



All About Hydrogen: Benefits and Challenges of Hydrogen-Derived Fuels for Marine Shipping



GREENTECH 2025

June 2025

clearseas.org

Clarity on marine shipping issues that matter most

Clear Seas is a Canadian not-for-profit organization that provides independent fact-based information to enable governments, industry, and the public to make informed decisions on marine shipping issues.



NEW
HYDROGEN
MICROSITE
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The latest insights



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ARTICLE

Simulations to Spot a Problem Before it Occurs

THE HYDROGEN HORIZON

Hydrogen?

Ammonia?

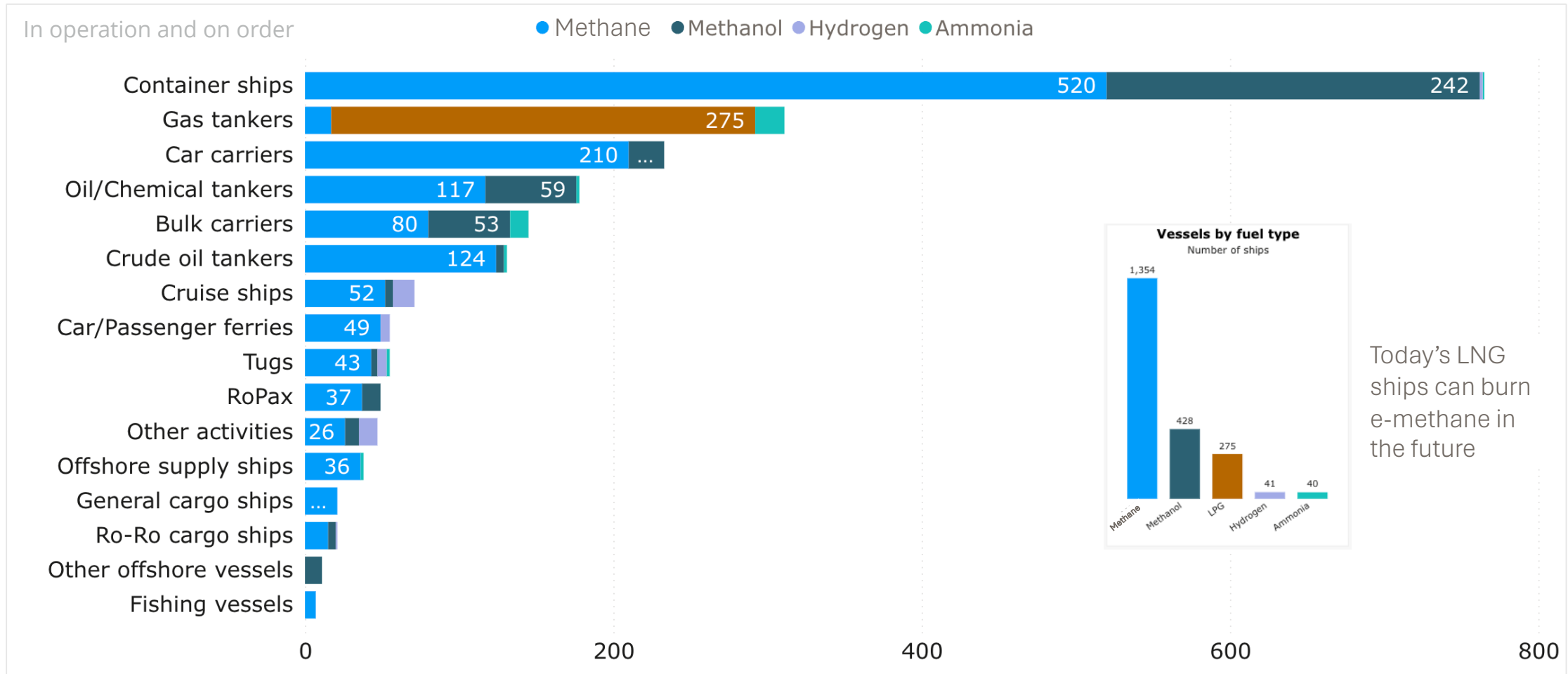
Methane / LNG?

Methanol?

Comparing Properties of Different Fuels

FUEL	CHEMICAL FORMULA	ENERGY DENSITY AS A LIQUID (OIL EQUIVALENT %)	NATURAL STATE AT ROOM TEMPERATURE	LIQUID TEMPERATURE (°C)
Hydrogen	H ₂	<div><div></div><div>⚡14%</div></div>	gas	-253°C
Ammonia	NH ₃	<div><div></div><div>⚡28%</div></div>	gas	-33.6°C
Methane	CH ₄	<div><div></div><div>⚡36%</div></div>	gas	-162°C
Methanol	CH ₃ OH	<div><div></div><div>⚡39%</div></div>	liquid	64.7°C

ALTERNATIVE FUEL UPTAKE BY SHIP TYPE



Source: DNV Alternative Fuel Insights



LNG Bunkering

Seaside LNG completes first ship-to-ship LNG bunkering operation along US Gulf Coast

Firm achieved two milestones with the first STS LNG bunkering in US Gulf Coast and “Clean Everglades”, the newest member of the Seaside LNG fleet, making its inaugural delivery last week.



Published 1 year ago on January 25, 2024
By Admin



Seaspan Energy puts Canada on the map for ship-to-ship LNG bunkering

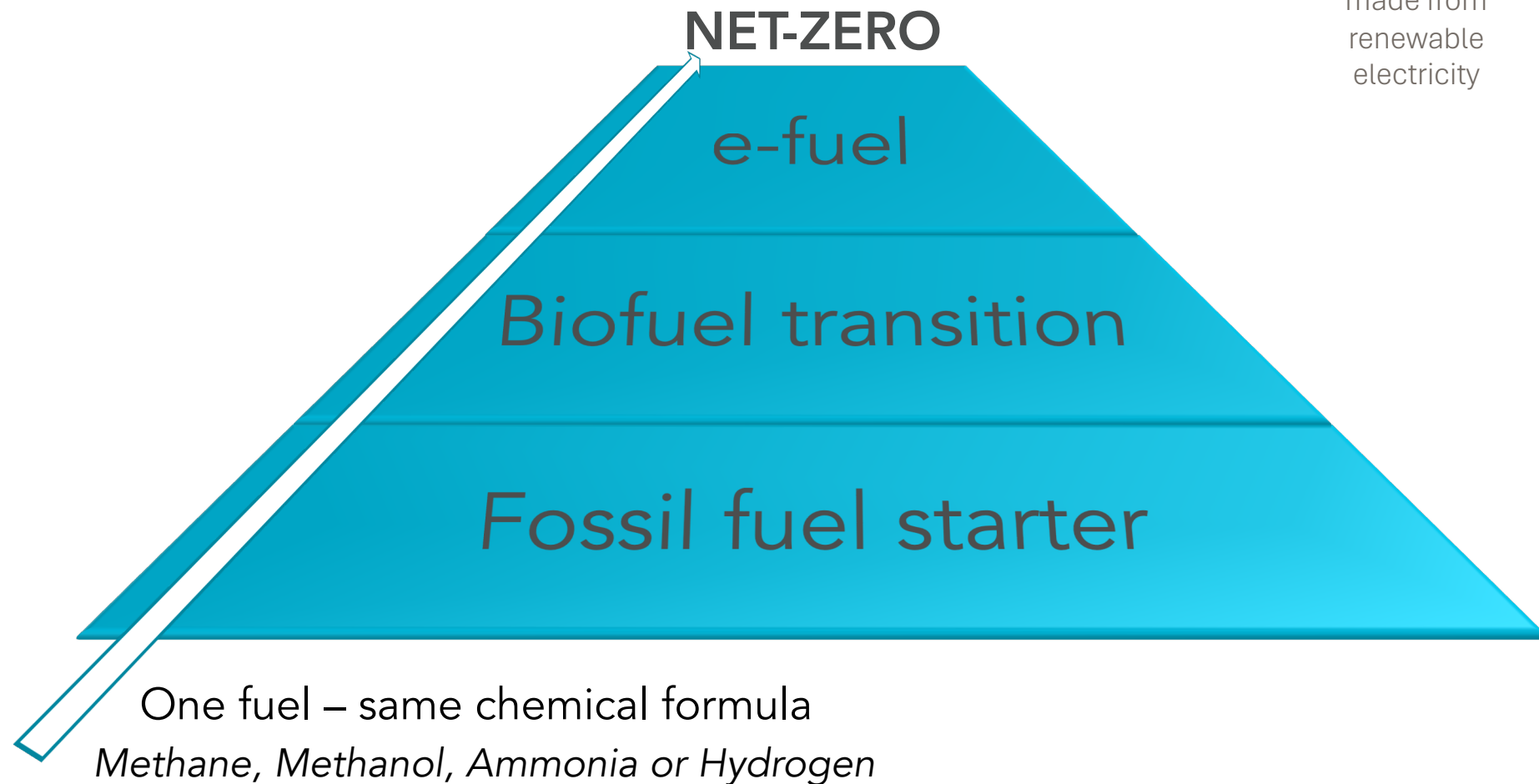
Second of Canadian shipowner's trio of LNG bunker vessels conducts its first fueling operation in Vancouver

4 February 2025 3:54 GMT UPDATED 4 February 2025 7:30 GMT

By [Jonathan Boonzaier](#) in [Singapore](#)

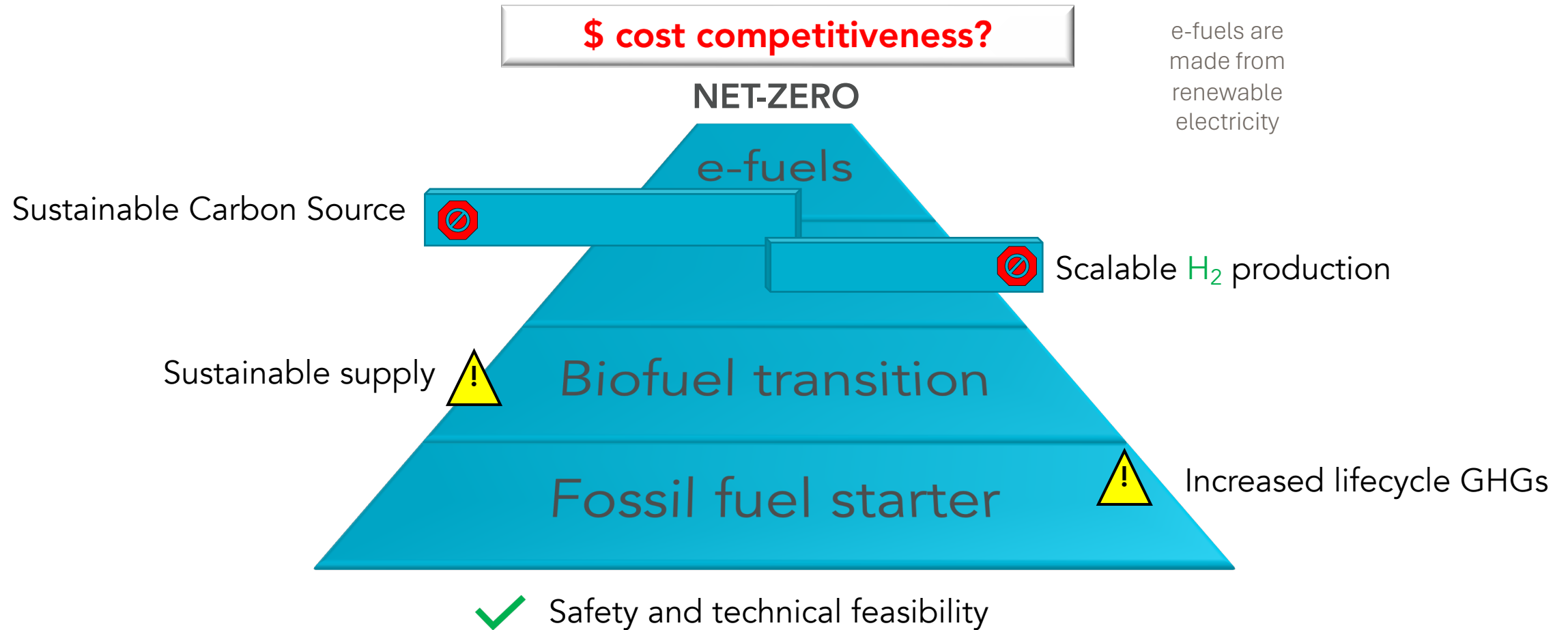
Vancouver, the Canadian west coast shipping hub, has hosted its first ship-to-ship LNG bunkering operation, becoming the first port in the country to do so.

DECARBONIZATION PARTHWAY ELEMENTS

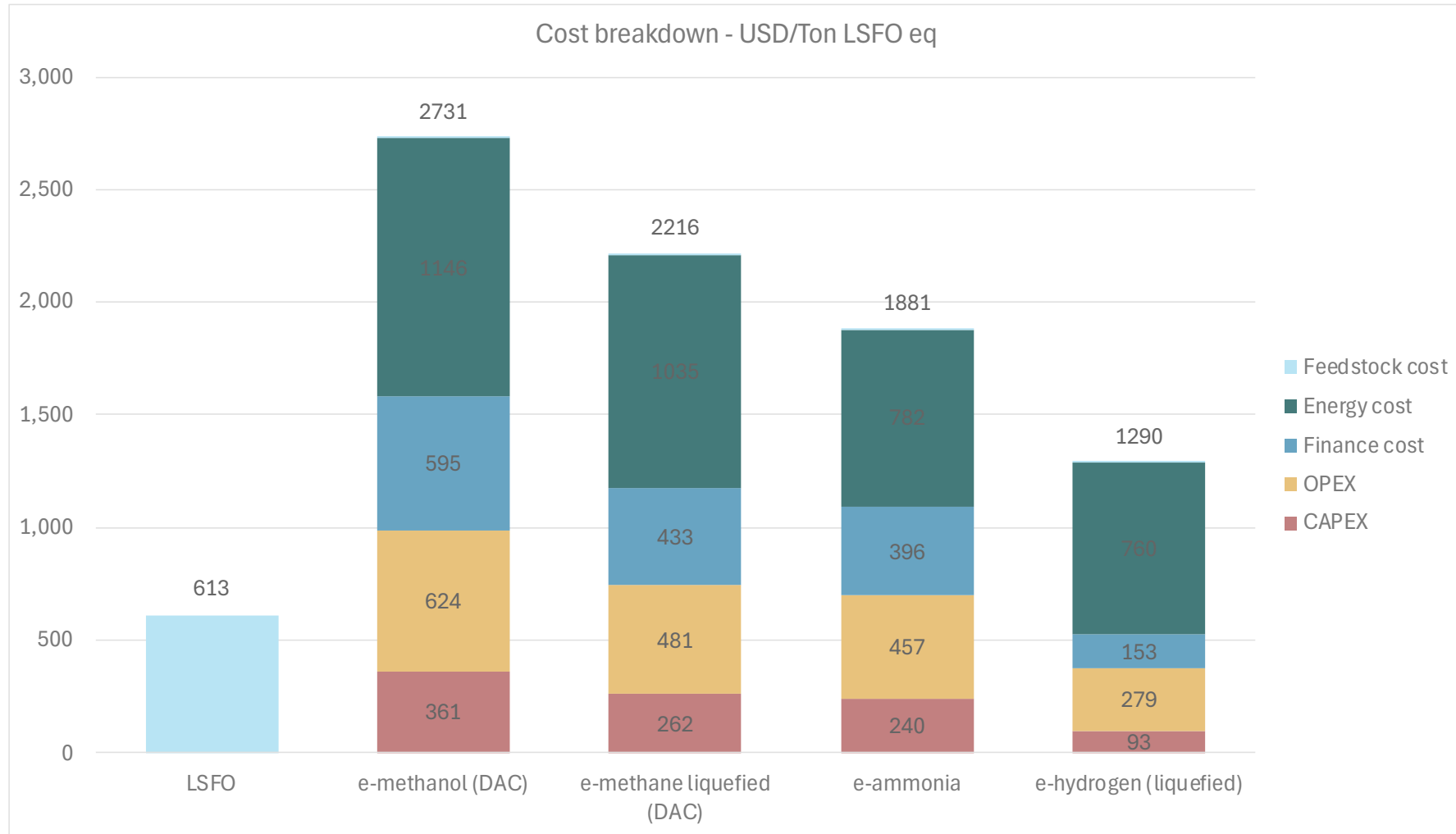


e-fuels are
made from
renewable
electricity

CHALLENGES ALONG THE PATH



COST OF ALTERNATIVE FUELS (2025)

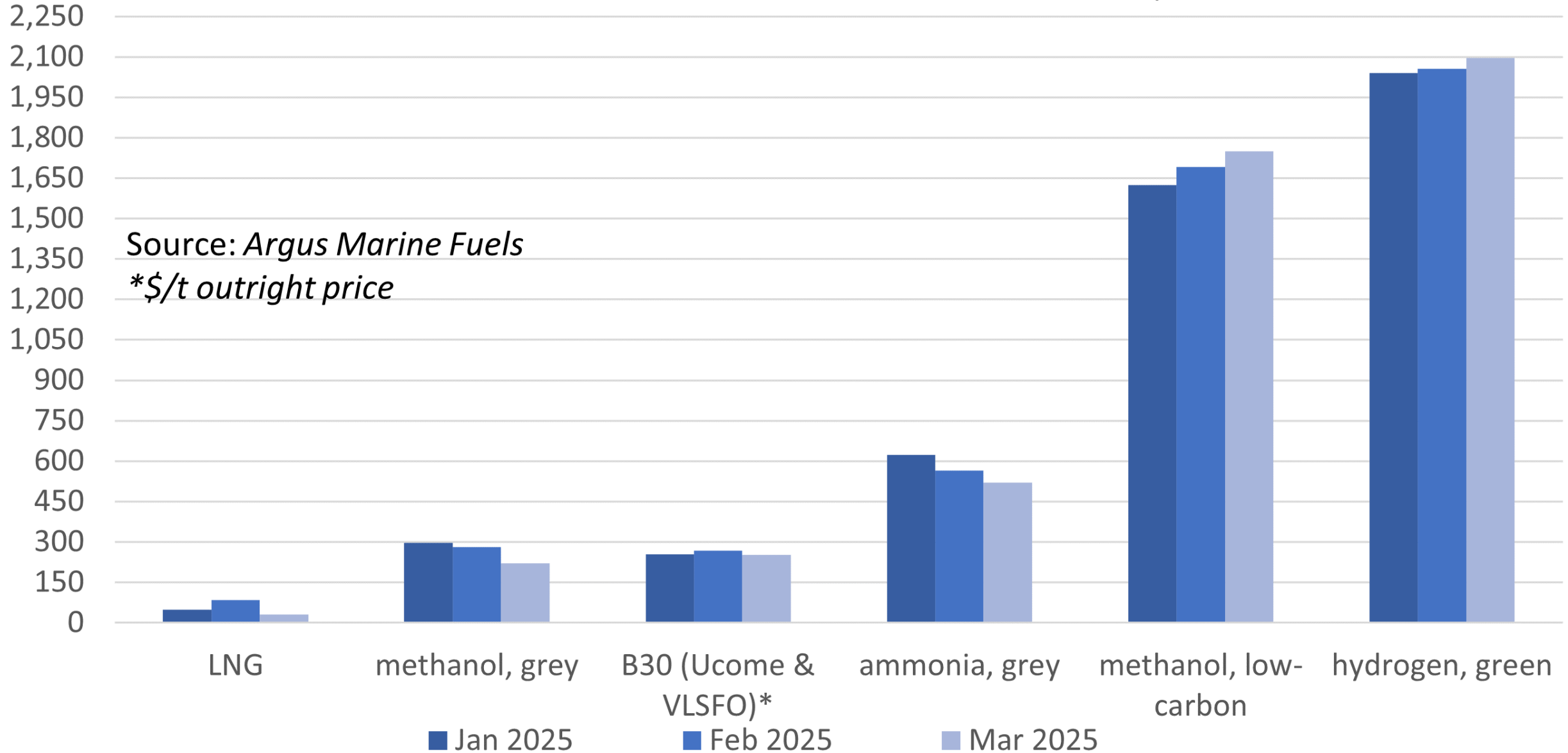


Low Sulphur Fuel Oil (LSFO) is the most common conventional ship fuel today

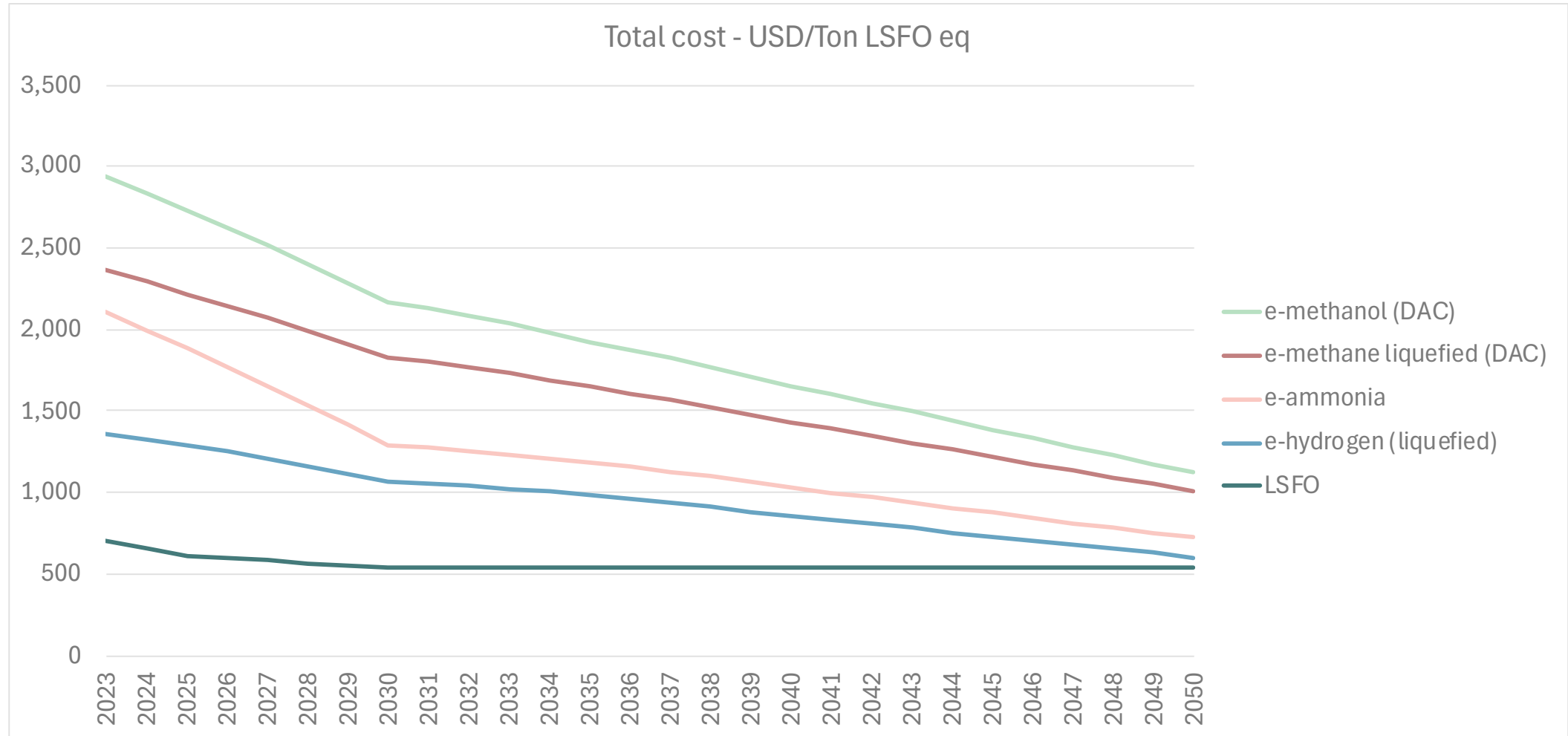
Direct Air Capture (DAC) provides the carbon for the fuel manufacture

Source: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping Fuel Cost Calculator 2024

US Gulf low-carbon marine fuels less VLSFO, \$/t VLSFO-equivalent



HYDROGEN FUEL COST COMPETITIVENESS



Source: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping Fuel Cost Calculator 2024

April 11, 2025 | Environment, News, Regulations

IMO's MEPC 83 approves net-zero regulations for global shipping

Written by Nick Blenkey



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High drama at the International Maritime Organisation, as a set of policies to drive the shipping sector to net-zero goes to a vote.

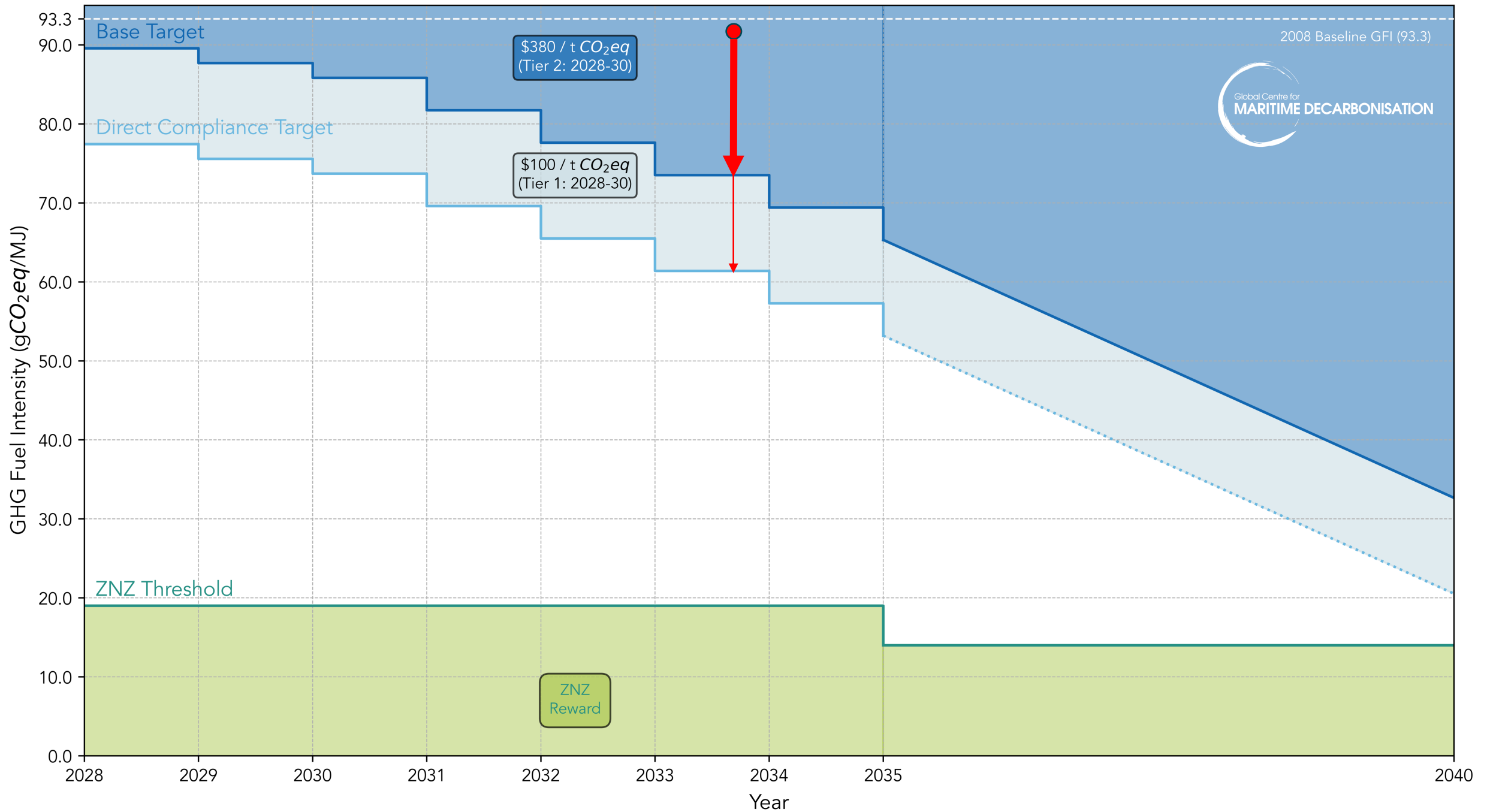
A set of countries including Saudi Arabia 🇸🇦 and Russia 🇷🇺 oppose the deal.

Pacific island nations, who have been pushing for more ambition all week, chose to abstain.

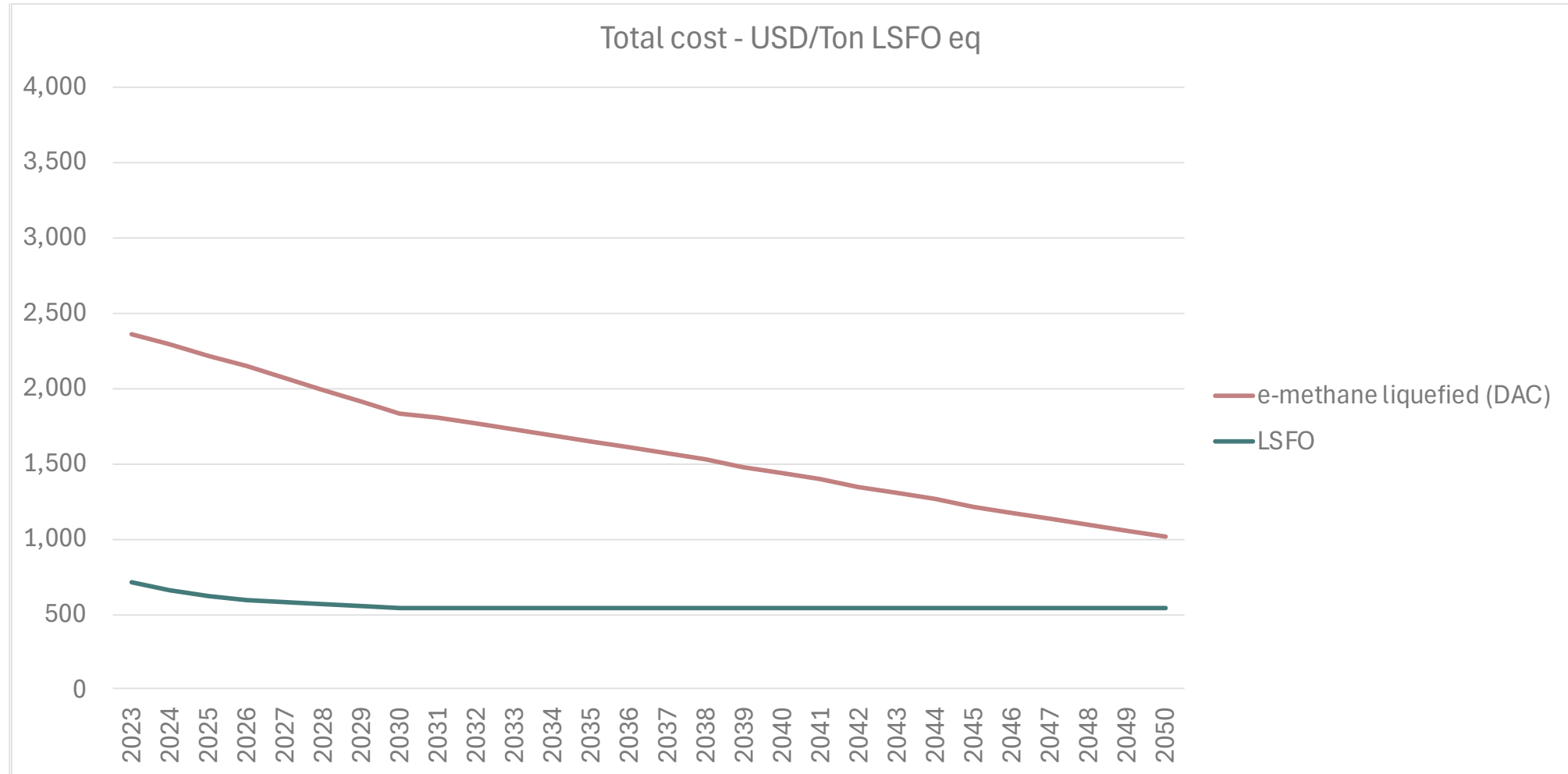
Yes			No	Abstain	
Lithuania	Cook Islands	Kenya	Saudi Arabia	Liberia	Morocco
San Marino	Costa Rica	Latvia	Thailand	Seychelles	New Zealand
Senegal	Croatia	Austria	UAE	Solomon Islands	Palau
Singapore	Cyprus	Luxembourg	Venezuela	Sri Lanka	
Slovenia	Denmark	Malta	Algeria	Suriname	
South Africa	Dominican Repul	Mexico	Brunei	Tuvalu	
Spain	Ecuador	Namibia	North Korea	Uganda	
Sweden	Estonia	Netherlands	Iran	Vanuatu	
Switzerland	Finland	Norway	Iraq	Egypt	
Tokelau	France	Panama	Kuwait	El Salvador	
Ukraine	Germany	Paraguay	Madasagacar	Fiji	
UK	Greece	Peru	Malaysia	Ghana	
Urguguay	Grenada	Philippines	Oman	Kiribati	
Antigua and E	Guatemala	Poland	Pakistan	Vietnam	
Bahmaas	Honduras	Portugal	Qatar	Argentina	
Barbados	Iceland	Korea	Russia	Australia	
Belgium	India	Romania		Azerbaijan	
Belize	Indonesia	St Kitts and Nevis		Bangaldesh	
Brazil	Ireland	St Lucia		Cambodia	
Canada	Italy	St Vincevnt and Grenadines		Colombia	
Chile	Jamaica	Samoa		Liberia	
China	Japan			Marshall Islands	

11 April 2025 at 06:59 Everybody can reply

IMO Net-Zero Framework

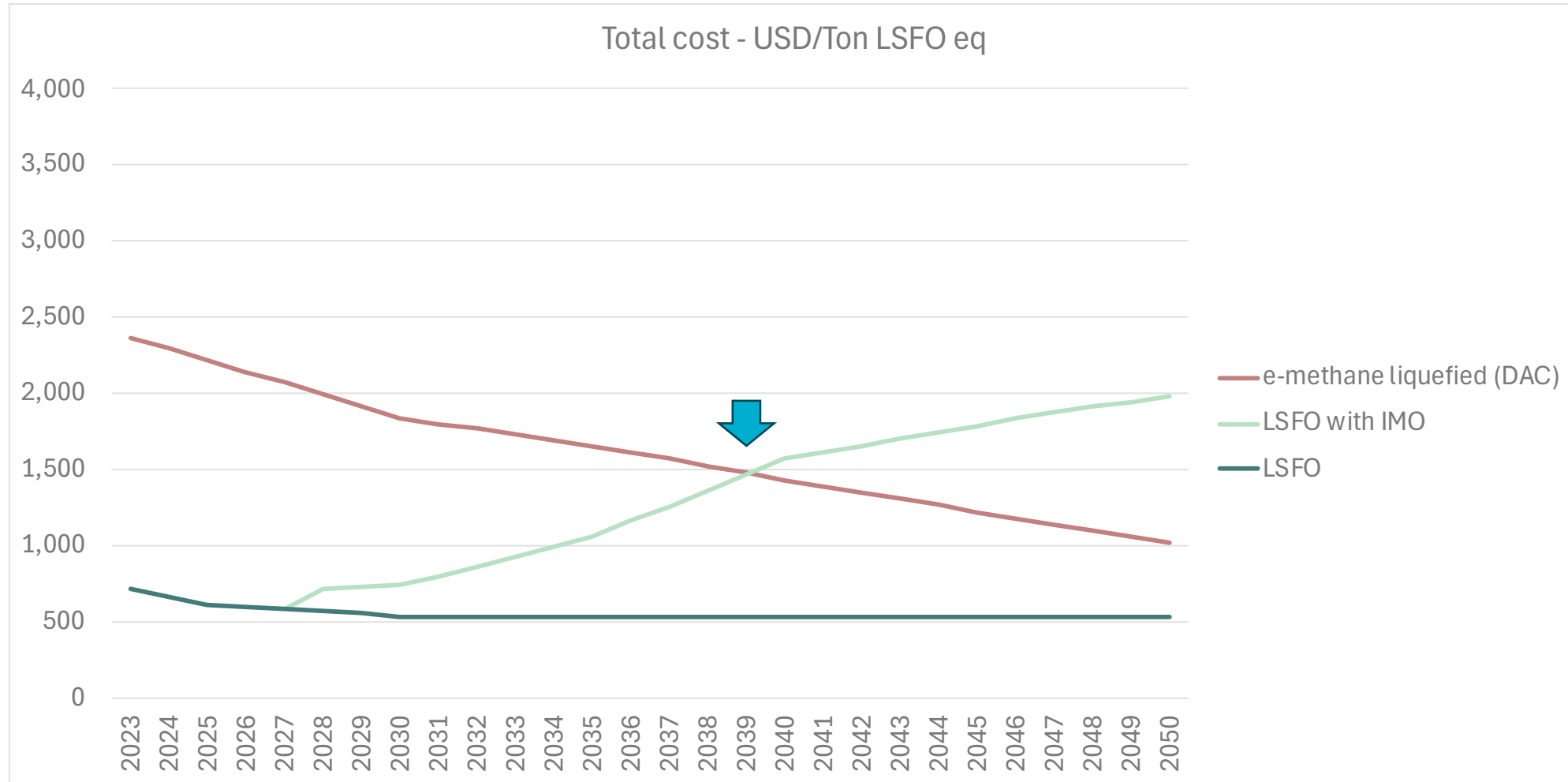


HYDROGEN FUEL COST COMPETITIVENESS



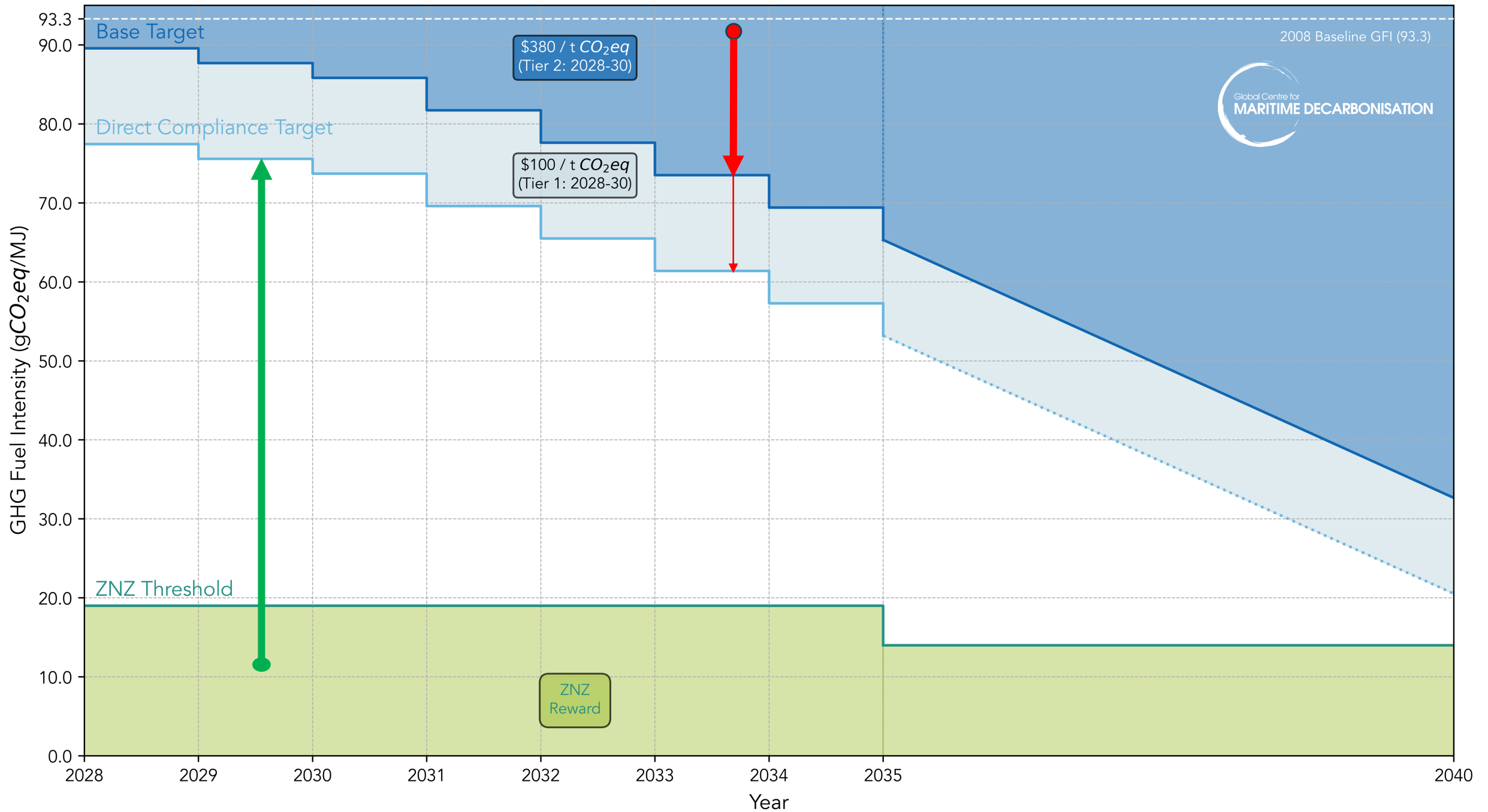
Source: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping Fuel Cost Calculator 2024

HYDROGEN FUEL COST COMPETITIVENESS

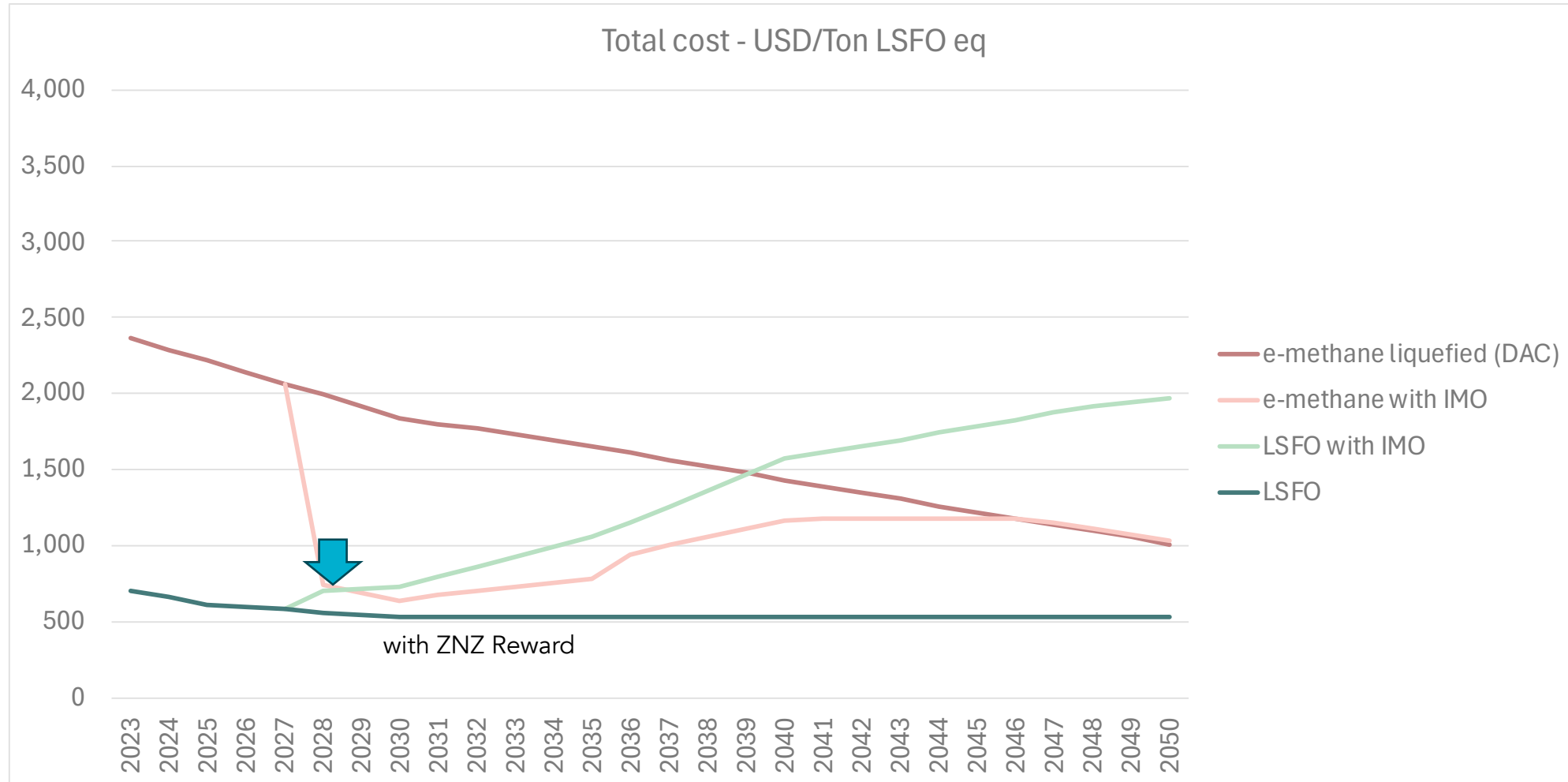


Source: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping Fuel Cost Calculator 2024, Clear Seas analysis

IMO Net-Zero Framework



HYDROGEN FUEL COST COMPETITIVENESS



Source: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping Fuel Cost Calculator 2024, Clear Seas analysis

KEY TAKEAWAYS

- Hydrogen derived e-fuels will be cheaper than heavy fuel oil in 2028
- International market for Zero and Near-Zero-Emissions marine shipping fuel is vast and growing – the customers will come to you

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