Teesside lighthouse green fuels

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Lighthouse Green Fuels (LGF), located in Teesside, UK, is set to become Europe"s ...

Lighthouse Green Fuels will play a key role in decarbonising the aviation industry ...

LGF will utilise the Gasification + Fischer Tropsch (FT) route to convert waste- or residue-based feedstocks into 2nd generation SAF - designated Fischer Tropsch synthetic paraffinic kerosene (FT-SPK). FT-SPK is one of the ASTM-certified production pathways alongside SAF derived from hydroprocessed esters and fatty acids (HEFA), alcohol-to-jet (ATJ) and several others (ref. ASTM D7566 Annexures). Currently, FT-SPK must be blended with conventional fossil-derived kerosene in accordance with the ASTM standards, however, 100% SAF usage in aircraft engines is envisaged in the near future after further testing by aircraft engine manufacturers and ASTM.

The syngas is then further cleaned in the syngas clean-up section of the LGF plant. Here, adsorbent, and catalytic process steps remove the residual minor contaminant species. Acid gas components, such as CO2 and sulphur species, are also removed by the acid gas removal unit (AGRU). CO2 removed from the syngas is purified to >99% purity, which meets meeting the requirements for injection into the local carbon capture and storage (CCS) network in Teesside - Net Zero Teesside. LGF plans to sequester CO2, subject to availability and access to the network. Another key part of this section of the plant is the water-gas shift (WGS) reactor. In the WGS the ratio of H2 to CO is adjusted to approximately 2:1. This ratio is required by downstream synthesis process steps.

After the syngas clean-up section, the ultra-clean syngas is directed to the FT reactor to be converted into liquid hydrocarbon waxes (also known as synthetic crude or "syncrude"). CO and H2 are reacted over a cobalt-based catalyst at elevated temperature (150 - 300 ?C) and pressure (>30 bar) to produce long-chain paraffinic hydrocarbon molecules (waxes). Alongside the waxes the FT unit also produces a "tailgas" made up of light hydrocarbons and methane. These valuable process gases can be recycled to other parts of the process to improve overall efficiency or generate power.

Waxes from the FT reactor are refined in the product upgrading unit, which contains similar process unit operations to a conventional refinery. The upgrading unit features a hydrocracker unit to "crack" the waxes into shorter chain hydrocarbons falling into the middle distillates range (C10 - C20 carbon chain length). Distillation is used to separate the SAF (FT-SPK) and naphtha products.. Final products are tested before being sent to a neighbouring tank farm for storage and export.

LGF not only marks a milestone in SAF production on a commercial scale nationally, it offers significant socio-economic benefits to the Teesside region by acting as a catalyst for economic growth. With a substantial ?1.5 billion investment, the project aims to establish an economic hub in Teesside related to renewable fuels.

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During the construction phase alone, it is expected to generate over ?470 million Gross Value Added (GVA) for the UK, providing a boost to the national economy. Additionally, it will create over 1,600 jobs across in the region, fostering employment opportunities and supporting local communities.

Establishing a domestic SAF market will improve national energy security and avoid dependence on imported alternative fuels. Domestically produced SAF will help maintain lower ticket prices compared to relying on imported SAF. It will also reduce the economic cost to UK PLC associated with import fees.

As the aviation industry seeks to reduce its carbon footprint, Sustainable Aviation Fuel (SAF) has become a crucial part of the conversation as the most viable option to decarbonise flights for the next decade and beyond. SAF can significantly cut emissions compared to traditional jet fuel, but there are several ways to produce it. Each production pathway offers its own set of advantages and challenges. Here"s a look at four of the main pathways and what they might mean for the future of aviation.

HEFA is the most established method for producing SAF today. It uses feedstocks like waste oils, animal fats, and vegetable oils to produce a fuel that can be used in existing aircraft engines without modification.

Why It"s Important: HEFA is popular because it can be scaled relatively quickly due to the maturity of the production technology and the ability to re-purpose existing refinery infrastructure. This means that HEFA facilities can be developed and constructed with significantly less CAPEX compared to advanced 2nd generation routes to SAF.

The cost of production is cheaper than other pathways, such as Gasification + Fischer Tropsch or AtJ. This makes it a strong candidate for meeting immediate demand.

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