

# 國際海事發展諮詢會議

## 「綠色海運走廊與淨零碳排之推動成果」

報告人  
吳巨聖  
裕民航運

# Green Corridor

## Our JIP vs Global Shipping Initiatives

**JIP 2017-2018**

### LNG-fuelled Newcastlemax for the "Green Corridor"

With DNV GL as project manager, a joint industry project (JIP) between key stakeholders operating in the "Green Corridor" bulk carrier trade between Australia and China has developed an LNG-fuelled Newcastlemax design as well as solutions for possible retrofits of dual fuel onto existing Newcastlemaxes. The solutions in this design are state of the art, yet well proven to make the design possible to order and build before the new sulphur limit of 0.5 per cent enters into force in 2020. The design had been presented at the Nor-Shipping exhibition in Oslo, Norway, in June 2017.



### Green Corridor JIP takes LNG propulsion to the next level

Now heading into Phase 2, the Green Corridor joint industry project (JIP) is looking to build on the success of their Newcastlemax design and bump it up to the VLOC level.

🕒 8 Minutes 📅 15 June, 2017 ➦ share 🖨️ Print

[LNG-fuelled Newcastlemax for the "Green Corridor" - DNV](#)

🕒 5 Minutes 📅 02 June, 2018 ➦ share 🖨️ Print

**COP26 Nov. 2021**



### Group of 19 countries unveil 'green corridor' plan at COP26

International deal to launch zero-emission shipping routes between ports as way of demonstrating that maritime decarbonisation is possible

10 November 2021 11:48 GMT UPDATED 10 November 2021 16:34 GMT

By **Paul Berrill** 📍 in **London**

[Group of 19 countries unveil 'green corridor' plan at COP26 | TradeWinds \(tradewindsnews.com\)](#)



U-Ming's Green Strategy in 2017

# Joint Industry Project 2017/2018

# "Green strategy" from U-Ming (2017)



# Joint Industry Project Green Corridor - Partners



Cargo owners:



Ship owners:



Mitsui O.S.K. Lines



U-MING  
MARINE

Designer:



woodside

Class:



LNG supplier:

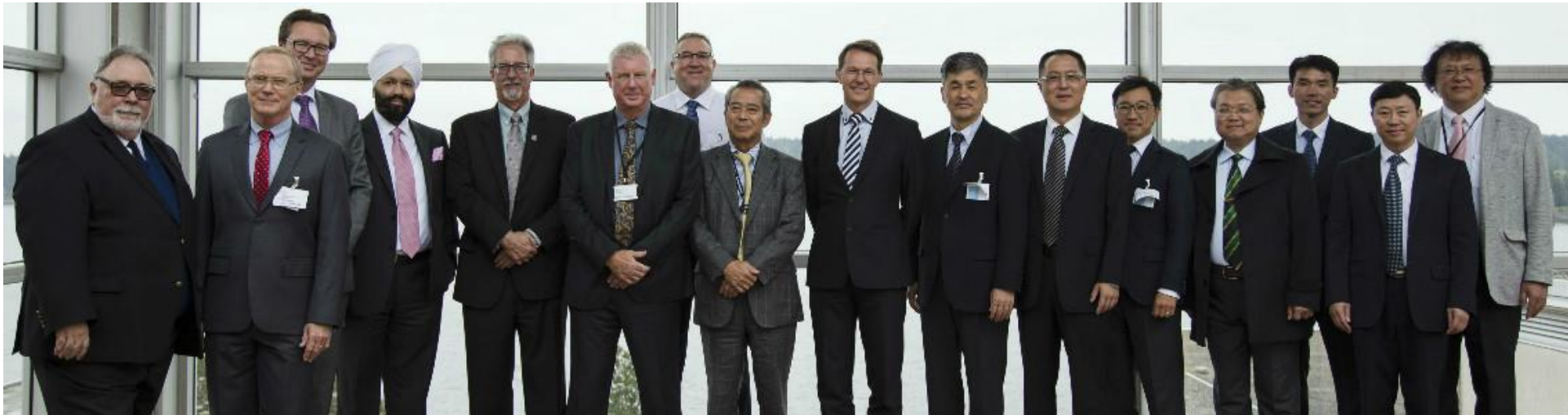


# Kick-off on 30<sup>th</sup> Oct. 2017



# Background

- IMO agreed to reduce the global fuel with sulphur limit to 0.5% since 1 Jan. 2020, therefore, shipowners need careful considerations about future marine fuel selection.
- LNG supplier in Western Australia demonstrated its commitment and support to LNG as marine fuel.
- More compelling business case, series of ships, there has been noted a heightened interest in LNG fueled bulk carriers by charter



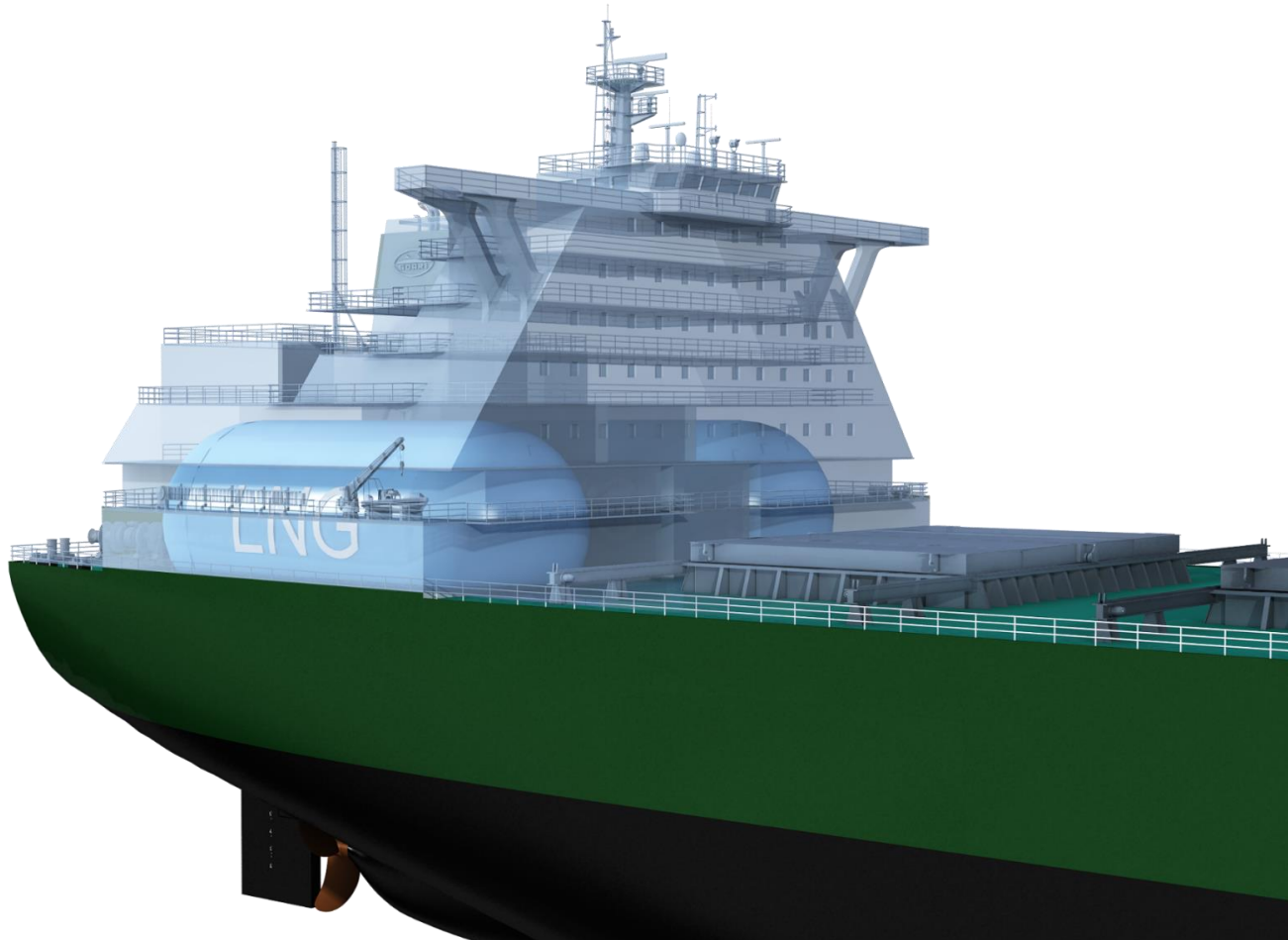
# Key objectives

- To assess the business case of LNG as fuel for Newcastlemax bulkers operating in Australia under various pricing scenarios including alignment of the bunker supply chain
- To develop an efficient and practical LNG-fuelled Newcastlemax concept design to a level where it will get an Approval in Principle (AiP) and where owners may start to negotiate orders from yards based on this design
- To bring together key stakeholders to address common challenges and position Australia at the forefront of developments in LNG fuelled shipping

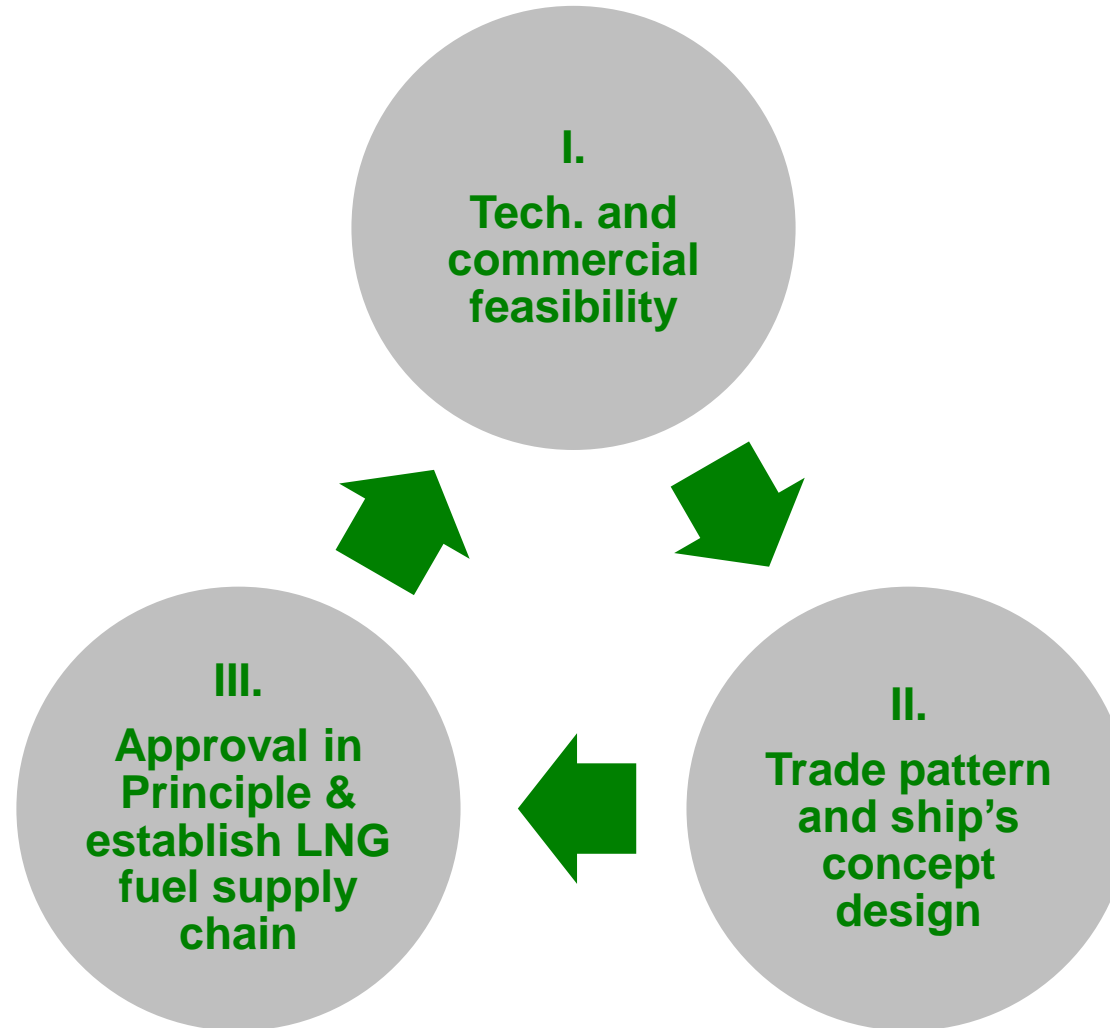




# Key element – 2 sets 3,000 m<sup>3</sup> LNG fuel tanks



# Scope of work



# GC 210K full spec. and drawings are ready (Jul. 2018)

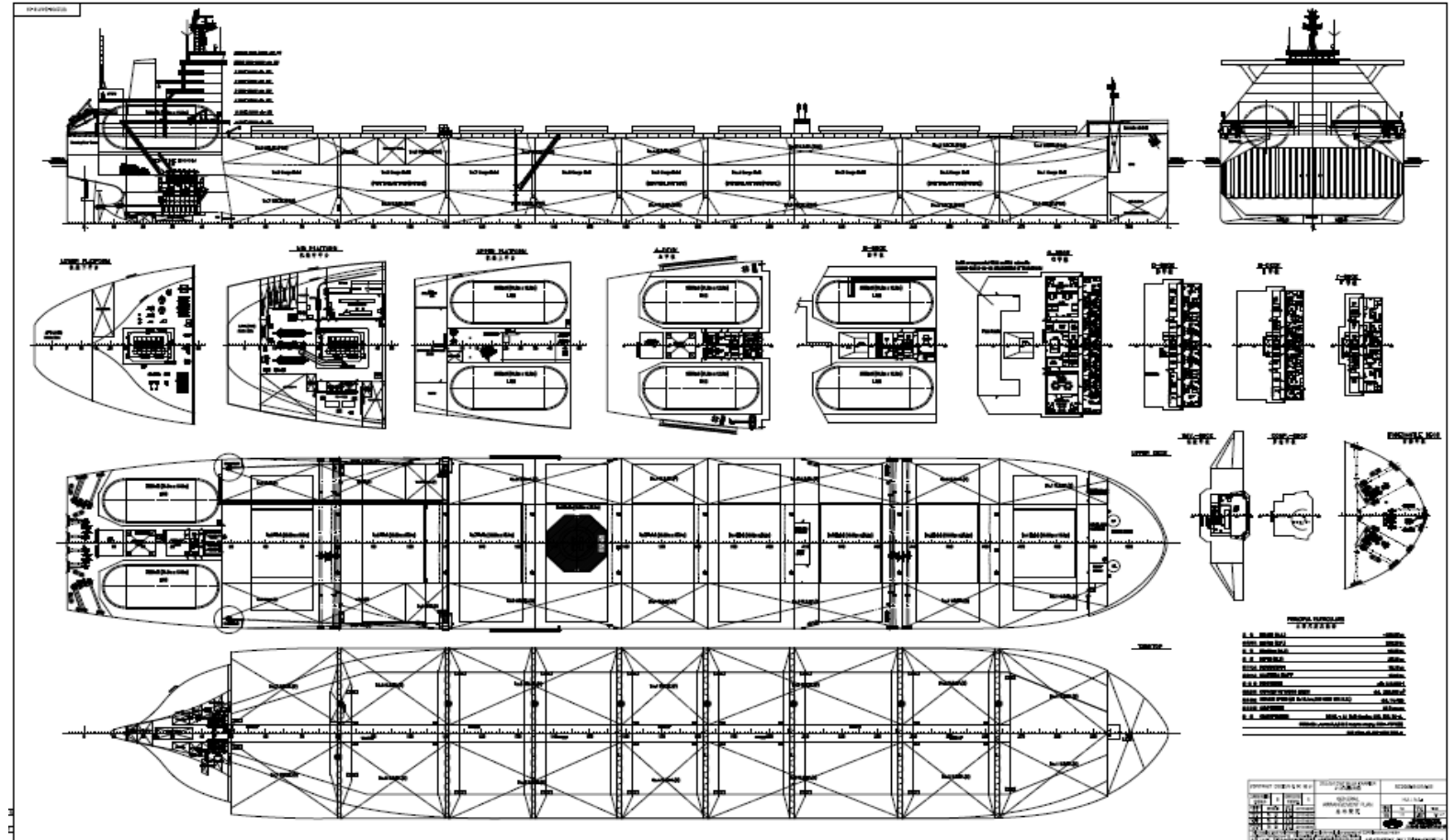


3D rendering of the GC 210K Dual Fuel Bulk Carrier ship, showing the hull and deck structure.

CONTRACT DESIGN 合同设计		210,000DWT DUAL FUEL BULK CARRIER 210,000 吨双燃料散货船		SC4745-010-025M	
CURRENT REVISION C.2	CURRENT STATUS S	FULL SPECIFICATION 全船技术规格书		HULL NO.:	
REVISION 修改	DATE 日期	2018.07.04		2018.07.04	
CG	DATE	2018.07.04		2018.07.04	
CG	DATE	2018.07.04		2018.07.04	
CG	DATE	2018.07.04		2018.07.04	

SHANGHAI MERCHANT SHIP DESIGN & RESEARCH INSTITUTE  
上海船舶研究设计院

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# Video – U-Ming 190K LNG DF bulk carrier





COP, UN, APEC, Global Shipping initiatives

# Green Shipping Corridor since Nov. 2021



# Green Shipping Corridor

- The first framework agreement to **create green shipping corridors between two or more port pairs** at the COP26 climate talks.
- Initially, a coalition of **24(19) countries**, signatories to the declaration include **Australia, Belgium, Canada, Chile, Costa Rica, Denmark, Fiji, Finland, France, Germany, Ireland, Italy, Japan, the Marshall Islands, Morocco, Netherlands, New Zealand, Norway, Palau, Singapore, Spain, Sweden, UK and USA.** up to 13 April 2022.
- Defined the corridors as **zero-emission maritime routes.**
- Mission is "a collective aim to support the establishment of **at least six green corridors by the middle of this decade**"<sup>14</sup>

Policy paper

## COP 26: Clydebank Declaration for green shipping corridors

Updated 13 April 2022

[COP 26: Clydebank Declaration for green shipping corridors - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/policies/cop-26-clydebank-declaration-for-green-shipping-corridors)



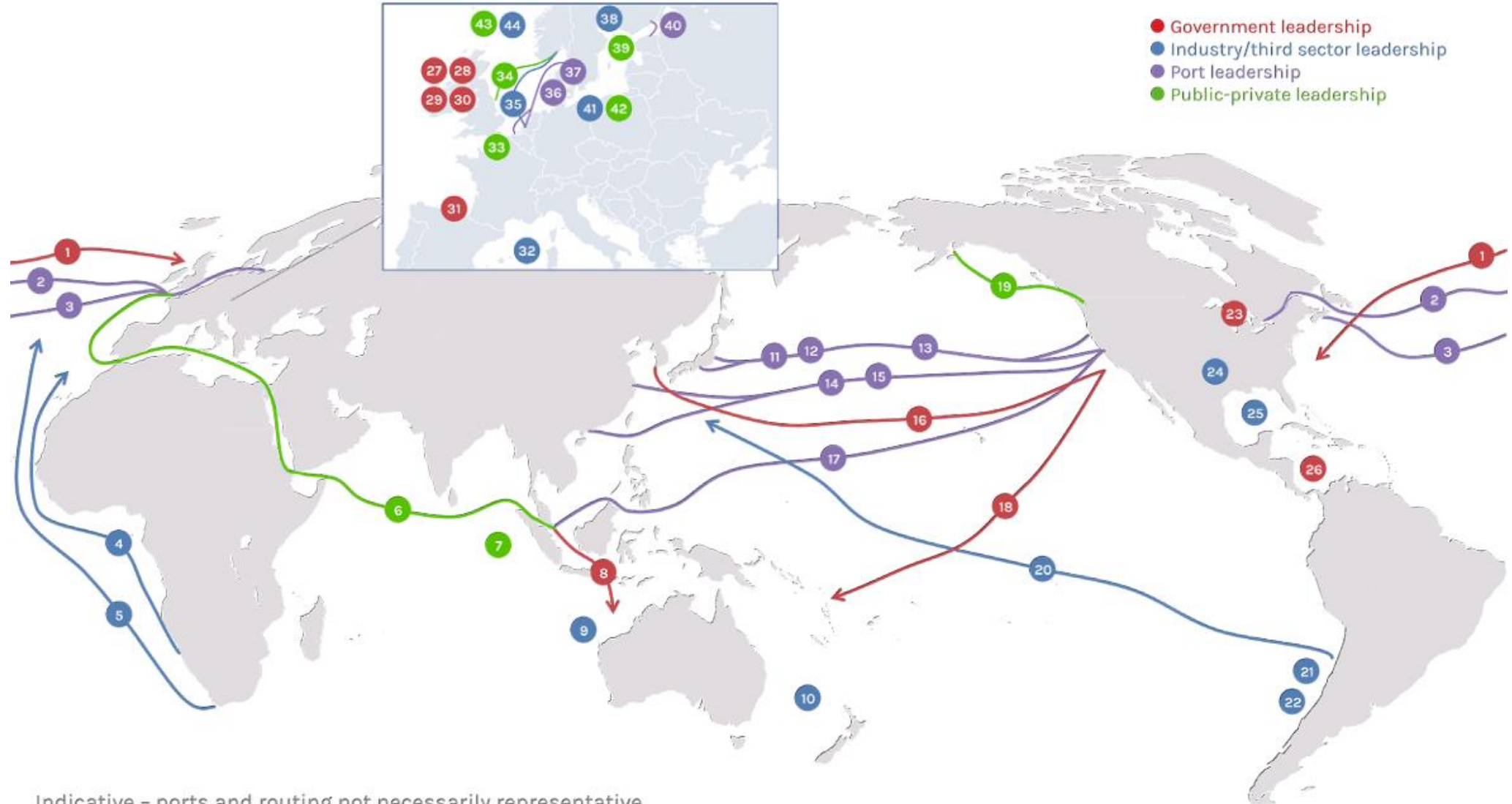
### Group of 19 countries unveil 'green corridor' plan at COP26

International deal to launch zero-emission shipping routes between ports as way of demonstrating that maritime decarbonisation is possible

10 November 2021 11:48 GMT UPDATED: 10 November 2021 16:34 GMT

By **Paul Berrill** in **London**

# At least 44 initiatives from 171 stakeholders (Dec. 2023)

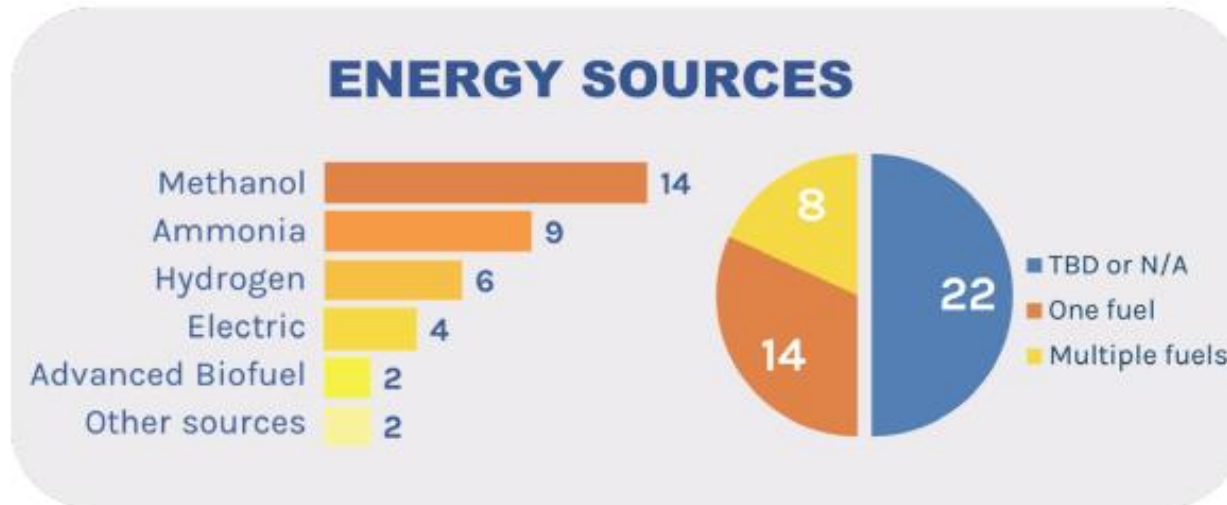


Indicative – ports and routing not necessarily representative

# The 44 corridors

1. US-UK Taskforce
2. Antwerp-Montreal
3. Halifax-Hamburg
4. Namibia-EU
5. South Africa - Europe Iron Ore
6. Rotterdam-Singapore
7. The Silk Alliance
8. Singapore-Australia
9. Western Australia-North Asia Iron Ore
10. Australia-New Zealand
11. Oakland-Yokohama
12. LA-Nagoya
13. LA-Yokohama
14. LA-Guangzhou
15. LA-Long Beach-Shanghai
16. Republic of Korea-United States
17. LA/Long Beach-Singapore
18. US-Fiji-Pacific Blue Shipping Partnership
19. Pacific Northwest to Alaska
20. Chile Cu-Concentrate
21. Chile Piscocultura
22. Chile sulfuric acid
23. Canada-US Great Lakes- St Lawrence
24. US Green Bulk
25. Gulf of Mexico
26. US and Panama
27. UK-Belgium
28. UK-Norway
29. UK-Netherlands
30. UK-Denmark
31. Green Corridors Spain
32. La Méridionale
33. Dover-Calais/Dunkirk Ferry
34. H2 powered North Sea crossing
35. Oslo-Rotterdam
36. Gothenburg - Rotterdam
37. Gothenburg - North Sea Port
38. Åland RoPAX
39. Decatrip
40. FIN-EST
41. European GC Network
42. Nordic Roadmap
43. Clean Tyne
44. GREENBOX

# What's the latest ?





# What's the latest ?



**12+ corridors**  
cleared a progress stage



**15 corridors**  
set operation targets  
between **2024-2030**

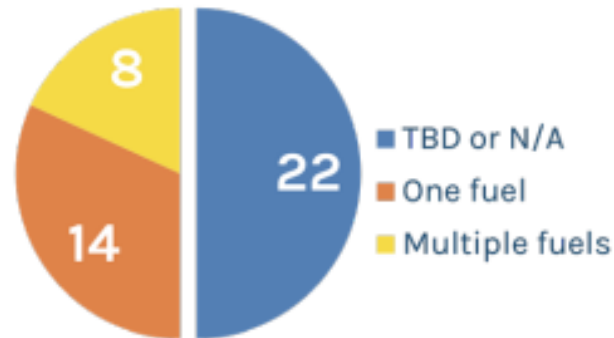


**6 corridors**  
aim for scaled pre-2030  
deployment

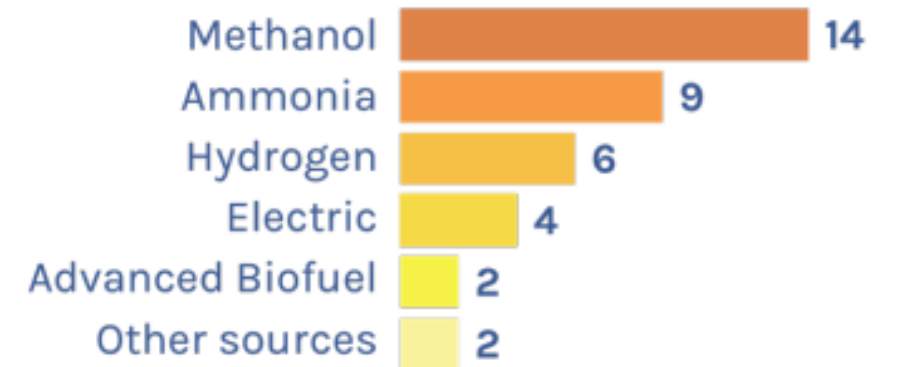


# Bottleneck – Fuel supply chain

**22 corridors**  
with specified fuel focus  
(+16 since 1<sup>st</sup> ed.)

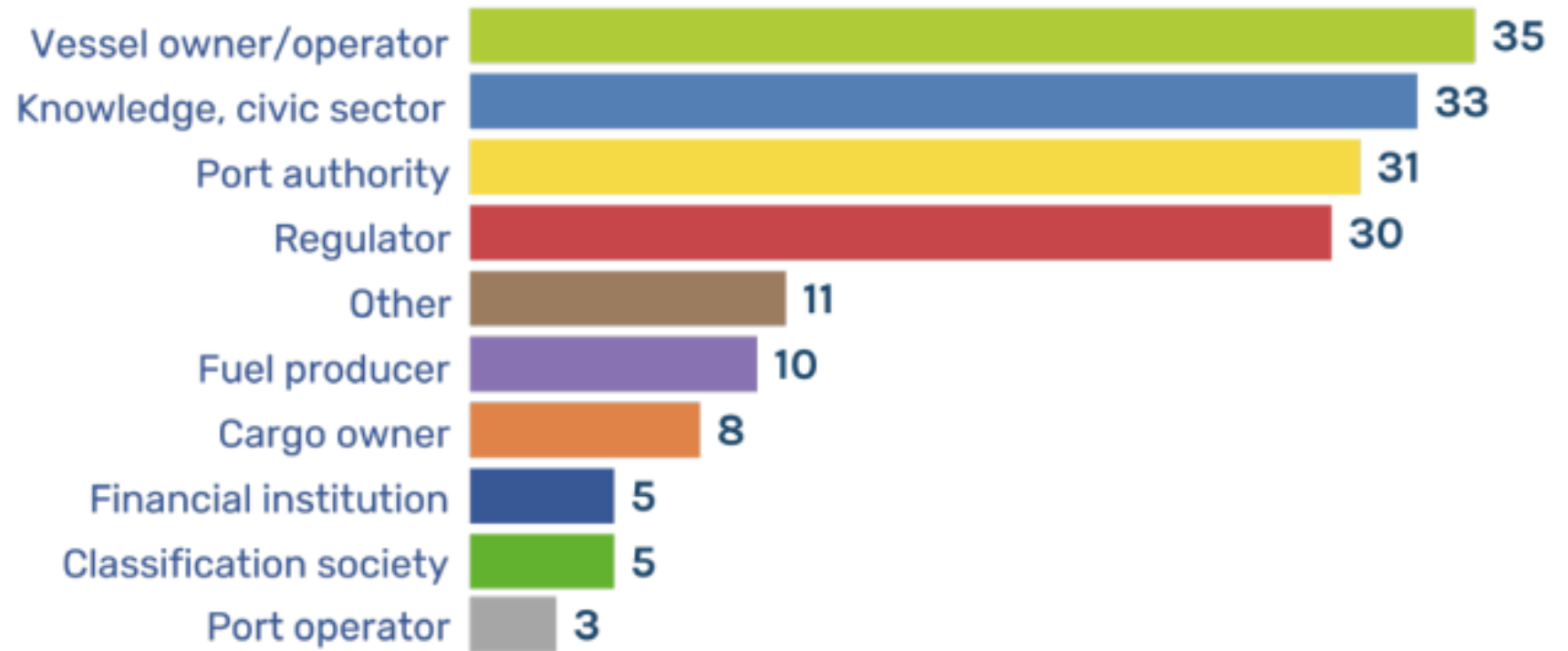


## Most considered energy sources

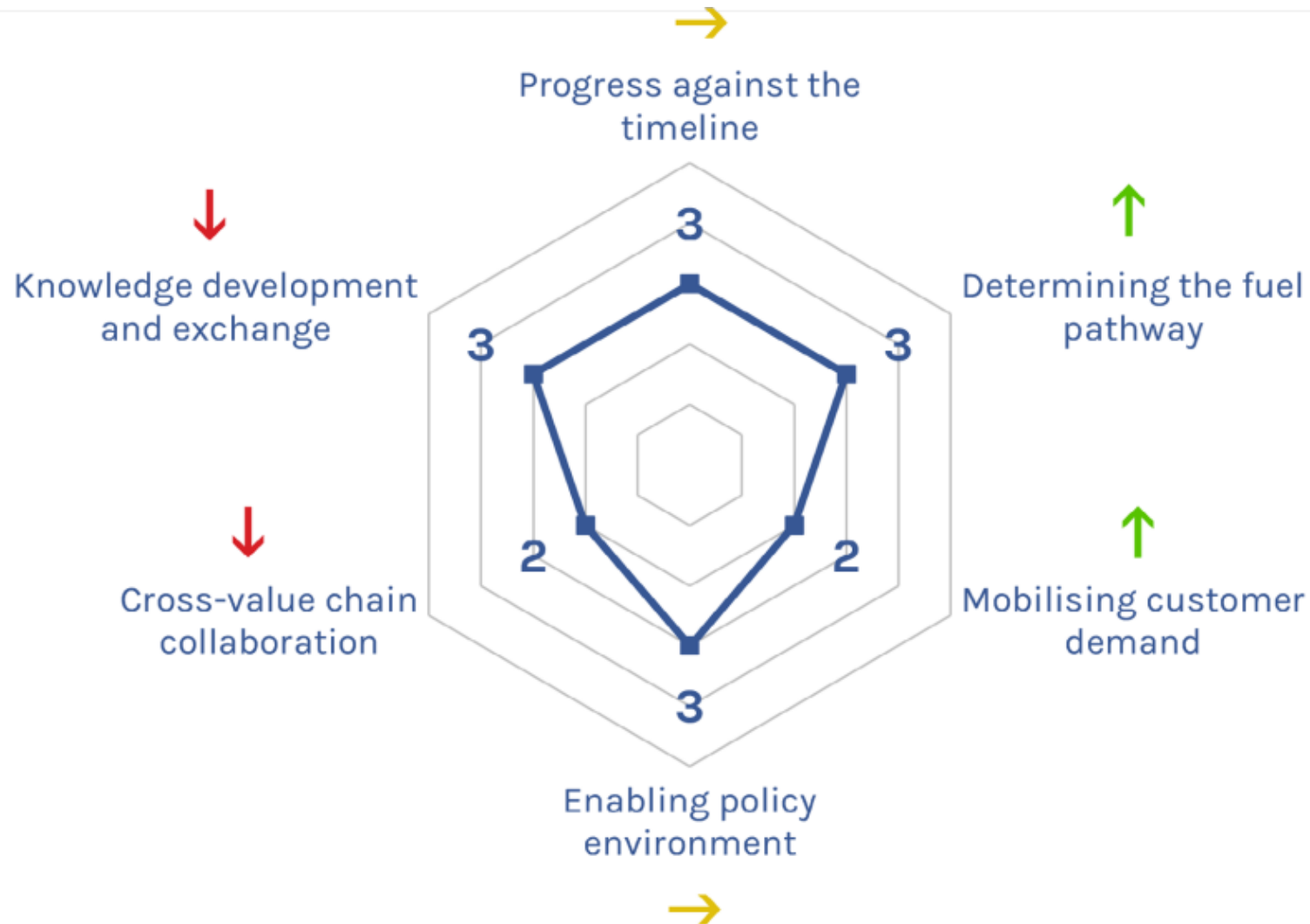


# Which org. engaged ?

**171**  
**STAKEHOLDERS**  
(+61 since 1<sup>st</sup> ed.)




# The latest status



# Publications

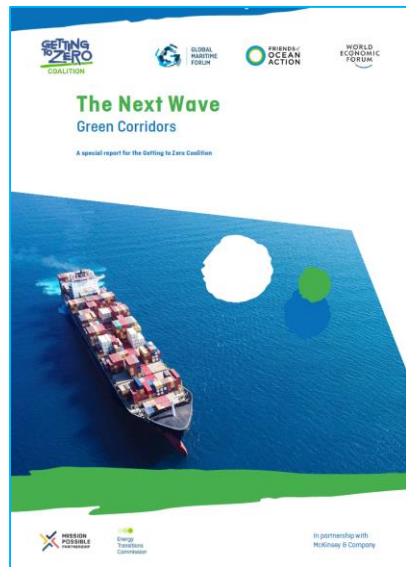
[Green Shipping Corridor Reports – Mission Innovation \(mission-innovation.net\)](https://mission-innovation.net)

ZERO-EMISSION SHIPPING

 [GREEN SHIPPING CORRIDORS](#)

2023-12

2022-11



2022-10



2022-11



2022-11



[Insight Paper on Green Corridors \(mission-innovation.net\)](https://mission-innovation.net)

[UMAS-2022-Green-Shipping-Corridors-Opportunity-Identification.pdf \(u-mas.co.uk\)](https://u-mas.co.uk)

[The-2023-Annual-Progress-Report-on-Green-Shipping-Corridors.pdf \(globalmaritimeforum.org\)](https://globalmaritimeforum.org)

# Why so many name and terms ?

Policy paper

**COP 26: Clydebank Declaration for green shipping corridors**

Updated 13 April 2022



GLOBAL  
MARITIME  
FORUM



**UMAS**

Mærsk Mc-Kinney Møller Center  
for Zero Carbon Shipping



**Getting to Zero  
Coalition**



GLOBAL  
MARITIME  
FORUM



FRIENDS of  
OCEAN  
ACTION



WORLD  
ECONOMIC  
FORUM

Zero-Emission Vessels (ZEVs)



Shanghai-LA



**First Movers  
Coalition**



# Definition of “Green Shipping Corridor”

- **Showcase zero-emission fuels and technologies along maritime trade routes between two (or more) ports.**

Policy paper

## COP 26: Clydebank Declaration for green shipping corridors

Updated 13 April 2022

- **Specific shipping routes** where the **technological, economic and regulatory feasibility** of the **operation of zero-emission ships** is catalyzed by a **combination of public and private actions**.
- **Green:** Emission-centric v.s. Technology-centric
- **Corridor:** Port-centric v.s. Route-centric v.s. Pilot/demonstration project-centric, and Programmatic/Niche market

[COP 26: Clydebank Declaration for green shipping corridors - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/cop-26-clydebank-declaration-for-green-shipping-corridors)



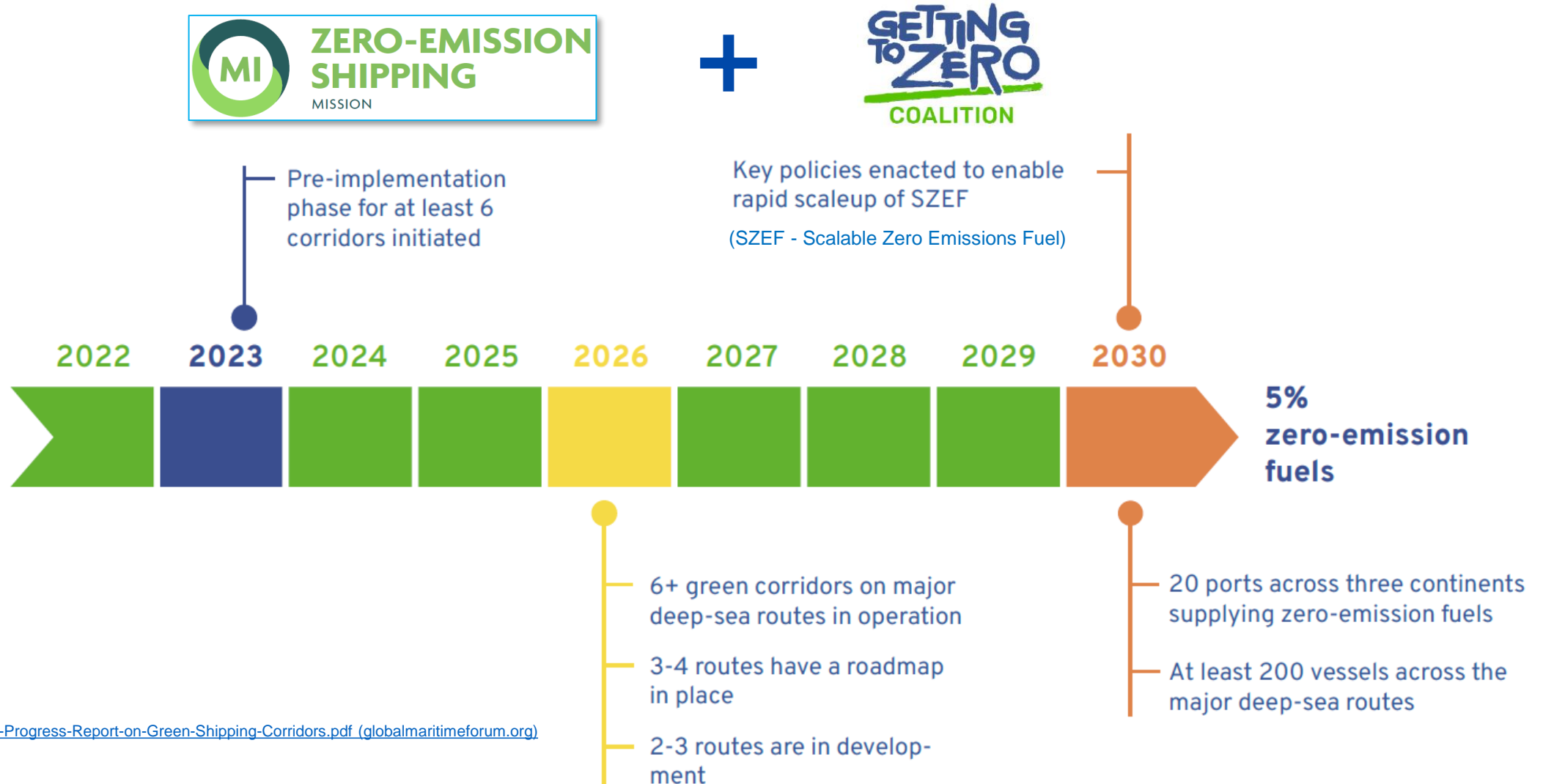
GLOBAL  
MARITIME  
FORUM

## Green Corridors: Definitions and Approaches

A Discussion paper from the Global Maritime Forum

[Discussion-paper\\_Green-Corridors-Definitions-and-Approaches.pdf \(globalmaritimeforum.org\)](https://www.globalmaritimeforum.org/discussion-paper-green-corridors-definitions-and-approaches.pdf)

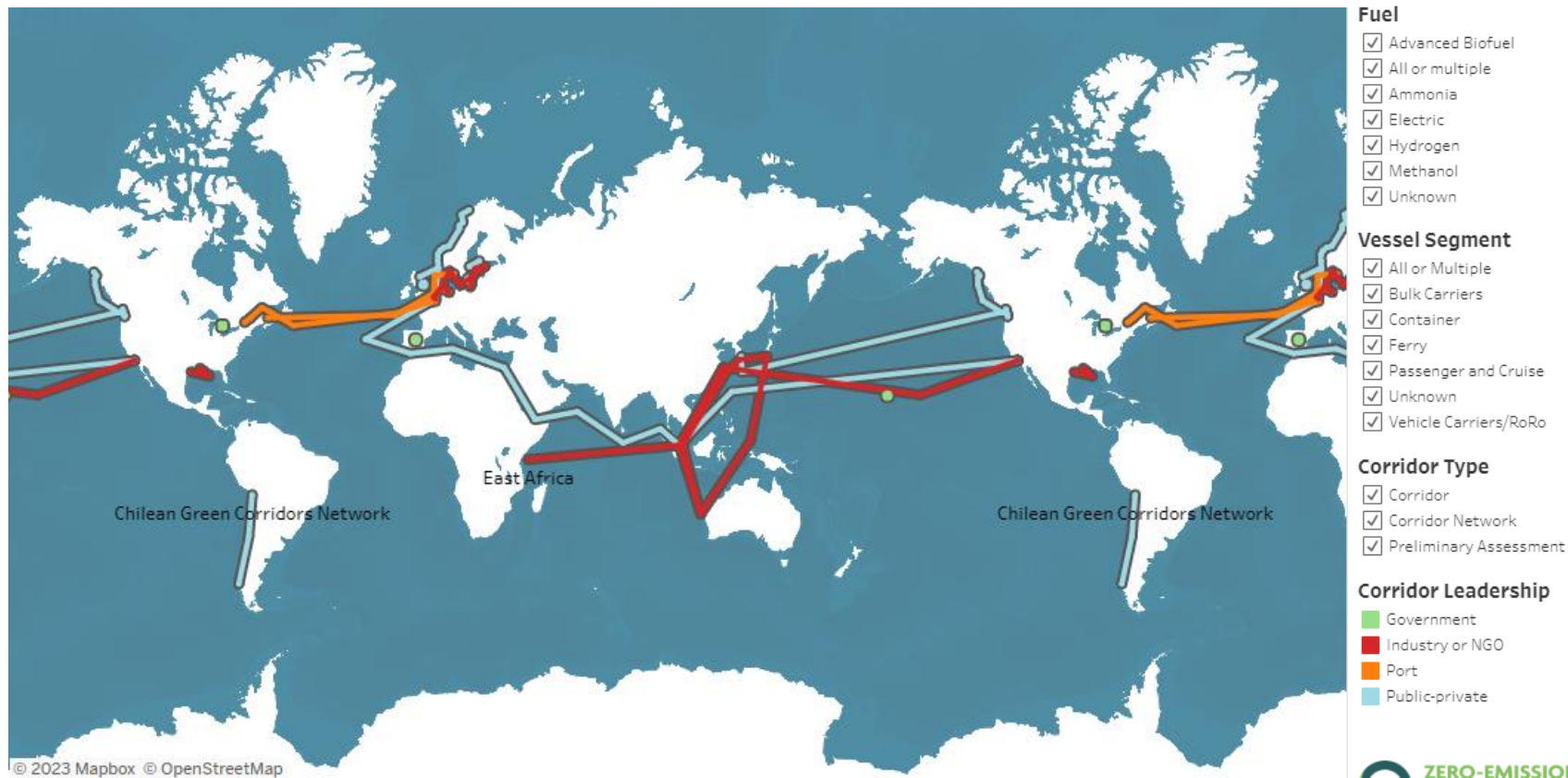
# Objectives and Goals



[The-2022-Annual-Progress-Report-on-Green-Shipping-Corridors.pdf \(globalmaritimeforum.org\)](#)

# Tool – Route tracker

An interactive map that shows the numerous **green shipping corridors** that have been **announced as under development or established**



All routes displayed are approximate. Visualization produced by the Pacific Northwest National Lab. Source data compiled by the Global Maritime Forum

at least 22  
Initiatives  
(Green  
Shipping  
Corridors)  
emerged

@2023-02



# Zero-Emission Shipping (ZESM) 2022-09 Action Plan



**ZERO-EMISSION  
SHIPPING**  
MISSION

Figure 7: Mission-led actions


● Ammonia

● Biofuels

● Hydrogen

● Methanol

S = Supporting stakeholders

Pillar	ID	Action	Fuel(s)	Timescale			Supporting Stakeholders					
				2022-2024	2024-2027	2027-2030	Maritime Industry R&D	Government/Regulators	Ship owners/operators	Ports	Fuel producers & providers	Knowledge community
<u>Cross pillar</u>	1	Create a framework for knowledge sharing between zero-emission fuel vessel stakeholders with a Mission focus on 2030	● ● ● ●	✓			S	S				S
<u>Pillar 1: Ships</u> 	2	Share knowledge from test pilot and demonstration projects (both new builds and retrofits)	● ● ● ●	✓	✓		S		S			S
	3	Share knowledge on information and best practices between ships owners, operators, and fuel suppliers	● ● ● ●	✓	✓	✓			S		S	
	4	Bring together relevant international players in order to accelerate demonstration and deployment of zero-emission fuel vessels and new ship technologies in <b>green corridors</b> , with a particular focus on obtaining experience in global supply chains	● ● ● ●	✓	✓	✓	S	S	S	S	S	S
	5	Showcase the possible support funds available for zero-emission fuel ship design from national, regional and global actors	● ● ● ●	✓	✓			S				S

# Zero-Emission Shipping (ZESM) 2022-09 Action Plan



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				2022-2024	2024-2027	2027-2030	Maritime Industry R&D	Government/Regulators	Ship owners/operators	Ports	Fuel producers & providers	Knowledge community
<u>Cross pillar</u>	1	Create a framework for knowledge sharing between zero-emission fuel vessel stakeholders with a Mission focus on 2030	● ● ● ●	✓			S	S				S
<u>Pillar 2: Fuels</u> 	6	Collect and share knowledge on performance of engines using methanol, ammonia, hydrogen, and advanced biofuels	● ● ● ●	✓	✓		S		S			S
	7	Develop and agree a methodology and framework for analyzing the impact of green shipping corridors	● ● ● ●	✓	✓			S	S	S	S	S
	8	Commercial testing and analysis to find the place on the value chain where there is willingness to pay extra for the use of renewable energy and green fuels, and where the willingness to pay is lowest	● ● ● ●	✓	✓			S	S	S	S	S
	9	Analyze the current and forecasted fuel demand at different ports to understand quantities needed for production scaling	● ● ● ●	✓	✓				S	S	S	S
	10	Develop and agree a methodology for performing well-to-wake life cycle analysis of marine fuels	● ● ● ●	✓							S	S




# Zero-Emission Shipping (ZESM)

## 2022-09 Action Plan



**ZERO-EMISSION  
SHIPPING**  
MISSION

Figure 7: Mission-led actions

<div> <span>● Ammonia</span> <span>● Biofuels</span> <span>● Hydrogen</span> <span>● Methanol</span> </div> <div>S = Supporting stakeholders</div>												
Pillar	ID	Action	Fuel(s)	Timescale			Supporting Stakeholders					
				2022-2024	2024-2027	2027-2030	Maritime Industry R&D	Government/Regulators	Ship owners/operators	Ports	Fuel producers & providers	Knowledge community
<b>Pillar 3: Fueling Infrastructure</b> 	11	Research and share barriers to community acceptance of ammonia, e.g. due to safety concerns	●		✓			S	S	S	S	S
	12	Develop global refueling plan and progress tracker covering key ports, including an overview of existing and planned infrastructure, refueling needs/demand, fuel capacity and availability, port development etc.	● ● ● ●	✓				S	S	S	S	S
	13	Identify ports and groups of ports for green corridor development	● ● ● ●	✓	✓			S	S	S	S	S
	14	Identify near term levers and policies to unlock fueling infrastructure investment	● ● ● ●	✓				S	S	S	S	S
	15	Create new business models and commercial strategies for zero-emission fuels	● ● ● ●	✓	✓			S	S	S	S	S
	16	Identify and track demand drivers for future fuels	● ● ● ●			✓		S	S	S	S	S
	17	Map existing refueling networks and demand for selected ports, including port support vehicles e.g. Container Handling Equipment	● ● ● ●	✓					S	S	S	S
	18	Identify opportunities to co-locate ammonia production and refueling infrastructure with other uses, e.g. cracking for power generation	●	✓						S	S	S

# Example of existing Green Shipping Corridors

under Mission Innovation

Zero-Emission Shipping Mission (ZESM)

# Green Shipping Corridors

## Tools – Routes Tracker, Vessel Segment - Container



**ZERO-EMISSION  
SHIPPING**  
MISSION



All routes displayed are approximate. Visualization produced by the Pacific Northwest National Lab. Source data compiled by the Global Maritime Forum

### Fuel

- ☒ Advanced Biofuel
- ☒ All or multiple
- ☒ Ammonia
- ☒ Electric
- ☒ Hydrogen
- ☒ Methanol
- ☒ Unknown

### Vessel Segment

- ☐ All or Multiple
- ☐ Bulk Carriers
- ☒ Container
- ☐ Ferry
- ☐ Passenger and Cruise
- ☐ Unknown
- ☐ Vehicle Carriers/RoRo

### Corridor Type

- ☒ Corridor
- ☒ Corridor Network
- ☒ Preliminary Assessment

### Corridor Leadership

- Industry or NGO
- Public-private

### Rotterdam-Singapore Green and Digital Corridor

Type: Corridor  
Status: Conducting route-specific feasibility assessment

Announce Year: 2022  
Led By: Public-private  
Fuel: Methanol, Ammonia  
Vessels on Route: TBD  
Ann. Fuel Demand: TBD  
Vessel Segment: Container

Participants: Port of Rotterdam, Port of Singapore, Global Centre for Maritime Decarbonisation, MMMCZCS, bp, CMA CGM, Digital Container Shipping Association, Maersk, MSC, Ocean Network Express, PSA International, Shell

Target Timeline: First sustainable vessels on route latest by 2027

### Shanghai-LA

Type: Corridor  
Status: Developing implementation plan

Announce Year: 2022  
Led By: Industry or NGO  
Fuel: Unknown  
Vessels on Route: TBD  
Ann. Fuel Demand: TBD  
Vessel Segment: Container

Participants: C40, Aspen coZEV, Port of Los Angeles, Port of Shanghai, Maersk, CMA CGM, COSCO, Port of Long Beach, ONE

Target Timeline: First zero carbon container ships introduced by 2030

### SILK Alliance

Type: Corridor Network  
Status: Developing implementation plan

Announce Year: 2022  
Led By: Industry or NGO  
Fuel: Unknown  
Vessels on Route: TBD  
Ann. Fuel Demand: TBD  
Vessel Segment: Container

Participants: Lloyds Register, MSC Shipmanagement, Pacific International Lines, Wan Hai Lines, X-Press Feeders, Yang Ming Marine Transport Corp., Keppel Offshore & Marine, Singfar International, Wärtsilä, Wilhelmsen Ship Management, Asian Development Bank, ING, PSA Corporation Ltd

Target Timeline: TBD



**ZERO-EMISSION  
SHIPPING**  
MISSION

**Green Corridors for container ships** announced as under development or established

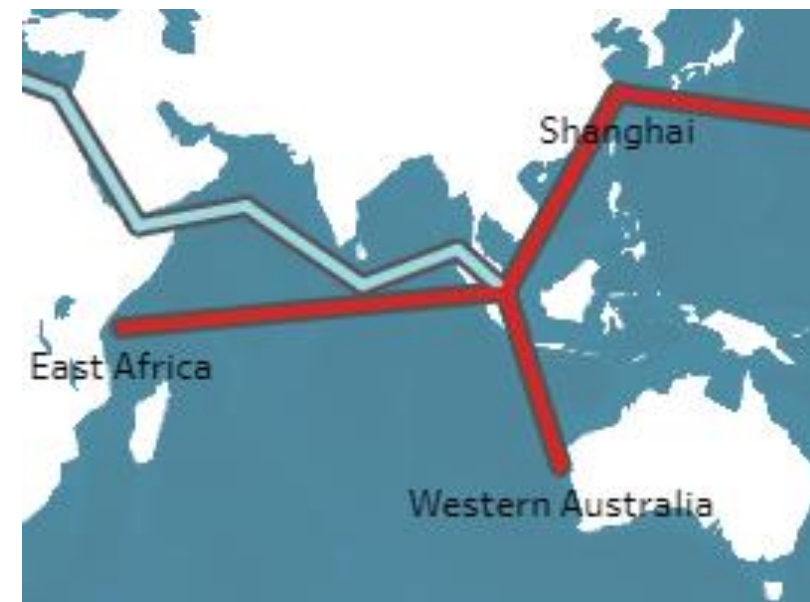
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Target Timeline: TBD



**Green Corridors for container ships** announced as under development or established

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Ann. Fuel Demand: TBD  
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Participants: Port of Rotterdam, Port of Singapore, Global Centre for Maritime Decarbonisation, MMMCZCS, bp, CMA CGM, Digital Container Shipping Association, Maersk, MSC, Ocean Network Express, PSA International, Shell

Target Timeline: First sustainable vessels on route latest by 2027



## Green Corridors for container ships announced as under development or established

### Shanghai-LA

Type: Corridor  
Status: Developing implementation plan

Announce Year: 2022  
Led By: Industry or NGO  
Fuel: Unknown  
Vessels on Route: TBD  
Ann. Fuel Demand: TBD  
Vessel Segment: Container

Participants: C40, Aspen coZEV, Port of Los Angeles, Port of Shanghai, Maersk, CMA CGM, COSCO, Port of Long Beach, ONE

Target Timeline: First zero carbon container ships introduced by 2030





## Green Shipping Corridors

### Tools – Routes Tracker, Vessel Segment - Container

**Green Corridors for multi-purpose ships** announced as under development or established

#### European Green Corridors Network

Type: Corridor Network  
Status: Conducting pre-feasibility assessment

Announce Year: 2022  
Led By: Industry or NGO  
Fuel: Methanol, Advanced Biofuels  
Vessels on Route: TBD  
Ann. Fuel Demand: TBD  
Vessel Segment: All or Multiple

Participants: CZCS, Port of Rotterdam, Port of Hamburg, Port of Roenne, Port of Tallinn, Port of Gdynia

Target Timeline: TBD



Example

# Norwegian Green Shipping Programme

**Green Shipping Programme**  
- a public-private partnership programme

Narve Mjøs, VP DNV, Programme Director  
Christoffer Bøhmer, DNV, Service Office

0.68% global population

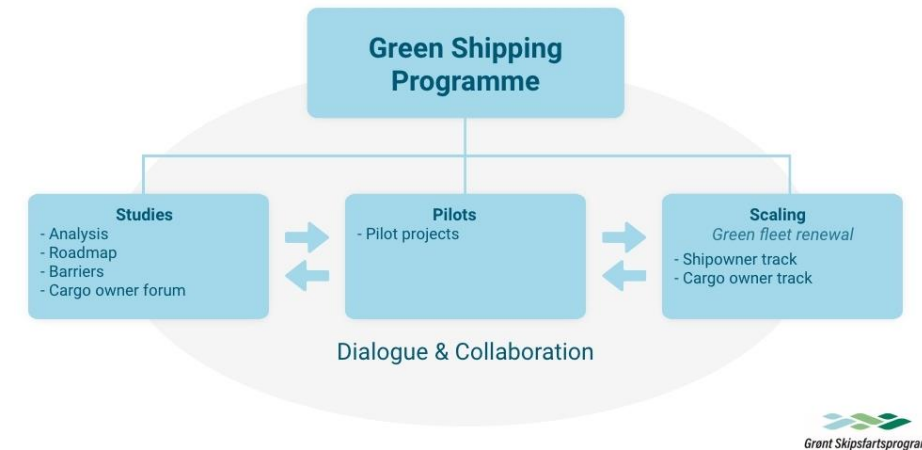


Green Shipping Programme

# Norwegian Green Shipping Programme



- **Green Shipping Programme (GSP)**, a public-private partnership, aims to advance the Norwegian government's maritime strategies and plans. The programme's vision is to develop and strengthen Norway's goal to establish the world's most efficient and environmentally friendly shipping.
- GSP was first established in January **2015** under the name "**the Green Coastal Shipping Program**", consisting of 16 private companies and organisations, as well as two government ministries.
- In the spring of **2019**, the program changed its name to the **Green Shipping Program** to state its international ambitions.
- In the spring of 2023, the program included more than **108 private companies and organizations** as well as **12 public observers**. The Green Shipping Program is financed partly by public allocations from the State budget of Norway and partly by the members themselves.
- By spring 2022, the program has initiated over **45 green pilot projects**, of which **17 have been realized or are under development**.



**Phase 1:** Assess the potential for battery and gas-powered maritime transport in Norway (2015/2016)

**Phase 2:** Evaluating business cases in the industry (2016/2017)

**Phase 3:** Develop and Removing barriers to green solutions (2018/2019)

**Phase 4:** scale green solutions in Norway (2019/2020)

**Phase 5:** Develop and scale green solutions in Norway and internationally (2021/2022)

**Phase 6:** Piloting for scaling and green growth (2023/2024)

[The world's most efficient and environmentally friendly shipping - Green Shipping Programme](#)

# Green Shipping Program

- A paradigm shift in maritime
  - Emissions will be regulated and get a cost
  - Green demands from the market, investors, employees and the public
  - Climate change and new requirements - a significant business opportunity
- Establish the world's most efficient and environmentally friendly shipping
- Profitable emission reductions
- Sustainable logistics solutions
- Green jobs
- Increased competitive advantage
- Front runner in green shipping

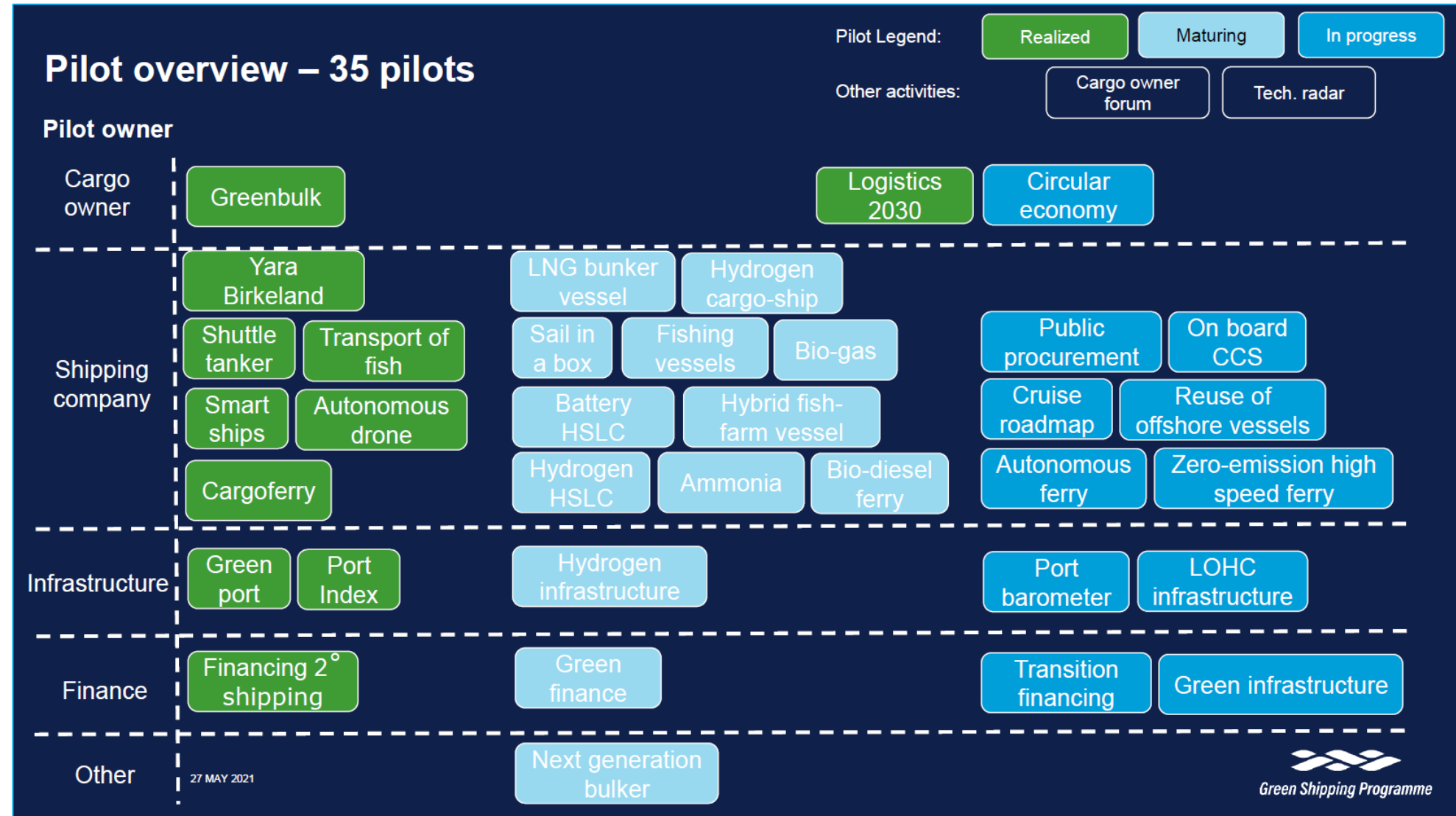




# GSP Stakeholders



# GSP initiatives



# Action plan (Jun. 2019)

The close cooperation between the authorities and the business sector will be of crucial importance as we begin a new chapter in efforts to create an even greener maritime industry.



Minister of Climate and Environment  
**Ola Elvestuen.**  
Photo: Bjørn H. Stuedal/Ministry of Climate and Environment

*Ola Elvestuen*



Minister of Petroleum and Energy  
**Kjell-Børge Frelberg**  
Photo: Ministry of Petroleum and Energy/Scanpix

*Kjell-Børge Frelberg*



Minister of Trade and Industry  
**Torbjørn Røe Isaksen**  
Photo: Marte Garmann

*Torbjørn Røe Isaksen*



Minister of Local Government and Modernisation  
**Monica Mæland**  
Photo: Torbjørn Tandberg

*Monica Mæland*



Minister of Fisheries and Seafood  
**Harald T. Nesvik**  
Photo: Knut Neerland, Inviso Næring.

*Harald T. Nesvik*



Minister of International Development  
**Dag-Inge Ulstein**  
Photo: Sturlason

*Dag-Inge Ulstein*



Minister of Transport  
**Jon Georg Dale**  
Photo: Olav Hegga

*Jon Georg Dale*



Norwegian Government

Action Plan

## The Government's action plan for green shipping



# THANK YOU