

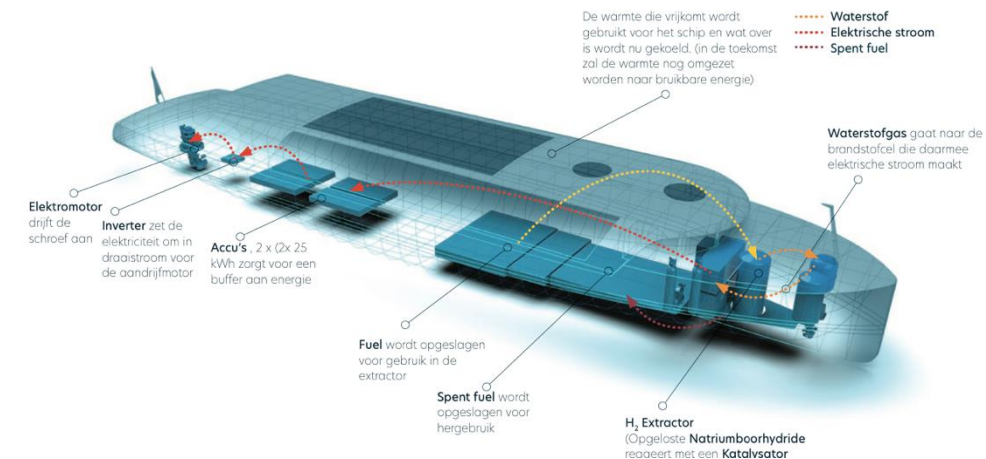


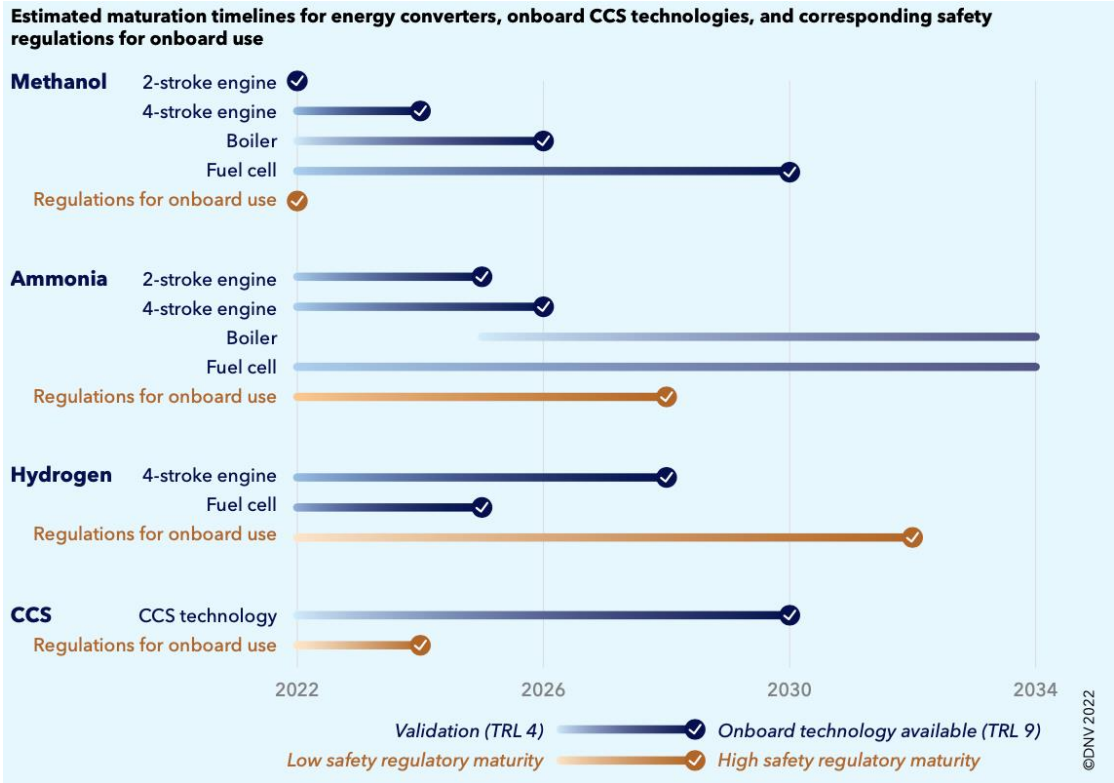
# Port Fuel Readiness

ESPO 2023, Bremen, 1-6-2023



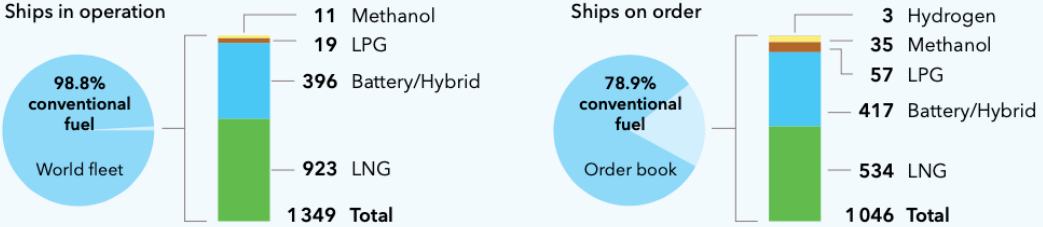
**Port of  
Amsterdam**





### Alternative fuel uptake in the world fleet by number of ships and gross tonnage

#### NUMBER OF SHIPS



#### IN % OF GROSS TONNAGE



Key: Liquefied natural gas (LNG); liquefied petroleum gas (LPG)  
Sources: IHSMarkit (ihsmarkit.com) and DNV's Alternative Fuels Insights for the shipping industry - AFI platform (afi.dnv.com)

## Methanol boxship orders growing more rapidly than all other fuel types

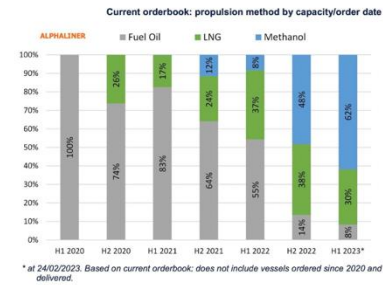
Alphaliner: “Green revolution in container shipping is now firmly underway with carriers using huge cash deposits to remake their fleets for the energy transition”

Container ships orderbook: LNG and methanol dual-fuel tonnage now represent 40%.

The methanol-fuelled boxship orderbook now stands at 68 ships of 0.93m teu  
The segment now represents 12% of the orderbook by capacity, versus less than 1% a year ago

Dry bulk and tanker orders are also now in the mix. The cruise business is also keen to embrace methanol. Costa, TUI Cruises, Disney, and Norwegian have declared their interest in moving toward methanol as a fuel for their cruise ships

MAN Energy Solutions: “the interest in methanol as a fuel has surged and represents more than 30% of all its current, open pipeline projects across a broad range of vessel segments



## Maersk’s First Green Methanol-Powered Containership Launched

April 14, 2023

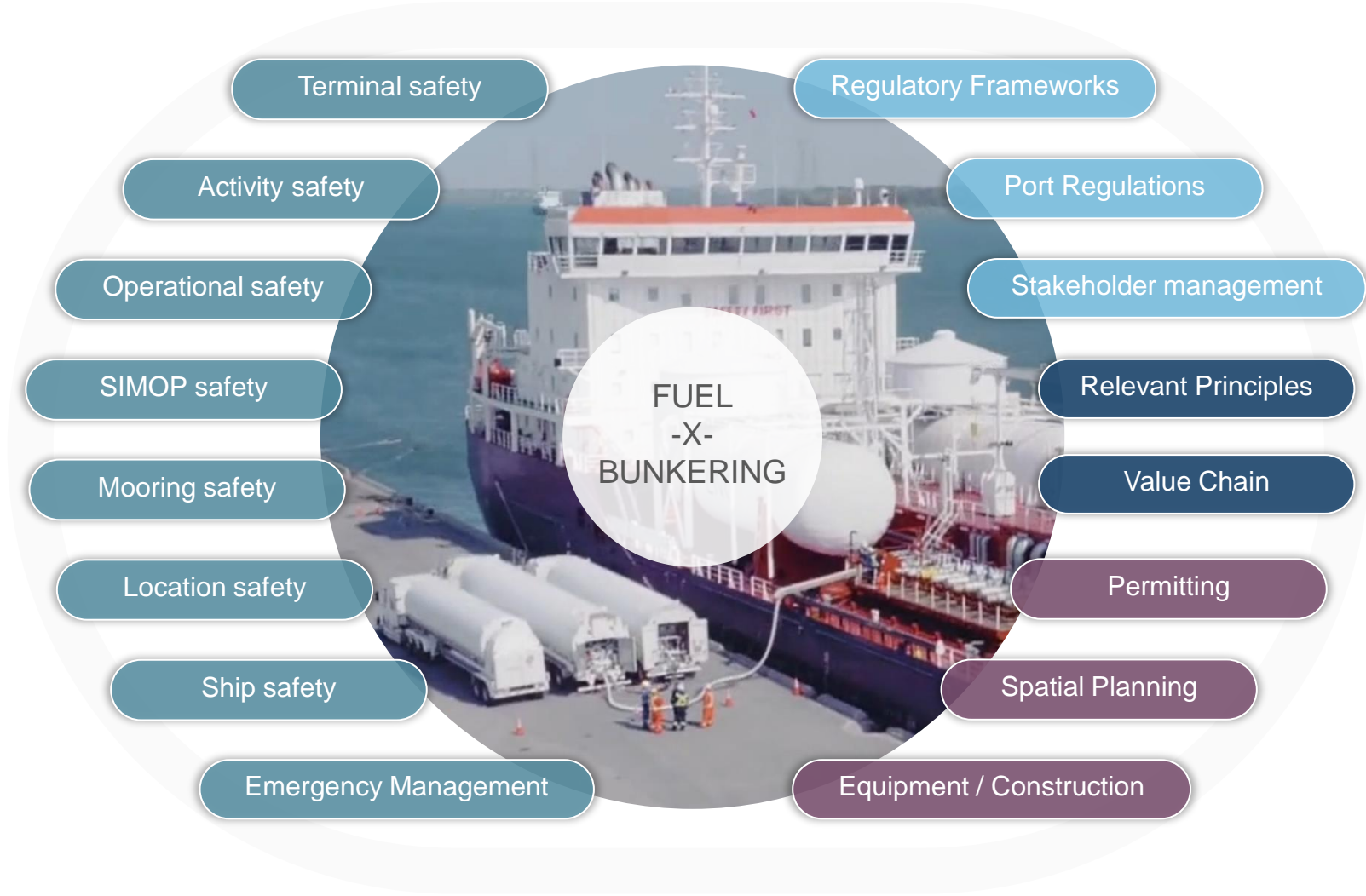
Danish shipping giant Maersk is celebrating the launch of the world’s first green methanol-powered containership.

The vessel, a 2,100 TEU capacity feeder ship, is the first of nineteen carbon neutral ships Maersk has on order that will be powered by green methanol fuel.

The 172-meter-long vessel was ordered in July 2021 from Hyundai Mipo Dockyard in South Korea with delivery planned for later this year.



GOVERNANCE    INFRASTRUCTURE    SAFETY    FUEL AVAILABILITY



# Port Readiness Levels for Alternative Fuelled Ships

Deployment  
Development  
Research

9: Vessel call or Bunkering service readily available
8: Vessel call or Bunkering system complete and qualified
7: Vessel call or Bunkering system established on a project basis in an operating environment
6: Vessel call or Bunkering framework demonstrated in a controlled environment
5: Vessel call or Bunkering framework designed
4: Vessel call or Bunkering approach decided
3: Sufficient Information gathered
2: Interest of port stakeholders determined
1: Fuel relevance assessed

The PRL-AFS is a nine-step indicator tool for the progress of a port in facilitating port calls or bunkering services for ships on alternative fuels.



# PRL-AFS tool

1. Level indicator

2. Self assessment tool

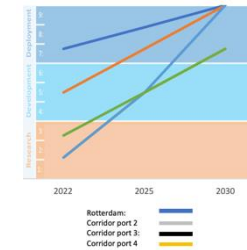
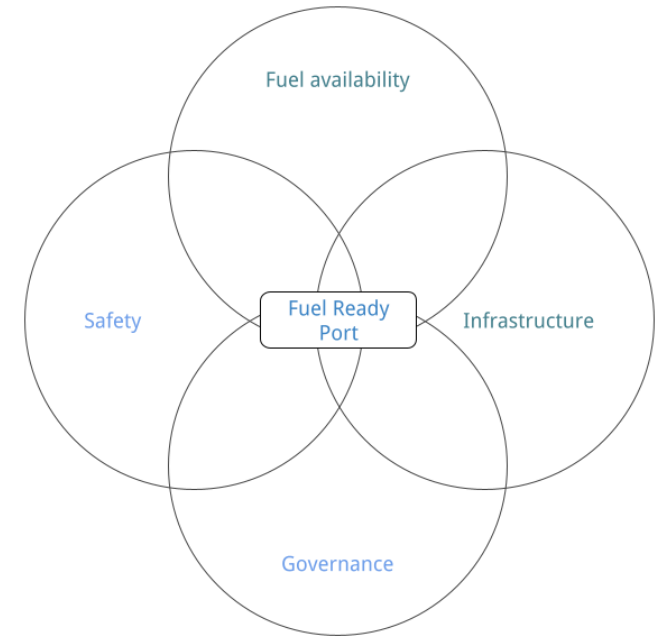
3. Best practice guidance

4. Green corridor profiler

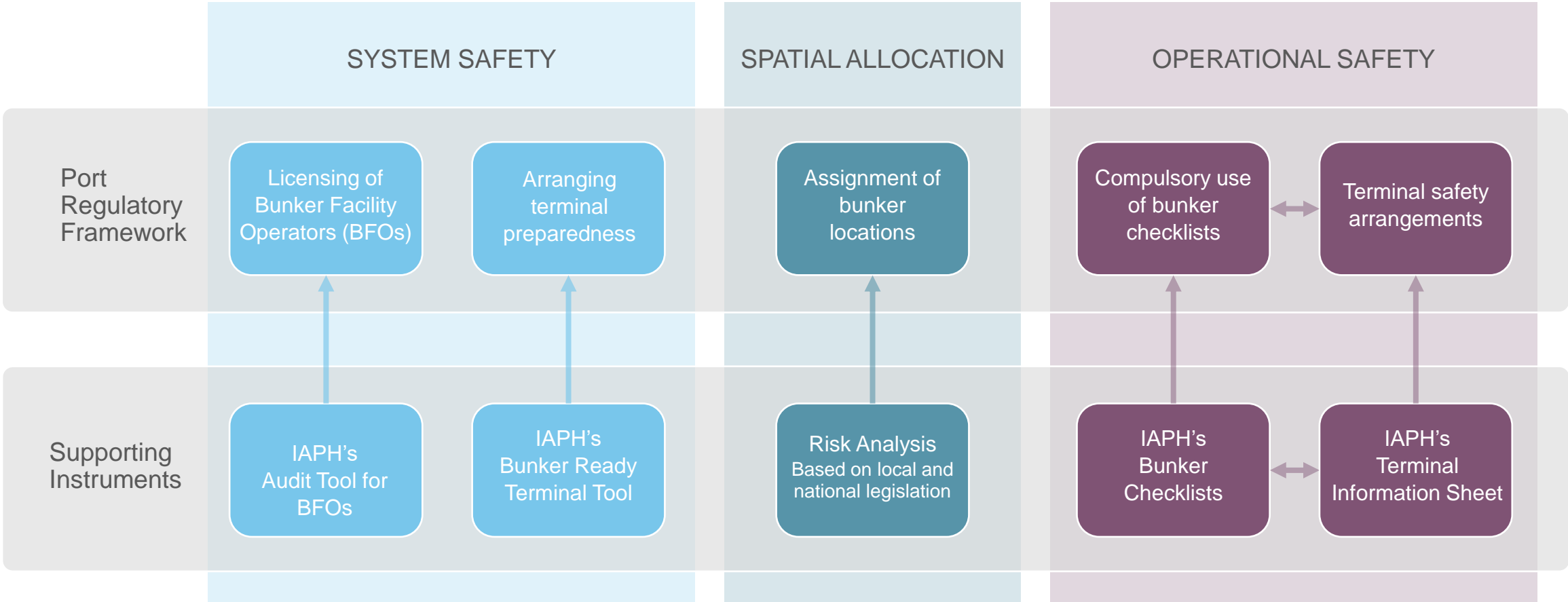
Deployment	9. Vessel call or Bunkering service ready available
	8. Vessel call or Bunkering system complete and qualified
	7. Vessel call or Bunkering system established on a project basis in an operating environment
	6. Vessel call or Bunkering framework demonstrated in a controlled environment
Development	5. Vessel call or Bunkering framework designed
	4. Vessel call or Bunkering approach decided
Research	3. Sufficient information gathered
	2. Interest of port stakeholders determined
	1. Fuel relevance assessed



10. Impact the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 11. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 12. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 13. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 14. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 15. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 16. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 17. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 18. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 19. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants  
 20. Identify the vessel's specific fuel use on CO<sub>2</sub> emissions and other pollutants



# IAPH CMF toolbox



Port Safety Management on bunker operations for low flash point marine energy carriers



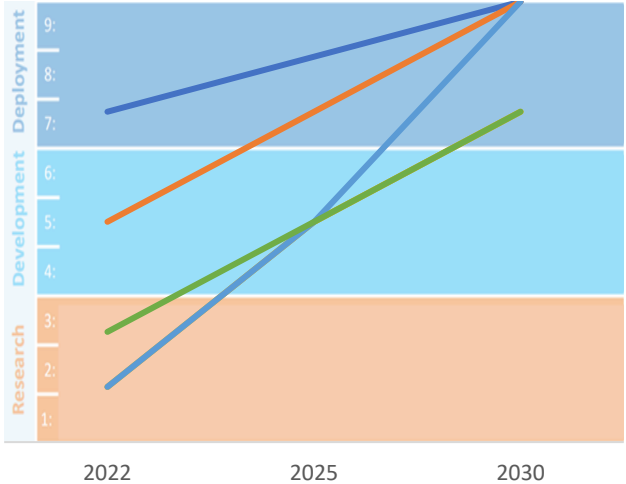
# PRL-AFS Example Port of Amsterdam

Fuel and bunkering	PRL 2022	PRL 2023 ambition	PRL 2024 ambition	PRL 2025 ambition
LNG	9	9	9	9
LBG	7	8	9	9
E-Methane	5	5	6	7
Methanol	6	8	9	9
B methanol	6	8	9	9
Ammonia	3	3	4	5
C Hydrogen (Inland vessels, contained)	4	6	7	8
L Hydrogen (Inland vessels, tank truck)	3	4	5	6
C Hydrogen (Sea going vessels)	8	8	9	9
L Hydrogen (Sea going vessels)	5	5	6	7

Draft

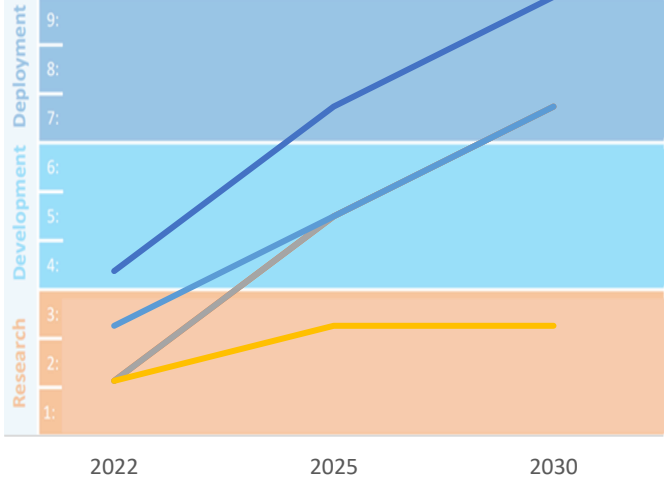
# PRL-AFS Green Corridor Profiler

## Liquid Hydrogen



Corridor Port 1: —  
 Corridor port 2: —  
 Corridor port 3: —  
 Corridor port 4: —

## Ammonia



Corridor Port 1: —  
 Corridor port 2: —  
 Corridor port 3: —  
 Corridor port 4: —

