



Biorenewable Insights: Power to Liquids: Transportation Fuels

Power To Liquids: Transport Fuels is one in a series of reports published as part of NexantECA’s 2023 Biorenewable Insights program.

Overview

“Power to X” is a chemical and fuel manufacturing concept that uses electricity and low-value, energetically stable feedstocks into value-added products. It is increasingly important because of its inherent capability to deliver valuable molecules without high emissions of greenhouse gases in comparison to traditional feedstocks. These products include fuel molecules that can be used as substitutes for traditional solutions in transportation.

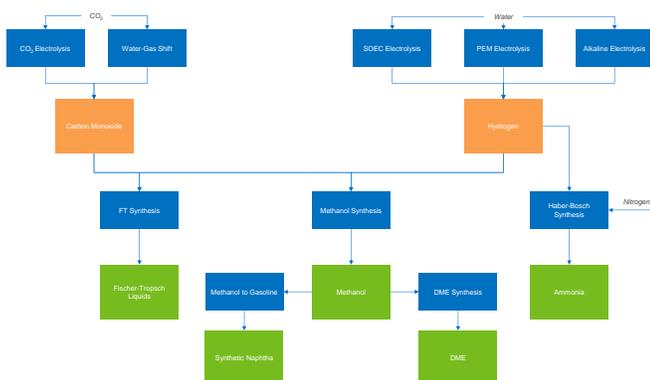
With the current wave of renewable electricity deployment and commercial deployment of electrolysis technologies, power-to-X liquid fuels are broadly seen as a method of addressing the decarbonization of many different forms of transportation. Major environmental policy incentives and enforcement schemes have made power-to-X an increasingly attractive option for future fuels manufacturing in a carbon emissions-constrained world.

This report covers the complex technology involved in power-to-X liquid fuel manufacturing and addresses the economics of transportation fuels produced from power-to-X as well as the translation of those manufacturing costs to use.

Technologies

This report covers five different liquid e-fuels using established transformation from electrolysis-based feedstocks shown below.

Liquid Fuels Production Technology Coverage



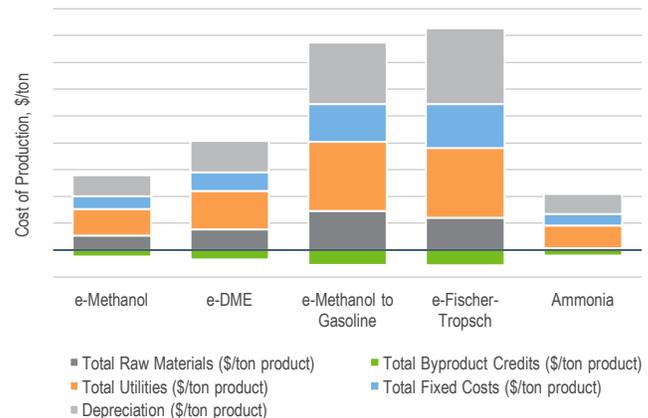
These fuels are investigated with an emphasis on:

- On-road cargo transportation
- Cargo rail transportation
- Marine cargo transportation
- Air freight transportation

Process Economics

This report features detailed manufacturing cost and carbon intensity analysis of currently available routes to power-to-X fuels as well as an investigation of their relative competitiveness in actual transportation applications.

Manufacturing Economics for Power-to-X Fuels



The report investigates manufacturing economics and carbon intensity under 2 regional scenarios and two major sensitivities:

- Intermittent price-following operations with plant-gate pricing variation
- Sourcing and pricing of carbon dioxide

Transportation costs and carbon intensity were examined using a scenario-based analysis covering demanding cargo applications on a cost of fueling basis, incorporating normalization by distance and load and the efficiency effects of different powertrains in each application.

For more information, please contact Technology@NexantECA.com or www.NexantECA.com



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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

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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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