NexantECA

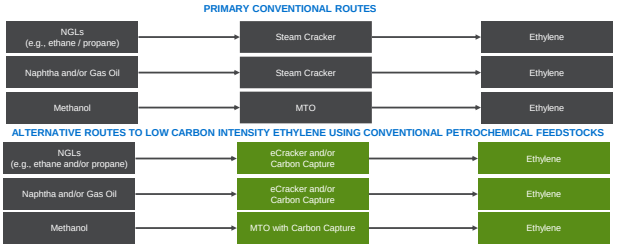
Special Reports

Low Carbon Intensity Ethylene: A Technoeconomic and Carbon Intensity Study

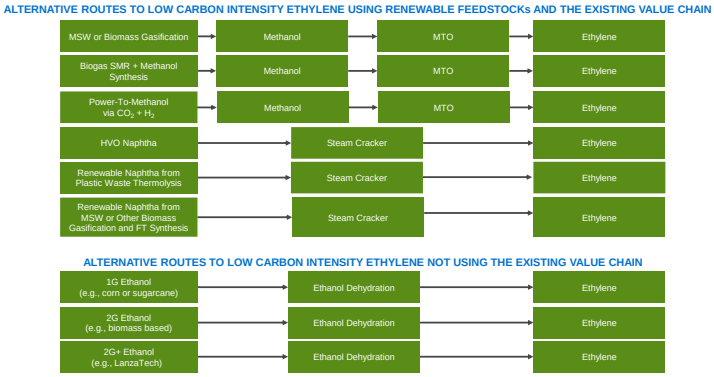
Background

Like many chemicals and fuels, ethylene is at a crossroads. As is happening for other fuels and chemicals currently, the ethylene industry is exploring options for increasing the sustainability of its product. There are several technically feasible options for producing ethylene at a likely reduced carbon footprint to current production; however, the competitiveness of many of these routes is uncertain. The fate of low carbon intensity ethylene, much like conventional ethylene, is likely to use the existing infrastructure; however, there may be some pragmatic approaches for reducing the carbon intensity, including electrification, carbon capture, and switching to renewable feedstocks.

Fossil Feedstocks



Renewable Feedstocks



Objective

The objective of this report is to review, evaluate, and analyze the various options for low carbon intensity ethylene production from a point-of-view of technical, economic, carbon intensity, and strategic comparisons. This study reviews:

- Cracker-based Decarbonization, including carbon capture, electrification, and renewable naphthas (HVO-based, FT-based, and plastic pyrolysis-based)
- MTO-based Decarbonization, including carbon capture and renewable methanol (biogas-based, gasification-based, and emethanol)
- Ethanol-to-Ethylene, including carbon capture and 1G and advanced ethanol (corn-based, sugarcane-based, cellulosic, and LanzaTech)

What is Included in the Report?

- **Technology Review**: technology descriptions, process flow diagrams, activity of major players for ethylene production, ethylene plant decarbonization, and renewable feedstock
- **Economic Analysis:** cost of production models, regional comparisons, technology comparisons
- **Carbon Intensity Analysis:** Individual and comparative analysis of low carbon intensity ethylene scope 1 (direct) emissions, Process Emissions (scope 1 +2), and Value Chain Emissions (scope 1 + 2 + 3)
- **Strategic Analysis:** high level strategic insights, SWOT analysis of technology approaches, breakeven analysis of carbon tax required for competitiveness against regional benchmarks based upon different scenarios: scope 1 (direct) emissions, Process Emissions (scope 1 +2), and Value Chain Emissions (scope 1 + 2 + 3)

For more information. please contact
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