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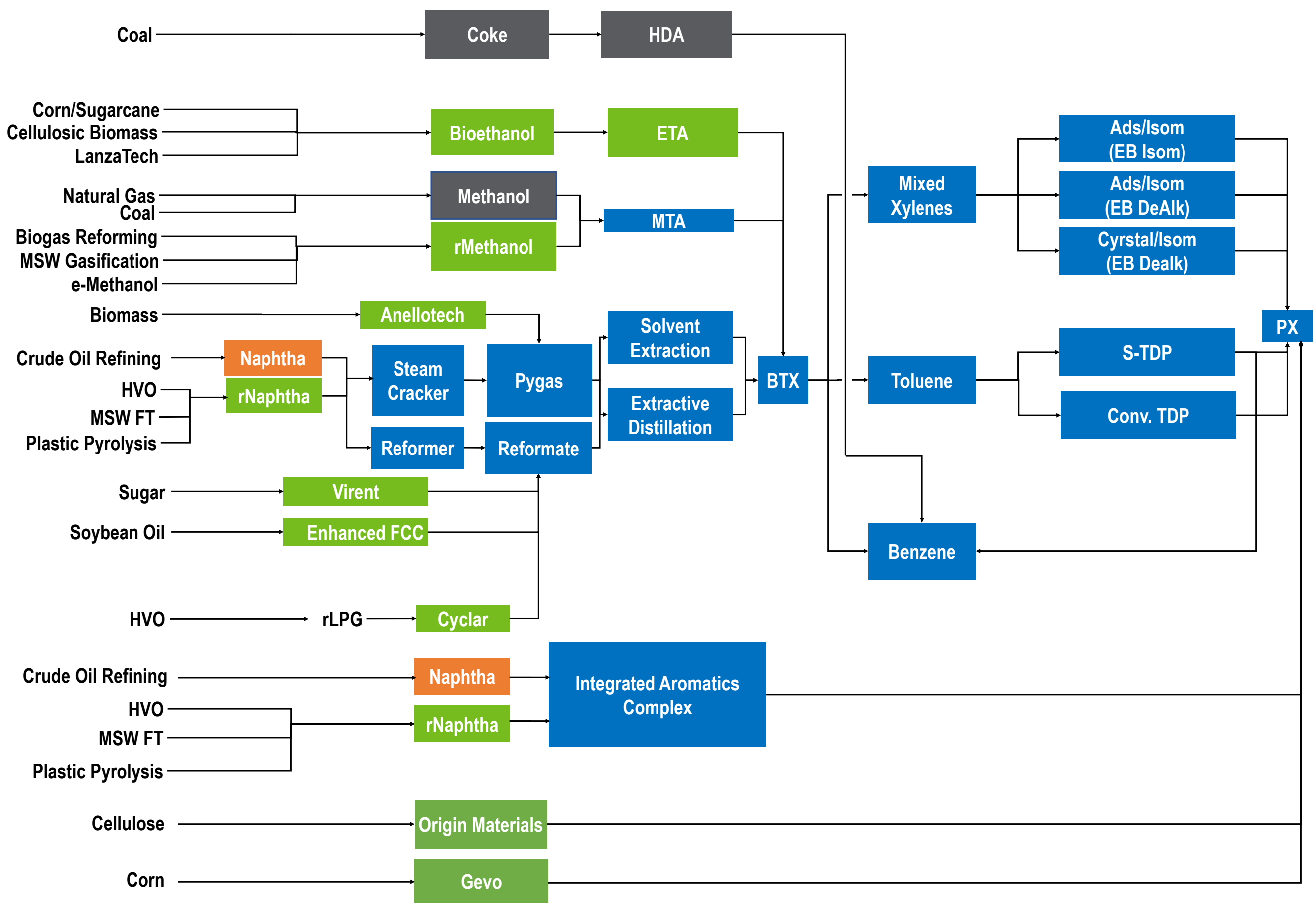
Special Reports

Low Carbon Intensity Aromatics: A Technoeconomic and Carbon Intensity Study

Background

As is happening for other fuels and chemicals currently, the aromatics industry is exploring options for increasing the sustainability of its products. Driven by promised made by companies throughout the chemical and energy industry, the industry has (more or less) committed to "net zero" emissions by 2050. There are several technically feasible options for producing aromatics 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 aromatics, much like conventional aromatics, is likely to use the existing infrastructure; however, there may be some pragmatic approaches for reducing the carbon intensity, including switching to renewable feedstocks. The following figure gives an overview of some of the routes under development for renewable aromatics.



Aromatics are basic building blocks, with significant roles in the petrochemical industry. The most commercially important aromatics are BTX. A significant number of the non-polyolefins polymers are produced using aromatic feedstocks, including polystyrene, PET, polyamides, polyurethanes, and polycarbonates which are all produced using aromatic feedstocks.

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Objective

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

- **Renewable Aromatics Feedstocks (Pygas and Reformate)**: Including renewable naphtha reforming, Virent APR of sugar, ethanol to aromatics, enhanced FCC of soybean oil, and Cyclar of rLPG, byproduct pygas of renewable naphtha steam reforming and Anellotech biomass catalytic pyrolysis pygas
- **Renewable Mixed Xylenes:** 17 models across 4 regions (68 total) including methanol to aromatics, renewable reformate solvent extraction, renewable pygas solvent extraction
- **Renewable Toluene:** 14 models across 4 regions (56 total) including renewable reformate solvent extraction, renewable pygas solvent extraction
- **Renewable *para*-Xylene:** 80 models across 4 regions (320 total) including Origin Materials' route from cellulose, Gevo's route from isobutanol, renewable mixed xylenes adsorption / isomerization (EB isomerization), renewable mixed xylenes adsorption / isomerization (EB dealkylation), renewable mixed xylenes crystallization / isomerization (EB dealkylation), renewable toluene TDP, and renewable toluene STDP
- **Renewable Benzene:** 44 models across 4 regions (176 total) including renewable reformate solvent extraction, renewable pygas solvent extraction renewable pygas extractive distillation, renewable toluene TDP, renewable toluene STDP

What is Included in the Report?

- **Technology Review**: technology descriptions, process flow diagrams, activity of major players
- **Economic Analysis:** cost of production models, regional comparisons, technology comparisons
- **Carbon Intensity Analysis:** Individual and comparative analysis of low carbon intensity aromatics value chain emissions (scope 1 + 2 + 3) for a variety of routes to low carbon intensity aromatics
- **Strategic Analysis:** high level strategic insights, SWOT analysis of technology approaches, breakeven analysis of carbon tax required for competitiveness against regional benchmarks

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Special Reports analyze issues of topical importance to the energy and chemicals industry. Each special report explores the subject matter in detail to provide an up-to-date and thorough understanding of the related issue, allowing investment decisions and new business strategy to be formulated.

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