



AGGREGATING DEMAND FOR ZERO-EMISSION SHIPPING FUELS

PART 2: PATHWAYS FOR ACTION

This insight brief is the second in a two-part series exploring the topic of demand aggregation for zero-emission shipping fuels and the role it can play in supporting their early uptake in the sector. It surveys the available approaches to aggregating demand for zero-emission fuels in shipping and provides considerations for how they can be applied by early movers.

The first insight brief, outlining the nature and potential role of demand aggregation for zero-emission shipping fuels, can be found [here](#).

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Background and introduction

Following several years of industry action, the key elements necessary to kickstart the transition to zero-emission shipping are now coming into place.

Nearly 300 vessels capable of operating on methanol and ammonia will hit the water in the next few years, with more expected to follow. Meanwhile green methanol and ammonia projects with the potential to supply tens of millions of tonnes of zero-emission fuel this decade are under development.

Yet only a handful of shipowners and operators have so far secured the fuels.

The substantial cost gap between conventional fuel and green methanol and ammonia is the biggest blocker to the uptake of these alternative fuels within shipping. However, it is not the only factor; as argued in the first insight brief in this series, there is also a mismatch between what zero-emission fuel producers need to kickstart production projects and what shipping companies are currently willing or able to commit to. Aggregating demand for green methanol and ammonia represents a promising way to help tackle this mismatch.

With almost a dozen separate approaches identifiable, there are opportunities for multiple actors within and beyond shipping to support fuel demand aggregation. To help early movers understand the options at their disposal, this insight brief surveys these approaches and provides an overview of key considerations surrounding them. With demand aggregation being an evolving landscape, it is not intended to be an exhaustive presentation, but rather to serve as a starting point for further discussion on the topic.

The recommendations in this brief should not be taken as legal or commercial advice.

Exploring zero-emission fuel demand aggregation measures

Securing zero-emission fuel is a process, and different shipping companies can be found at different stages. This suggests there is potential for demand aggregation not just at the point of procurement, but also in the stages before.

As such, a distinction can be drawn between pre-commercial and commercial fuel demand aggregation measures. While commercial measures provide vehicles and mechanisms for aggregated purchases of zero-emission fuel, pre-commercial measures lay the groundwork for aggregated purchasing by engaging the supply-side and/or bringing together stakeholders to create networks capable of collaborative action.

Pre-commercial measures

Three main pre-commercial fuel demand aggregation measures can be identified: shipping companies can coalesce around sending demand signals, while third parties can engage in matchmaking exercises or facilitate the creation of hydrogen hubs.

Demand signal initiatives

Demand signal initiatives involve groups of shipowners, charterers and/or cargo owners communicating an intention to use zero-emission fuel or ships, with the aim of creating a “buzz” among fuel producers, the bunkering ecosystem, and governments. This can help direct fuel producers’ interest and planning towards the maritime market and/or stimulate dialogue between the hydrogen ecosystem, national policymakers and shipping around the infrastructure and policy enablers required for the uptake of zero-emission fuel.

Two demand signal initiatives currently exist in the shipping sector: the *First Movers Coalition* and the *Cargo Owners for Zero-Emission Vessels (coZEV) 2040 Ambition Statement*, both launched in late 2021. Meanwhile several of the most advanced green shipping corridor initiatives have established targets for zero-emission fuel uptake and/or estimates of the potential demand for zero-emission fuel on the route,¹ which can be seen as location-specific demand signals.

These initiatives have the greatest impact on the zero-emission fuel market under conditions of technology and regulatory uncertainty, making them an early pre-commercial intervention.

Matchmaking

Matchmaking efforts involve a third party connecting potential buyers and sellers of zero-emission fuel. In the case of shipping, both government and ports are well-positioned to serve as matchmakers, as neutral actors with visibility over the supply and demand sides, including both shipping and land-side sectors.

Matchmaking efforts can be more or less structured, ranging from convenings to online platforms and targeted exercises. They have the highest potential where they provide an on-ramp for commercial demand aggregation.

Governments may create online platforms to support matchmaking. In June 2024, the EU announced a so-called Pilot Hydrogen Mechanism intended to “help scale-up EU hydrogen [...] market development by [...] helping buyers and suppliers connect”. Building on the example of the AggregateEU platform for gas demand pooling and joint purchases, the mechanism will “collect hydrogen demand from potential buyers and offers from suppliers”, and support matchmaking between them.² It is planned to launch in mid-2025.

As illustrated by the Maritime and Port Authority of Singapore,³ ports can undertake expression of interest (EOI) exercises for zero-emission fuels. Here, a port presents an estimate of the aggregated volume of zero-emission fuel expected to be needed at the port and invites potential suppliers to submit proposals about whether and how they could meet this volume. This provides a two-way signal, about potential offtake opportunities at the port, on the one hand, and the feasibility, cost, and interest of suppliers to meet demand at the port, on the other. In this way, EOIs can generate confidence in the market and facilitate planning, while making connections between buyers and sellers that lay the groundwork for future offtakes.

1 For example, the *Australia-East Asia Iron Ore Corridor* and *The Silk Alliance*

2 *Pilot mechanism to support the market development of hydrogen* (europa.eu)

3 See Box 1 in the first *insight brief* in this series

EOIs are likely to be valuable exercises for first-mover ports in general, but particularly those that will import green methanol or ammonia rather than leverage local production. Ports with strong connections to regional or national government may also have particularly good potential for EOIs, with the ability to galvanise greater participation and enable more effective coordination of demand across sectors.

Hydrogen hubs

Hydrogen hubs describe networks of hydrogen producers, consumers, and connective infrastructure in a specific location.

Participating in hydrogen hubs can connect shipping with other local actors and industries seeking to offtake hydrogen-based fuels, while helping to reduce infrastructure costs and uncertainties. This makes them in some ways similar to matchmaking efforts.

One difference, however, is the access to economic support they may afford. As highly visible, strategic initiatives, many governments are providing funding for hydrogen hubs. While this has so far mostly consisted of development and capital expenditure support, facing slow progress in activating demand for hydrogen, governments are increasingly exploring incentives for operational expenditure. These incentives would target the cost gap associated with the consumption of clean hydrogen in end-use sectors. Notably, the US is developing a mechanism of this type connected to its seven hydrogen hubs. In January 2024, the US Department of Energy appointed a consortium to design the scheme, which has been allocated up to \$1 billion in funding, with Contracts for Difference, a fixed premium, or market maker mechanism all being considered as potential design options.⁴

Shipping has not yet played an active role in hydrogen hubs, with, for example, just one of the seven US hubs focusing on marine fuels or bunkering.⁵ This suggests there may be opportunities for greater involvement by the sector in these initiatives.

Commercial measures

Commercial demand aggregation measures can be led by actors across the shipping value chain and beyond. Three groups of measures can be identified: a) supply-led measures, undertaken by fuel producers; b) demand-led measures, headed by shipowners, charterers, and cargo owners; and c) third party-led measures, spearheaded by ports, traders, international institutions or governments.

Supply-led

Fuel producers may support the aggregation of demand for zero-emission fuel in shipping through either offtake portfolio or “time stacking” efforts.

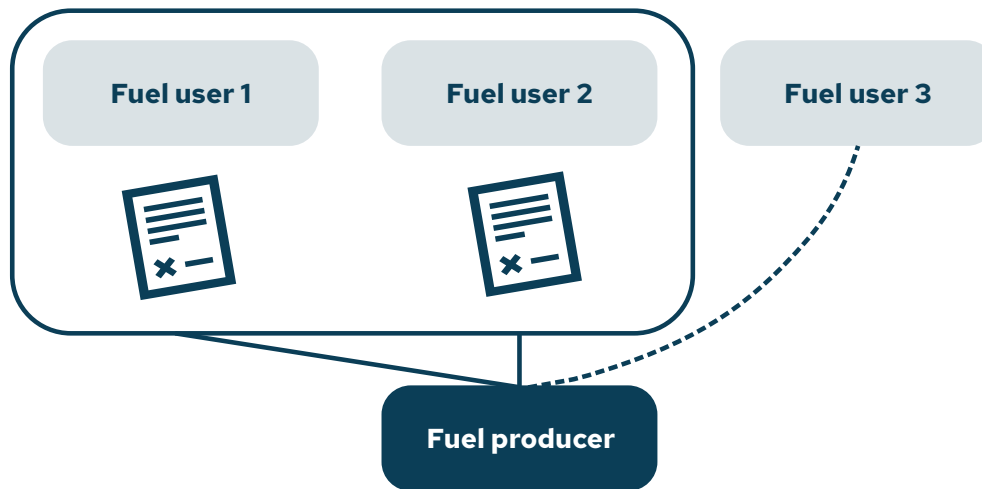
⁴ *DOE Selects Consortium to Bridge Early Demand for Clean Hydrogen, Providing Market Certainty and Unlocking Private Sector Investment* (Department of Energy)

⁵ *The Gulf Coast Hydrogen Hub plans to produce e-methanol as a marine fuel. Cf. Regional Clean Hydrogen Hubs Selections for Award Negotiations* (Department of Energy)

Offtake portfolio

An offtake portfolio effort describes an effort by a project developer to build a portfolio of offtakes sufficient to take final investment decision (FID) on a fuel project. This involves engaging possible customers from target end-use sectors, negotiating with interested parties, and aligning the offtakes into a viable portfolio. These activities represent common practice for project developers and are already happening today.

Figure 1: Schematic of an offtake portfolio effort



As outlined in the first insight brief, project developers are seeking several offtake agreements, preferably from different sectors, to take FID on large-scale green methanol and ammonia projects. In this context, offtake portfolio efforts are likely to play an important role in aggregating demand for zero-emission fuels, by integrating demand across sectors in a way required for an FID.

These efforts could present some benefits relative to other commercial demand aggregation measures; they may, for example, facilitate closer discussion with financiers during the offtake negotiation, which could help reduce the resource-intensiveness and accelerate the process, while generating cost benefits that could flow through to the offtakers. They are, however, also subject to several limitations:

- **Financial and logistics challenges:** The full offtake would remain on shipping companies' balance sheets; as such, some form of credit enhancement or guarantees may be required for smaller shipping players to secure supply. Meanwhile, offtakers will not necessarily seek delivery of the fuel to the same location. This could make new infrastructure investments more difficult. A case may need to be made for the fuel to be delivered to the same bunkering location. Otherwise, bunkering may need to take place in one of today's major bunkering hubs, which are likely to be the preferred point of delivery for many early movers in the sector.
- **Complexity:** Aligning multiple actors from different sectors (with differing willingness to pay and operational models) is likely to be more complex and time-consuming than negotiating with aggregated sources of demand.

- **Bargaining power and scale:** Buyers’ bargaining power is fragmented, which may lead to less favourable offtake terms than demand-led aggregation.

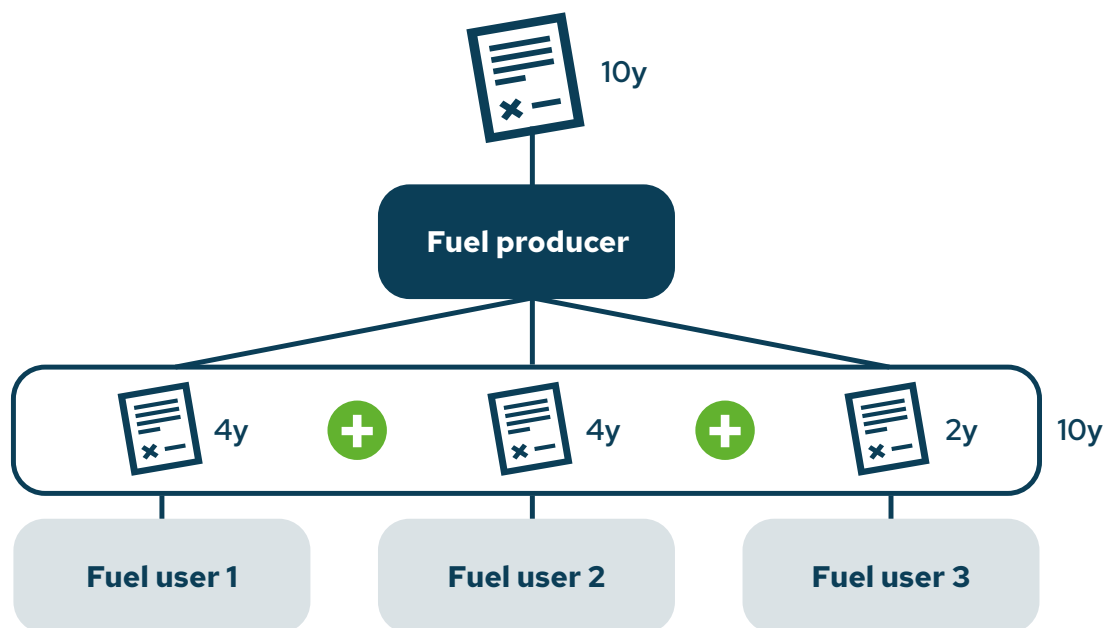
These factors may limit the relevance of offtake portfolio efforts until the zero-emission fuel market reaches a greater level of maturity.

Time stacking

More innovative approaches are also being considered by fuel project developers. One such idea is “time stacking”.

Time stacking involves a fuel producer splitting the conventional 10-to-15-year offtake commitment needed to kickstart a fuel project into shorter tranches that can be signed by different offtakers. These tranches could, in theory, be equal length – e.g. a series of five two-year offtakes – or of different lengths – e.g. one “cornerstone” offtake covering the early period of the offtake and a series of smaller tranches covering the end. The fuel producer would then align or “stack” the tranches into a package covering the 10-to-15-year period. As such, it may be thought of as aggregation in time, rather than volume.

Figure 2: Schematic of time stacking mechanism



The major benefit of time stacking would be allowing shipping companies that may not have the risk appetite or balance sheet to sign a full 10 or 15-year offtake to secure a level of zero-emission fuel supply for their fleets.

Time stacking has not yet been put into practice and thus its real-world feasibility remains to be demonstrated. Several anticipated challenges would need to be overcome for it to be a solution in aggregating zero-emission fuel demand in shipping:

- **Advanced commitment:** Aligning a sequence of buyers across a 10 to 15-year period is likely to be complex and require buyers willing to make purchase commitments up to a decade in advance. If the cost of the fuels declines over time, these commitments could be more

expense than buying the fuel at the time of use. Pricing adjustment mechanisms could mitigate this issue but may be unappealing to fuel project financiers.

- **Acceptability to financiers:** An appropriate legal “wrapper” that would make the package acceptable to the fuel project’s financiers would need to be found, including an approach to assigning credit risk between the different buyers.
- **Infrastructure investment:** The short-term supply associated with time stacking may make investments in dual-fuel vessels and, particularly, methanol or ammonia bunkering infrastructure more difficult, unless the actors buying tranches committed to bunker at the same location and, ideally, to use the same bunker provider.

Demand-led

Perhaps the most obvious approach to aggregating demand for zero-emission fuels would be for groups of shipowners, operators, and/or charterers to come together and pool their individual demand. Indeed, collaborative action by shipping actors, as the users of the fuel, would present several advantages:

- **Expediency:** The ability to leverage shipping actors’ existing relationships and understanding of the sector could allow the quick identification of possible collaborators and kickstart action.
- **Bargaining power:** Bringing large bundles of demand to the market could give participating companies greater bargaining power, positioning them to negotiate favourable offtake terms.
- **Demand buzz:** Bringing large bundles of demand to the market may make shipping as a whole more visible and attractive to zero-emission fuel producers.
- **Directional alignment:** Acting in concert with counterparts in the sector would provide participating companies with a level of reassurance about their zero-emission fuel choices and early-mover status.
- **Creditworthiness:** Smaller shipping companies could potentially benefit from the greater creditworthiness of their larger counterparts, broadening access to zero-emission fuel.

While examples exist in other sectors,⁶ demand-led fuel demand aggregation initiatives have yet to emerge in shipping. But some suggestions can be made about the main opportunities and challenges facing these efforts.

First, at this early stage in the development of the zero-emission fuel market, a global effort to secure fuel for participating companies’ fleets would be a major undertaking. In the near-term, demand-led initiatives may benefit from having a specific geographical focus. One possibility would be focusing on securing supply on a given green corridor. Another possibility would be for a group of stakeholders with a shared bunkering pattern to make zero-emission fuel available at a given bunkering port/ports. While green corridors may be most relevant in trades with more regular operational patterns – such as container shipping, ferries, and metal and ore trades – a port-centric approach may be more relevant to tramp shipping, which lacks predictable routes but will regularly stop to bunker at key bunkering hubs, making them a logical place to create supply.

⁶ For example, joint sustainable aviation fuel procurements have been announced by members of major airline alliances, like the [oneworld Alliance](#)

Second, these initiatives could involve other sectors. Bulk shipping may be particularly well-placed to collaborate with other sectors, given the segment’s interface and relationships with the industrial economy. For other segments, this could be an area in which matchmaking or hydrogen hub efforts could be beneficial.

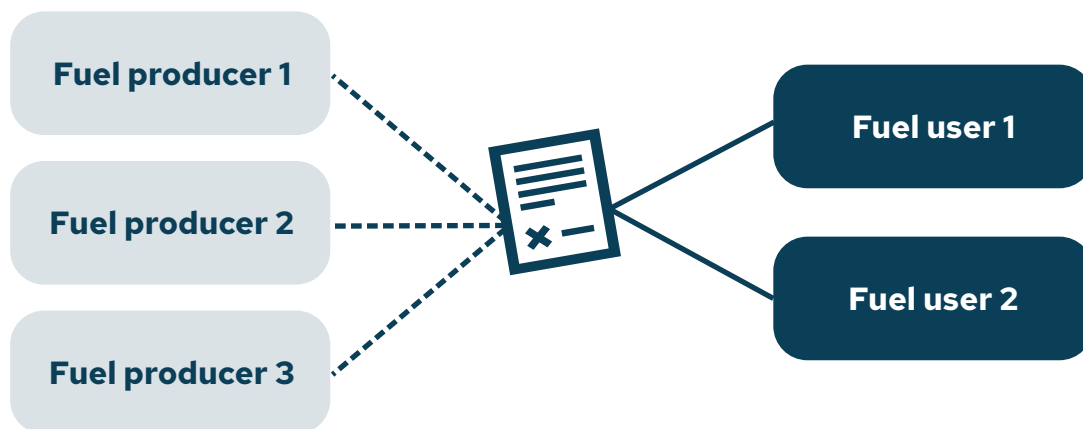
Third, in contrast to supply or third party-led aggregation, demand-led aggregation would involve direct collaboration between shipping companies. Given the commercially sensitive nature of fuel contracts and potential implications of action on freight costs, care will need to be taken to ensure the full compliance of these efforts with competition law, particularly where companies are competitors. Given its concentration and higher visibility, these issues may be particularly acute in container shipping; however, other concentrated markets, like iron ore shipping, could also be affected. The specific vehicle and mechanism by which demand is aggregated will be important in this regard.

Several approaches are conceivable:

Joint zero-emission fuel procurement

One approach could be for interested members of a green corridor initiative or port-centric consortium to run a joint procurement for zero-emission fuel supply. This would involve a joint tender process for the quantity of fuel needed to meet collective corridor targets or combined demand for zero-emission fuel at the port in question.

Figure 3: Schematic of joint fuel procurement



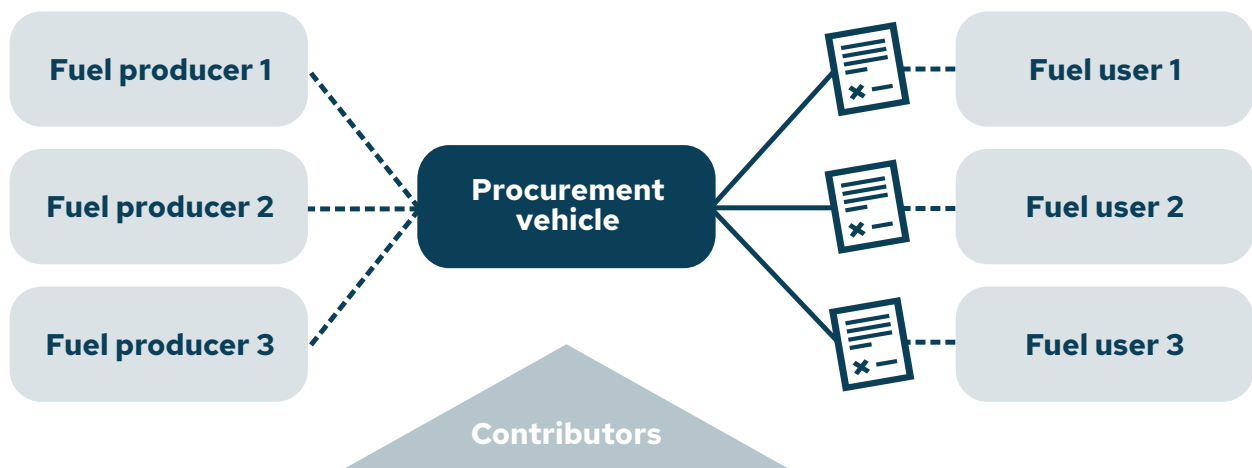
Firewalls would need to be built into this process to prevent the exchange of sensitive information about fuel prices, particularly between competitors. This may mean a neutral third party managing the process or using a third-party procurement platform.

While there may be benefits in establishing a more formal structure for collaboration (see below) where multiple offtakes are needed, joint procurement could be a model for securing one-off zero-emission fuel supply. This could be relevant for green shipping corridors with lower amounts of traffic, where a single offtake would be sufficient to decarbonise the route’s fleet, or where shipping companies are taking a portfolio approach to zero-emission fuels, securing small scale supply of several different alternatives.

Zero-emission fuel procurement vehicle

Another approach would be to create a vehicle for joint procurement of zero-emission fuels. This could be an independent entity set up by the group of prospective buyers or by a neutral third party, such as a port, NGO, or international organisation.

Figure 4: Schematic of zero-emission fuel procurement vehicle



The vehicle could operate via a tender process, gathering indicative fuel requirements at given port(s), before putting the aggregated volume out to the market. The party managing the process would scrutinise the bids and recommend a winner to participants. They may then bilaterally sign agreements with the winning supplier. This approach - resembling the one used by the Zero-Emission Buyers Alliance initiative (see below) - could reduce the resource-intensiveness of the offtake negotiations both for suppliers and users through a single process managed by a third party, while ensuring compliance with competition law.

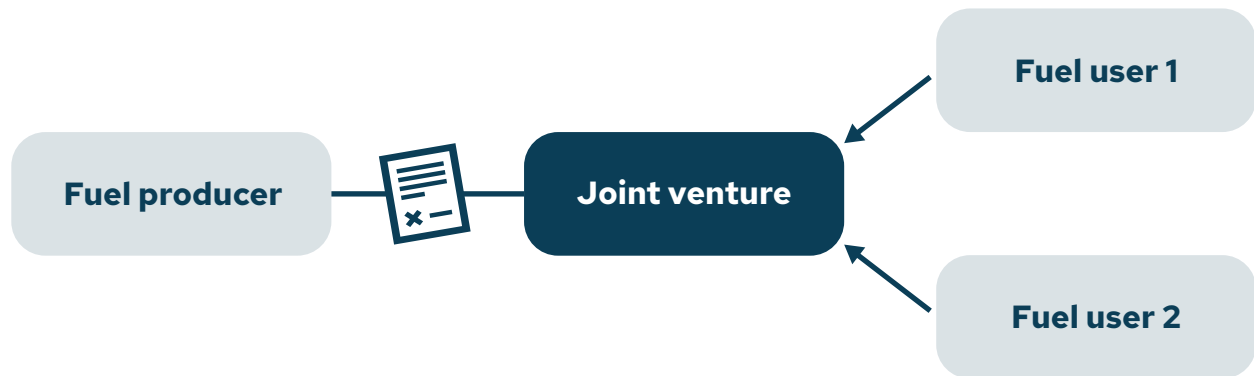
Participation in such tenders could be open to any actors interested in securing fuel on the route or at the ports in question. Indeed, this would help enable access to larger-scale projects, with resulting cost benefits. This could include cargo owners, which could provide cash to fund the offtakes as a pre-payment for zero-emission shipping services.

Since the tender would be focused on delivery to specific ports, this approach should not fragment demand for bunkering investments. It would, however, require participants to be sufficiently creditworthy to sign the offtake agreements, which may be a challenge for smaller players. It is conceivable that aggregating demand into a wider package, particularly one that includes commitments from larger, more creditworthy parties, may offset this. If not, these actors may need credit enhancement or guarantees to facilitate their participation; one possibility in this regard would be for investment or multilateral development banks to establish a facility with the entity to support these actors.

Green joint venture

A final option could be for interested parties to establish a joint venture to own and operate zero-emission vessels; this joint venture would procure fuel to meet its operational needs, effectively aggregating demand between the partners.

Figure 5: Schematic of joint venture for zero-emission fuel demand aggregation



Green joint ventures are not new in shipping, with several real-world examples emerging in recent years, including *Skarv Shipping Solutions*, and *Viridis Bulk Carriers*. There are also emerging examples of joint ventures connected to green corridors, with, for example, COSCO and Fortescue having recently agreed to explore jointly building and deploying green ammonia-fuelled vessels on the China-Australia iron ore shipping corridor.⁷

Benefits would include cost and risk sharing, and leveraging combined financial capacity, while generating holistic experience about ordering and operating green methanol or ammonia-powered vessels. This would represent a deeper form of collaboration than a joint procurement. At the same time, the joint venture would not necessarily need to be a “forever arrangement”, but could be time-limited, for example, covering just the offtake or ship amortisation period.

Such a joint venture could be either a horizontal collaboration, between shipowners or operators, or a vertical collaboration, between shipowners, operators, charterers, and even cargo owners.

A horizontal collaboration could take one of two forms - a corporate collaboration between competitors, similar to a shipping pool arrangement, or creating a new entity, positioned as a competitor of the “parent” companies. These variants would be subject to different competition requirements, and therefore be more or less complex to set up and manage. In general, a new entity is likely to take some time to get the necessary clearances - in the range of months to years - particularly if the parents are large players.

A vertical collaboration could be relevant in parts of shipping with high complexity, such as bulk. In bulk shipping, deploying a zero-emission vessel may involve a complex web of contracts, responsibilities and decisions, including a shipowner ordering the dual-fuel vessel, a charterer agreeing to hire the vessel and securing the zero-emission fuel, and a customer signing a long-term supply contract. A vertical joint venture could help align these different elements while providing a means of leveraging downstream demand.

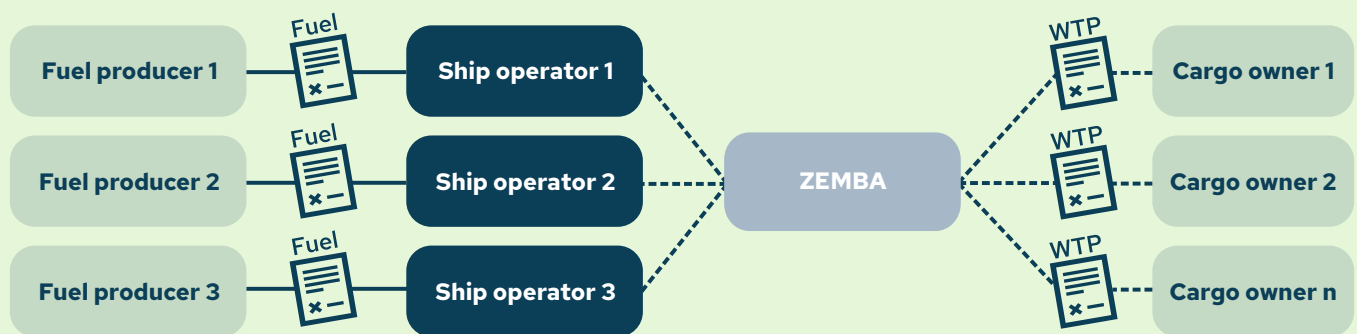
⁷ *Mining giant Fortescue strikes deal with Chinese shipping heavyweight Cosco to deploy vessels on green corridor* (tradewindsnews.com)

Zero-emission shipping buyers alliances

An additional approach to supporting the uptake of zero-emission fuels is to aggregate cargo owners' willingness to pay for zero-emission shipping.

This is an area that has seen activity in recent years, with the emergence of the *Zero-Emission Maritime Buyers Alliance* (ZEMBA), under which consumer goods shippers collectively procure zero-emission shipping services. ZEMBA's first procurement was completed in April 2024 and regular tenders are expected to follow.

While ZEMBA's first tender focused on container shipping, there is scope for aggregating cargo owner willingness to pay in other segments; for example, leading automakers procuring zero-emission car carrier shipping services or leading steelmakers procuring zero-emission iron ore transportation. ZEMBA is contemplating the potential to expand its focus to other segments.



Simplified representation of ZEMBA procurement model.⁸ WTP stands for willingness to pay for zero-emission shipping services

The key question in terms of fuel demand is whether procurements by zero-emission shipping buyers alliances can flow through and enable the winning ship operators to sign offtakes. This will depend on the design of the procurements, with a few key factors likely to have a particular influence:

- **Sequencing:** Given the limited number of existing zero-emission fuel offtakes, flow through is more likely if the cargo owner demand can be used as a basis for signing offtake agreements, rather than an offtake agreement needing to be in place upfront
- **Volumes:** The level of zero-emission demand should be commensurate with the size of announced green methanol and ammonia projects and/or likely offtake volumes
- **Contract duration:** Longer contracts are more likely to enable flow-through, by minimising ship operators' exposure on the long-term offtake agreement

⁸ N.B. contracting takes place bilaterally between ZEMBA cargo owners and the winning carrier, rather than through the ZEMBA Secretariat.

- **Premium and competition:** The premium associated with the tender should be sufficient to cover a significant portion of the added cost of operating vessels on zero-emission fuels. Within zero-emission fuels, biofuels will be cheaper than e-fuels, like green methanol and ammonia, in the near-term. This may create a case for targeted green methanol and ammonia procurements.

Zero-emission shipping buyers alliances could also work in tandem with fuel demand aggregation measures. For example, they could “fill out” demand for zero-emission fuels on concentrated trade routes. By introducing off-route demand, the alliance could increase fuel demand to the scale needed to support large-scale investments while sidestepping possible anti-trust concerns associated with collaboration between competitors. Alternatively, they could contribute cash to a zero-emission fuel procurement vehicle, as described above.

All sources of demand for zero-emission fuel across the value chain will likely need to be leveraged if shipping is to hit the IMO’s goal of 5-10% uptake of zero-emission fuel by 2030.

Third party-led

Third party-led measures involve an actor outside of the fuel value chain buying zero-emission fuel “on behalf” of end users and selling it on to them on a short-term and/or smaller-scale basis.

These efforts may strive to achieve multiple objectives but would have the effect of aggregating fuel demand. Where in demand-led measures the individual demand of several offtakes is bundled into a bigger package, in third-party measures this process is flipped, with a large bundle of fuel being sourced and then parcelled out into smaller units to meet individual players’ demand.

Similar to demand-led action, third-party measures could bring large-scale fuel demand to the market and, as such, facilitate favourable offtake terms and streamline offtake negotiations. But they can be expected to present several additional advantages on top of this:

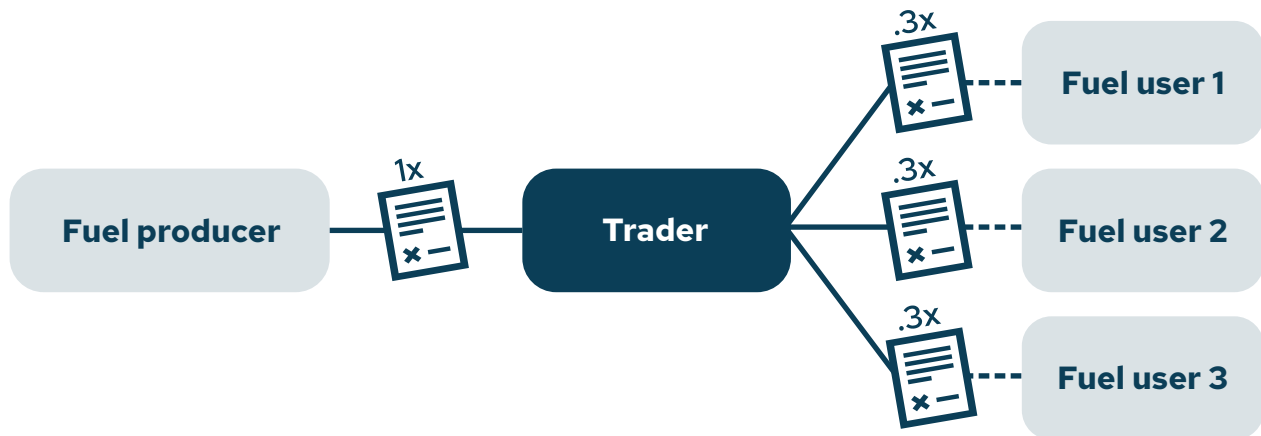
- **Accessible supply:** The availability of shorter-term or smaller-scale supply of zero-emission fuels would allow shipping companies that may not have the risk appetite or balance sheet to sign a full 10 to 15-year offtake to secure a level of supply for their fleets.
- **Financial capacity:** A third-party serving as the offtaker would take the offtake commitment off shipping companies’ balance sheets. Depending on the financial strength of the third-party this could mitigate concerns and challenges surrounding offtaker creditworthiness. If the third party was sufficiently well-capitalised, for example a government or international institution, it could buy large volumes of fuel, accelerating the development of the zero-emission fuel market as a whole.
- **Competition:** Third party-led action could sidestep the anti-trust and competition issues associated with collaborative action by competitors in the value chain.
- **Reducing cost gap:** Third-party efforts have the potential to incorporate mechanisms to reduce or close the cost gap for zero-emission fuel.

Two main approaches to third-party fuel demand aggregation can be identified, based on who serves as the third party.

Zero-emission fuel trading

One option is for bunker, energy, or commodity traders to take this role, diversifying their existing business into zero-emission fuel.

Figure 6: Schematic of zero-emission fuel trading



Traders are in many ways well-placed to drive zero-emission fuel supply, being able to leverage their expertise, capacity, and energy industry networks to move at speed. However, they are also commercial actors that would need to achieve a return commensurate to the risk associated with being an early offtaker of the fuels. This margin/risk premium may exacerbate the cost gap associated with the zero-emission fuel for the end user unless the trader can make purchases of a large enough scale to offset it.

The perceived level of risk could also explain why there is currently limited activity in this space, with few offtakes having been signed by traders for the marine market. Activity so far has instead focused on ammonia as a hydrogen carrier, particularly imports to the EU.⁹ This could present an opportunity for shipping to access any of this fuel that does not find a buyer, in so far as it will be delivered to and stored at key ports.

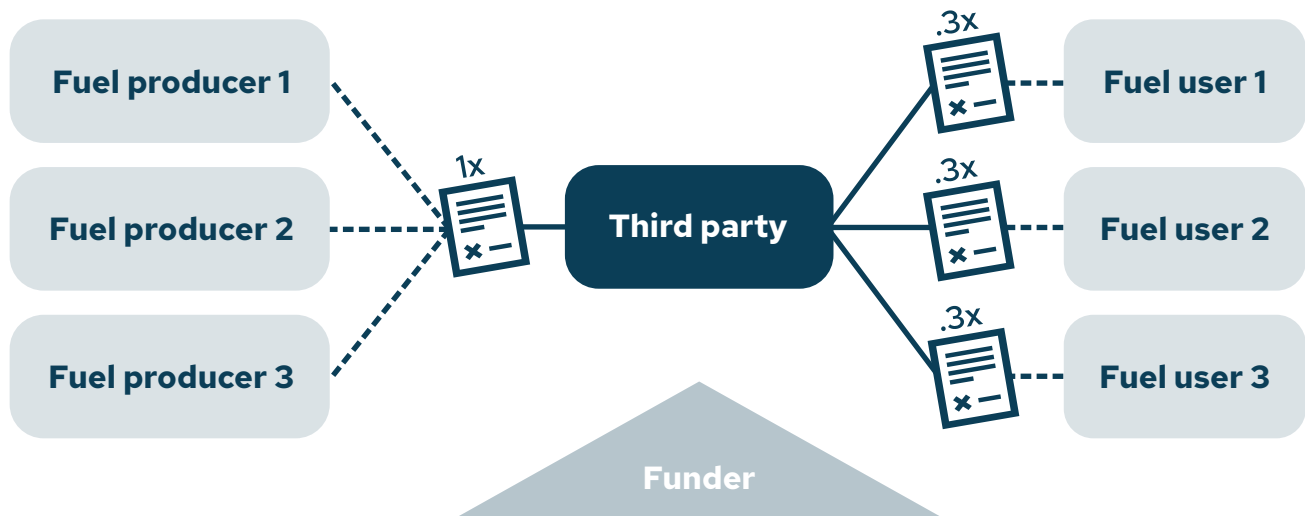
Market maker schemes

Another option is for governments, quasi-governmental entities, multilateral institutions or even ports to buy the fuel, with a view to kickstarting supply in their area of operation.

An emerging model for such initiatives is the “double auction” employed by the H2Global scheme established by the German government.

9 Cf. agreements signed by *Trammo* and *Air Products*, among others

Figure 7: Schematic of double auction-based market making scheme



In a double auction, the third party runs two competitions – one for a contract to supply the zero-emission fuel and a second to buy the fuel. While the fuel contract is aligned with conventional offtake requirements, the fuel is sold on a short-term basis and/or in small quantities. The fuel supplier with the lowest price bid wins the supply contract, while the end users with the highest price bids win the fuel. Given the current gap between the cost of hydrogen-based fuels and existing solutions, a gap between the price of the fuel and what end users are willing to pay is anticipated. In this case, the gap is filled by a public grant, industry, or philanthropic funds.

A double auction model offers multiple benefits. However, there are challenges that would need to be tackled for it to be a major accelerator of zero-emission fuel supply in shipping. Some of these can be exemplified by the H2Global pilot auction:

- **Cross-sectoral competition:** Shipping faces a higher cost gap than other end users of green methanol and ammonia, such as fertilisers or chemicals. In an open competition, there is a risk that shipping will be outbid for supply by these other sectors. A solution to this problem would be to hold shipping-specific auctions, open only to the shipping sector.
- **Scale:** The budget for the pilot auction was €40m per year; at current green ammonia prices, this was sufficient to procure around 40,000 tonnes per year of green ammonia, which will be sold in batches of 500 tonnes per year.¹⁰ Just one large ammonia-powered containership could consume around 40,000 tonnes of ammonia per year;¹¹ as such, to meaningfully support the adoption of zero-emission fuel in shipping, the scale of both the funding and batches in such schemes would need to be significantly increased.
- **Duration of sales contracts:** The batches will be sold in annual auctions. Annual supply may make investment in new bunkering infrastructure more challenging, by leaving uncertainty about the ongoing demand for these long-lived assets. As such, it could limit bunkering to

¹⁰ This is the guaranteed minimum volume that H2Global will be supplied under the purchase agreement with the supplier Fertigllobe, once the facility reaches full capacity in 2028. H2Global has the option to obtain additional volumes of between 17,500 and 33,000 tonnes above this minimum. Cf. *Shaping the global energy transition* (sanity.io)

¹¹ Based on *Fourth IMO Greenhouse Gas Study* data, with assumed energy efficiency improvement

areas with existing infrastructure. To support new investments and broaden the availability of the fuels, the duration of supply contracts may need to more closely align with infrastructure investment horizons.

While initiated by the German government, H2Global is envisaged as a platform that can be used by different governments and organisations. The focus, level of funding, batch sizes, and duration of sales contracts are parameters determined by the funder, creating an opportunity to support access to market making by shipping.

With national governments often struggling to make a case for financially supporting the decarbonisation of international shipping, an obvious challenge is funding an auction for shipping. One solution could be for pairs of governments to collaborate on an auction, sharing the financial burden; this could include governments on either end of a green corridor or an exporter and importer of zero-emission fuel. The Australian and German governments are currently exploring the potential to hold a bilateral auction under H2Global, which could provide a model to be rolled out and replicated in shipping. Another solution could be to leverage philanthropic funding to cover part of the cost of an auction.












Finally, while third-party measures are likely to be relevant for the entire shipping industry, some segments may be more dependent on third-party measures for early access to supply than others. For example, with their ad hoc and seasonal operational profile, and price-sensitive cargo, it can be argued that grain carriers would have significant obstacles to aggregating fuel demand without third-party measures. While container shipping has a regular operational profile and transports high-value consumer goods, it faces high scrutiny around its competitiveness, which may make the collaboration associated with demand-led action challenging; as such, it may also have a strong case for third-party measures. In contrast, methanol and ammonia carriers should have access to both supply of zero-emission fuel and infrastructure via their cargo, and thus have a generally limited need for this sort of support.

Summary and next steps

Fuel demand aggregation can play an important role in accelerating the availability and use of zero-emission fuels in shipping.

Multiple approaches to implementing demand aggregation are available across different actors and the pre-commercial and commercial stages. A comparison of the measures' key pros and cons and the contexts in which they may be most relevant can be found below.

Figure 8: Summary of pros and cons for surveyed fuel demand aggregation measures

Leadership	Measure	Pros	Cons	Context
Supply-led (Project developers)	 Offtake portfolio	<ul style="list-style-type: none"> Enhanced financing terms and speed 	<ul style="list-style-type: none"> Fragmented bargaining power Creditworthiness constraints Infrastructure investment case Complexity and speed 	<ul style="list-style-type: none"> Nth-of-a-kind offtakes
	 Time stacking	<ul style="list-style-type: none"> Provide short-term supply 	<ul style="list-style-type: none"> Advanced commitment premium Acceptability to financiers Complexity and speed Infrastructure investment case 	<ul style="list-style-type: none"> Further examination needed
Demand-led (Shipowners, operators, charterers, cargo owners)	 Demand signal initiative	<ul style="list-style-type: none"> Catalyse supply Network of potential fuel users 	<ul style="list-style-type: none"> Decreasing relevance as market matures 	<ul style="list-style-type: none"> Early pre-commercial stage
	 Joint procurement	<ul style="list-style-type: none"> Expediency Bargaining power Enhanced creditworthiness 	<ul style="list-style-type: none"> Legal complexity and lead in Collaboration culture 	<ul style="list-style-type: none"> Small green corridors Offtake portfolios
	 Green joint venture	<ul style="list-style-type: none"> Deeper risk/reward sharing Enhanced creditworthiness and financial capacity Holistic experience of zero-emission fuels 	<ul style="list-style-type: none"> High legal complexity and lead in Wider strategic decision 	<ul style="list-style-type: none"> Green corridor initiatives Complex value chains
	 Zero-emission fuel procurement vehicle	<ul style="list-style-type: none"> Expediency Bargaining power Catalyse supply Directional alignment Enhanced creditworthiness 	<ul style="list-style-type: none"> Legal complexity and lead in Collaboration culture 	<ul style="list-style-type: none"> Green corridor initiatives Port-centric consortia Large scale fuel procurement
	 Zero-emission shipping buyers alliance	<ul style="list-style-type: none"> Reduce cost gap Existing opportunities (ZEMBA) 	<ul style="list-style-type: none"> Currently limited to container Complex interaction with offtakes 	<ul style="list-style-type: none"> Timing, volume, and contract duration aligned with market Filling out demand on green corridor
Third party-led (Governments, ports, traders)	 Hydrogen hub	<ul style="list-style-type: none"> Connect supply and demand sides Infrastructure coordination Funding opportunities 	<ul style="list-style-type: none"> Low visibility of shipping 	<ul style="list-style-type: none"> Pre-commercial stage Hydrogen hubs at/near ports
	 Match-making	<ul style="list-style-type: none"> Connect supply and demand sides On-ramp to commercial demand aggregation 	-	<ul style="list-style-type: none"> Pre-commercial stage Ports aiming to import SZEZ Government-owned ports Governments with hydrogen targets
	 Zero-emission fuel trading	<ul style="list-style-type: none"> Provide short-term, smaller-scale supply Offtake off balance sheet Sidestep anti-trust issues Accelerate market development Leverage existing capacity and expertise 	<ul style="list-style-type: none"> Risk appetite Risk premium 	<ul style="list-style-type: none"> Surplus volumes at key ports
	 Market-making	<ul style="list-style-type: none"> Provide short-term, smaller-scale supply Offtake off balance sheet Sidestep anti-trust issues Bulk buying Reduce cost gap Accelerate market development Existing mechanism 	<ul style="list-style-type: none"> Cross-sectoral competition Scale of funding Batch sizes Infrastructure investment case 	<ul style="list-style-type: none"> Shipping-specific auctions Bilateral funding

Given the urgency of reaching the IMO’s 2030 zero-emission fuel target, stakeholders should begin exploring opportunities to aggregate demand in their specific contexts as soon as possible. Due to their potential to play a leading role, coupled with often limited experience with zero-emission marine fuels, ports and governments in particular should act fast and intensify their engagement with demand aggregation. Suggested actions they - and others - can take to begin this journey can be found in the box below:

Next steps for progressing zero-emission fuel demand aggregation across the value chain

Governments

- Include demand aggregation as a component in policies to support commercial implementation of zero-emission shipping, alongside regulation, subsidies, and research, development and demonstration programmes
- Consider differences between shipping segments, how demand aggregation may interact with regulations and subsidies, as well as opportunities to combine shipping and land-side demand, when designing policy interventions

Ports

- Explore the potential to support pre-commercial action through engagement with customers and reflection on likely position in the hydrogen economy; this can help clarify ports' role in any commercial action

NGOs

- Leverage the potential to act as a convenor on demand aggregation, from exploratory discussions through to pre-commercial and even commercial action

Shipping companies

- Assess the need for participating in fuel demand aggregation efforts against commercial strategy and transition plans
- Assess the legal and commercial feasibility of demand-led measures
- Seek opportunities to engage in testing real-world feasibility - e.g., through green corridors

Green corridor initiatives

- Evaluate the need and opportunities for fuel demand aggregation as part of the corridor's feasibility assessments and implementation planning
- Share learnings related to demand aggregation to help roll out effective practices

Finance

- For commercial banks and investors – take a proactive role in supporting supply-led action, including time stacking
- For investment and development banks – explore opportunities to broaden access to zero-emission fuel through credit enhancement and/or market making for shipping
- For philanthropic investors – consider the potential to support convening organisations and/or financially contribute to zero-emission buyers alliances and market making efforts