

INSIGHT BRIEF

Accelerating Maritime Decarbonisation: A Book and Claim Chain of Custody System for the early transition to Zero-emission Fuels in Shipping

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Executive summary

The development of book and claim chain of custody systems – which allow the emission profile of a zero-emission fuel¹ to be separated from the physical flow of that fuel in a transportation supply chain – can play a major role in accelerating the early phases of shipping's decarbonisation transition.

These systems can enable early action, even when zero-emission fuels and vessels are in limited supply, by separating decarbonisation from the physical transportation of an organisation's cargo. By activating early demand from shippers and cargo owners, these systems can help shipowners and fuel providers develop a business case for decarbonisation even while preferred fuel pathways are still being determined. Done well, these systems can also build customer confidence in the voluntary, non-regulated market for zero-emission shipping by providing verifiability, credibility, and consistency.

A book and claim chain of custody system for maritime decarbonisation will have to meet the needs of fuel producers, shipowners, and cargo owners and charterers shipping ocean freight. While such systems could be relevant for all segments, logistical complexity and economic factors make container shipping especially likely to benefit from book and claim approaches. Today there is a blossoming of offerings in this space, including a number of proprietary services from shipowners and logistics providers, and growing demand from cargo owners.

The overall impact of these systems on maritime decarbonisation will be determined by the accounting frameworks, commercial frameworks, and reporting rules that govern them. To complement proprietary activity, coordinated action from the sector will be needed to:

1. Ensure the maritime applicability of emerging accounting frameworks for freight decarbonisation and generate

¹ [A Strategy for the Transition to Zero-Emission Shipping \(globalmaritimeforum.org\)](https://www.globalmaritimeforum.org)



convergence around issues that are key to the credibility of book and claim solutions.

2. Promote convergence on commercial practices and norms in a way that builds confidence among customers and meets the needs of demand aggregation initiatives.
3. Communicate the importance of these systems and the need for international reporting standards to accept their use for maritime decarbonisation.

Introduction

The shipping industry is in the initial stages of its decarbonisation journey, with industry leaders recognising both the need for full decarbonisation in line with international climate goals and the key role actions between now and 2030 will have in setting the stage for a rapid transition thereafter.² The ambitious target of 5% adoption of scalable zero-emission fuels by 2030 has been identified as a tipping point that could lead to full decarbonisation by 2050.

Numerous public, private and civil society initiatives have been launched in the interests of achieving this objective.³ Industry actors are also beginning to take action on decarbonisation at the company level - demonstrated through an increase in orders for vessels and the demand for low-emission shipping services. On the freight side of the equation, Mærsk reports that demand for its ECO Delivery service has grown more than 170% year-on-year since it was introduced in 2019,⁴ and a 2022 Boston Consulting Group survey of 125 companies that ship cargo showed that 82% are willing to pay a premium for zero-emission shipping. The shipping industry is responding to this and in 2022, a total of 35 vessels capable of running on methanol, including 30 large container vessels, were ordered.⁵ As of Q1 2023, there are 68 methanol-fuelled container ships in the orderbook, accounting for 12% of the total orderbook capacity, a significant increase from less than 1% a year ago.⁶

However, the industry's first movers still face the classic chicken-and-egg problem when it comes to zero-emission fuel adoption. Shipowners are reluctant to invest in zero-emission vessels until there is widespread availability of fuels, while potential producers of scalable zero-emission fuels and suppliers of bunkering services face uncertain demand for fuels and infrastructure. The result of this situation is a vicious cycle that must be broken if new technologies are to be developed, demonstrated, diffused and deployed at scale. Even policy measures that can close this cost gap - an essential part

2 [Getting to Zero-Coalition: Five percent zero-emission fuels by 2030 \(globalmaritimeforum.org\)](https://www.globalmaritimeforum.org)

3 [The Getting to Zero Coalition, the Zero Emission Shipping Mission, Breakthrough Energy, Cargo Owners for Zero Emission Vessels \(coZEV\), etc.](#)

4 [Press release: Visy opts for Maersk ECO Delivery \(maersk.com\)](https://www.maersk.com)

5 [Future Fuels: 275 Alternative Fuel Ships Ordered In \(marinelink.com\)](https://www.marinelink.com)

6 [Methanol boxship orders growing more rapidly than all other fuel types \(splash247.com\)](https://www.splash247.com)

of every phase of the transition – will be harder to put in place until the new value chains for zero-emission shipping begin to take shape.

Even as vessels and fuels become available, logistical challenges threaten to slow progress in these early stages. Already, carriers seeking to provide low-emission journeys (via, e.g., biofuels) face difficulties **aligning demand with routes where physical bunkering is actually available**. This situation is likely to be similar for all new fuels in the first years after their introduction and, therefore, suggest the need for a virtual option to help address initial logistical challenges.

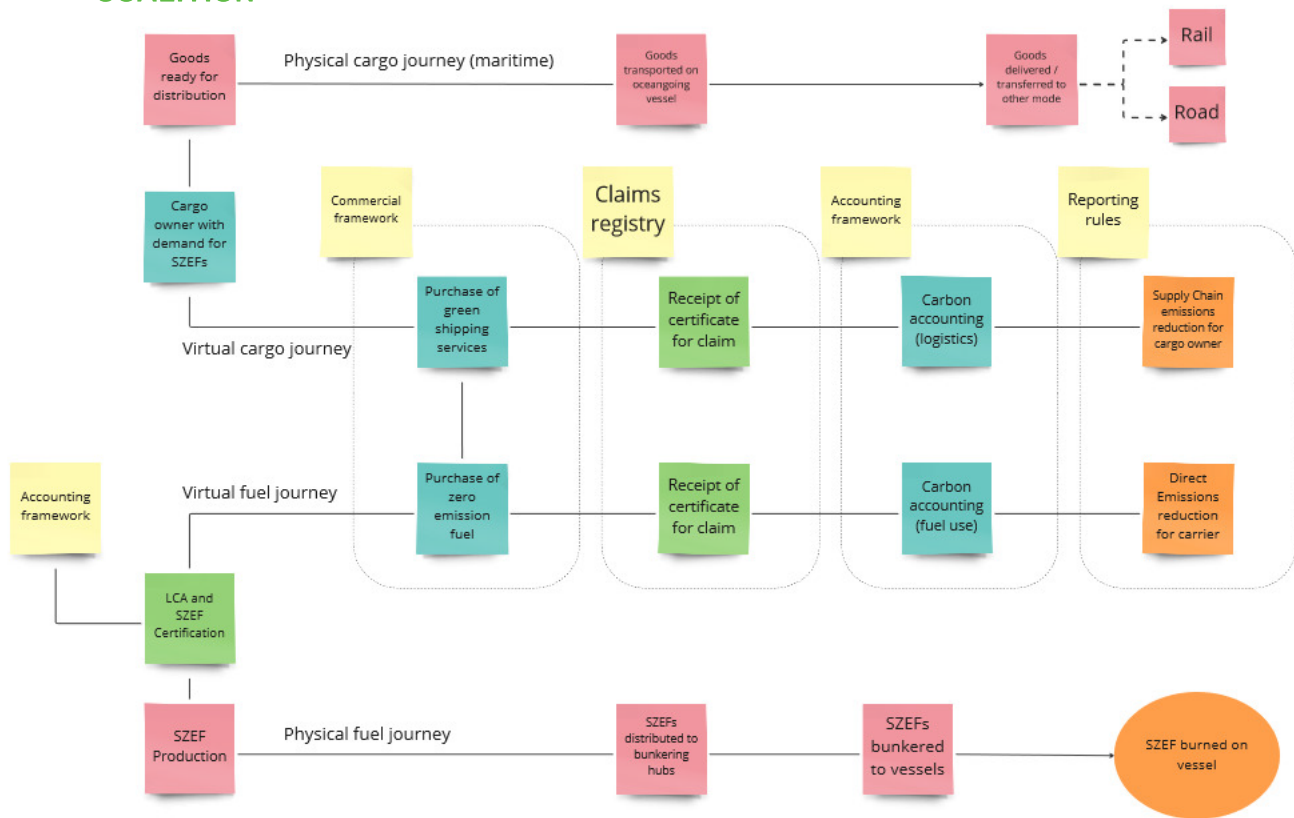
Container shipping has already emerged as a first-mover segment in shipping's transition, with demand for low-emission consumer-facing products allowing more of the cost of decarbonised shipping to be shared across the value chain. Yet cargo owners seeking to buy decarbonised freight face a similar challenge to carriers seeking to purchase zero-emission fuels: **aligning demand for decarbonised freight with a vessel physically consuming zero-emission fuels** without generating complexities that further increase the cost premium and further reduce the practicality of low-emission shipping. A cargo owner looking for low-emission shipping services on route AB might have difficulty finding a vessel using zero-emission fuels with space for their cargo. Meanwhile, a carrier on route CD might have corresponding difficulty in filling up a zero-emission vessel with cargo if demand on that route is low, even if the corresponding infrastructure, policy support, and overall value chain is ripe to support zero-emission fuel bunkering.

A book and claim chain of custody system can overcome these challenges. By decoupling the physical use of zero-emission fuel from its attributes (i.e., the fuel's greenhouse gas emission profile), a book and claim chain of custody system can allow demand for low-emission shipping to scale up without the need to overcome the many challenges of providing zero-emission fuel and cargo space with a physical link to an organisation that is willing to pay a premium for low-emission transportation services.

Book and claim chain of custody systems

In a book and claim chain of custody system, the records that document the characteristics of a product – here, a zero-emission fuel – are not connected to the physical flow of the product from the product's generation to its use. Once the fuel is produced, the attributes of the fuel (such as its greenhouse gas emission profile) are tracked separately from the physical fuel. The zero-emission fuel may be mixed with and indistinguishable from conventional fuels during its transport to bunkering hubs and its consumption on a vessel.

A depiction of the elements of a potential maritime book and claim chain of custody system - **the accounting framework, commercial framework, claims registry, and reporting rules** -- as well as the process of the separation of physical products from their virtual attributes, is included in [fig. 1] below.



Legend:



Figure 1: Illustration of a maritime book and claim system and process (see enhanced figure here)

Source: Global Maritime Forum

The processes at the very top and bottom (with red post-its), describe the physical transportation of cargo or fuels while the middle rows (blue and green post-its) are a virtual system governed by book and claim elements. At the bottom, the zero-emission fuel is produced, blended, distributed and consumed.

When a cargo owner purchases low-emission shipping services, as illustrated by the top line, the goods will physically be loaded onto a vessel that may not necessarily be fuelled by zero-emission fuel. The profile of the zero-emission fuel is assigned to the cargo owner who paid for that profile, regardless of the emissions from the actual vessel employed.

While a book and claim approach may be particularly appealing in the case of decarbonising container shipping, this kind of approach can play a role in easing supply and demand matching challenges for fuel use in other segments as well. Indeed, such voluntary systems are not unique to shipping and can and have been successfully applied in other sectors to drive decarbonisation efforts, such as aviation and the power sector. For instance, SABA, the Sustainable Aviation Buyer’s Alliance, has been established by a group of leading financial and technology service companies to aggregate demand for and drive investment in sustainable aviation fuels. SABA is developing rigorous book and claim chain of custody frameworks and building a registry to facilitate transparent transactions.



A voluntary book and claim system needs to enable smooth and transparent transactions and bring confidence to consumers that they are buying legitimate low emission transportation services in accordance with well-understood rules and norms. Here these rules and norms are described as an **accounting framework** (which guides the actual process of booking and claiming emissions profiles of fuels and transportation services) and a **commercial framework** (the norms that guide elements of transactions such transferability of claims).

A broadly recognised and applicable accounting framework ensures that low emission claims are made in a transparent and consistent fashion and can help prevent erroneous “double claiming” that would undermine credibility of claims and provide no climate benefit. Such an accounting framework brings certainty to actors along the book and claim chain of custody system that the emission profiles they buy correspond to actual zero-emission fuel use. A set of broadly recognised commercial norms gives confidence to purchasers of claims that the emissions profiles they represent have market value and will be recognised and treated the same in future transactions.

While accounting frameworks are often developed by independent bodies seeking to develop common guidelines and standards, commercial norms tend to emerge from the marketplace, where contracting between parties happens in different ways. Although competition in the market may eventually lead to greater convergence and transparency on commercial norms, frameworks can play a crucial role in reducing uncertainty and fostering the development of demand, particularly in the early stages of market development when commercial practices may not yet be fully established. As such, they can be a valuable step towards achieving a more stable and predictable marketplace faster.

What is the role of the book and claim mechanism in shipping decarbonisation?

On the road to a fully decarbonised shipping sector, book and claim chain of custody systems are important because:

- **When zero-emission fuels and vessels are in limited supply, early actors need a way to access decarbonisation solutions (or customers willing to pay for those solutions) without a physical connection between the solution and specific assets like ships or cargo.** In the early stages of the transition, zero-emission fuels and vessels will be in limited supply and will not be able to efficiently and cost-effectively meet disaggregated demand from shipowners and cargo owners. Book and claim approaches can be an effective mechanism to help drive the early stages of the transition as it allows for the separation of decarbonisation from the logistics chain, this unblocks geographical bottlenecks, allowing efforts to be focused on technology and market development while minimising logistical challenges. It solves fuel availability and cargo space issues by allowing willing companies to

purchase zero-emission fuels or shipping services without their operations needing to be physically connected to the supply of zero-emission fuels.

- **These systems enable the business case for decarbonisation to be developed in advance of a fuel pathway being determined.** Among first movers, there is a need to develop a robust business case for the early transition to zero-emission fuels. As the transition is still nascent and new fuels and technologies are being developed, uncertainties remain around technology choice on the supply side. Since a book and claim approach is adaptable for different fuel types, it can help enable and demonstrate the demand for these services even before there is an available technology of choice
- **These systems build customer confidence in the voluntary, non-regulated market for zero-emission shipping by providing verifiability, credibility and consistency:** Zero-emission fuel use is currently voluntary and the market remains largely unregulated. Fostering confidence among customers that they are paying for certified and legitimate zero-emission fuels can be crucial, especially in the first stages of the energy transition. A robust and transparent book and claim chain of custody framework - with a shipping industry-tailored and widely accepted accounting framework, a claims registry and robust commercial norms - promotes traceability of claims, credibility, and consistency among offerings, while reducing the risk of fraud or misrepresentation. Organisations that participate in such a book and claim chain of custody system can provide reputable evidence of their efforts to reduce their emissions, consistent with broadly accepted principles.

What has happened with book and claim for transport decarbonisation so far?

There have been numerous advancements in the book and claim space over the past few years, which can broadly be categorised into four types of initiatives. The [fig. 2] below provides a non-exhaustive overview of what exists in the market today and some of the developments that are underway.

The most significant progress has been observed in the **Accounting and Reporting** space, where various sustainability frameworks, insetting (emissions reductions generated along a company's value chain)⁷ guidelines, as well as accounting and reporting guidelines have been developed. Notable examples of these frameworks include **Clean Skies for Tomorrow**, a universal guideline developed by the World Economic Forum (WEF) for the aviation sector to claim environmental benefits, and accounting frameworks developed or under development by Smart Freight Centre for aviation and other modes of freight transportation.⁸

7 [What is insetting? \(insettingplatform.com\)](https://insettingplatform.com)

8 [Smart Freight Centre partners with World Economic Forum and leading companies to develop a book and claim chain of custody system for](#)

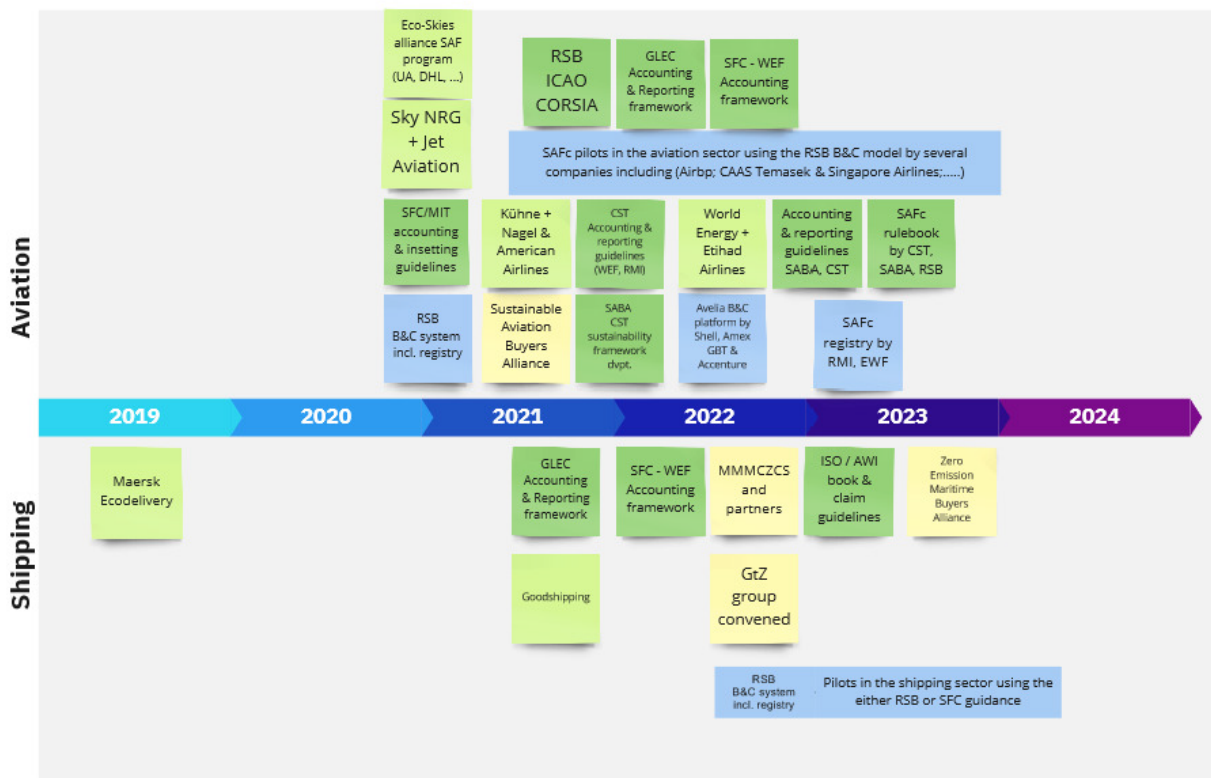


There has also been a surge in activity recently, with numerous **pilot** initiatives being launched in the aviation and shipping industries. These pilots involve the deployment of **registries** such as one developed by the Roundtable on Sustainable Biomaterials (RSB), as well as the testing and implementation of the aforementioned guidelines. A diverse range of companies and stakeholders, including fuel providers, cargo carriers, logistics service providers, and cargo owners, are participating in these pilots as they seek to reduce their emissions footprints and enable their customers to benefit from low-emission transportation services.

In recent years, a variety of **proprietary book and claim offerings** have been developed to enable companies to market low-emission services. Fuel suppliers, like Sky NRG, and Jet Aviation have been using book and claim solutions to offer Sustainable Aviation Fuels (SAF) and biofuels to their clients (carriers) in the aviation, shipping

transportation supply chain emission reduction actions (smartfreightcentre.org)

Timeline of developments in aviation and shipping



Legend:

Accounting and Reporting elements	Collaborative B&C projects; Demand aggregation initiatives
Announced B&C Pilots; Registries (existing & in dvpt.)	Proprietary B&C offerings

Figure 2: Development of book and claim activities (see enhanced figure here)

Source: Global Maritime Forum



and logistics industries. Shippers and ocean freight carriers have also introduced corresponding schemes to their own customers, in the form of services like those from [GoodShipping](#) and [Maersk](#).

What are the emerging issues that need to be addressed for maritime book and claim to succeed?

Many of the established book and claim approaches being implemented today (both in aviation and shipping) are proprietary initiatives, where logistics providers or shipping companies only offer low-emission shipping to their customers along with their own book and claim services.

While these market developments may do a great deal to prove the value and workability of book and claim approaches, there is also a risk: that proprietary offerings diverge in terms of their accounting practices and the commercial terms on which they are offered. This divergence could create uncertainty in the market that slows demand. Conversely, coordinated or even collective efforts that create convergence around the accounting and commercial frameworks may help strengthen acceptance and therefore demand, accelerating the transition to zero-emission fuels.

The value in convergence may be particularly important given the burgeoning activity on demand aggregation. By aggregating demand via, e.g. joint procurement initiatives, transport customers can create a larger market and send a signal to suppliers that there are buyers for their services. This signal can help strengthen the business case for carriers and fuel producers to invest in zero-emission vessels and fuels.

Several examples of such initiatives already exist in shipping and aviation. In aviation, the Sustainable Aviation Buyers Alliance (SABA) is a collaborative demand aggregation effort which has brought together more than 20 key stakeholders. The alliance has sent a market signal in support of SAF through the joint development of a SAF sustainability framework, increased and aggregated investment in SAF, and the establishment of book and claim based tracking systems.

In shipping, there have also been good examples of demand aggregation. Cargo Owners for Zero-Emission Vessels (coZEV), an initiative facilitated by the Aspen Institute, is a cargo owner-led network to enable maritime freight customers to come together to use their brand power and economies of scale to decarbonise their own maritime transportation value chains and accelerate maritime decarbonisation of the sector overall. Through the coZEV 2040 Ambition Statement, climate-leading cargo owners have stated their intention to only use zero-emission ocean freight services by 2040. Through the [First Movers Coalition](#), a partnership between the U.S. State Department's U.S. Special Presidential Envoy for Climate and the World Economic Forum, cargo owners have committed to the same 2040 decarbonisation goal as well as the interim goal of at least 10% of goods internationally on ships powered by zero-emission



fuels by 2030. Building on the demand demonstrated in the coZEV 2040 Ambition Statement, The Aspen Institute alongside Amazon, Patagonia, and Tchibo have co-founded the Zero-Emission Maritime Buyers Alliance (ZEMBA),⁸ which aims to accelerate commercial deployment of zero-emission shipping, enable economies of scale, and maximise cargo owners' collaborative emissions reduction potential beyond what any one freight buyer could accomplish alone through providing committed demand for new zero-emission fuels and technologies. A first request for proposal (RfP) for zero-emission freight services will launch in late 2023. Initiatives like ZEMBA could be instrumental in stimulating investments in zero-emission solutions by demonstrating concrete demand for these services.

Offerings seeking to meet the demand from these initiatives will likely need to include book and claim services, for all the reasons outlined above. This demand may be well-served by proprietary book and claim offerings; however, any joint procurement, request for proposals, etc., is likely to include stipulations regarding accounting and commercial frameworks, the registry or registries used, etc. Thus, proactive convergence around such elements may help match supply and demand more quickly and efficiently.

Where coordinated and collective action could help book and claim

In order to foster this convergence, three areas need particular attention from the community of maritime of stakeholders.

- **Ensuring that accounting frameworks are applicable in maritime shipping:** Smart Freight Centre, World Economic Forum, and a group of supporting companies have come together to develop an accounting framework for book and claim systems in freight logistics. This effort is directly engaging some crucial first movers among cargo owners, shipowners, and logistics companies, and represents an important step in generating convergence around the accounting framework that could guide proprietary offerings using book and claim systems. In line with the needs of cargo owners/freight shippers, the framework is designed to be applicable across all modes of freight transport, to include maritime freight.

As an example, there have been discussions about how additionality is handled in the maritime context. In the context of forthcoming efficiency regulations and existing/forthcoming fuel blending mandates, some stakeholders are seeking clarity about which low emission interventions in maritime would be considered 'additional.' Accounting frameworks must therefore be flexible enough to work with a variety of sector-specific practices and regulations.

To this end, multiple 'pilot projects' as shown in [fig. 2] above are ongoing whereby companies are attempting to apply the principles to the book and claim chain of custody frameworks

they are developing or using in their own operations.

- **Generating convergence on commercial issues:** Decarbonisation options based on book and claim approaches in maritime are today provided as commercial offerings. As such, commercial decisions about the service are governed by the contracts between companies. However, with a growing number of proprietary systems in operation, there has already been some divergence in practice, and it may take some time for “norms” to be established in the market. Uncertainty about the resolution of different approaches may undermine confidence in book and claim.

Several examples have already emerged from discussions with companies. One relates to boundaries for acceptable ‘insetting’ that occurs somewhere else in a company’s value chain. Book and claim assumes the acceptability of at least one kind of insetting: the transfer of credits for emissions reductions from a company’s vessel that uses zero-emission fuel to another of the company’s vessel that does not. But some questions about credibility of different options remain: Do the reductions need to take place on the same type and size of vessel? In the same segment? Could reductions achieved on, for example, vessels that cover short distances e.g. feeders be transferrable to deep sea cargo ships?

A similar case arises around whether this transferability can legitimately happen between companies, and when. In order to meet the needs of its customers, a shipowner may purchase a claim related to zero-emission fuel use and transfer the credit for the zero-emission cargo shipment (often thought of as a ‘scope 3’ reduction) to the cargo owning customer. Should the right to do so be fundamental, or can the company selling the zero-emission fuel place limits on transferability? What if the shipowner does not feel the need to reduce its own direct (‘scope 1’) emissions, and would like to sell the claim for doing so on to a different shipowner. Is this sound commercial practice?

These questions are not fundamentally accounting questions, as they don’t necessarily create difficulties related to measurement or risks of double claiming. Instead, they are commercial questions: What does the market consider legitimate? Is there a place for collective or coordinated action that could help establish the legitimacy of a set of practices acceptable to the whole value chain?

- **Acceptance in reporting standards:** The market for low emission transportation services is being driven by companies who wish to reduce their direct emissions (Scope 1) and indirect (Scope 3) emissions, as defined by the Greenhouse Gas Reporting Protocol. Emission profiles booked and claimed through a chain of custody system cannot be reported under either GHG Protocol or apply towards achievement of an organisation’s Science Based Targets Initiative (SBTi)



emission reduction targets, a book and claim approach may be significantly inhibited. And with that inhibition, the benefits of book and claim approaches to accelerate transport decarbonisation described above would be constrained. Companies that cannot take credit for paying for low emission transport in those companies' greenhouse gas inventories or towards achieving their emission targets will have less incentive to pay for low emission transport. Alignment between the GHG Protocol, SBTi, and book and claim approaches to accounting is crucial to the viability of book and claim tools, these tools' uptake, and by extension, to near-term progress on shipping decarbonisation. Achieving this alignment will require the rapid establishment of fully credible and broadly accepted accounting practices, in combination with clear communications from the industry about why book and claim approaches are essential.

Market development and collective action, in parallel

The development of book and claim chain of custody offerings in the marketplace is a positive one for shipping decarbonisation. But there is clearly room for the sector to act in a coordinated fashion on key barriers and potential enablers for the uptake of book and claim tools to accelerate maritime decarbonisation. Finding ways for companies to collectively drive convergence around accounting frameworks, commercial norms, and the acceptability of book and claim in reporting standards can be the next frontier for action in this crucial area on the path to zero-emissions ocean transportation.