NexantECA

Technology and Costs

Biorenewable Insights: Renewable Ammonia

Renewable Ammonia is one in a series of reports published as part of NexantECA's 2018 Biorenewable Insights program.

Overview

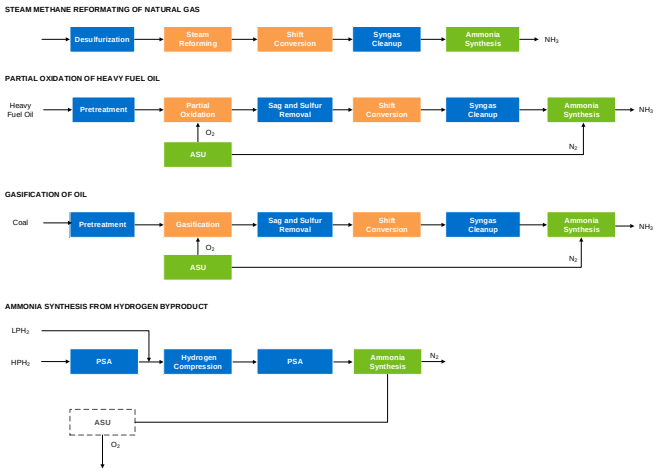
According to the IEA, Ammonia is the single largest emitter of carbon dioxide by the chemical industry globally, nearly doubling the next nearest chemical, methanol.

The global ammonia industry produces billions of dollars' worth of ammonia every year, primarily as fertilizer. Renewable ammonia may allow them to have a significantly smaller carbon footprint, as conventional ammonia production is responsible for a large proportions of fossil fuel carbon emissions. Renewable ammonia is also seen as a potential energy storage chemical, as renewable energy can be turned into a commodity (ammonia) that can be shipped anywhere in the world and converted back into electricity or hydrogen gas. Additionally, a number of green ammonia projects have been announced around the world. Almost every major ammonia player has become involved in or has their own renewable ammonia project ongoing.

Technologies

Due to environmental concerns and technological advances, routes that are different from conventional fossil ammonia made by the Haber process, such as from biomass and wastes as gasification feedstocks, and from hydrogen made by electrolysis, have started to gather attention. More importantly, these are developing into initiatives and projects in several parts of the world.

Significant decarbonization can be achieved via feedstock switching of the conventional routes—in particular to produce lower carbon intensity hydrogen.



Most of the renewable ammonia activity is centered on the production of renewable hydrogen. The following routes are/have been pursued:

- Hydrogen production via Biogas / Bio-methane
- Hydrogen production via biomass gasification
- Hydrogen production via electrolysis with renewable electricity

Process Economics

Cost of production models for USGC, Brazil, Western Europe and China are shown for 50,000 tons of renewable Ammonia via:

- Hydrogen production by Steam Methane Reforming (SMR) of Biogas
- Hydrogen production via biomass gasification
- Hydrogen production via electrolysis with renewable electricity

Capacity

NexantECA has catalogued existing and planned renewable ammonia capacity and profiled projects.

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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 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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