



SUSTAINABLE METHANOL

A Solution for the Marine Sector

JANUARY 25, 2024



Enerkem

ENERKEM: LEADER IN LOW-CI SOLUTIONS

For hard-to-abate sectors



285+

Highly skilled and
professional employees



120+

Patents



Multiple

Projects in construction
and development

World-Class Strategic Partners

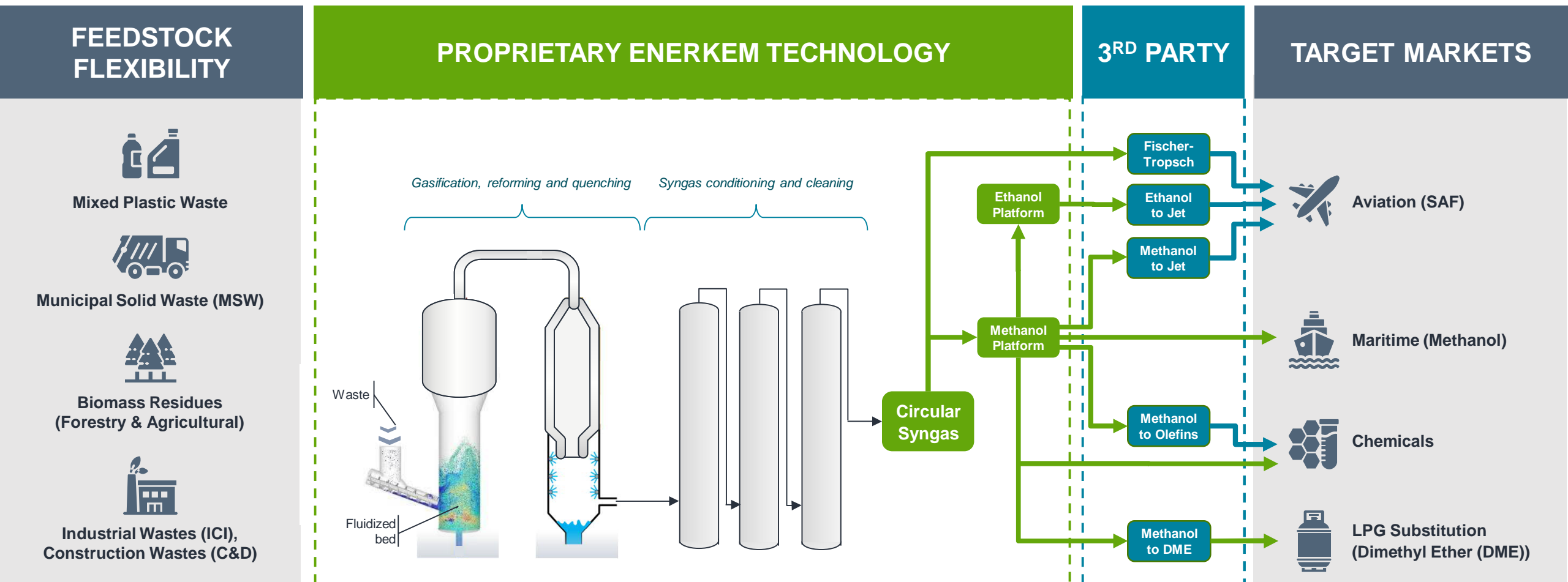




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KEY ENABLING TECHNOLOGY

From non-recyclable waste materials to sustainable fuels and chemicals





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OUR COMPETITIVE ADVANTAGE

Five reasons to choose Enerkem

MATURITY



In commercial roll-out



FEEDSTOCK FLEXIBILITY



Handling
the widest breadth
of feedstock

PRODUCT DIVERSITY



Multiple
low-CI end-products
pathways

SCALABILITY



Large volumes,
in and out

VERSATILITY



Adaptable to feedstock
and regulations
changes

LEADING TECHNOLOGY ENABLING LOW-CI HYDROGEN ECONOMY



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OUR BUSINESS MODEL

A flexible and structured business model to accelerate deployment

WHO ARE OUR CLIENTS?

What are their needs?

TRADITIONAL CLIENTS

Desire to operate, owners of the facilities, need for adaptation, developers

OFFTAKERS CLIENTS

Those interested solely in the product, partners who have land or raw materials, etc.

OUR OFFER

Enerkem Technologies

- **Engineering services:** support for pre-feasibility / feasibility, PDP, support for feed, etc.
- **Proprietary equipment**
- **Support services:** marketing, feedstock evaluation, training, pre-commissioning and commissioning, operations, etc.

DevCo

- Project development: sites, permits, feedstock & H2 sourcing, financing, replicability (MeOH)
- Feed via 3rd party EP (Core Process & BOP)
- **Product purchase agreement offtake required to obtain AssetCo financing**
- Project execution via AssetCo or traditional client

Technology License

Commercial collaboration with Technip

Development with technological partnerships (e.g. SAF, DME, ..)

COMMERCIAL ROLL-OUT



Partners



Large pipeline
in development
globally

Focused
on methanol
for marine fuel
and SAF

Sustainable methanol

Renewable and recycled
carbon dimethyl ether (DME)



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LEVERAGING OUR PARTNERSHIP



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- Technology License
- Proprietary Equipment
- Support Services



TECHNIP
ENERGIES

- Concept / Feasibility Studies
- Front End Engineering Design (FEED)
- Detailed Engineering
- Procurement
- Fabrication / Construction Management

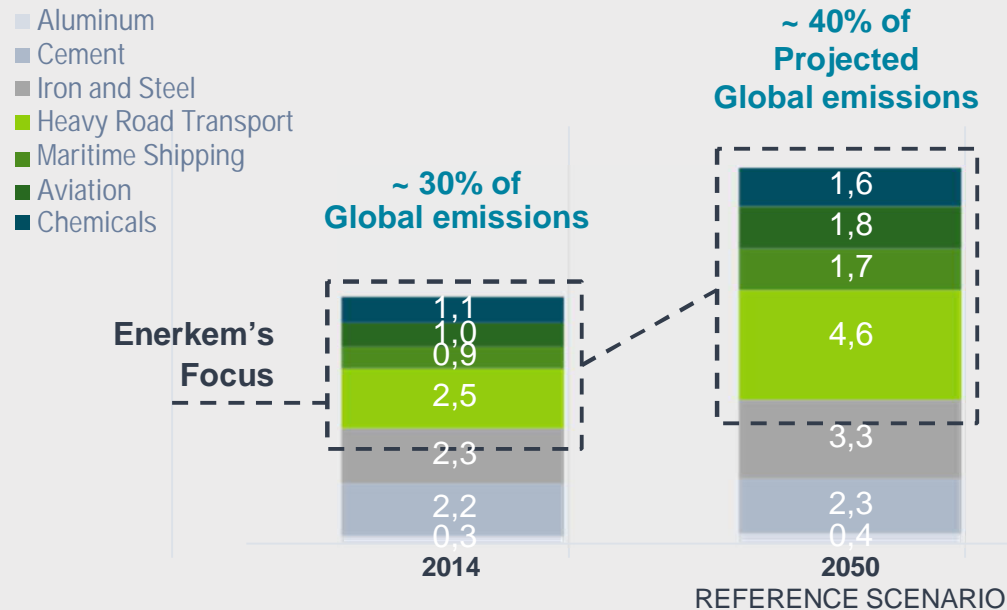


TARGETED MARKETS

Target Markets: Hard-to-Abate Sectors

Hard-to-abate sectors are responsible for more than ~30% of CO₂ emissions

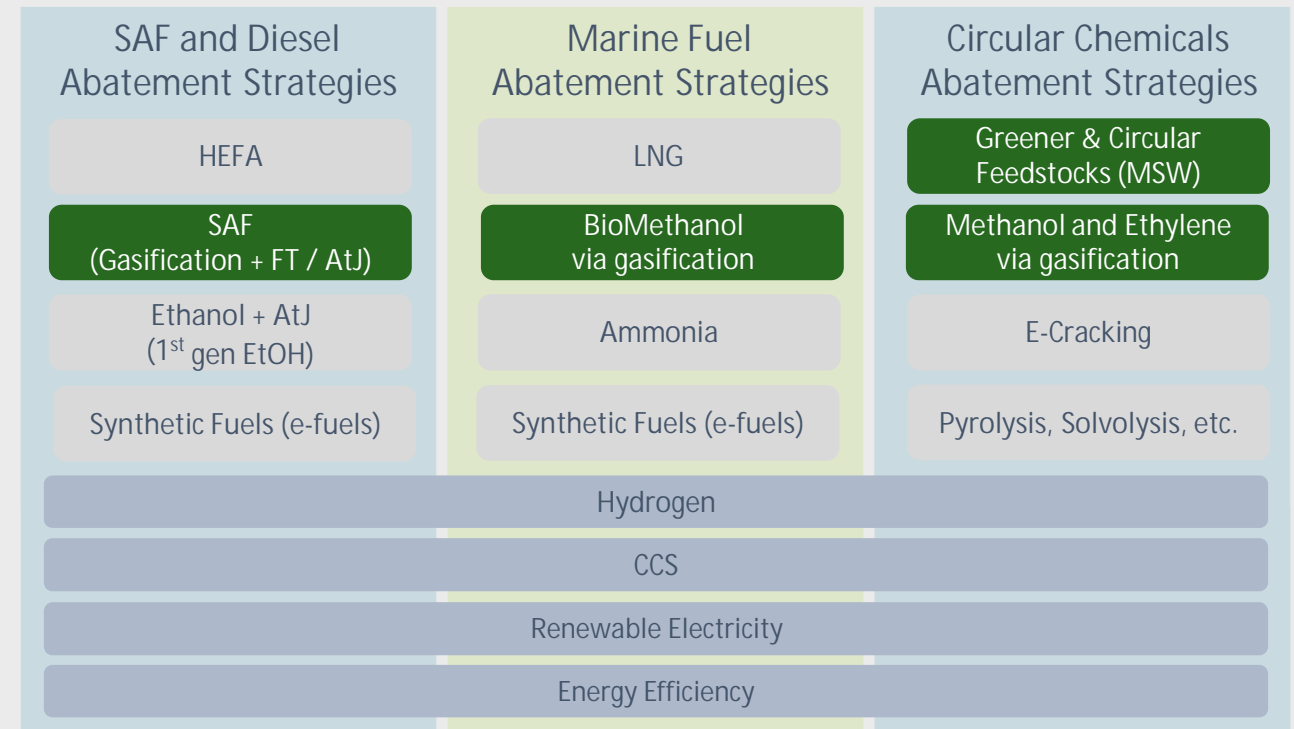
Direct Emissions from Hard-to-Abate Sectors (GT CO₂)



Source: IEA

Gasification at Core of Decarbonisation Strategy

Versatile technology that can be used for energy, fuels, chemicals, hydrogen and reach negative CO₂ emissions





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THE WORLD IS EVOLVING IN THE RIGHT DIRECTION

For a Sustainable Future



GHG
Abatement

Net-Zero emissions
economy by 2050



Key
Regulations

Fostering
robust demand for
sustainable products



Financial
Support

Grants, Funds, Tax Credits
and other financial instruments
in key jurisdictions



Expanding
Markets

Customer demand
follows government action
for the energy transition

Waste and residues
are a global strategic feedstock



REGULATORY CHANGES DRIVING SUSTAINABILITY

In the Marine Sector

RED III: Targets and Multipliers

- Introduction of the **methane avoidance credit (MAC)** – improves MeOH GHG performance when using MSW. The MAC must be distributed uniformly between the RCF and the RFNBO.
- The combined share of RFNBO and Advanced Biofuels from Annex IX Part A in the energy supplied to the transport sector is **at least 1% in 2025** and **5.5% in 2030**, of which a share of at least **1 percentage point must be from RFNBO in 2030**
- When calculating the % of renewable energy in the transport sector, Member States may apply the following multipliers:
 - **2X** for all volumes of advanced biofuels or RFNBO
 - **Incremental 1.2X** if advanced biofuels in aviation or maritime
 - **Incremental 1.5X** for RFNBO in aviation and maritime
 - No multiplier for RCF.

= **2.4x** Advanced biofuel in aviation or maritime
 = **3x** RFNBO in aviation or maritime

Fuel EU Maritime

- **Obligation:** all ships of above 5 000 gross tonnage (cargo & passenger) must reduce the GHG intensity of the energy used on-board from the baseline of 91,16 gCO₂eq/MJ. All technology can contribute to this obligation. Emissions include CO₂, N₂O and CH₄.
- **Eligible fuels:** AB, RCF and RFNBO are as defined in REDII. Food and feed crop-based fuels are excluded.
- **Scope:** 100% of the energy used on board for EU-to-EU port voyages, 50% for voyages with a non-EU port.

Regulation	2025	2030	2035	2040	2045	2050
FuelEU Maritime (proposed regulation from 2016 levels & complementary to EU-ETS)	2%	6%	14.5%	31%	62%	80%
IMO EEXI / CII (from 2008 levels)		-40%				-70%

With MAC, all MeOH produced from MSW feedstock qualify in the fuel market. (Advanced Biofuel, RFNBO and/or RCF)

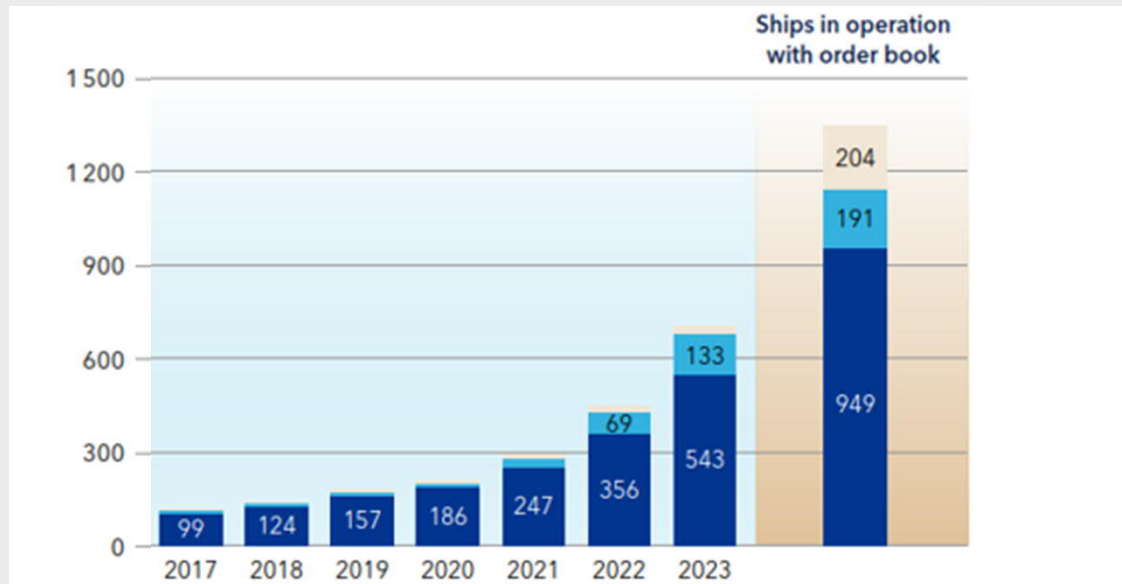


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PROPULSION TECHNOLOGY EVOLUTION

For Maritime Industry

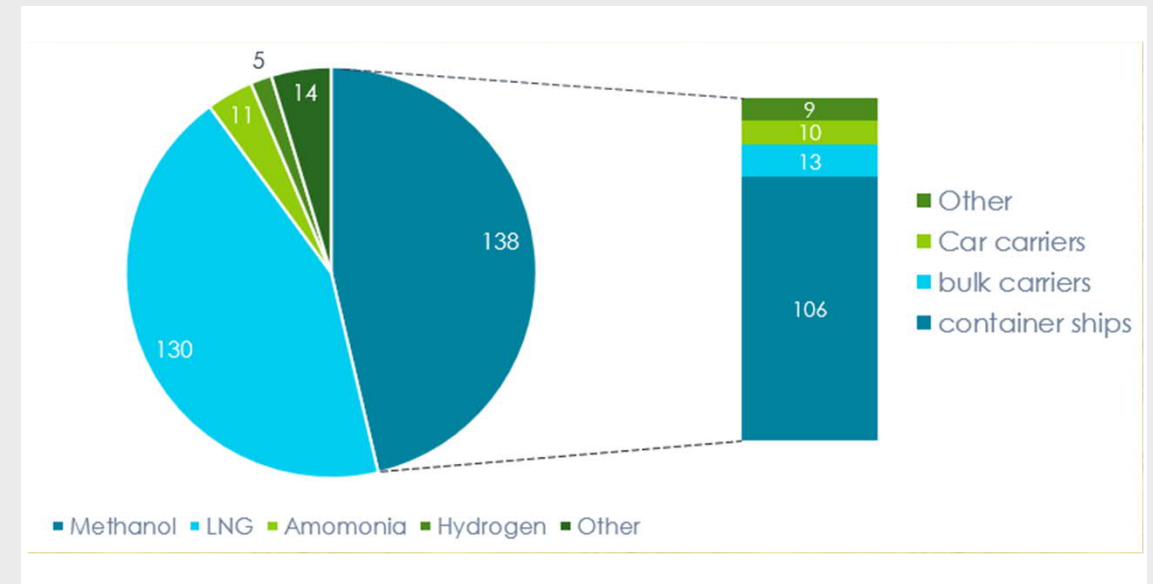
Development of LNG, LPG and MeOH fuel technology



Source: DNV, Energy Transition Outlook 2023, Maritime Forecast to 2050 (July 2023)

By the end of 2023, methanol vessels were #1 amongst alternative fuel propulsion ordered in 2023.

Alternative fuel propulsion ordered in 2023



Source: DNV, Maritime decarbonization efforts propelled as orders for alternative-fueled vessels grow, 9 January 2024

Methanol vessels ordered is the fastest growing segment among alternative fuel propulsion.



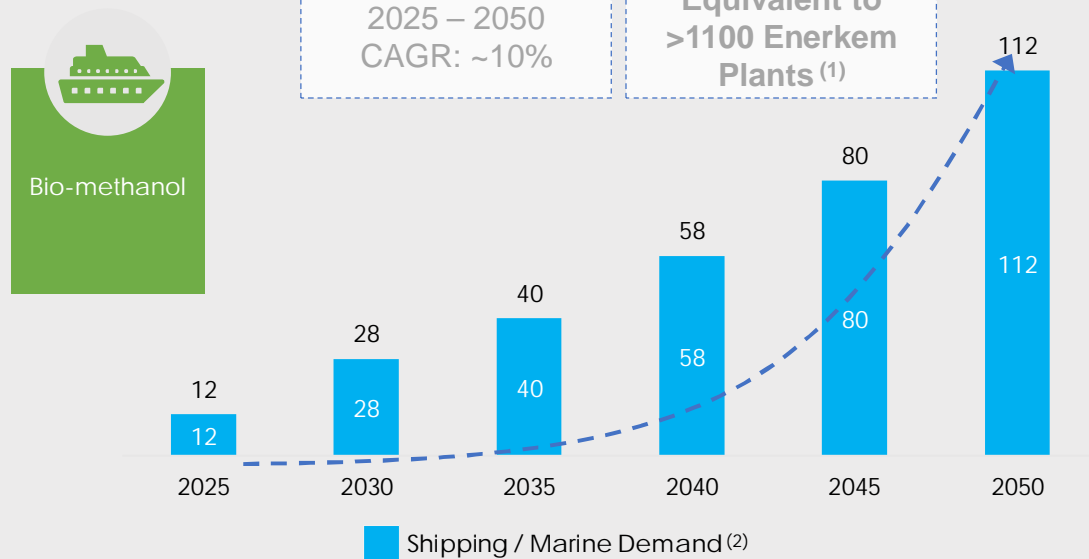
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MAIN DEMAND FOR BIO-METHANOL WILL COME FROM TWO SECTORS:

Marine Shipping and Sustainable Aviation

Projected Global Bio-methanol Demand Outlook

Tonnes/year, Millions



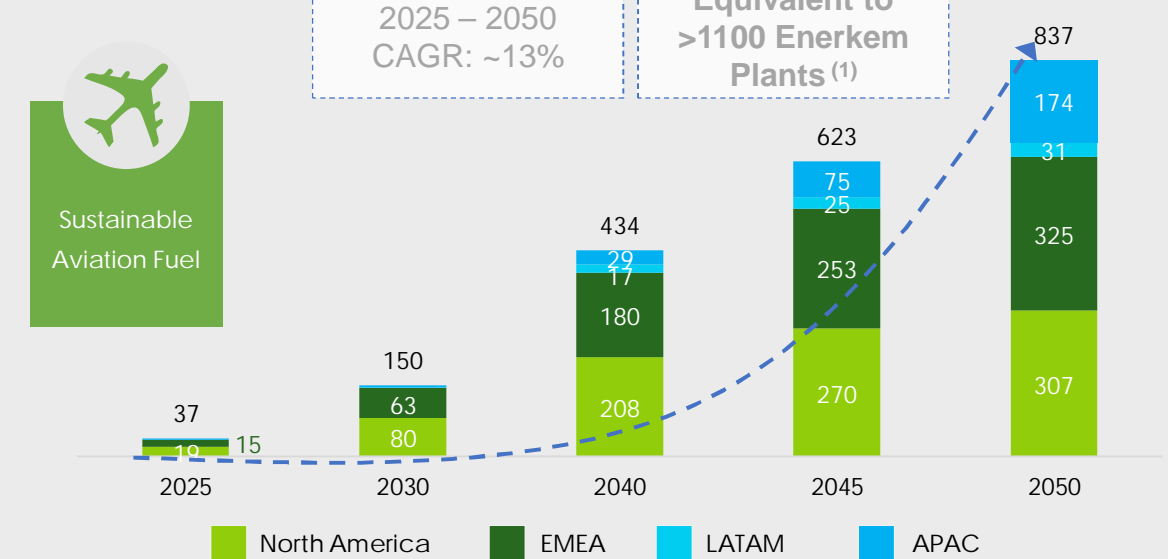
Source: IHS, Methanol Institute, DNV and Company Estimates

(1) Assumes Enerkem plant size of 100,000 Tonnes of bio-methanol per year (1 train)

(2) Methanol Institute and DNV forecast (based on assumption that Methanol represents 25% of marine fuel mix by 2050)

Projected Global SAF Demand Outlook

Barrels/day, Thousands



Source: BIS, IEA, CMAI, Wood Mackenzie, Company Forecast

(1) Assumes Enerkem SAF plant size of 35,000 tonnes per year, equal to 61,865 gallons per day or 736 barrels per day (1 train)

Projected supply of bio-methanol for 2030 is expected to be less than 3,000,000 tonnes
There will be a scarcity of biomethanol which will translate into higher sales price – analogous to current SAF



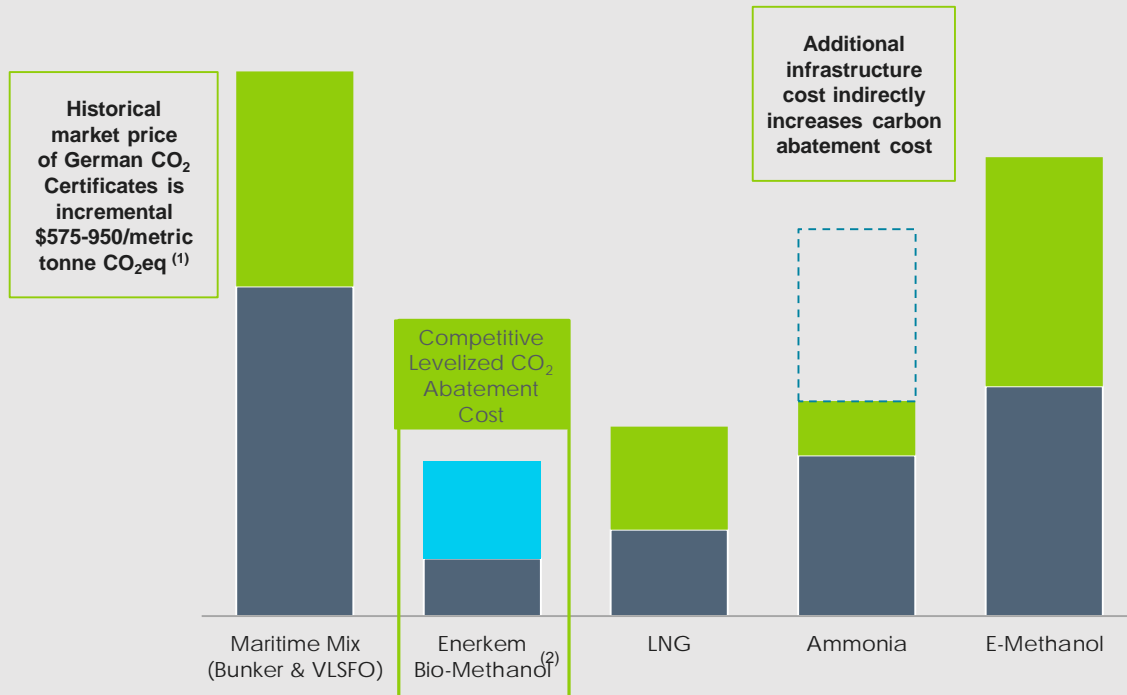
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COMPETITIVE ABATEMENT COSTS AND PRODUCTION COSTS

Versus Alternatives or 'Do Nothing Case'

Marine Fuel's CO₂ Abatement Cost

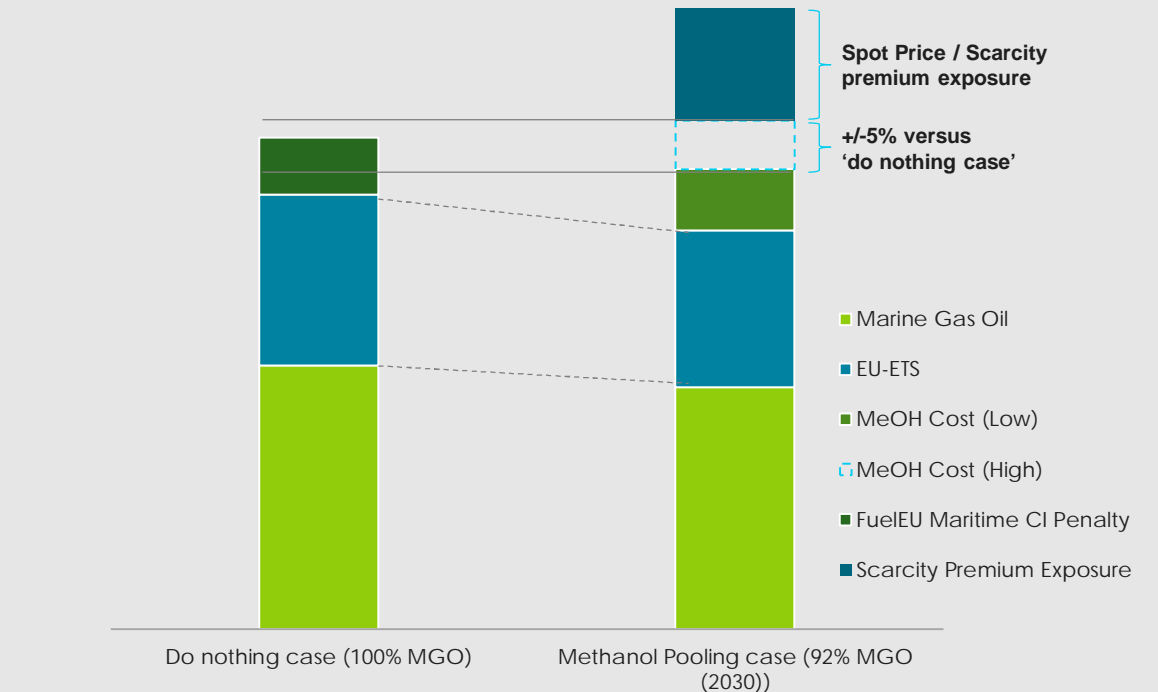
Carbon Abatement Cost | (\$US / metric tonne CO₂)



Source: Company Disclosure, Argus

Illustrative Fully Loaded Marine Cost per Tonne of MGOeq ⁽³⁾

Marine Fuel Cost | (\$US / metric tonne CO₂)



- Does not include opportunity to charge customers green premiums (Ship Green)
- Difference between methanol high / low cases are utilities pricing, gases, etc.

(1) Range of market price for German Certificate from May 2022 - May 2023 based on Argus Media
 (2) Enerkem MeOH or SAF plant with 10% unlevered IRR target return
 (3) Marine Gas Oil (MGO) equivalent



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WHAT ENERKEM OFFERS

1

COMPETITIVE PRICING

- ✓ Lower cost than compliance cost
- ✓ Lower cost than alternatives
- ✓ No exposure to additional margins

2

PRICE CERTAINTY

- ✓ No exposure to scarcity premiums
- ✓ Based on actual executed projects costs and established equipment supply chain

3

SCALABILITY

4

NO DEVELOPMENT COST EXPOSURE via DevCo

Offtake a key enabling contract

Opportunity for off-taker to secure volumes through Heads of Terms (HoTs)

Offtake could be anchored around compliance model





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Denis Arguin

Vice President, Strategic Relationships



darguin@enerkem.com



1-855-363-7536



1130 Sherbrooke West, Suite 600
Montreal, QC H3A 2M8 - CANADA

enerkem.com