Demand potential for alternative fuels on the Rotterdam-Singapore Green & Digital Shipping Corridor

Accelerating the switch to sustainable fuels for maritime container shipping

19 September 2024

The partners on the Rotterdam-Singapore Green Corridor are committed to achieving early commercialization of sustainable fuels and accelerating the fuel switch.
This publication shows the potential demand for sustainable fuels coming from the partners, and the conditions to make this reality.

CONTEXT

GREEN CORRIDOR (GC) AIMS TO ACCELERATE THE FUEL SWITCH

- *100,000 commercial vessels operate globally*
- *Around 300 million tons of fuel consumption annually*
- *Causing ~3% of global carbon emissions*
- *While trade is expected to grow in this hard to abate sector*

The Port of Rotterdam, MPA and its partners in the Green Corridor are dedicated to take a leading role in reaching international ambitions of IMO and the EU.

The Rotterdam-Singapore Green Corridor aims to accelerate and facilitate the fuel switch by jointly solving technical, regulatory and financial barriers

Aiming for a 20% share of sustainable fuels* on our corridor in 2030 to achieve IMO's strengthened ambition to reduce Green House Gas (GHG) emissions by 20%, striving for 30% in 2030

**Sustainable fuels in the Green Corridor are defined on page 4 of this document*

In 2028 GC partners are expected to have >200 vessels capable of sailing on sustainable fuels, for now being methane and methanol. This translates into a total potential demand of >2.5 million p.a. for both fuels. However, these are all dual fuel vessels and commitments on sustainable fuel offtake are hard to make.

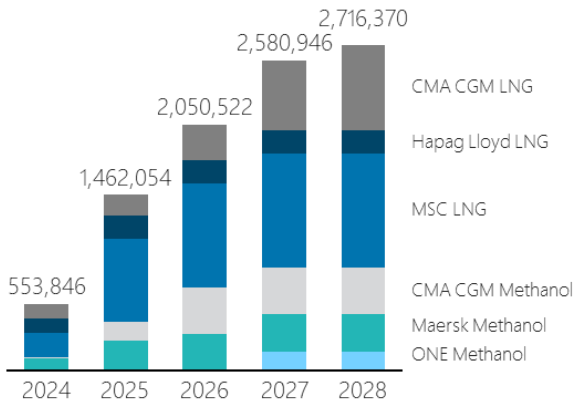
THE OPPORTUNITY

In 2028, the GC partners will have **>200 vessels, larger than 8,000 TEU**, capable of sailing on methane or methanol globally

~25% of the GC partner vessel capacity could sail on sustainable fuels in 2030

Sustainable Fuel Fleet Capacity GC Partners

Cumulative TEU capacity order book of container vessels >8,000 TEU (million TEU)



Vessel updates considered up to1 September 2024.

Sources: IHS Seaweb, Clarksons, GC partner input

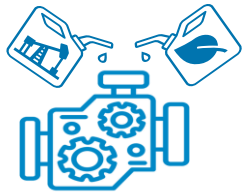
Potential **bio-/e-methane** demand from the order book is estimated between 1.5 – 2.1 million tonnes p.a. in 2030. Including existing demand, estimated **total potential demand is 3 million per annum.**

Potential **bio-/e-methanol** demand is estimated between 2.2 – 3 million tonnes p.a. in 2030. Including existing demand, the estimated **total potential demand sums up to 2.6 million per annum**

This is ~2% of the annual fuel consumption of vessels >5,000 Gross Tonnage (IMO 2022)

These vessels are all DUAL FUEL

- These vessel can switch between fuels
- Making the demand highly uncertain
- Ensuring availability of affordable is sustainable fuels is essential



Current demand estimates are based on the orderbook of new vessels within members of the consortium. The corridor remains committed to supporting ammonia as a fuel pathway for international shipping

The commitments of shipping liners are limited due to significant challenges in affordability, availability and acceptability. One of the biggest bottlenecks is the price of sustainable fuels, which creates a chicken-and-egg problem between demand and supply.

COMPLICATIONS & CHALLENGES

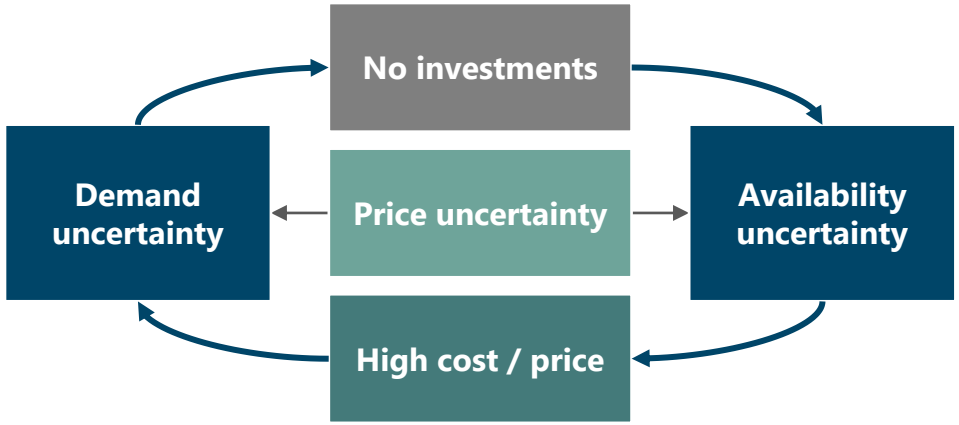
Key challenges that **limit shipping liners to make far-reaching commitments** to operate these vessels on sustainable fuels

Acceptability: Uncertainty surrounding the policy & regulatory implementation, enforcement, support mechanisms and certification processes. Visibility and certainty on regulation and certification topics are crucial to develop low carbon fuels supply chains and stimulate the uptake.

Affordability: Sustainable fuels are 2-3 times more expensive than fossil fuels and make up 75-90% of the Total Cost of Ownership (TCO) for container vessels.* This is a massive financial hurdle.

Availability: Limited available volumes and maturity of the market lead to high price (uncertainty), while competition from other sectors add uncertainty

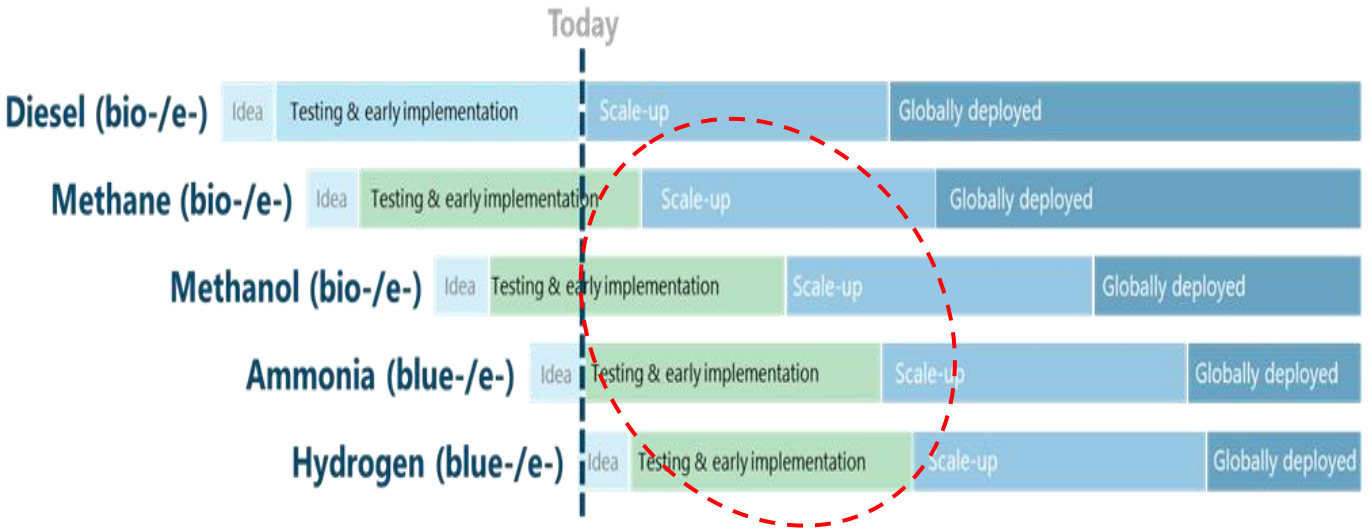
One of the biggest challenges is the price of sustainable fuels, creating a **chicken-and-egg problem between demand and supply** limiting investments in fuel production capacity, consequently hindering the potential of economies of scale



*Source: UMAS Cost of zero emissions container freight shipping: a study on selected deep-sea and short-sea routes , December 2023

The Green Corridor is pursuing a multi-fuel strategy of which (bio-/e)methane and (bio-/e-)methanol are most mature. Both ammonia & hydrogen are currently not in the order books of our partners, but these fuels are expected to experience similar challenges. Lessons learnt and mechanisms currently under development can be applied to these fuels in the future.

- **The Green Corridor is solution-agnostic regarding decarbonization, as the key drivers are the sustainability and GHG reduction potential of the fuel solution.**
- In the multi-fuel future of shipping, every fuel has its own path for development.
- Our focus for (bio-/e) methane and (bio-/e-) methanol is on scaling availability and improving affordability under efficient and transparent certification schemes and regulatory procedures.
- Both ammonia & hydrogen are not in the container vessel order books of our partners as the application of the fuel and engine technology needs to be matured.
- The corridor remains committed to supporting these fuel pathways for international shipping. **The focus in the upcoming years is on technology advancement, testing and implementation.**
- Fuels will most likely experience similar challenges in the scale-up phase. **Lessons learnt and support structures developed should be leveraged for all other sustainable future fuels.**



These significant challenges limit the commitments shipping liners can make. Supply and demand of sustainable fuels needs to be matched and supported to stimulate uptake and provide offtake certainty for investment by fuel producers. Shipping-specific dynamics need to be considered.

Supply and demand need to be matched and supported now

The cost gap needs to be closed while understanding maritime dynamics

- Limited continuity caused by intermittent demand and fuel consumption uncertainty
- Multiple unique steps in the maritime fuel supply chain which need to be coordinated add to complexity
- Specific maritime fuel procurement dynamics requires attention
- Uncertainty and potential of carbon leakage due to international nature of shipping and deployment flexibility
- Regulations highly influence demand and its location

Liner perspective:
Liners have to take commercial decisions in a highly competitive international market, dealing with global and local compliance and high uncertainty on investment decisions.

Fuel suppliers need investable demand now to ensure timely availability

- Fuel production requires large investments and build out takes ~5-7 years from initial development plan to operational production.
- These investments require offtake certainty for more than 10 years
- Feedstock availability and production capacity are limited
- Investments need to accelerate now as we need to prepare for scale

Supplier perspective:
Current demand based on the potential use of future vessels is not sufficient for a supplier to invest in production capacity

A possible solution is to create a market-place that can aggregate and connect supply and demand while including means to bridge the cost gap. The availability and affordability are expected to improve if such a structure arranges competitive matchmaking while addressing both the maritime specific demand and the supply considerations and timelines.

POSSIBLE SOLUTIONS

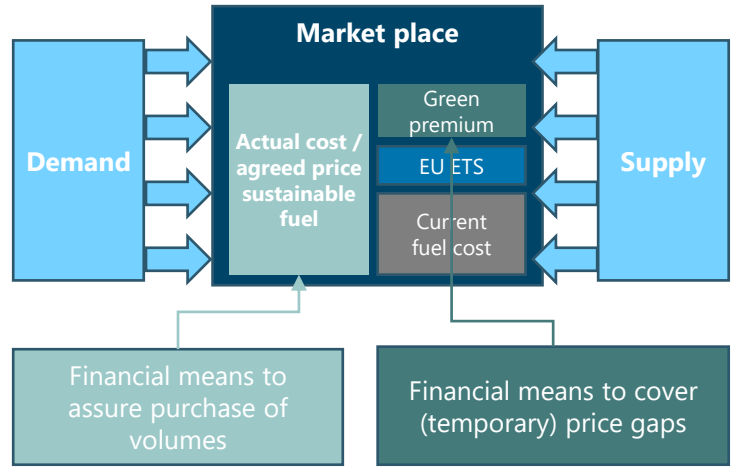
We need to create the conditions to overcome the chicken-and-egg problem and get **long-term sustainable fuel offtake agreements and projects reaching FID**

A solution is to **create an accessible market-place that can aggregate and connect supply and demand that includes means to bridge the cost gap**

The structure would arrange **competitive matchmaking** and address both the demand and the supply considerations and timelines, which **requires support from the private and public sector**

Supply-demand matchmaking

Competitive Mechanism	**Stimulate Demand**	**Secure & Scale Supply**
Transparent and competitive matchmaking of supply-demand and timelines	*Actively address and stimulate continuous demand and leverage the willingness to pay of shipping liners & their customers*	*Involve, stimulate and secure long-term offtake while considering supplier success factors*



Green Corridor calls for timely and dedicated support to scale up sustainable fuel production capacity for shipping in a timely manner, while continuing the joint efforts on improving the availability, affordability and acceptability of sustainable fuels.

ASK & ACTION

Required support

1. Ringfenced funds and OPEX subsidy for maritime shipping from public support funds
2. Public support and value chain collaboration to test and develop demand driven mechanisms catered towards shipping
3. Ambitious regulatory regimes that create a level playing field and provide long-term perspective

Green Corridor actions

1. Physical pilots to achieve operations, safety and certification standards
2. Identify, develop and mobilize commercial structures & funding options for early commercialization
3. Leverage knowledge and learnings for wider decarbonization

Please reach out to us if you want to explore and discuss the options to advance our initiative

energy&industry@portofrotterdam.com

Partners of the Green Corridor Rotterdam-Singapore: