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HP-TriJet: Revolutionizing Waste-to-Fuel with a Single-Step SAF & Green Diesel Process

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Abstract

The aviation sector is under increasing pressure to reduce carbon emissions, with the International Air Transport Association (IATA) committing to cut emissions to 50% of 2005 levels by 2050. Sustainable Aviation Fuel (SAF) has emerged as a key solution, offering a near drop-in replacement for conventional Jet A-1 fuel. However, large-scale SAF production faces challenges due to high capital investment and complex multi-step processing in conventional pathways like Hydro processed Esters and Fatty Acids (HEFA).

To address these challenges, Hindustan Petroleum Corporation Limited has developed HP-Triglycerides to Jet fuels (HP-TriJet), an innovative single-step hydroprocessing technology that converts Used Cooking Oil (UCO) into Sustainable Aviation Fuel (SAF) and Green Diesel. Unlike conventional processes that require separate hydrotreating, hydrocracking, and isomerization stages, HP-TriJet seamlessly integrates depropanation, deoxygenation, hydrocracking, and isomerization within a single reactor system, utilizing a proprietary catalyst and optimized process conditions for efficient fuel production

Key features of HP-TriJet include:

- Flexible product yields: Capable of producing up to 35% SAF (meeting Jet A-1 specifications) or 80% Green Diesel (compliant with EN 15940:2016 Class A standards) based on operating conditions.
- Lower capital and operating costs: A single-step process eliminates the need for multiple reactors and reduces hydrogen consumption, improving economic feasibility.
- Scalability and refinery integration: Enables co-processing with conventional feedstocks, allowing refineries to transition towards renewable fuel production without major infrastructure modifications.

India’s Food Safety and Standards Authority (FSSAI) estimates that 3 MMT of UCO can be recovered annually, providing a significant domestic feedstock source for SAF production. In alignment with global decarbonization goals, HPCL has completed the Basic and Front-End Engineering Design for a 7.4 KTPA HP-TriJet plant. With project implementation in progress, HP-TriJet is emerging as a cost-effective and scalable solution for advancing low-carbon aviation and transportation fuels

This game-changing technology provides a sustainable, economically viable, and industrially scalable solution for reducing fossil fuel dependency in the aviation and transport sectors