Renewable Energy Directive and widely applied certification frameworks such as ISCC and RSB, whereas long balance periods enables what is known as temporal arbitrage – temporal borrowing that can mask supply shortages and over-claims. Extended time spans for mass balance also separate the physical supply of the feedstock and fuel too far from its end-use period, adding complexity to audits and increasing risk of misaccounting and potentially fraud. Operators should maintain "no-deficit" stock at all times, with inputs, outputs, losses, and conversions transparently recorded using standardized factors and subject to risk-based audits and unannounced site checks. Traceability rules must ensure that every claim can be matched to verifiable physical flows and audited records at each node of the supply chain.

Use identity-preservation or "hard mass balance" at early chain nodes for scarce or high-risk feedstocks to ensure transparency and auditability across the system

10 "Hard mass balance" refers to a more stringent variant in which physical batch integrity is maintained throughout processing – volumes and sustainability attributes are tracked at the batch level rather than pooled across a site or time period. This sits between full identity preservation and standard mass balance, offering stronger traceability without requiring complete physical segregation. For feedstocks with elevated fraud or scarcity risks such as certain waste oils, animal fats, or small-volume residues, the system should require more stringent standards in line with identity preservation CoC models (also known as physical

separation) or "hard mass balance" at collection, first aggregation, and first processing. This ensures that certified volumes remain physically traceable until they enter a controlled and audited mass-balance pool. Mixing with conventional materials should only occur after that point. This targeted stringency preserves physical linkages where they are most vulnerable without mandating full segregation across the entire global chain.

11 Future development of standards could also consider the use of emerging fingerprinting technology and other analytical methods –techniques already used in food fraud detection and increasingly applied to biofuels – to help verify waste feedstock and other potential high-risk materials' origin and reduce risks of misclassification at the point of collection.

Conclusion

12 As the important step of sustainable fuel certification and CoC models are implemented, it is critical to set certain parameters such that the sustainability criteria of fuels are ensured while effective implementation is reached in the early stages. Early design choices will determine the credibility of the system.

13 A mass balance system designed with weak balance periods or inadequate traceability will be vulnerable to fraud, over-claiming, and reputational damage – outcomes that would undermine confidence in the framework across all Member States regardless of their position on the pace of decarbonization. Establishing clear rules for balance periods, traceability, and safeguards for higher-risk feedstocks will help ensure that sustainability claims associated with marine fuels reflect verifiable physical flows rather than accounting artefacts.

14 The balancing periods for all fuels should therefore be set every three months to ensure the physical flows match the sustainability claims of producers and end-users. For potentially high-risk feedstocks and projects, higher stringent identity-preservation or "hard mass balance" standards should apply to reduce the risk of environmental harm, misreporting and the possibility of fraud. Early specification of these parameters will protect the integrity of the system and provide a stable foundation for the investment decisions that fuel producers, suppliers, and ship operators will need to make.

15 To meet these goals, GESAMP-LCA WG should consider:

.1 noting the comments in this document on CoC models and traceability;

.2 prioritizing further work on balance period length and stringency within the mass balance framework; and

.3 initiating development of traceability requirements, such as identity preservation safeguards for high-risk feedstocks, as an early priority in the design phase.

Action requested of the Committee

16 The Committee is invited to consider the information contained in this document and to take action as appropriate.