

METHANOL INSTITUTE

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Role of Green Methanol for green economy Prakriti Sethi, Chief India Representative

17 October 2023



Members



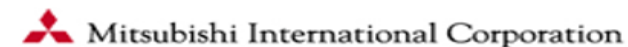
Tier 1



Tier 2



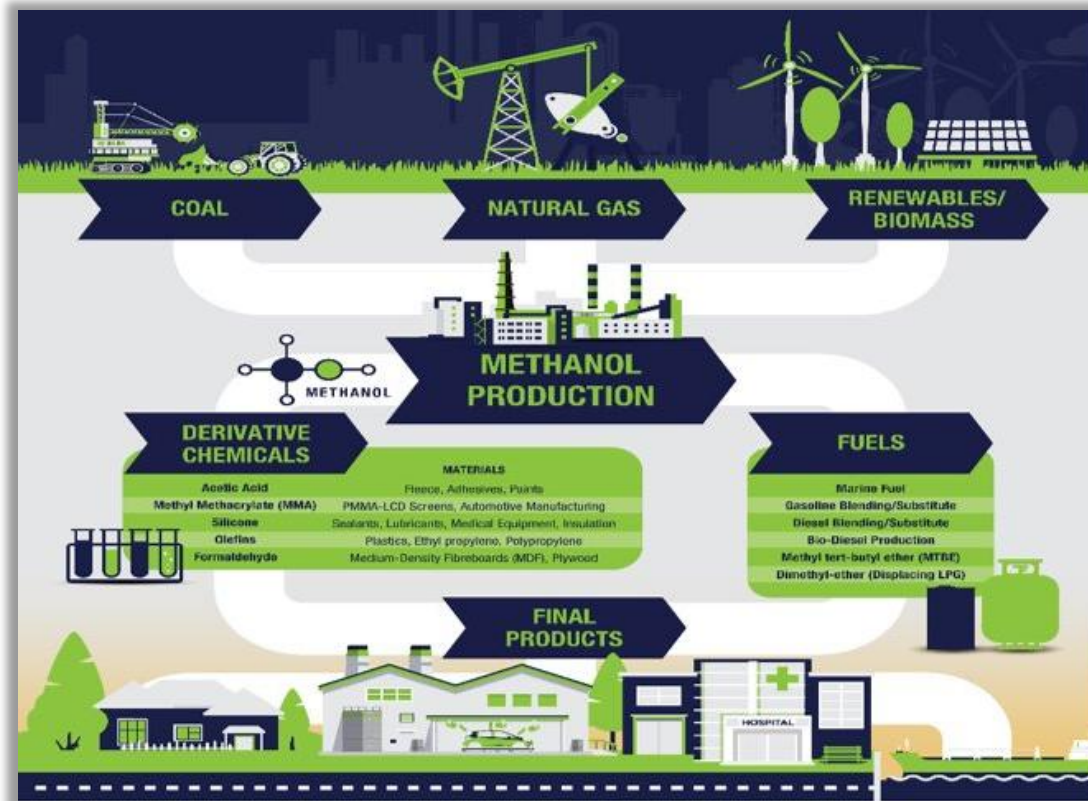
Tier 3



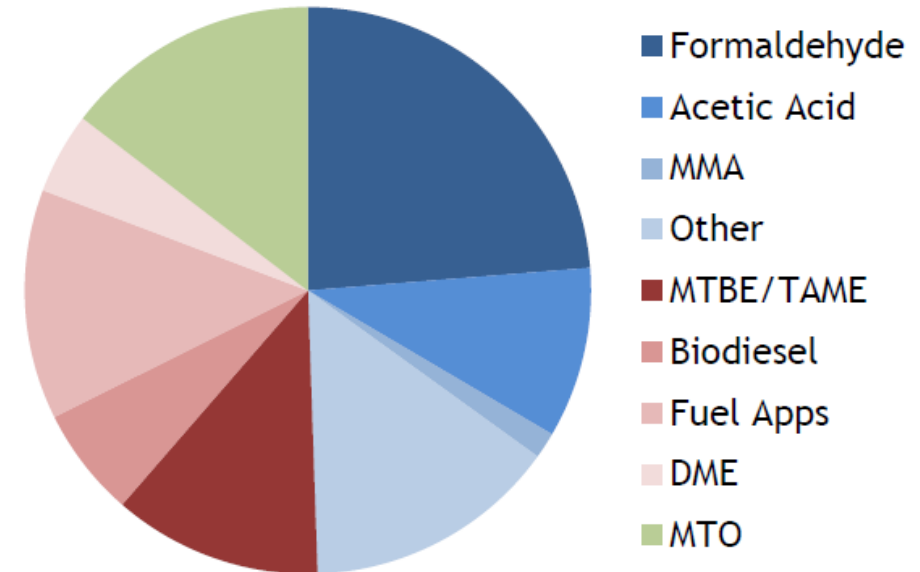
Tier 4



Essential Methanol



2022 ~ 88.7 mn t



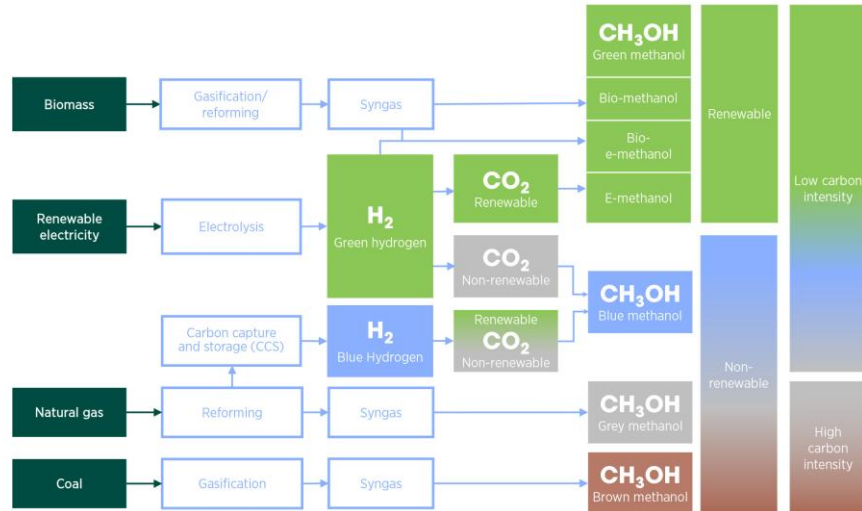
Excludes China's captive
CTO sector



2018 83.1 mn t
2019 89.6 mn t
2020 87.7 mn t
2021 88.3 mn t
2023 89.5 mn t

88.7 Mt = 29.5 Billion Gallons

Figure 2. Principal methanol production routes



Renewable CO₂: from bio-origin and through direct air capture (DAC)

Non-renewable CO₂: from fossil origin, industry

While there is not a standard colour code for the different types of methanol production processes; this illustration of various types of methanol according to feedstock and energy sources is an initial proposition that is meant to be a basis for further discussion with stakeholders



E-Methanol

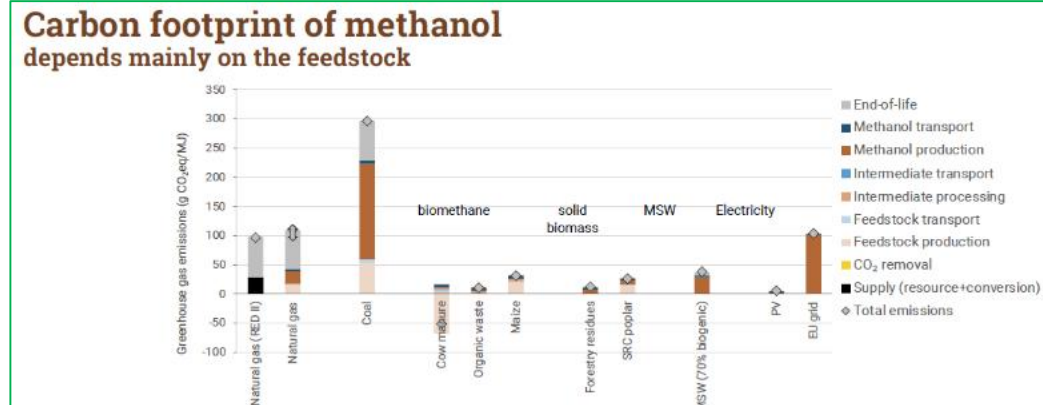
- Feedstocks: green hydrogen and captured CO₂
 - Green hydrogen produced from the electrolysis of water with renewable energy (e.g. solar, wind, geothermal etc.)
 - CO₂ from industrial flue gas (e.g. steel, cement, ethanol), biogenic sources, or direct air capture
- E-methanol is a very-low to net carbon-neutral fuel

Bio-methanol

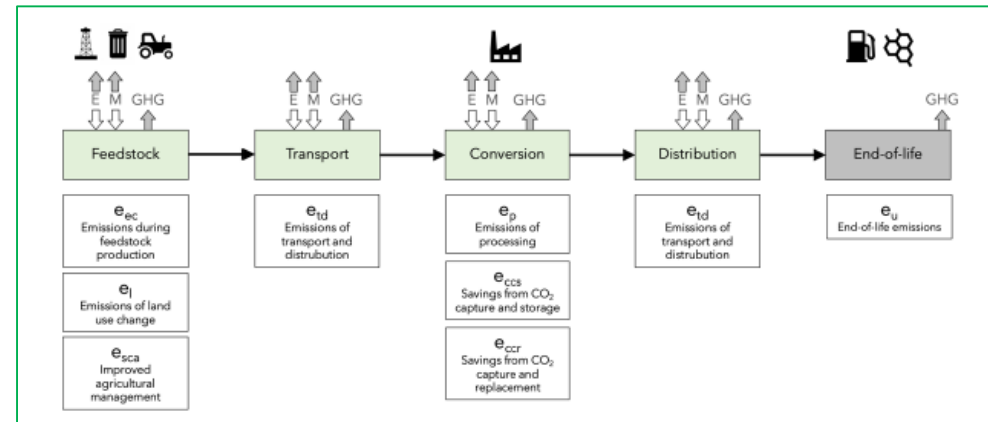
- Feedstocks: Municipal Solid Waste (MSW), Agricultural Waste, Black Liquor, Bio-Methane from wastewater treatment, landfills, or animal husbandry
- Feedstocks can be gasified or anaerobically digested to produce syngas used in methanol production
- Avoided emissions from landfills, incinerators, or dairy farms potentially allow bio-methanol to be a net carbon-negative fuel

Carbon Intensity Accounting

- In January, MI released a report from Amsterdam-based consulting firm studio Gear Up on “Carbon Footprint of Methanol”
- Depending on feedstock and production process methanol’s carbon footprint can be reduced by 65-95%
- In May, International Methanol Producers and Consumers Association working with sGU released a “backpack” calculator can help determine the carbon footprint of methanol depending on feedstock, conversion technologies, and the fate as either fuel or chemical
- **MI and IMPCA working together assist the methanol industry in developing a common platform for carbon intensity accounting**



<https://www.methanol.org/policy-initiatives/europe/>



<https://www.imPCA.eu/IMPCA/Technical/IMPCA-Documents>



Renewable Methanol



www.methanol.org/renewable/

Figure 3. Current and future production costs of bio- and e-methanol

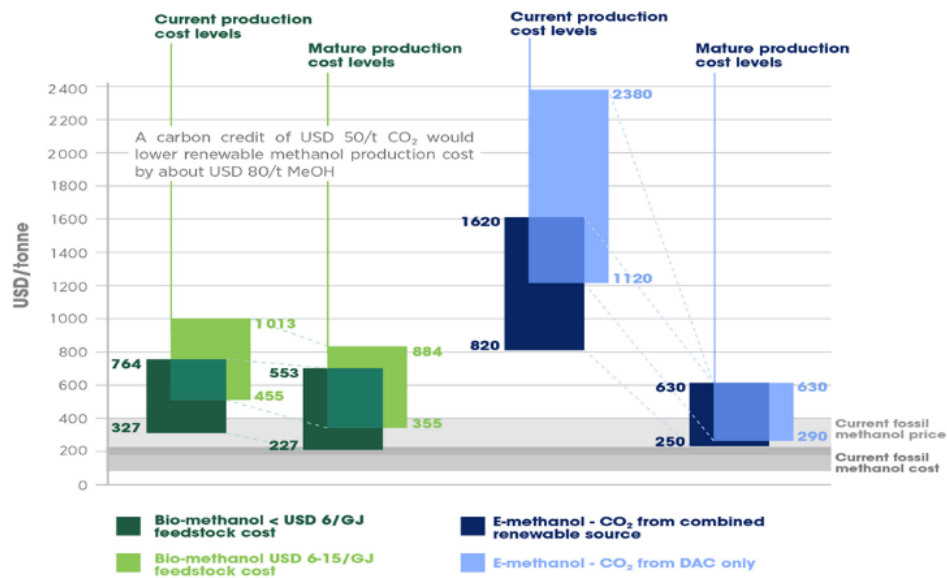
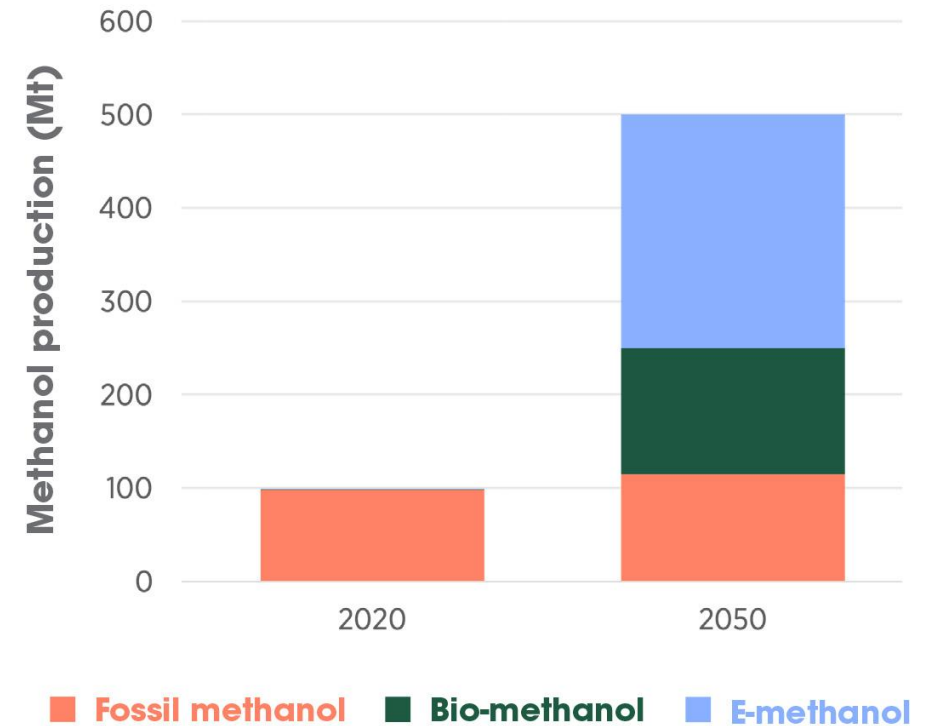
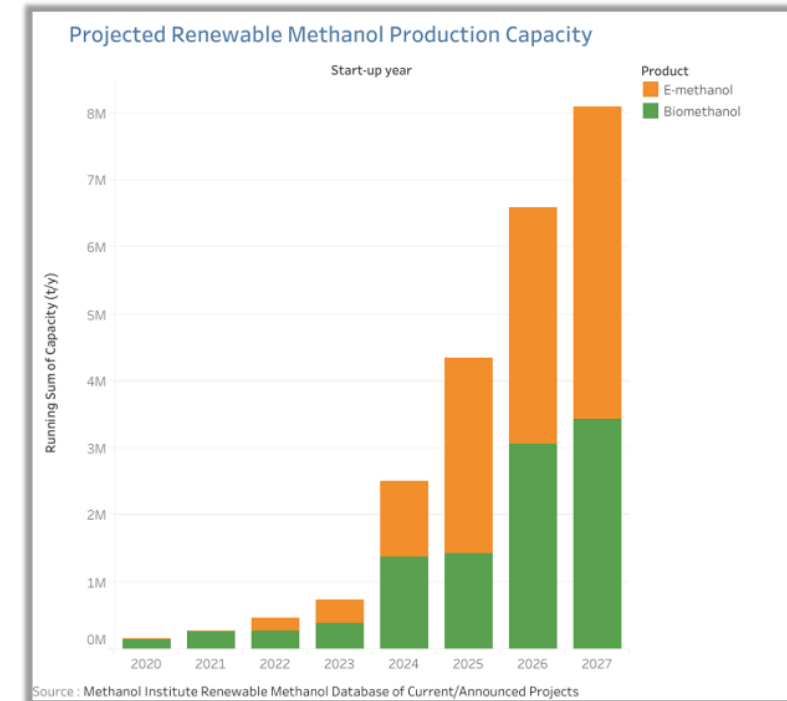
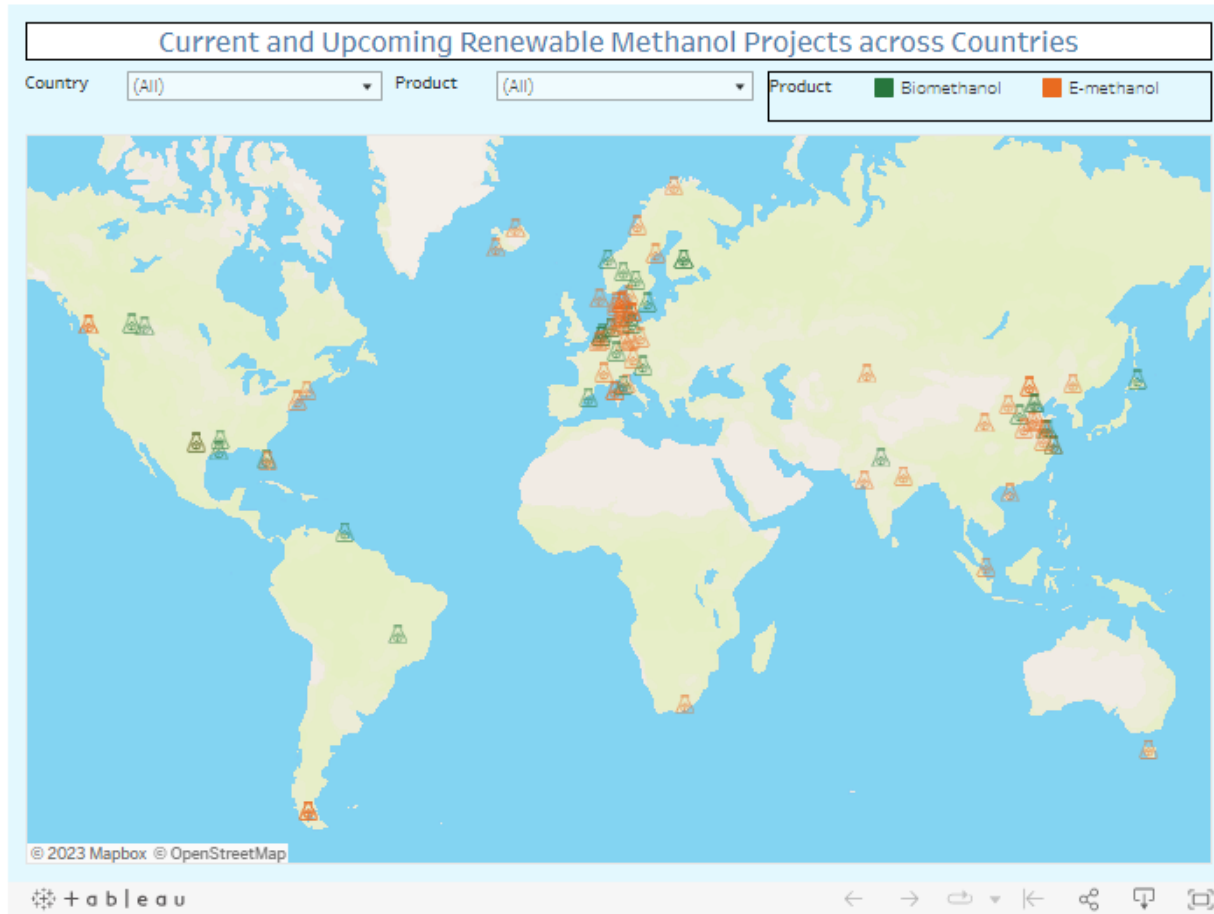


Figure 47. Current and future methanol production by source



Renewable Methanol Tidal Wave

www.methanol.org/renewable/



“With 80 renewable methanol projects already announced, we are seeing clear signs of an incoming wave of bio-methanol and e-methanol production”

Gregory Dolan, CEO, Methanol Institute

<https://www.einpresswire.com/article/594328267/methanol-institute-sees-renewable-methanol-production-growth>

Increasing Scale – Bigger Players

- Increasing scale: To date, e-methanol and biomethanol plants have been in range of 4,000-10,000 tons/year, and we are now seeing announced plants with planned capacity of 50,000, 100,000, 250,000 tons/year
- Expanding from project developers like Carbon Recycling International, Enkemo, Liquid Wind and Gidara, we are seeing major utilities like European Energy, Orsted, Iberdrola, and Engie
- We are also seeing interest in methanol from oil/gas majors including new MI members Aramco, BP, ENI/Ecofuel, TotalEnergies as well as Chevron, ExxonMobil, and Sinopec



Game Changer : Maersk Vessel Orders



- **21 Feb 2021:** Maersk announces that the world's first carbon neutral container vessel by 2023 will operate on dual-fuel methanol
- **24 Aug 2021:** Maersk accelerates fleet decarbonization ordering eight 16,000 TEU ocean-going vessels to operate on methanol
- \$1.4 billion order each vessel \$175 million 10-15% more expensive
- Maersk has now ordered 25 newbuild methanol dual-fuel vessel, with an additional 11 retrofit orders
- **14 September 2023:** Naming ceremony held in Copenhagen for Laura Maersk the world's first methanol dual-fueled container ship, bunkered with green methanol from OCI (biomethanol is produced from biogas from manure)
- *Each ship will require 35,000-40,000 tons of methanol annually or a total of over 750,000 tons of methanol*
- *Customer Pull:* Maersk's 200 largest customers asking for carbon neutral transport

Opportunities and Challenges

- Low-hanging fruit that presents GHG emission reduction opportunities
- Due to its chemical properties, it is easy to store and transport promoting cost competitiveness
- Advancing the development of lower carbon solutions for hard-to-abate sectors
- Lack of infrastructure facilities to amass the feedstocks is a deterrent
- Feedstock availability / feedstock competition for e-methanol may hinder scale-up
- Demand-side regulatory mechanisms still lack coherency to create a strong business case for green methanol
- Significant investments in green methanol production are needed



THANK YOU

