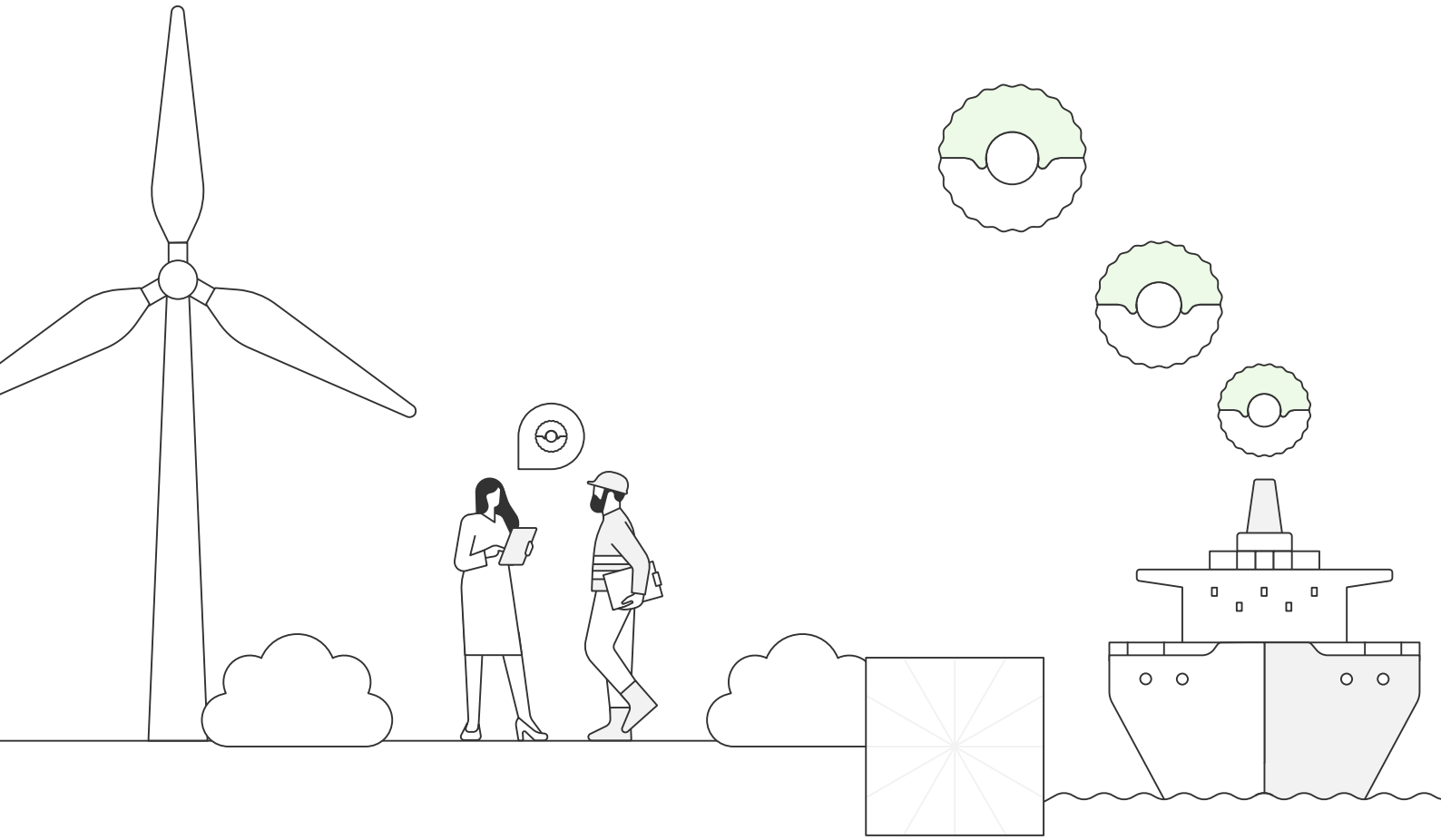
Maritime Book & Claim



System overview

Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

RMI

DanishShipping

MAERSK OIL TRADING

Project funding received from DEN DANSKE MARITIME FOND

1 Introduction

Global warming is a climate emergency. The maritime industry is responsible for more than 80% of world trade by volume and around 3% of global greenhouse gas (GHG) emissions each year.[1] With current decarbonization efforts, this is expected to grow to 5-8% of global emissions by 2050, as other sectors, such as road transport, are decarbonizing faster than maritime.[2] All sectors, including the maritime industry, must take immediate collective action to reduce emissions in line with the Paris Agreement and the IPCC 1.5°C trajectory of a 45% reduction in 2030 compared with 2010 levels.[3]

Two key levers can be used to align the maritime industry with the IPCC 1.5°C trajectory: reducing the energy demand of the global fleet through onboard efficiency measures, and replacing fossil fuels with low-emission alternative fuels. However, activating these levers will be challenging for four reasons. First, new energy efficiency technologies require investments from shipowners; however, their impacts are difficult to quantify, and payback periods are uncertain. Second, no alternative fuel pathway is fully mature or available in large enough supply to decarbonize the entire industry. As a result, a mix of alternative fuel types will likely be used over the coming decades, with large regional differences in availability and price. Third, alternative fuels are forecasted to continue to be more expensive than conventional fossil fuels in the coming decades. Furthermore, building new vessels, retrofitting existing ones, and fuel-specific infrastructure will also increase costs across the maritime supply chain. Fourth, while customer demand and willingness to pay for sustainable products and low-emission transport are growing, demand remains scattered across the industry.[4] Furthermore, today there is no standard mechanism for quantifying and selling green shipping.

These challenges are stopping stakeholders from investing in decarbonization. This is unacceptable for a sector where assets have a lifetime of 25-30 years; therefore, strong decarbonization measures must be in motion in this decade. We need new solutions to tackle the challenges that are slowing the transition. Book & Claim is one potential solution.

This paper describes the Maritime Book & Claim system under development by the Maersk Mc-Kinney Møller Center for Zero Carbon Shipping (MMMCZCS), RMI (formerly Rocky Mountain Institute), Danish Shipping (DS), and Maersk Oil Trading (MOT). Furthermore, it outlines how this system aims to achieve our vision of the Maritime Book & Claim system becoming a trusted, global platform for exchanging and tracking maritime GHG emissions, accelerating decarbonization in the maritime industry.

2 Why Book & Claim?

Book & Claim is one of five commonly used chain of custody models. Chain of custody models track specific product characteristics, such as GHG emissions, as they travel through a supply chain from their source to the end consumer. They provide transparency and credibility about a product's characteristics to the end consumer. While most chain of custody models track the product characteristics alongside their physical flow, Book & Claim decouples the characteristics from the physical product. These characteristics are then 'booked' in a registry, and consumers can 'claim' them without any connection to the physical goods. In the maritime industry, a Book & Claim system can decouple GHG emissions from transport activity, aggregating willingness to pay and, in turn, incentivizing green shipping.

Book & Claim is an approach to the buying and selling of green shipping similar to how green electricity certificates (e.g., renewable energy certificates or guarantees of origin) are sold and bought today. When we purchase green electricity certificates, we know it has been added to the grid from renewable sources, but the physical supply may not be in our own home or office. Customers are not physically consuming renewable electricity, but are still able to pay for and claim the benefits from lower emissions. The same logic is applied to buying and selling green shipping via Book & Claim. Alternative fuel is consumed on ships and the resulting emissions are disconnected from the actual transport service. Customers with no physical connection to the ship can pay for and claim the benefits of these lower emissions. Book & Claim

1 Ocean shipping and shipbuilding, Organisation for Economic Co-operation and Development
2 Industry Transition Strategy, Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping, 2021
3 Special Report: Global Warming of 1.5°C, Intergovernmental Panel on Climate Change
4 Customers' Willingness to Pay Can Turn the Tide Toward Decarbonized Shipping, Boston Consulting Group, 2022

can help solve the mismatch between supply and demand for low-emission alternative fuels by allowing alternative fuels to be consumed where there is a supply, and allocating the benefits and costs to where there is a demand.

Decoupling and exchanging emissions bring benefits for stakeholders across the maritime value chain. Cargo owners willing to pay a green premium for low-emission transport services can use Book & Claim to reduce their emissions. Ship operators using low-emission fuel can use Book & Claim to access a broader market of cargo owners willing to pay a green premium. Furthermore, as ship operators can use Book & Claim to monetize their green services, shipowners will have the chance to achieve a higher time charter premium for low-emission ships, helping them recover their investments in decarbonization technologies. In this way, Book & Claim can act as a cost-sharing mechanism to alleviate the burden of decarbonization. All roles in the maritime supply chain, for example shipowners, ship operators, freight forwarders, and cargo owners, will be able to participate in the Maritime Book & Claim system. As a result, we hope that the system will unlock the willingness to pay for decarbonization throughout the maritime supply chain.

The Maritime Book & Claim system will also provide participants with more transparency around their shipping emissions through primary data related to emissions and transport activity. A comprehensive governance structure will ensure the credibility of this data and allow participants to focus on their core competencies rather than investing resources in estimating emissions. The transparency and credibility of the data from the Maritime Book & Claim system will bring certainty for participants aiming to accelerate the decarbonization of the maritime industry.

Over time, we expect the Maritime Book & Claim system to unlock as well as stabilize demand for green transport services and trigger additional investments into green shipping. With these investments, we expect green shipping costs to decrease due to higher offtake volumes for alternative fuels and better financing terms for green ships. From a fuel-producer perspective, a stable and increasing demand for alternative fuel for the maritime industry will be felt, and the cost of transporting alternative fuels to meet physical demand will be reduced.

3 Developing the Maritime Book & Claim system

The MMMCZCS and RMI began investigating the applicability of Book & Claim to the maritime industry in early 2022. In August 2022, we kicked off a project to develop a framework for a maritime-specific Book & Claim. This project was funded by the Danish Maritime Fund and included MMMCZCS, RMI, DS, and MOT. Throughout the project, feedback on the system design was collected from companies across the maritime value chain to ensure that the system fits the needs of the organizations that will use it.

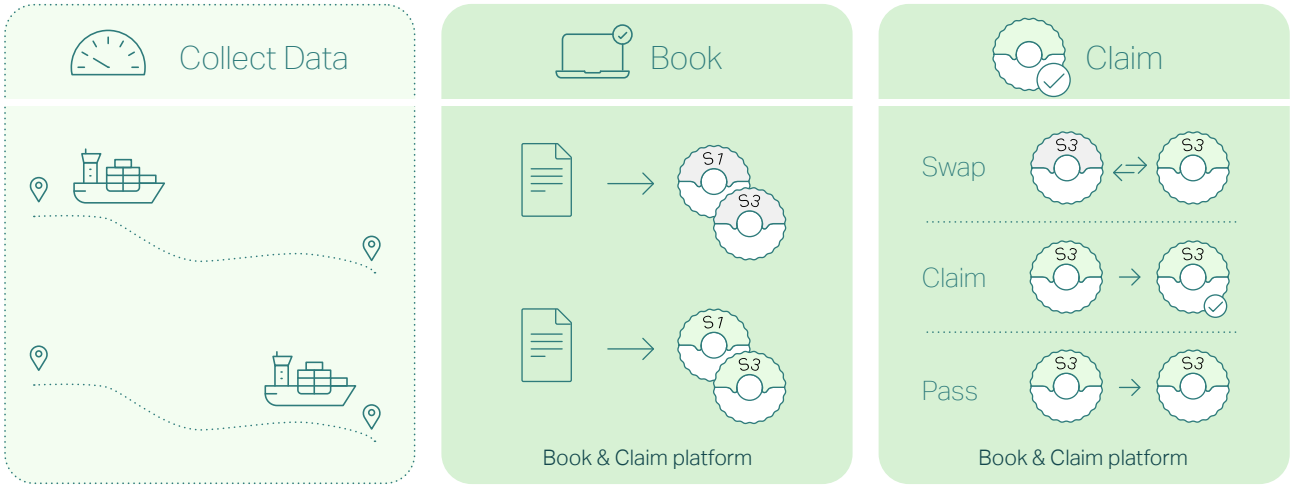
In addition to this paper, we have also published a background paper 'Maritime Book & Claim: Design decisions and justifications' that describes and justifies the design decisions we took when designing the system in detail. A system manual that provides detailed instructions about how to use the system is currently under development for the upcoming pilot. The design outlined in these documents will continue to be refined as feedback and learnings are gathered in the coming months. Preparations for a pilot of this system will begin in May 2023, with a pilot expected to commence at the end of 2023.

4 How the Maritime Book & Claim system works

The functionality of the Maritime Book& Claim system can be described in three basic steps: 'collect', 'book', and 'claim' as shown in Figure 1.

First, key voyage information is collected and uploaded to the Book & Claim system. This data is verified by the Book & Claim platform and booked as energy intensity tokens. Each token represents one MJ of energy and its corresponding GHG emission, as illustrated in Figure 2. Users can swap these tokens with other users, claim them for internal reporting purposes, and pass them down their physical supply chain.

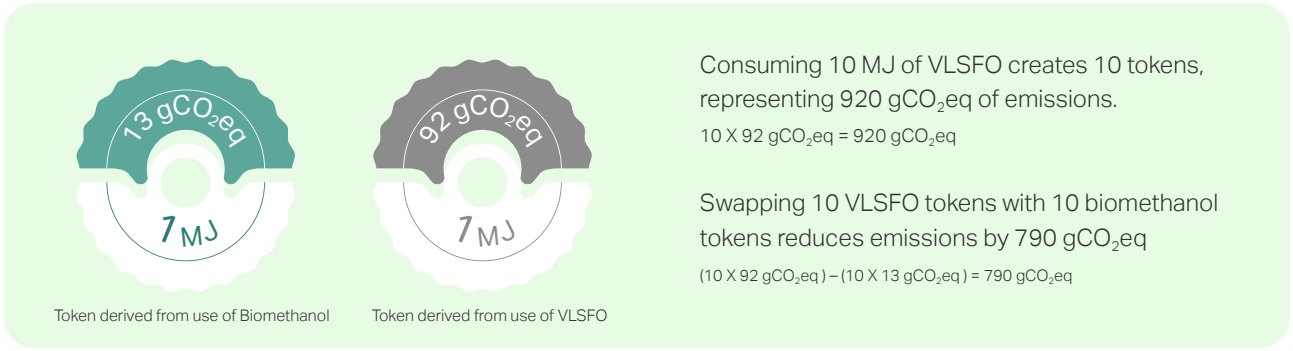
Figure 1: Functionality of the Maritime Book & Claim system (S1 = scope 1, S3 = scope 3).



A robust governance structure will ensure data quality and prevent incorrect double counting, and fully articulated market rules will ensure that exchanges are transparent and fair. The use of primary data and maritime focus further enhances the credibility of the Maritime Book & Claim system.

An illustrative example of how this process would work in practice is shown in Figure 3.

Figure 2: Illustrative example of a token.



Source: NavigaTE model by Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Assumptions:
CO_2, CH_4, N_2O Global warming potential over 100 years
GWP CO_2 = 1; GWP CH_4 = 29; GWP N_2O = 266
(VLSFO = very low sulfur fuel oil).

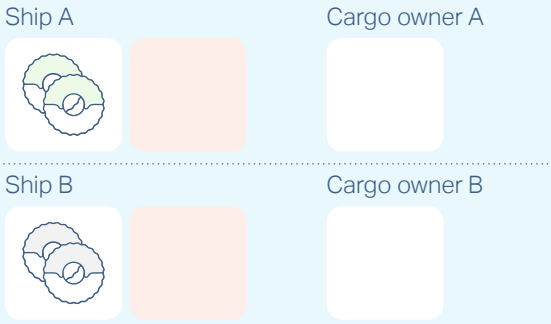
Figure 3: Illustrative example of the Maritime Book & Claim process.

Measure

- Ships A & B sail on voyages and measure key information, including:
- Type and amount of fuel used
- Distance traveled
- Cargo carried

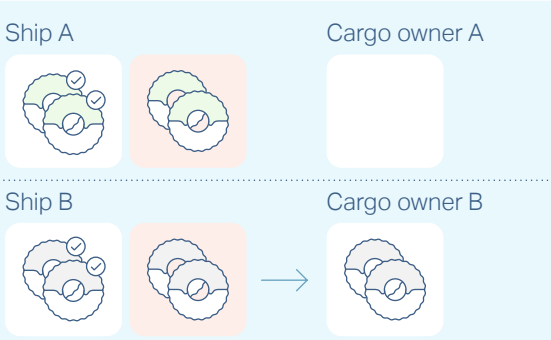
Book

- Ships upload data to the Maritime Book & Claim Platform
  and receive tokens reflecting the carbon intensity of fuel they consumed.
- Both ships consumed the same amount of fuel.
- Ship A used alternative fuel and ship B used conventional fuel.



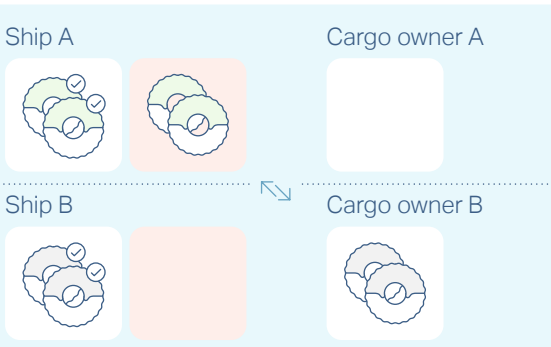
Claim & Pass

- Both ships claim their tokens and identical tokens are made to pass down the supply chain.
- Ship B passes tokens to its cargo owners.
- Ship A does not pass tokens to its cargo owners as they won't pay a premium for green transport.



Swap

- Ship A looks for a cargo owner who will pay a premium for green transport
- Cargo owner B is willing to pay a premium for green transport, but received conventional fuel tokens from ship B
- Ship A and cargo owner B agree to swap tokens for a payment that is negotiated between both parties



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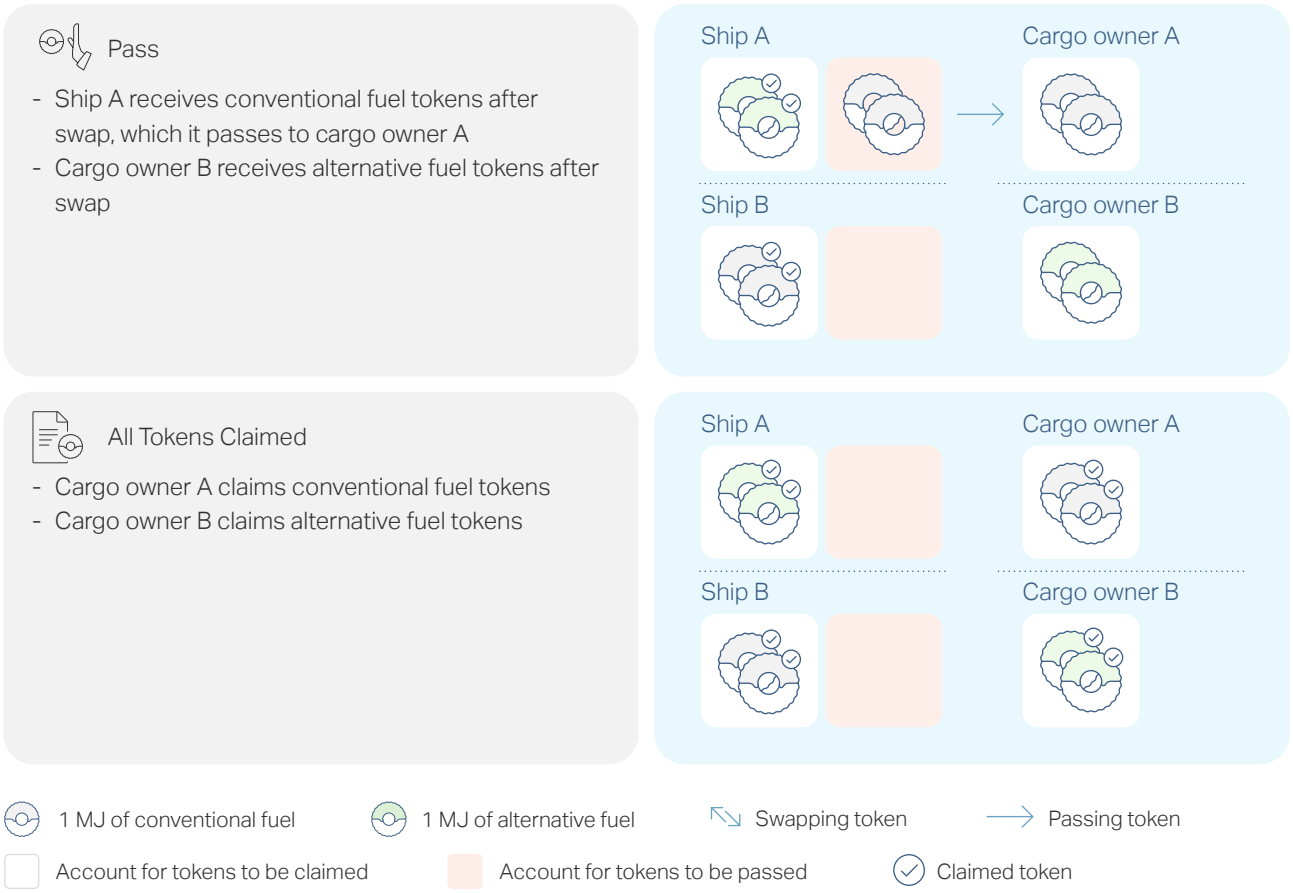
1 MJ of conventional fuel
1 MJ of alternative fuel
Swapping token
Passing token
Account for tokens to be claimed
Account for tokens to be passed
Claimed token

Figure 3: Illustrative example of the Maritime Book & Claim process (continued).



5. Conclusion and next steps

As the maritime industry continues to decarbonize, we will meet new challenges that require new solutions to help us navigate the transition successfully. The Maritime Book & Claim system directly addresses challenges like limited supply and high alternative fuel costs by allowing alternative fuel to be used where available, while allocating the costs and emission benefits to stakeholders with green ambitions.

The current system design results from extensive collaboration with the maritime industry and will continue to be refined towards the upcoming pilot. If your organization is interested in learning more about this Maritime Book & Claim system, or would like to participate in the pilot, please reach out. If you have any feedback or comments to this paper or the Maritime Book & Claim: Design decisions and justifications paper, please fill in the survey included in this link.

6. FAQs

Who can use the Maritime Book & Claim system?

The system will serve four user types who are either directly or indirectly responsible for maritime emissions: ship owners, ship operators, freight forwarders, and cargo owners. Almost all vessel segments and sizes, geographies, and fuel types will be included in this system.

Can a cargo owner whose ship owner or operator is not on this system use this system?

By default, cargo owners need their ship owner or operator who provide transport services to be on the system, and start the process on the system by submitting transport and emission-related information to generate tokens.

Nevertheless, at the initial stage of the Maritime Book & Claim, there could be a substantial amount of cargo owners whose ship owner or operator are not part of the system. In case these cargo owners, who are 'stranded', would like to contribute to decarbonization, they will be able to generate and exchange tokens based on data they receive from their ship owner or ship operator, even if this ship owner or ship operator is not part of the system.

Is the system accepted by Greenhouse Gas Protocol (GHG-P)/ able to be used against Science Based Targets (SBTi)?

Neither the GHG-P nor SBTi has endorsed or mentioned using Book & Claim systems to meet reporting requirements or emission-reduction targets. Nevertheless, the need for market-based mechanisms to bridge the mismatch between supply and demand for low-carbon fuels might influence the acceptance of Book & Claim systems in these voluntary schemes in the future.

Can this system be used in EU Emissions Trading System (EU ETS)?

No. Our Book & Claim system is considering the global nature of the maritime sector and it has been designed to meet industry-wide needs, rather than as a compliance mechanism for specific regulations. Furthermore, there will be a time before ETS is fully enforced, in which the Book & Claim system will help market players to get closer to achieving EU goals.

Is this system compatible with other Book & Claim systems being developed?

An ongoing dialogue is in place with other organizations developing Book & Claim systems, both in the maritime and other transport sectors, to ensure as much alignment as possible.

Is the Maritime Book & Claim the same as offsetting?

No, the Maritime Book & Claim is not offsetting. Offsetting are actions taken by customers in which they purchase emission reductions outside of their organization's value chain to compensate for their own emissions. In contrast, all emissions in the Maritime Book & Claim system arise from the maritime industry, and only participants directly or indirectly responsible for maritime emissions are allowed to participate. As the Maritime Book & Claim system focuses only on the maritime value chain, it is not offsetting.

Is the Maritime Book & Claim the same as insetting?

The Maritime Book & Claim is close to insetting in spirit, but is not the same. Insetting involves using emissions reductions in or along an organization's value chain, which is similar to the Maritime Book & Claim's focus on the maritime value chain. Both insetting and this system enable in-sector decarbonization. However, the quantification and application of emissions in the Maritime Book & Claim are different from insetting. Insetting is a way to compensate for the emissions that result from a company's own activity, using

emission reductions. Emission reductions are avoided or removed emissions that are calculated relative to a counterfactual baseline. The Maritime Book & Claim replaces the avoided/removed emissions with the exchange of actual emissions from the maritime industry that are independent from any counterfactual baselines.

How does the system define voyage?

As no industry standard definition of voyage exists, the Maritime Book & Claim system allows flexibility when defining voyages. The background paper Maritime Book & Claim: Design decisions and justifications outlines the rules for defining voyages.

What GHG emissions are included in this system?

All emissions are on a well-to-wake basis and include CO_2, methane (CH_4), and nitrous oxide (N_2O).

How are scope 1 tokens treated?

Only one set of scope 1 tokens will be created per voyage. These tokens can only be claimed once and swapped with other scope 1 tokens only.

Please refer to the background paper Maritime Book & Claim: Design decisions and justifications for the detailed rules on how the scope 1 and scope 3 tokens are unbundled and assigned to participants.

How does this system incentivize energy efficiency?

This system uses a system unit based on fuel consumption and thus does not directly incentivize investments in energy efficiency. However, an inefficient ship consuming conventional fuel will need to swap with more alternative fuel-based tokens to decarbonize, which is an incentive to improve efficiency.

As work on the system continues, different system units (e.g., CO_2equivalent per tonne-kilometer) that directly incentivize energy efficiency will be considered.

What kind of registry will be built for this system, and who will run it?

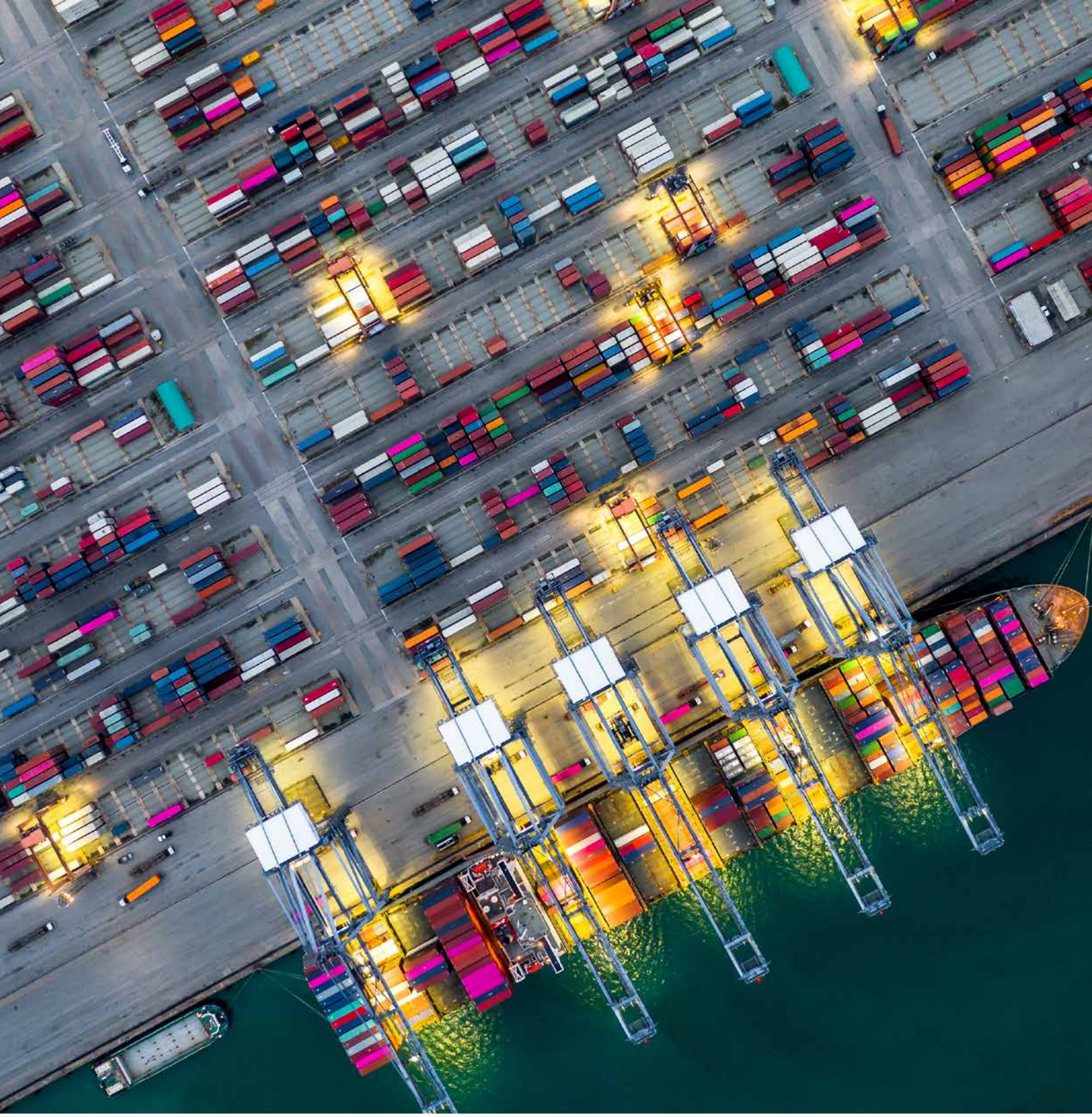
The system defines a registry as a standardized database that enables token traceability and transactions. At this point of development, it is still too early to define the core functionalities required for transparent, accurate, and reliable token generation and exchanges. The particular technology will be decided upon in the course of the next phase. The governance structure of the system includes a registry administrator to oversee the registry's operations (please refer to the background paper Maritime Book & Claim: Design decisions and justifications for more details).

How will tokens be priced?

All financial transactions will take place outside this system. It will be up to participants to agree on pricing with counterparties.

How does the system control double counting?

The Maritime Book & Claim system has several different approaches and policies to safeguard against double counting. For a comprehensive overview, please see Box 2 in the Governance section of the Maritime Book & Claim: Design decisions and justifications' paper.



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