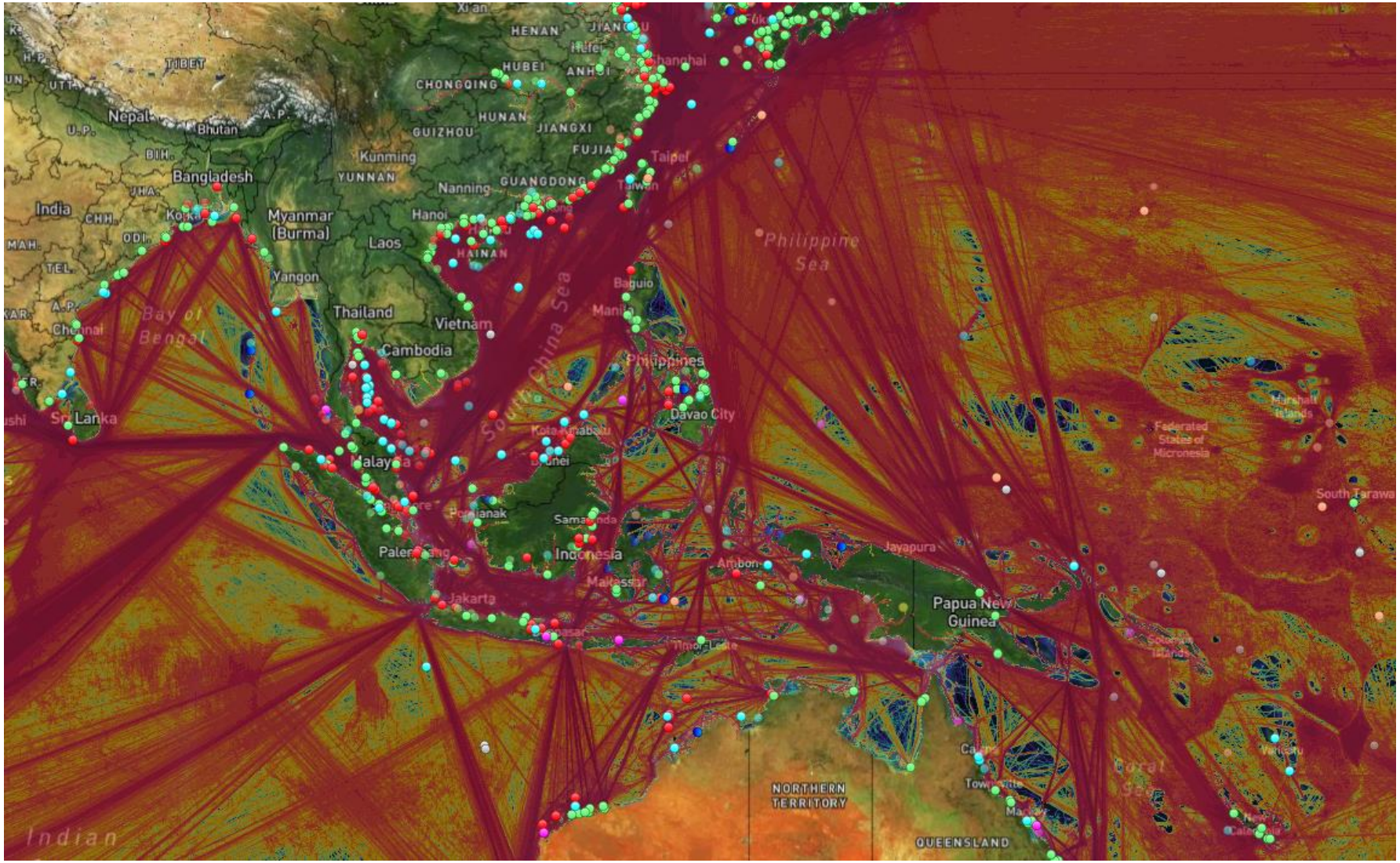
Green corridors

On Tuesday 16th of May 2023, Manila (Philippines)

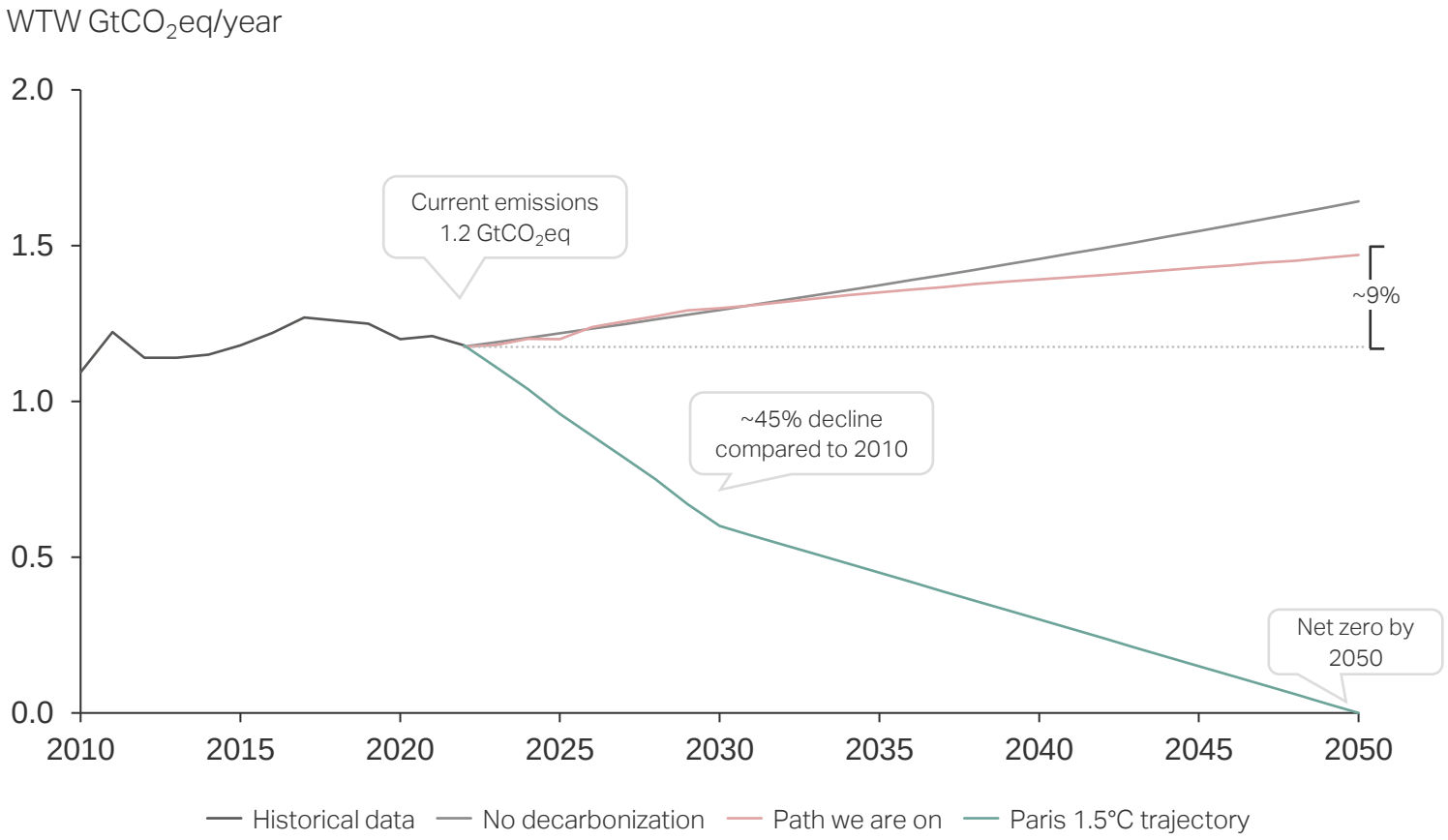
Aixa Pérez – Regulatory Affairs Manager, MMMCZCS

Situational assessment for shipping in this area



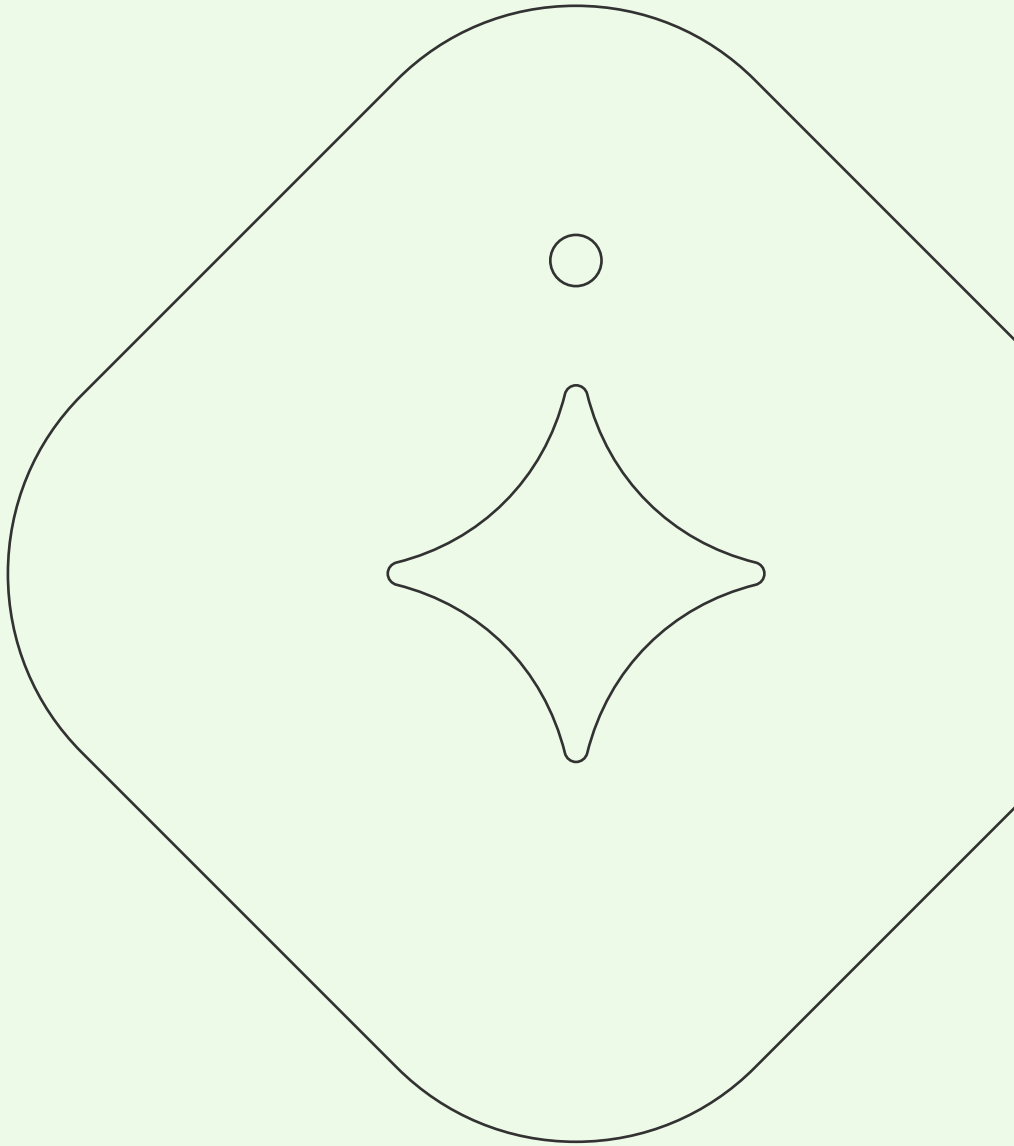
MarineTraffic: Global Ship Tracking Intelligence | AIS Marine Traffic

Emissions will continue to increase if relying on current decarbonization efforts



If just energy efficiency measures are currently considered, the expected GtCO2eq in 2050 is 9% > present. Why? Because the sector is expected to grow.

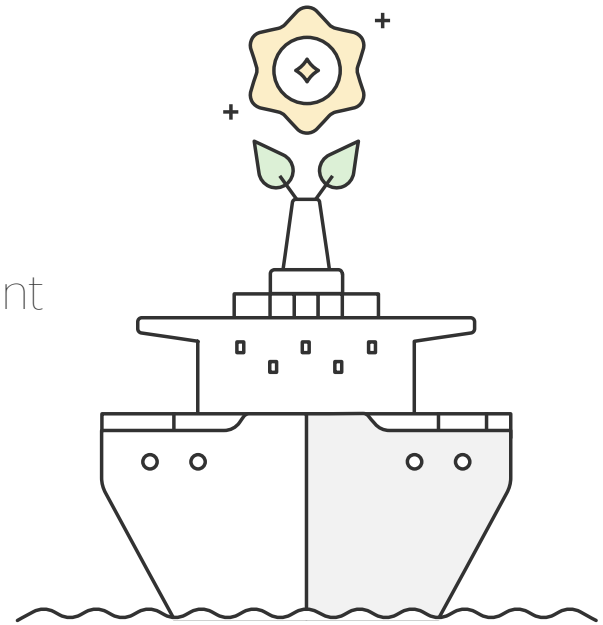
Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping (MMMCZCS)



The Center is built around a simple but ambitious vision to accelerate collaborative climate action

Our vision is to sustainably decarbonize the maritime industry by 2050

Our mission is to be an independent and significant driver of a sustainable maritime decarbonization



Not-for-profit
Money earned by or donated to the Center is used entirely to finance Center work,

Independent
We are un-biased, solution agnostic and have no vested interest in any technology. We work collaboratively and bring together key players across the value chain.

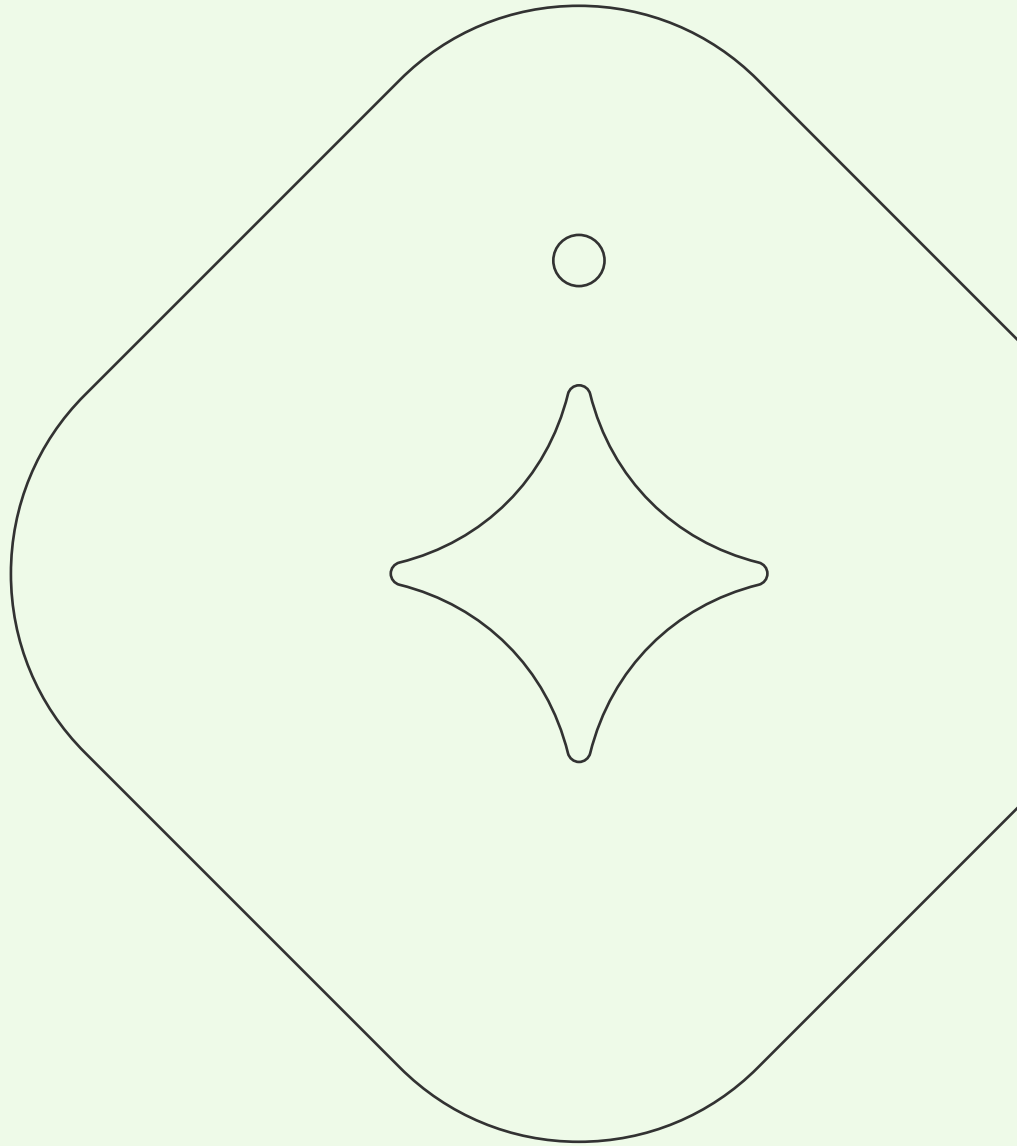
Science-based
We commit to climate science and use a data driven approach to explore viable decarbonization pathways.

Our Partners share the zero-carbon vision and are committed to climate action.

24 Strategic Partners

13 Knowledge Partners

First movers and green corridors

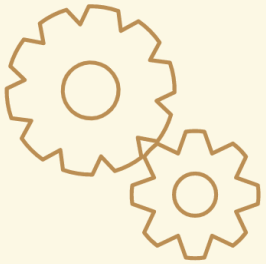


Accelerated progress is needed in four areas during the next decade to make the 2050 target

A level playing field with global regulation

Alternative fuels available at scale.

Energy efficiency support across the value chain

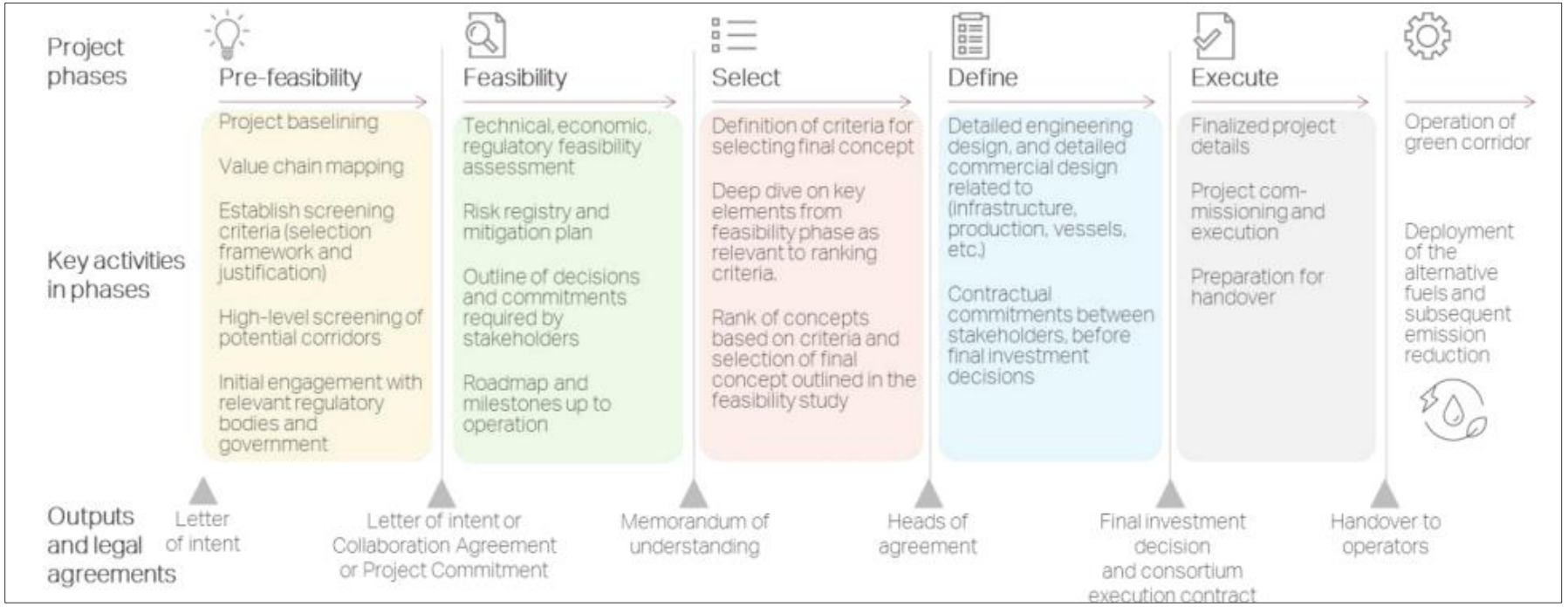


Support to first movers.

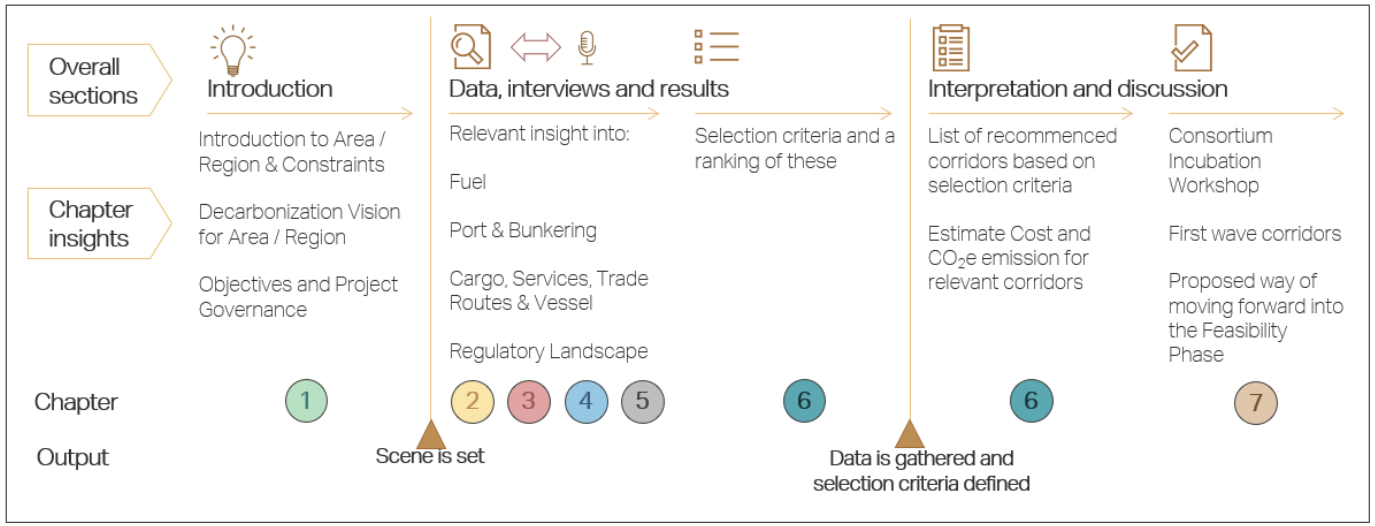
Source: MMM Center for Zero Carbon Shipping

First movers and green corridors

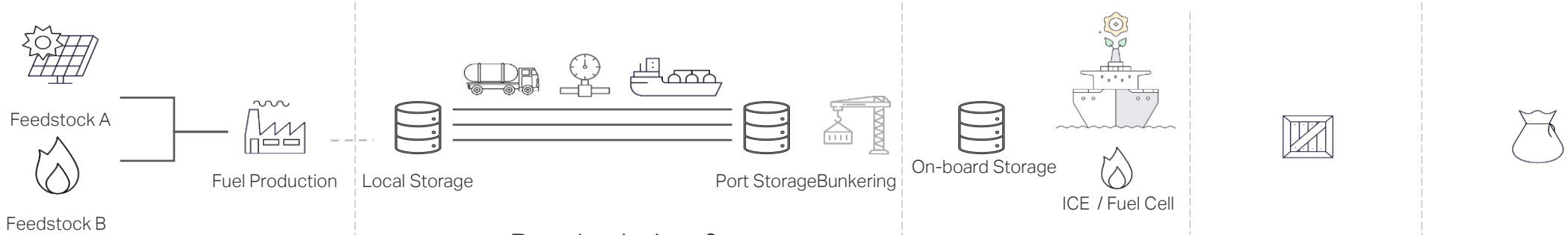
- Decarbonizing the maritime industry will require transitioning to low- and zero-carbon fuels.
- Clydebank Declaration (COP 26): green corridors as the catalyser for the green transition.
- MMMCZCS has developed a framework to bring green corridors from concept to execution.



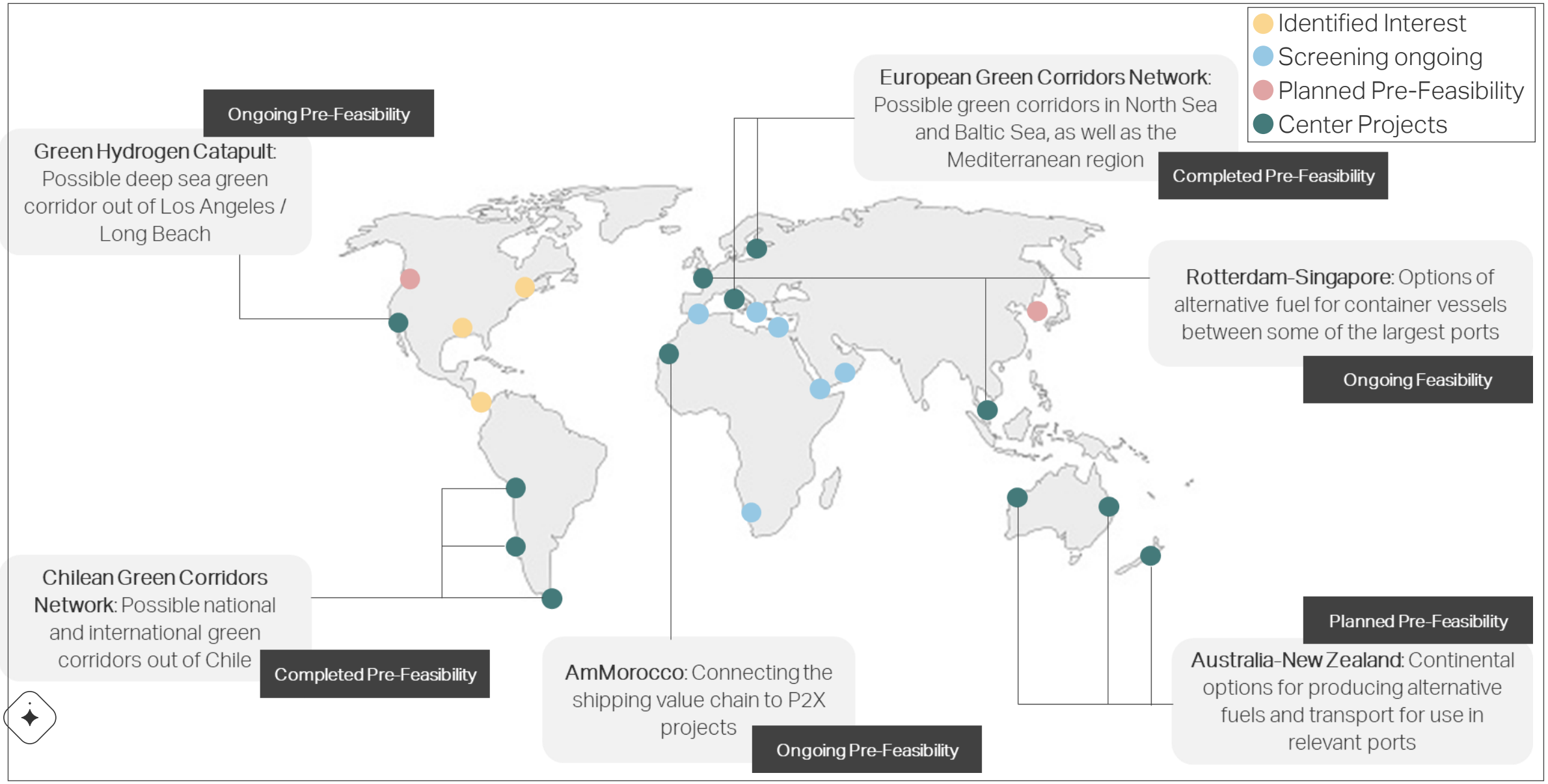
Methodology for green corridors: Prefeasibility study



Green Corridors



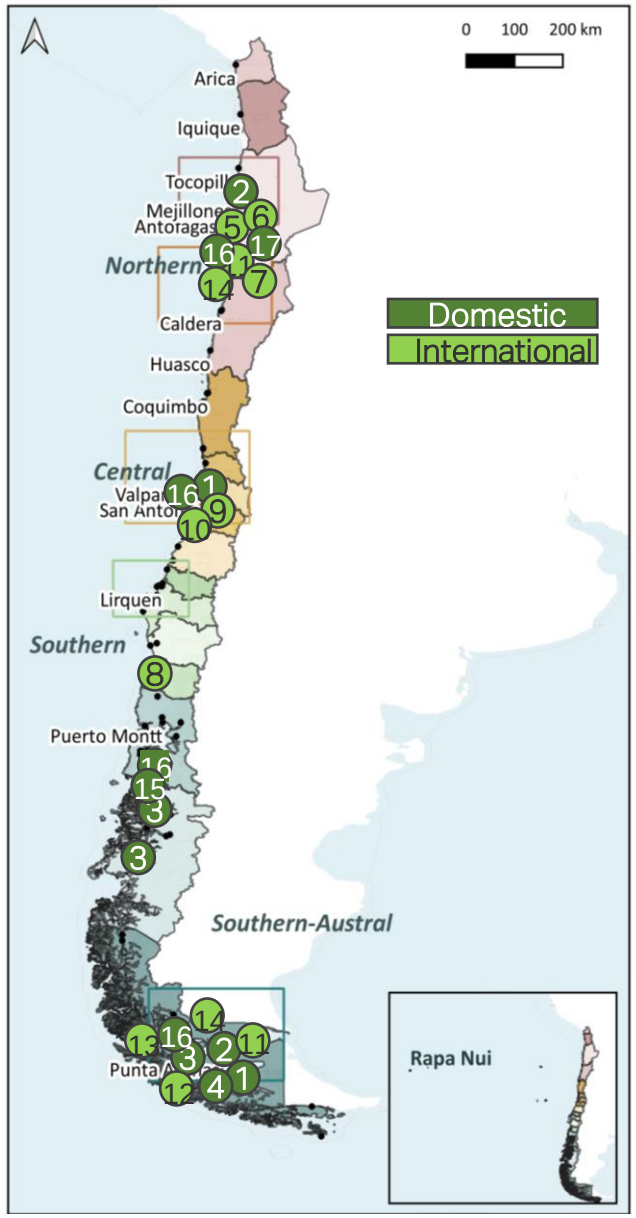
Green corridors - ongoing green corridor projects in various phases

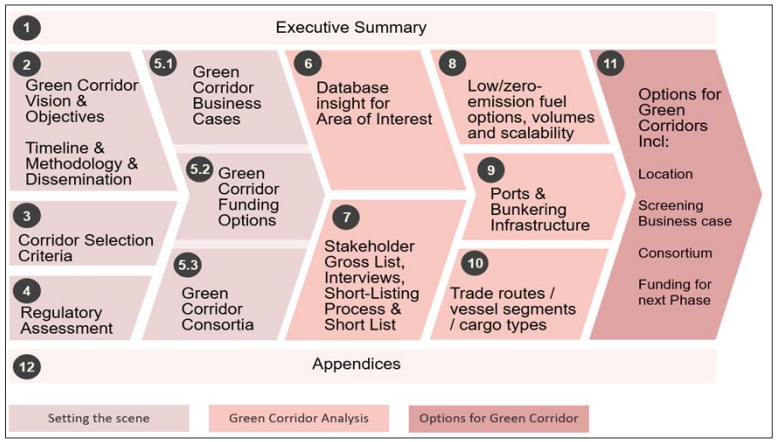


Proposed Chilean Green Corridors

Loc.	ID	Short description
D	1	Chilean Powerplant Ammonia
D	2	Chilean Mining Explosives Ammonia
D	3	Austral Ferries
D	4	Austral Cruise
I	5	CuS Corridor
I	6	Copper China Corridor
I	7	Green Cupper Europe
I	8	Car Import from Japan/South Korea
I	9	Agri/Aqua-culture Corridor
I	10	ContainEurope
I	11	CircumSouthAmericas
I	12	Ammonia Exp Japan
I	13	Ammonia Exp Rotterdam
I	14	Ammonia Exp Los Angeles
I	15	Ammonia Exp Singapore
D	16	Austral Fish/Aqua
D	17	Tug/service
D/I	18	H_2SO_4 Carrier for mining

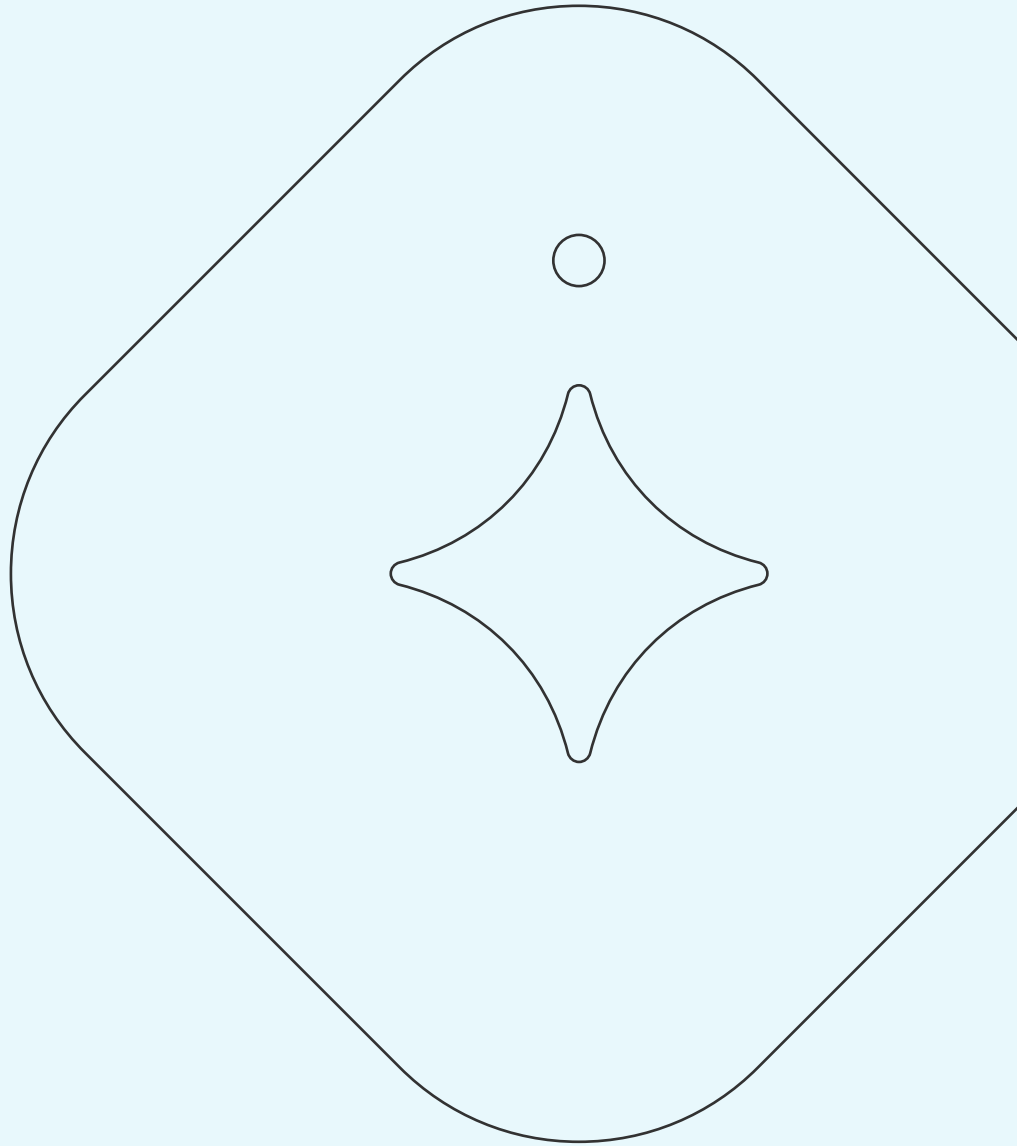
D: Domestic, I: International



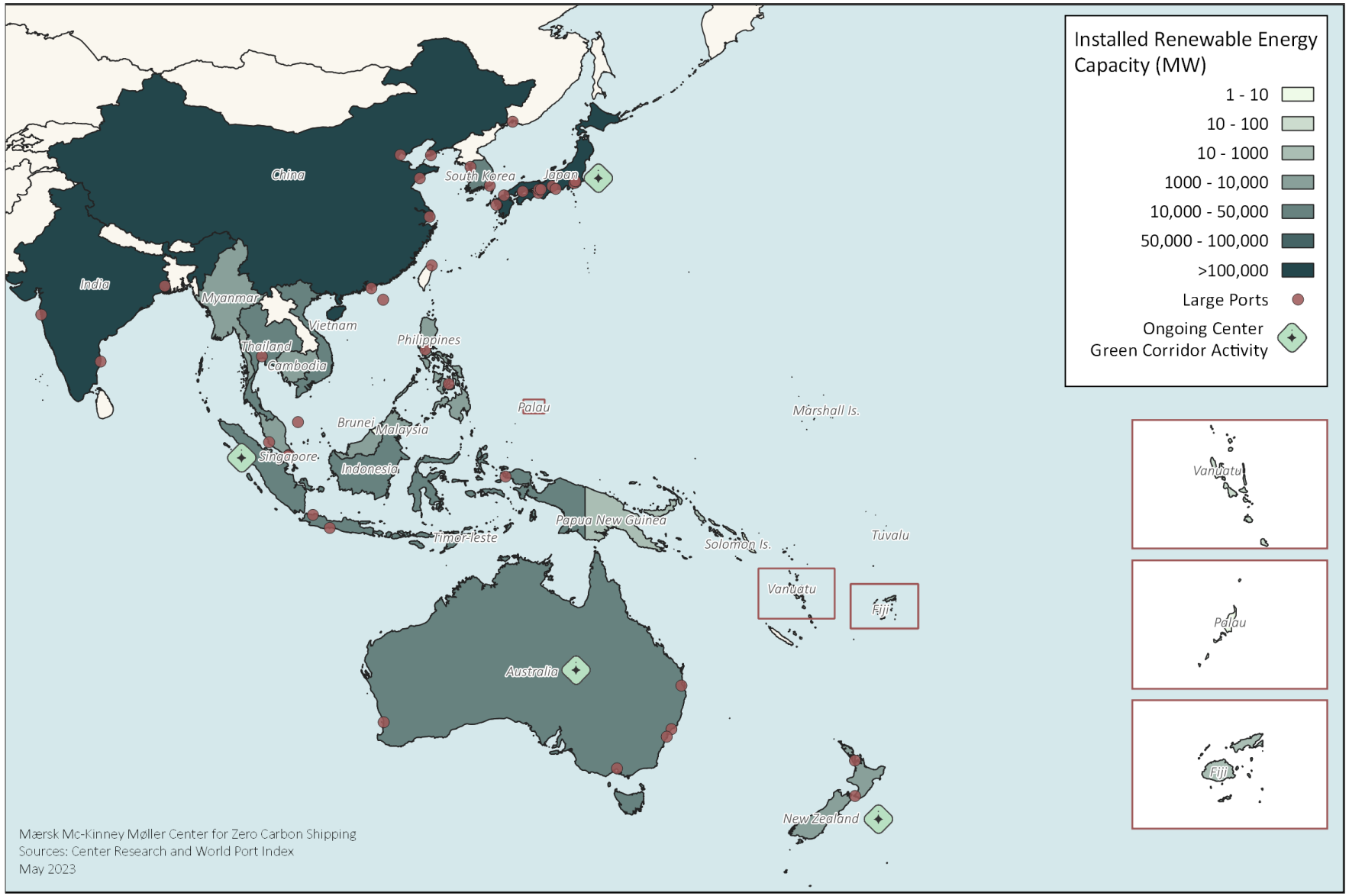


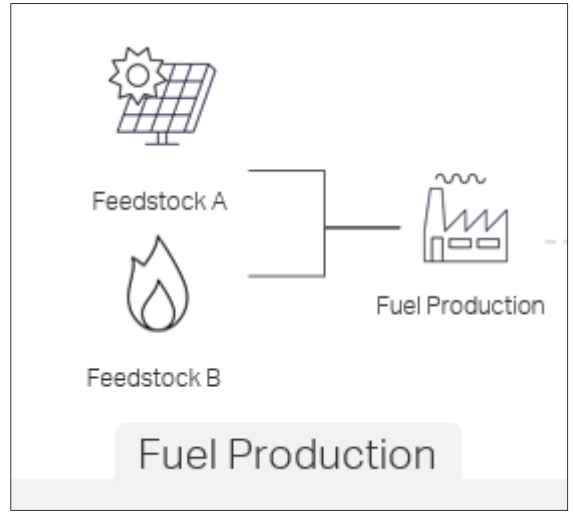
Just transition

The Asia-Pacific region and the potential for green corridors

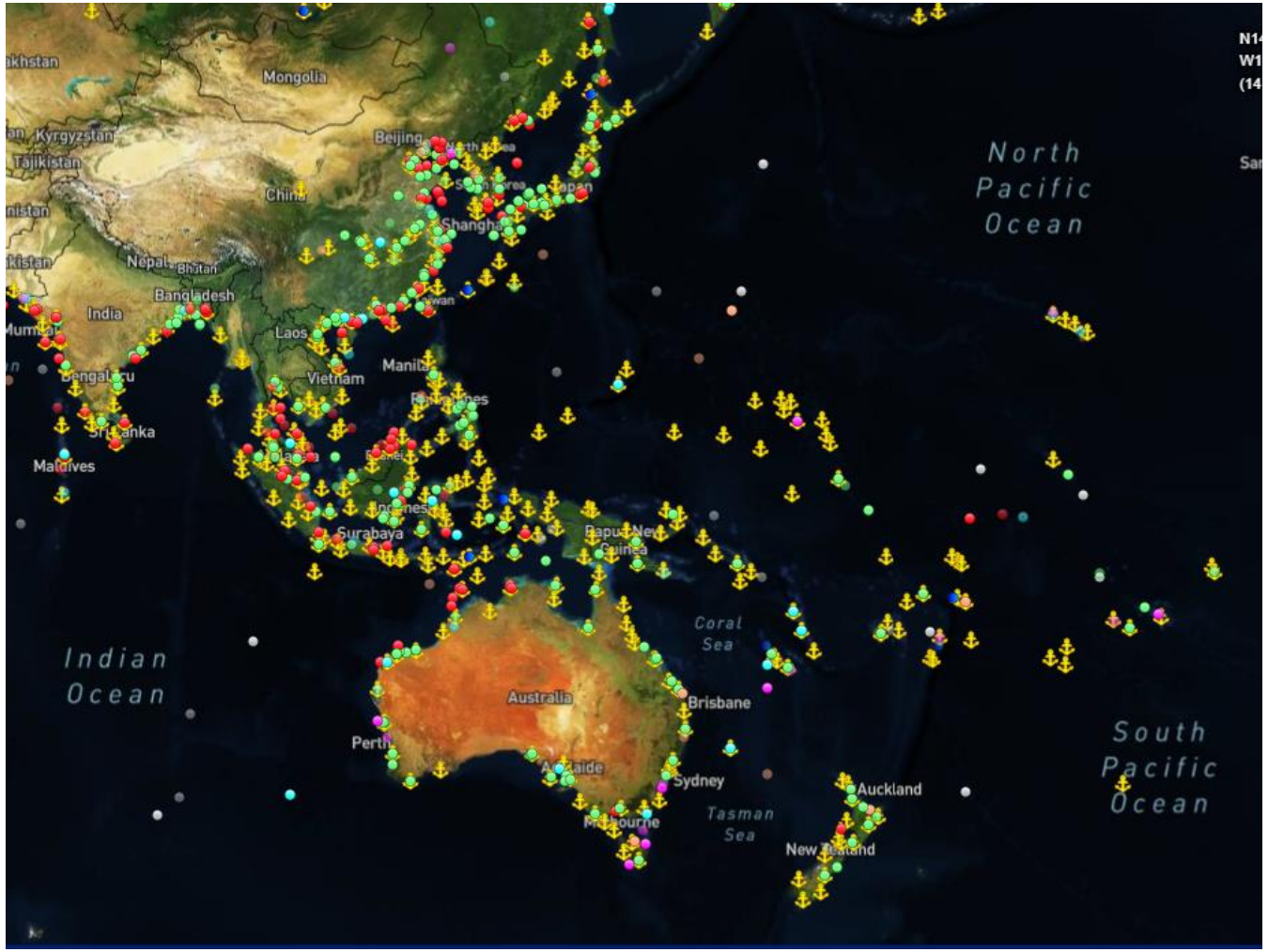


What is needed to initiate a Green Corridor





Potential for green corridors in the Asia-Pacific region



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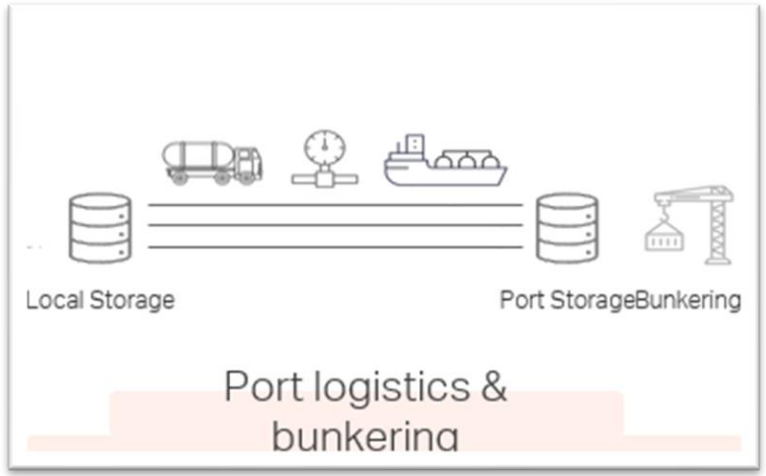
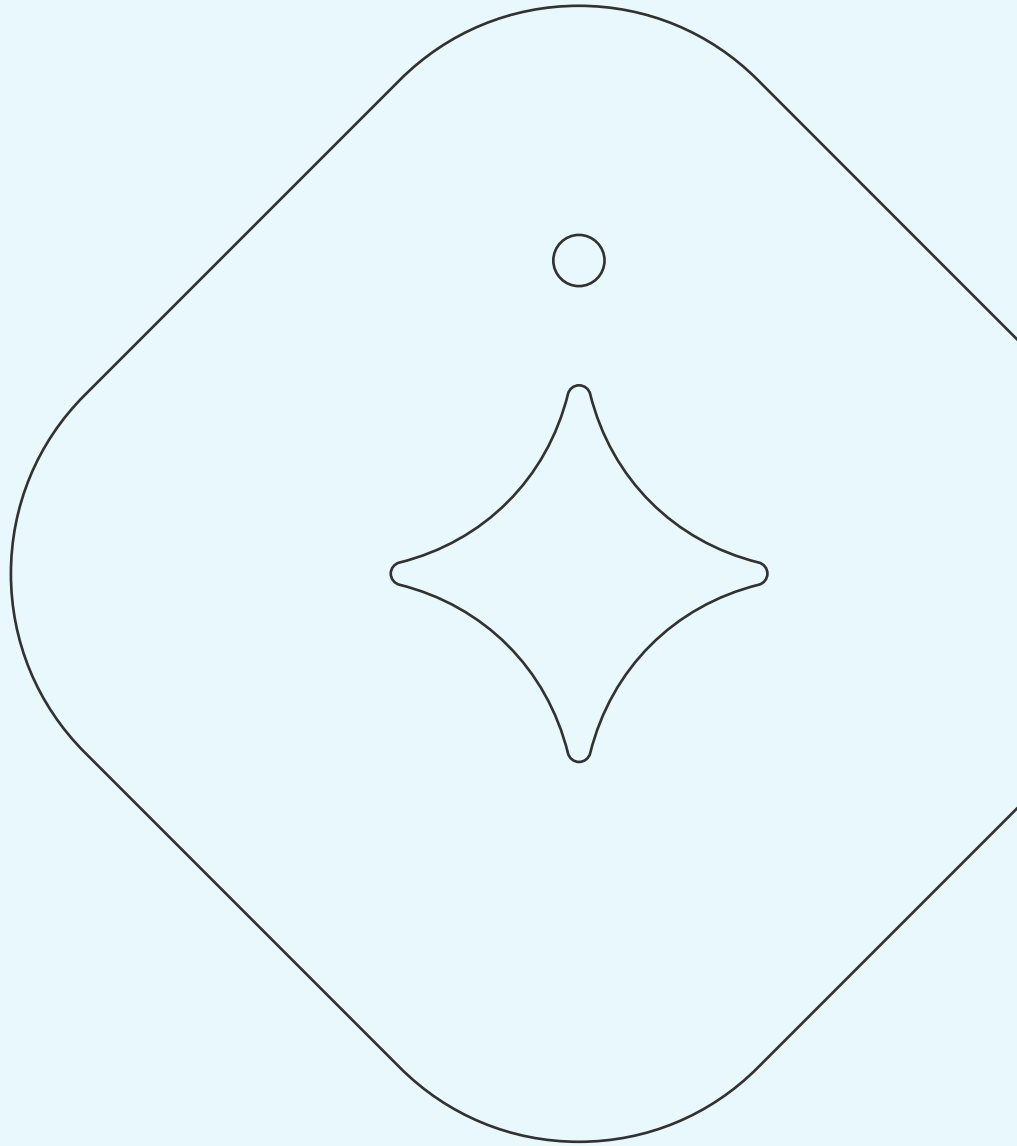
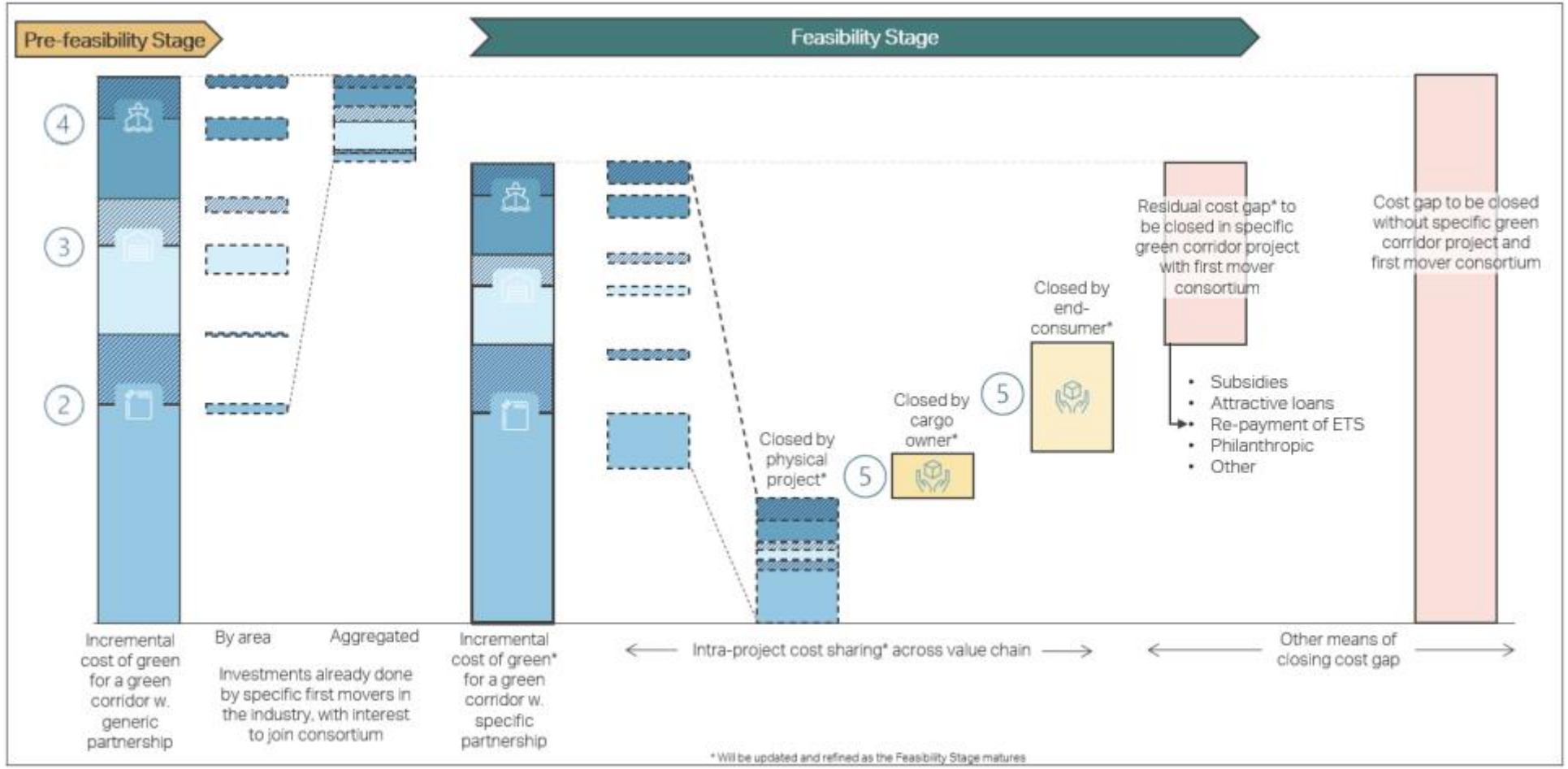


Green corridors and the feasibility consideration



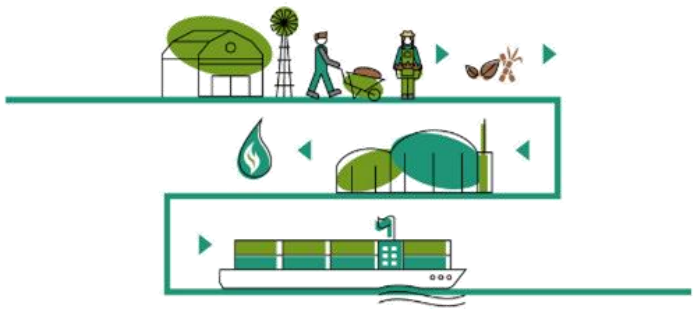
Feasibility of the GCs: Cost gap analysis to be considered



First-mover initiatives – It is happening

CMA CGM and biomethane

CMA CGM launches the first low-carbon shipping offer by choosing biomethane



NYK and ammonia

NYK: Project to commercialize ammonia-fueled ships set to begin

Maersk and methanol

"Designing the future of our customers' supply chains with carbon-neutral methanol vessels" 15 kTEU container vessels

Questions?

Thanks for your attention!

More info:
www.zerocarbonshipping.com

Contact:
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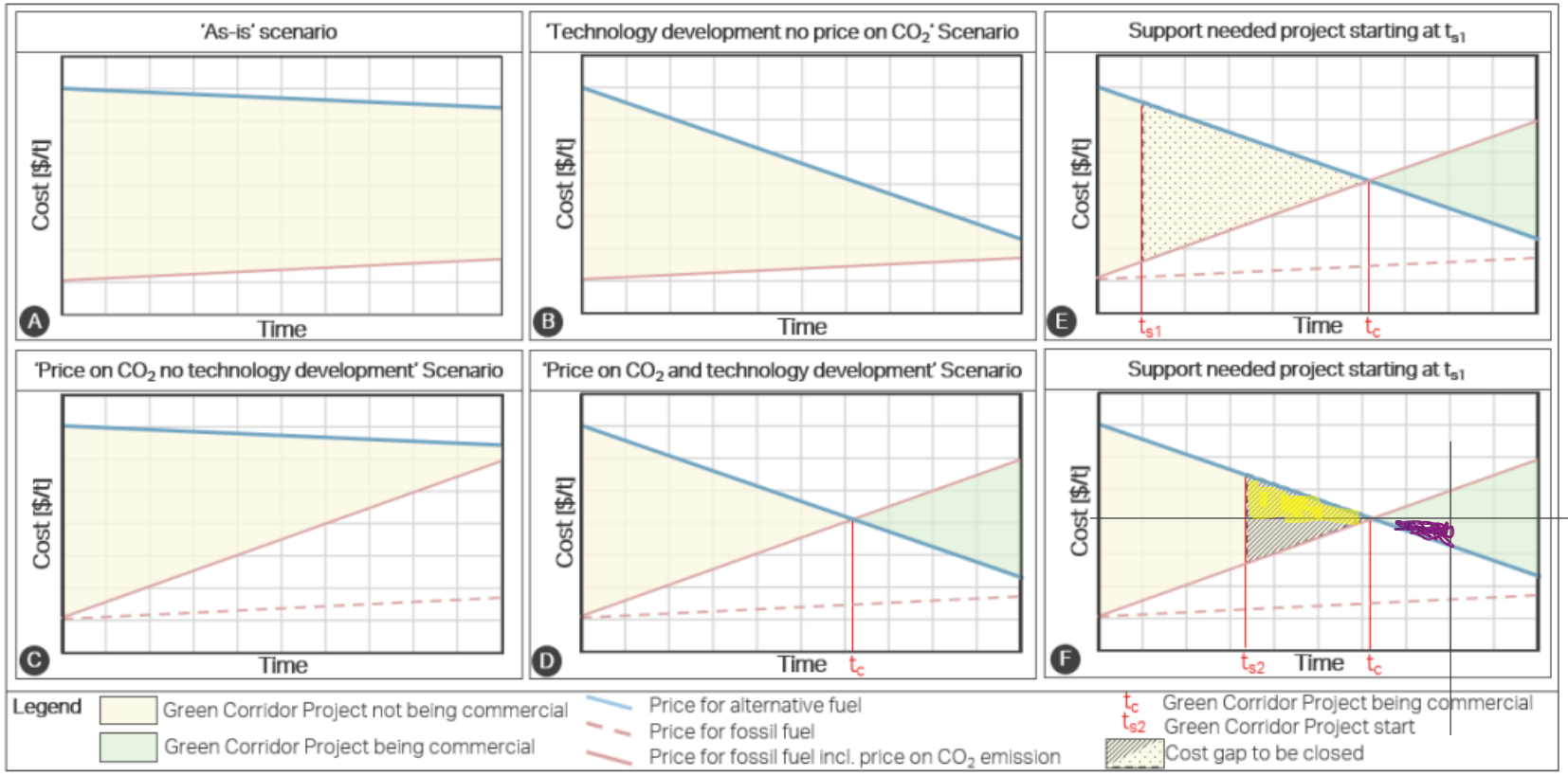
Extra

When is the GC a business opportunity?



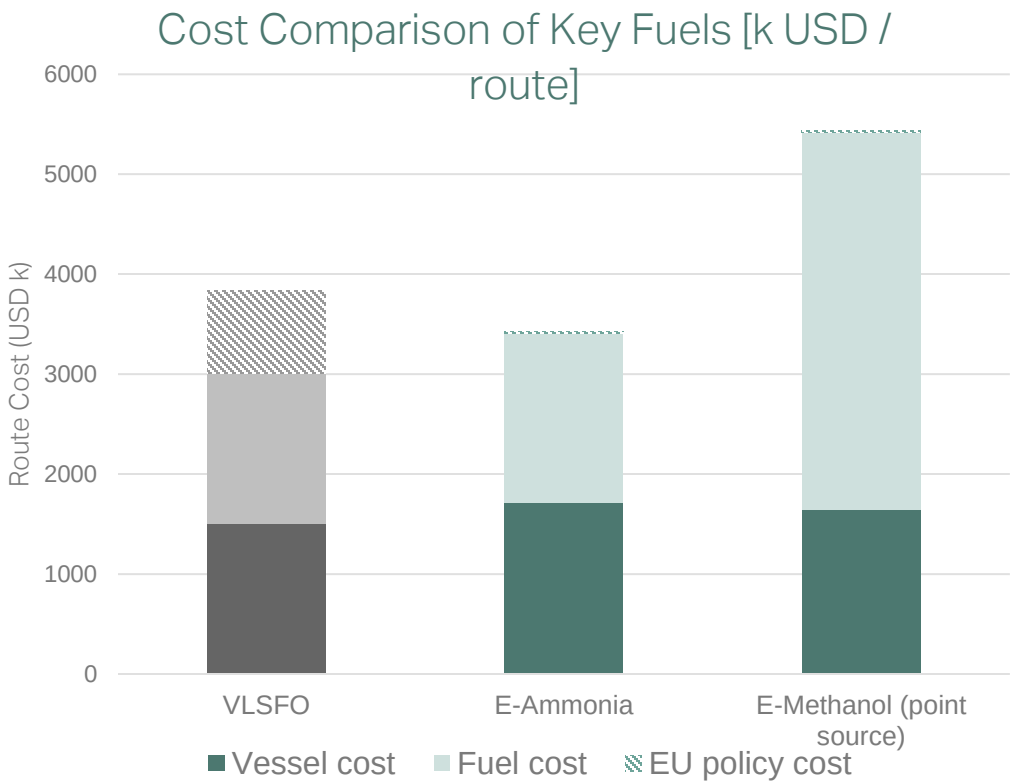
We to close the GAP?

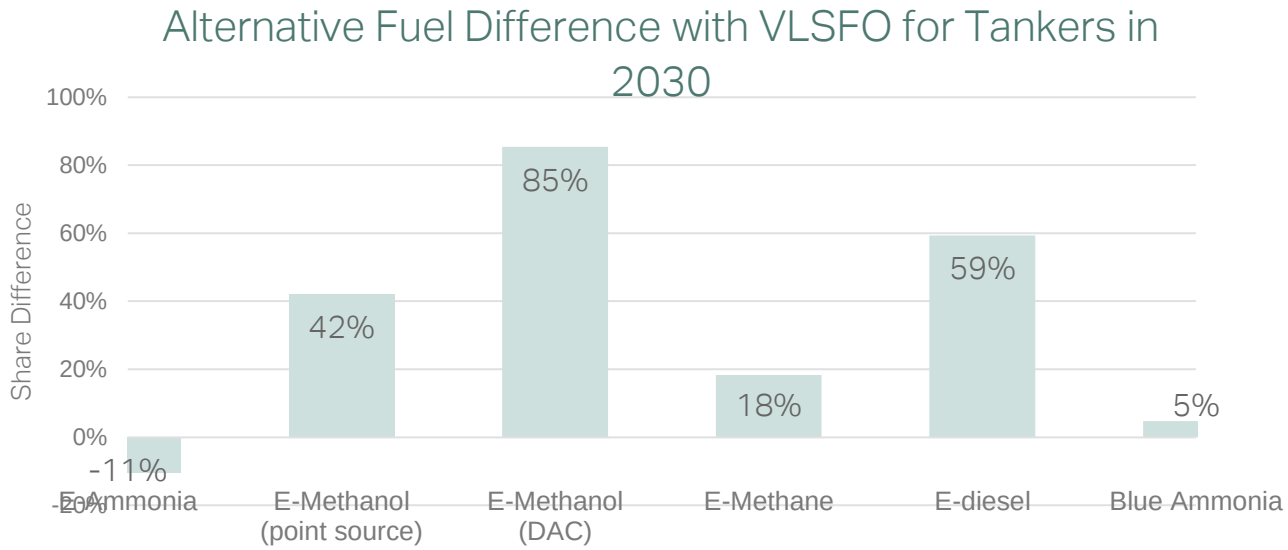
CCFD

Strike price

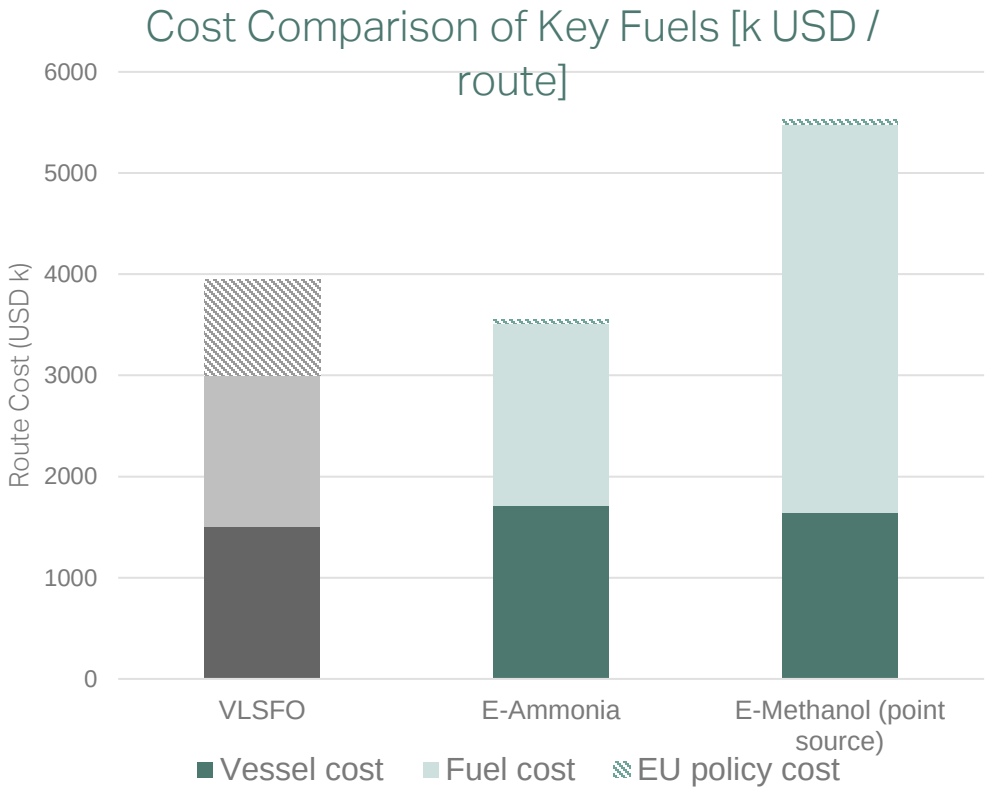
AF price> strike price, government is providing money
AF price < strike price, the company has to pay the delta

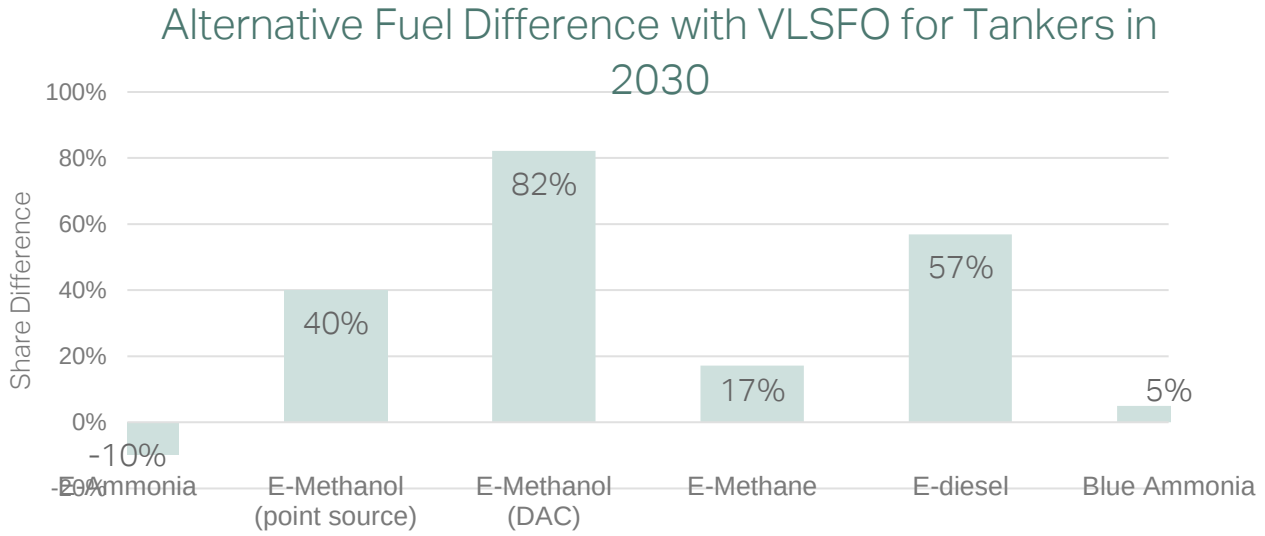
US scenario


Cost Comparison of Key Fuels [k USD / route]
Route Cost (USD k)
6000
5000
4000
3000
2000
1000
0
VLSFO
E-Ammonia
E-Methanol (point source)
Vessel cost
Fuel cost
EU policy cost

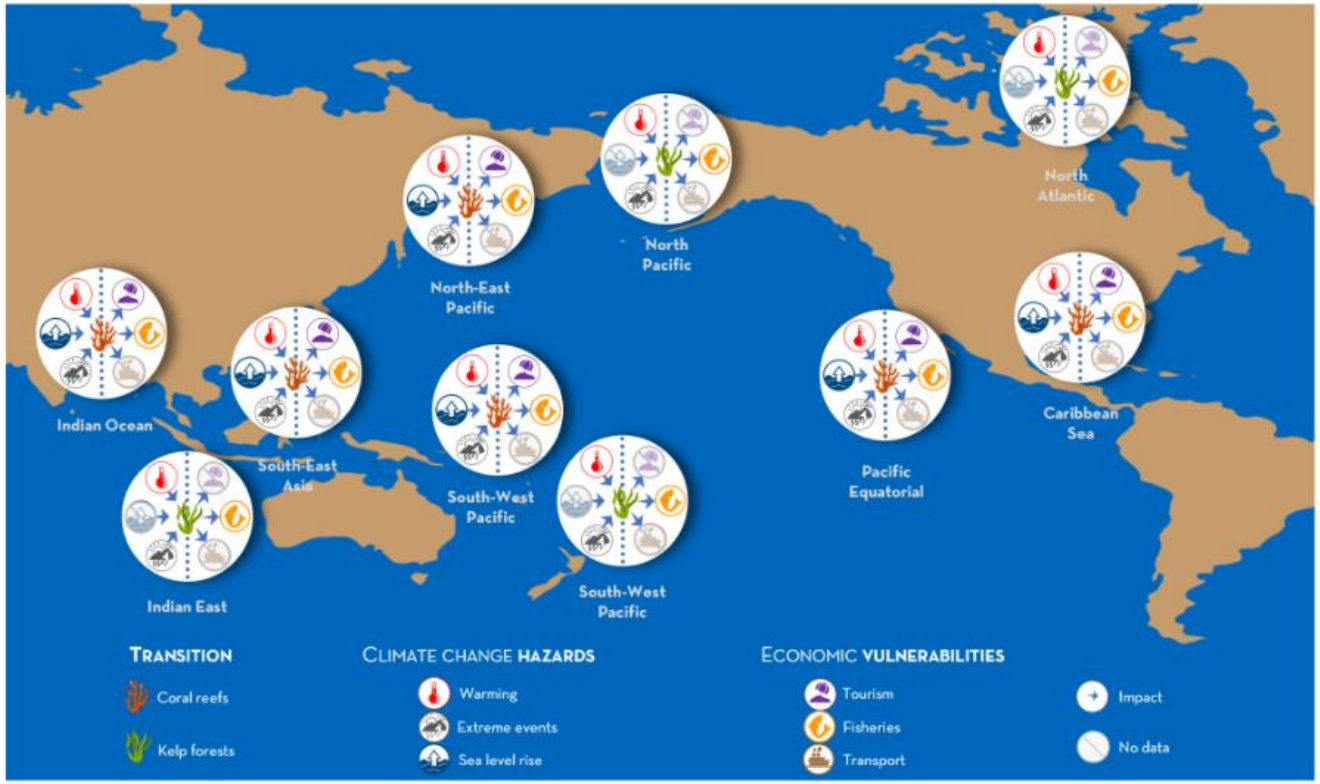

Alternative Fuel Difference with VLSFO for Tankers in 2030
Share Difference
100%
80%
60%
40%
20%
0%
-20%
-11%
42%
85%
18%
59%
5%
E-Ammonia
E-Methanol (point source)
E-Methanol (DAC)
E-Methane
E-diesel
Blue Ammonia

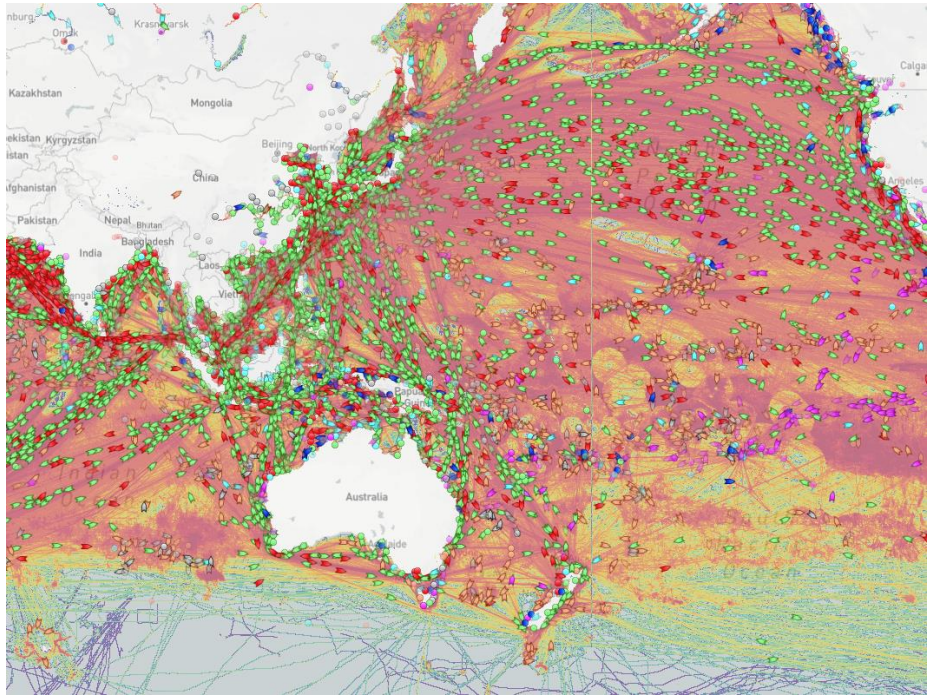
Hybrid scenario: USA and EU



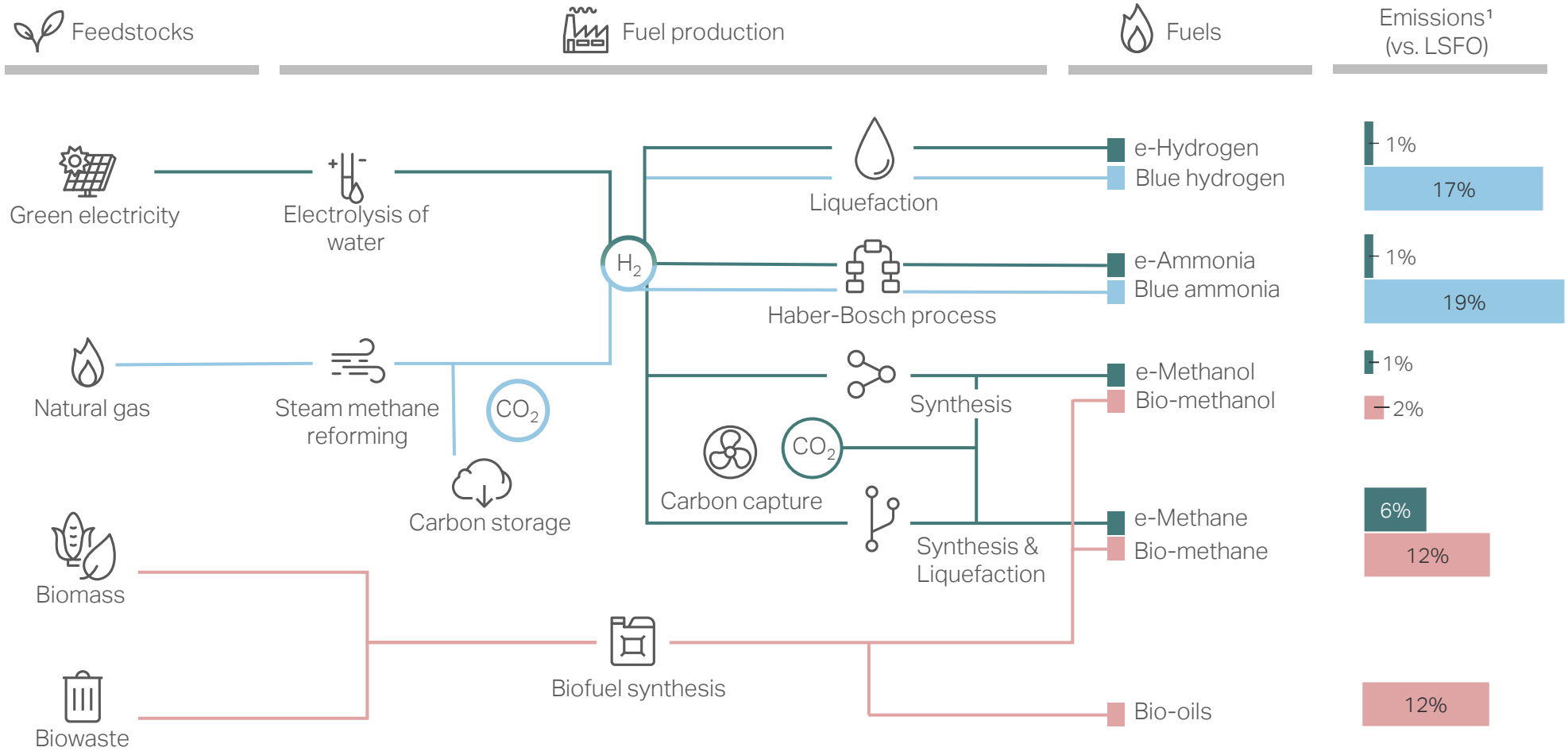


Tipping points and correlation with traffic density





The diversity of alternative fuel options makes it difficult to agree on a common pathway



Source: MMM Center for Zero Carbon Shipping

Alternative fuels have varying maturity levels and challenges in the early years of transition

	Feedstock availability	Fuel production	Fuel storage, logistics and bunkering	Onboard energy storage & fuel conversion	Onboard safety and fuel management	Vessel emissions	Regulation & certification
e-ammonia							
Blue ammonia							
e-methanol							
Bio-methanol							
e-methane							
Bio-methane							
Bio-oils							

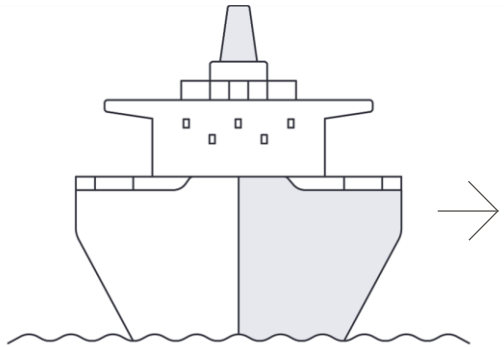
The systemic maturity map presents in a simple, interactive overview the readiness for solutions in the entire value chain. Can vessels, fuel production plants or bunkering vessels be ordered without technical risk, at realistic price levels and with underlying regulation in place.
The maturity map is to be updated with e-diesel

MATURE
Solutions are available with no or limited barriers remaining.

SOLUTIONS IDENTIFIED
Solutions exist, but there are some challenges on e.g. maturity and availability.

MAJOR CHALLENGES REMAIN
Solutions are not developed or lack specification.

Maturing them is a complex task that depends on key market, regulatory and technical developments



Bio-fuels availability to shipping

Renewable electricity cost development

Safety case for ammonia

Main scenario

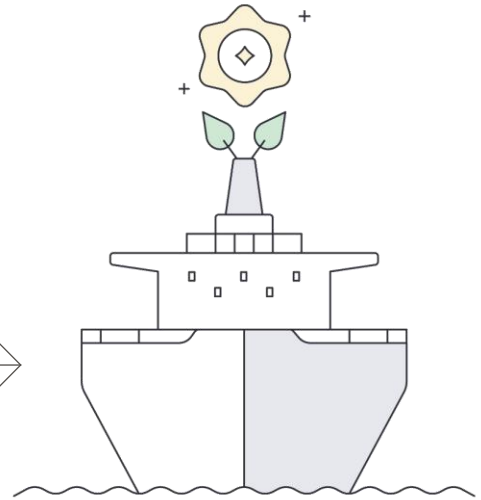
"A Path to Zero"

Alternative scenarios

Reaching zero with:
Scarce / Abundant biofuels

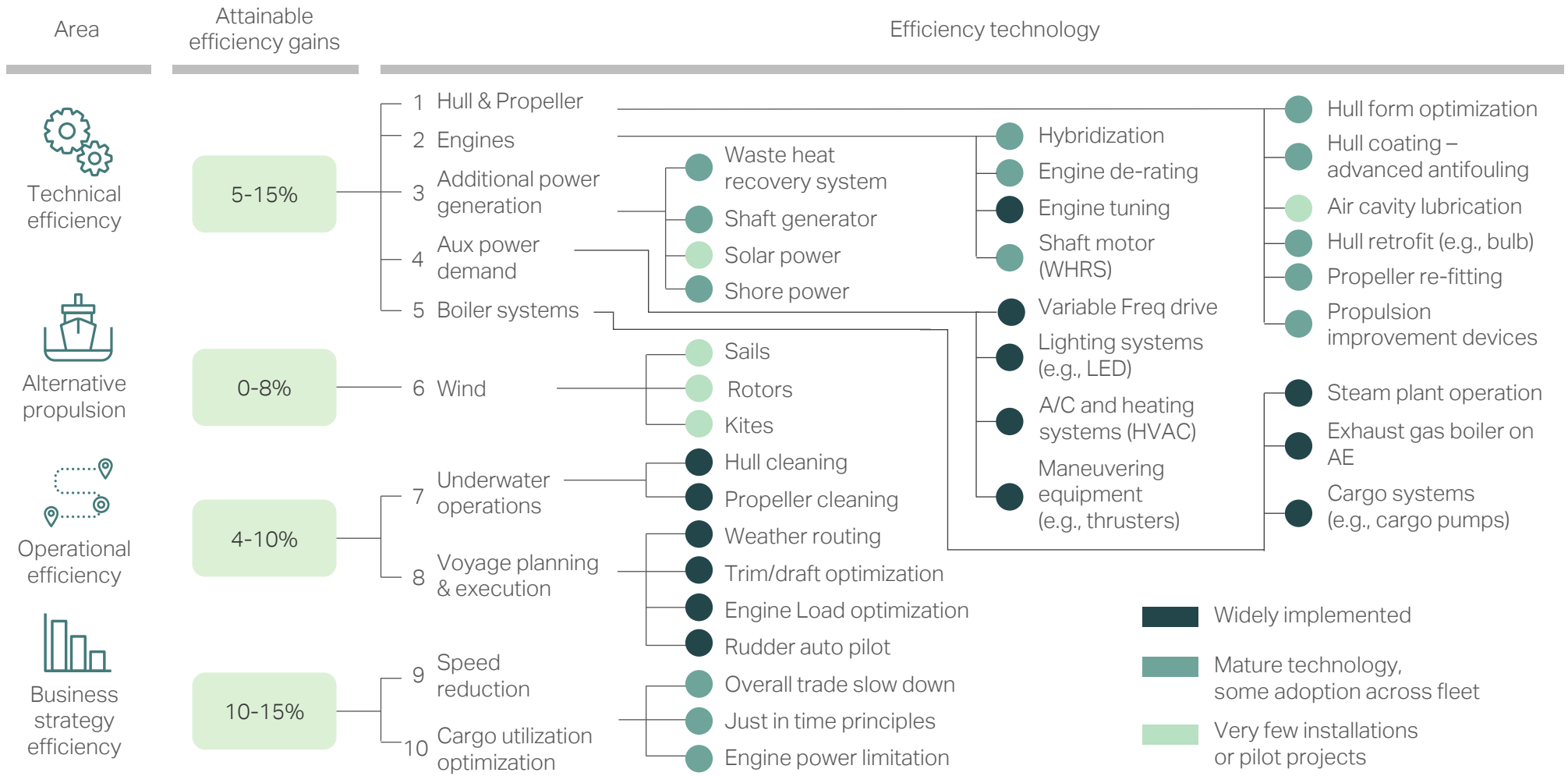
Reaching zero with:
More / less costly electricity

Reaching zero with:
No ammonia acceptance



Alternative possible fuel composition outlooks

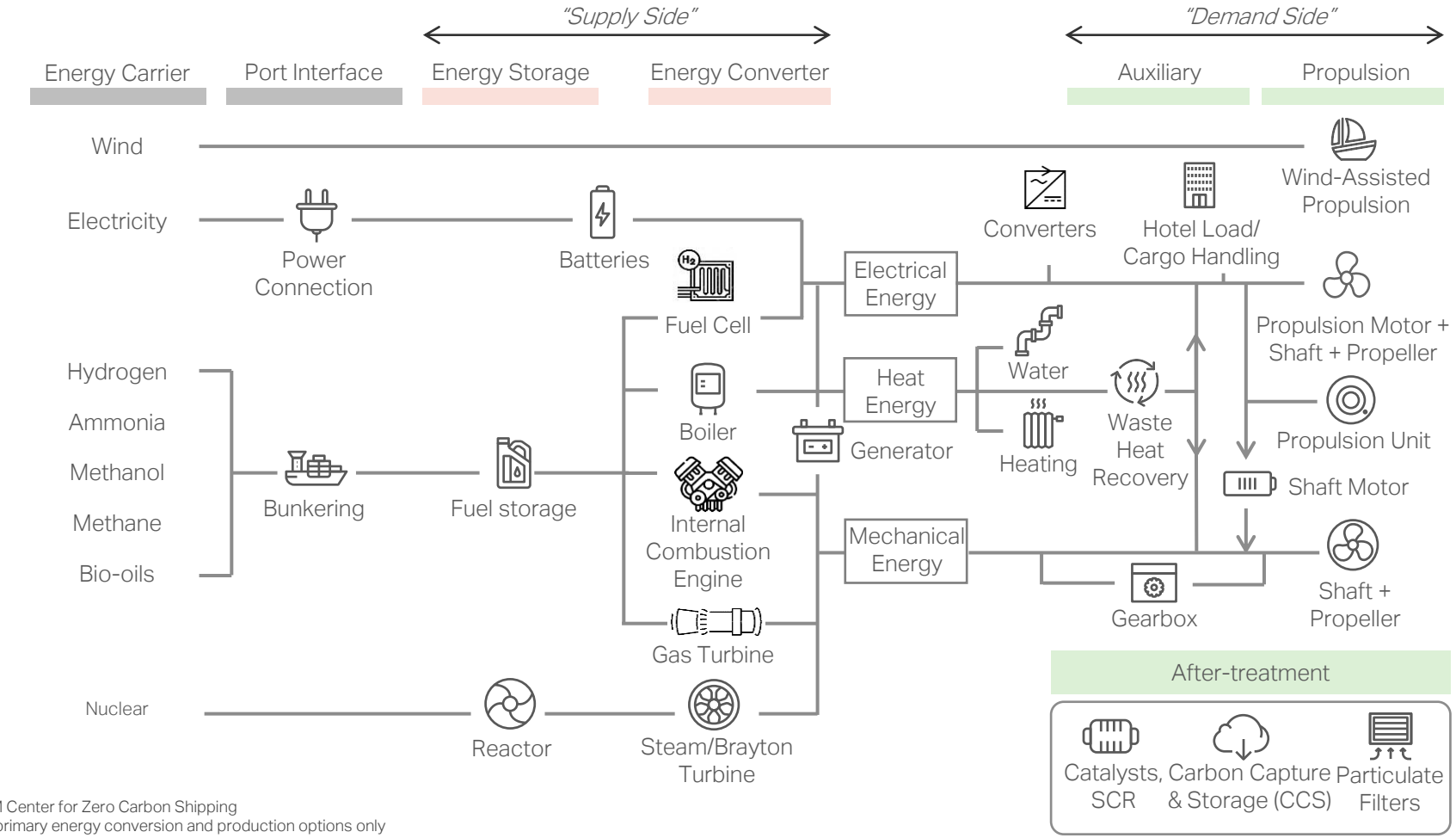
Ship efficiency technology is available and could reduce emissions if adopted more widely



Source: MMM Center for Zero Carbon Shipping

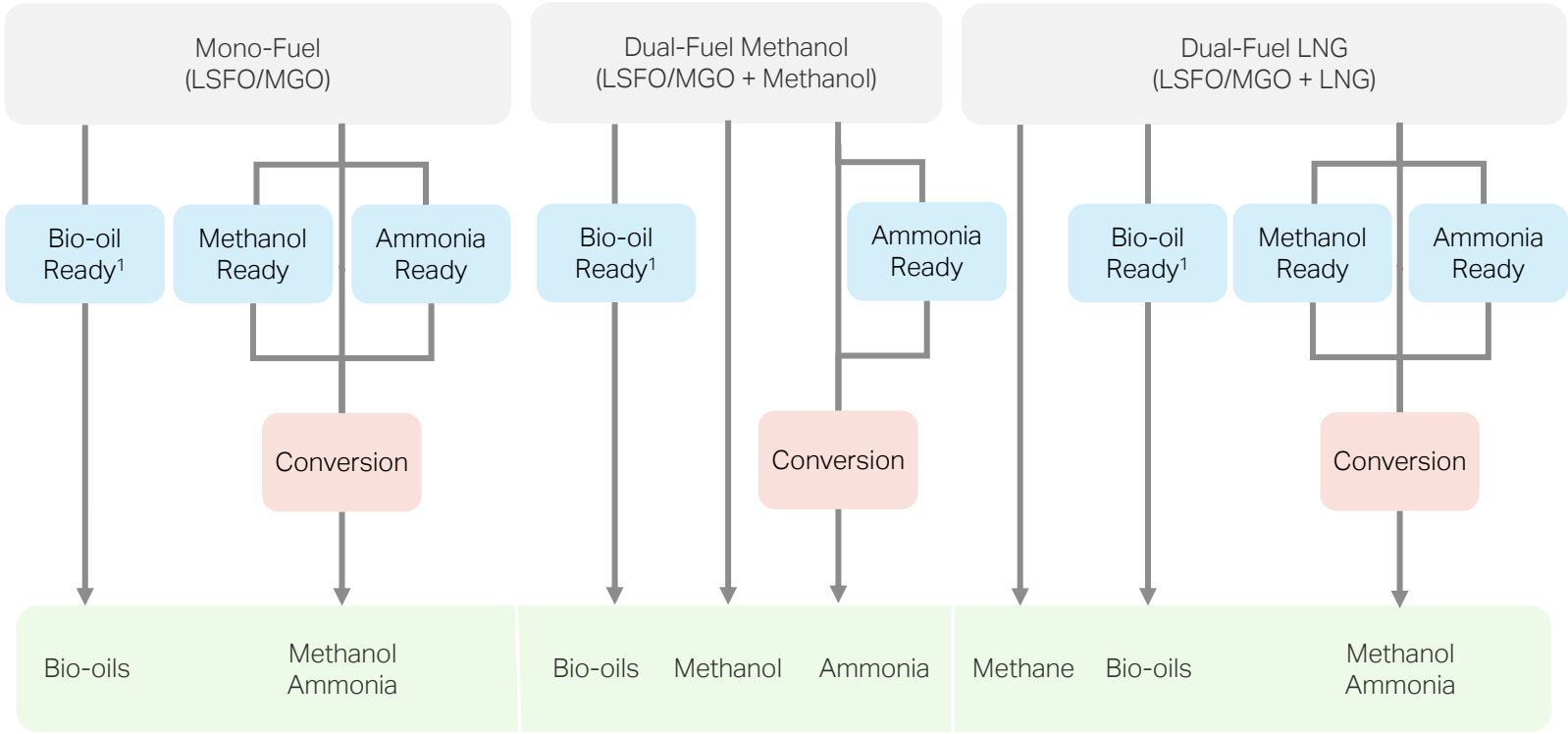
Onboard energy demand can be met in different ways leading to added complexity

Maritime energy conversion and propulsion options[1]



Source: MMM Center for Zero Carbon Shipping
1 Represent primary energy conversion and production options only

Vessel fuel flexibility via fuel conversion and dual-fuel engine configurations allow for multi-fuel pathways



Available Alternative Fuel Options

1) Bio-oil-Ready requires less preparation compared to Methanol-Ready and Ammonia-Ready, which are much more extensive
Source: DNV "Maritime Forecast to 2050: Energy Transition Outlook 2021"