NexantECA

Technology and Costs

Biorenewable Insights: Hydrogenated Vegetable Oil (HVO)

Hydrogenated Vegetable Oil (HVO) is one in a series of reports published as part of NexantECA's 2022 Biorenewable Insights program.

Overview

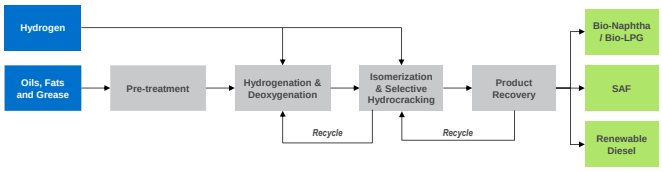
Hydrogenated vegetable oil (HVO) is one of the fastest-growing sustainable technologies. Its fantastic growth is due to a convergence of demand factors.

HVO is the only current commercial source of sustainable aviation fuel (SAF). Additionally, renewable diesel product is in high demand as it is a fungible solution to diesel replacement, solving many of the hurdles of 1G biodiesel. Furthermore, the other minor byproducts are also seeing high interest as sectors with few currently available options seek to fulfill promises of carbon neutrality. HVO is also among the least capital-intensive solutions for these demand sources (compared to gasification, alcohol to jet, or even efuels); thus, HVO offers potential opportunities for refiners to convert fossil servicing assets to green assets and has real commercially-available quantities on the market (unlike many competing advanced fuels which are still pre-commercial). While there are feedstock limitations, there are other feedstocks under development.

Regardless of feedstock limitations, however, even in a feedstock-constrained world, HVO is expected to be one of the key solutions to reduce fossil fuel consumption, as no one solution on its own will allow industry to achieve net zero carbon emissions by 2050.

Technologies

The HVO process is a commercially deployed technology available in different forms from several licensors that converts vegetable and animal oils into hydrocarbons suitable for use in diesel and jet fuel. It is considered one of the most matured and established pathways for SAF and renewable diesel production, with naphtha and LPG as byproducts or feedstocks for hydrogen to lower the carbon intensity of the process. A typical process flow is shown below:



This report covers HVO production technologies by existing major licensor/producers, covering a significant portion of global capacity:

- UOP Ecofining
- Topsøe Hydroflex
- Axens Vegan
- Neste NExBTL
- Sulzer Bioflux

Process Economics

Cost of production model estimates on a total hydrocarbon basis under several scenarios are presented for five locations (USGC, Brazil, Western Europe, China and Southeast Asia): virgin oil and UCO feedstock cases shown for both maximum diesel and maximum SAF configurations for all technologies listed above. Regional pricing is set on Q3 2022 basis. Due to the significant role credits play in HVO economics, they are included in the analysis.

Commercial Impact

With over 10 million tons of existing capacity in 2022, there are enough planned projects to more than double this by 2030. Production in 2022 has almost tripled since 2015.

Supply is highly concentrated among a small number of early-adopting companies, but technology is increasingly easy to access from major providers such as UOP/Eni, Topsøe, and Axens, while other companies such as Neste have their own proprietary technology. The potential upper limit on consumption of HVO-derived products is extremely high. The total demand for a range of mass-consumption transport fuels, domestic fuels, and chemical feedstocks and barriers to growth are more from limits on capacity construction and, more pressingly, feedstock supply limits. The threat of substitution is low in the short to medium term, with competing processes for drop-in fuel production only now emerging at a commercial scale and likely to take some time to reach a comparable size, although, in the longer term, these options are likely to grow more rapidly—though ultimately HVO is not in competition with other sustainable fuels until all fossil fuels have been replaced.

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

NexantECA

Technology and Costs

Biorenewable Insights: Hydrogenated Vegetable Oil (HVO)

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

Subscription Options

A subscription to BI comprises:

- PDF reports including detailed technology analyses, process economics, as well as commercial overviews and industry trends
- 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.

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

NexantECA

NexantECA Subscriptions & Reports provide clients with comprehensive analytics, forecasts and insights for the chemicals, polymers, energy and cleantech industries. Using a combination of business and technical expertise, with deep and broad understanding of markets, technologies and economics, NexantECA provides solutions that our clients have relied upon for over 50 years.

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.

NexantECA serves its clients from over 10 offices located throughout the Americas, Europe, the Middle East, Africa, and Asia.

Americas
Tel: +1 914 609 0300
44 S Broadway,
5th Floor White Plains
NY 10601-4425
USA

Europe, Middle East & Africa
Tel: +44 20 7950 1600
110 Cannon Street
London EC4N 6EU
United Kingdom

Asia Pacific
Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand

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