NexantECA

Technology and Costs

Biorenewable Insights: Renewable DME

Renewable DME is one in a series of reports published as part of NexantECA's 2023 Biorenewable Insights program.

Overview

In recent years, the energy transition movement, supported by government and industry pledges to reach carbon neutrality, has spurred a new wave of investments to promote scale-up and deployment of sustainable, low carbon fuels, including Renewable DME. Produced from sustainable sources such as biomass, waste residues, renewable power, etc., Renewable DME is a safe, clean-burning fuel that allows Greenhouse Gas (GHG) emissions reduction with minimal time lag, particularly in hard-to-abate sectors across remote locations.

There is increasing pressure to decarbonize industrial boilers, off-grid power, medium- and heavy-duty transport, heating, and cooking applications; the use of Renewable DME can help reduce the carbon emissions from these sectors. Most importantly, as no one solution on its own will allow the industry to achieve net zero carbon emissions by the stipulated timeframes (2050, 2060, etc.), Renewable DME has a key role to play in supporting the global net zero pathway. For instance, with minimal modifications to infrastructure, Renewable DME can leverage the existing liquid gas supply chain, thereby reducing the transition costs. Alternatively, it can also be used as a stand-alone fuel.

This report evaluates the techno-economic analysis of various pathways to produce Renewable DME in regions, as well as the capacity analysis, strategic implications to the existing market, and associated greenhouse gas emissions of these processes.

Technologies

This report covers the following Renewable DME process routes by selected pathways:

- Catalytic Dehydration of Renewable Methanol to DME
- Biogas/Landfill gas Reforming

  (via anaerobic digestion of animal waste, agricultural residue, organic wastes, etc.)
- Biomass and Waste Gasification

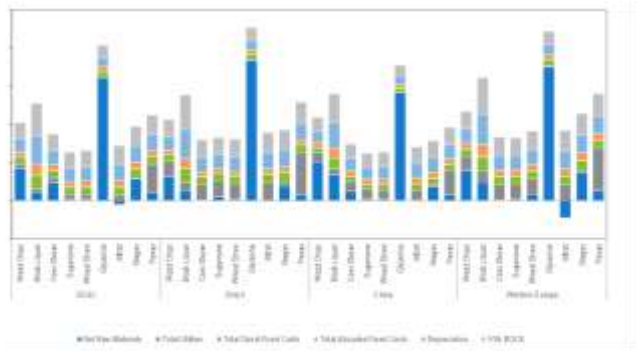
  (via gasification of biomass and waste)
- Hydrogenation of Carbon Dioxide

  (via hydrogen obtained from electrolysis of water using renewable power and captured carbon dioxide)

Process Economics

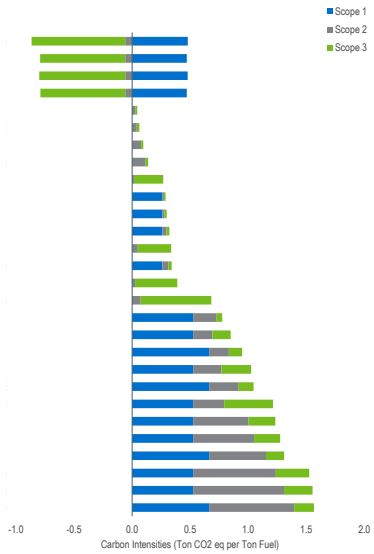
Cost of production estimates expressed in terms of US$ per ton of Renewable DME for four locations (United States Gulf Coast, Western Europe, Brazil, and China) are presented for production of Renewable DME from various pathways:

- Wood Chips Gasification
- Agricultural Waste (i.e. Corn Stover, Wheat Straw, and Sugarcane Trash)
- Black Liquor Gasification
- Municipal Solid Waste (MSW) Gasification
- Glycerine Reforming
- Biogas Reforming
- Renewable Power to DME via electrolysis



Carbon Intensity

This report includes models of scope 1, 2 and 3 emissions for the selected Renewable DME pathways mentioned above, as well as regional carbon intensity baselines, in terms of ton CO_2 eq per ton of Renewable DME produced.



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Subscribe to BI

The BI program (sister program to the world renowned TECH program, formerly known as PERP) is globally recognized as the industry standard source of process evaluations of existing, new and emerging technologies of interest to the renewable energy and chemical industries.

BI's comprehensive studies include detailed technology analyses, process economics, as well as capacity analysis and impacts on conventional industry. Reports typically cover:

- Trends in technology
- Strategic/business overviews and/or developer profiles
- Process Technology:
- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Capacity tables of plants and analysis of announced capacities
- Regulatory and environmental issues where relevant

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- Cost of production tables in spreadsheet format (as requested)
- Consultation time with the project team

An annual subscription to BI includes 10 reports published in a given program year. Reports can also be purchased on an individual basis, including reports from previous program years.

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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