CASE STUDY

A world designed to last

Hummingbird® ethanol-to-ethylene technology

hummingbird



TECHNIP ENERGIES



Overview

Hummingbird® ethanol-to-ethylene technology has been selected by LanzaJet, Inc. for a key application which, when combined with LanzaJet's Alcohol-to-Jet (ATJ) technology, can be used to manufacture sustainable aviation fuel (SAF) using fuel grade bioethanol as raw material.

LanzaJet is building their first commercial demonstration scale integrated biorefinery at LanzaJet's Freedom Pines Fuels site in Soperton, Georgia, USA, that will produce 10 million gallons per year of SAF and renewable diesel starting from sustainable ethanol sources. The facility, which is partially supported with a grant from the US Department of Energy and leverages technology developed by LanzaTech and the Pacific Northwest National Lab (PNNL), will be in production in 2022.

The License and PDP for the project was delivered by the office in Milton Keynes, UK in 2019, with support from the office in Chennai, India. In early 2021, the supply agreement for our proprietary catalyst for the facility was awarded.

Hummingbird® ethanol-to-ethylene (E2E) technology used for sustainable aviation fuel (SAF) at LanzaJet's Freedom Pines Fuels site in Soperton, Georgia, USA.

1ST COMMERCIAL LICENSE FOR HUMMINGBIRD®

10 MILLION GALLONS PER YEAR OF SAF AND RENEWABLE DIESEL

HIGHLY SELECTIVE PROPRIETARY CATALYST

Challenge

Commercialising a new chain of technologies

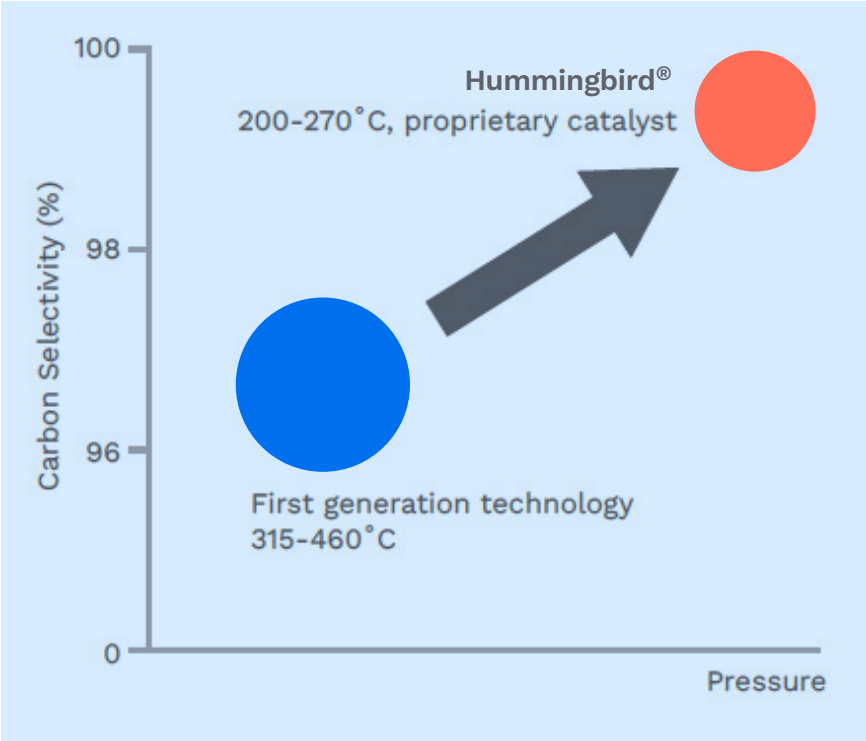
With no commercial reference for LanzaJet's Alcohol-to-Jet technology and Hummingbird®, the major challenge is appropriate technical and commercial risk mitigation. LanzaJet's trust in the Hummingbird® E2E technology, paired with Technip Energies providing market leading process guarantees and support, paved the way for this innovative energy transition project that is progressing to realization in 2022.





Technologies

Ethanol dehydration operating regimes



Second generation low-cost process for dehydrating bioethanol to ethylene

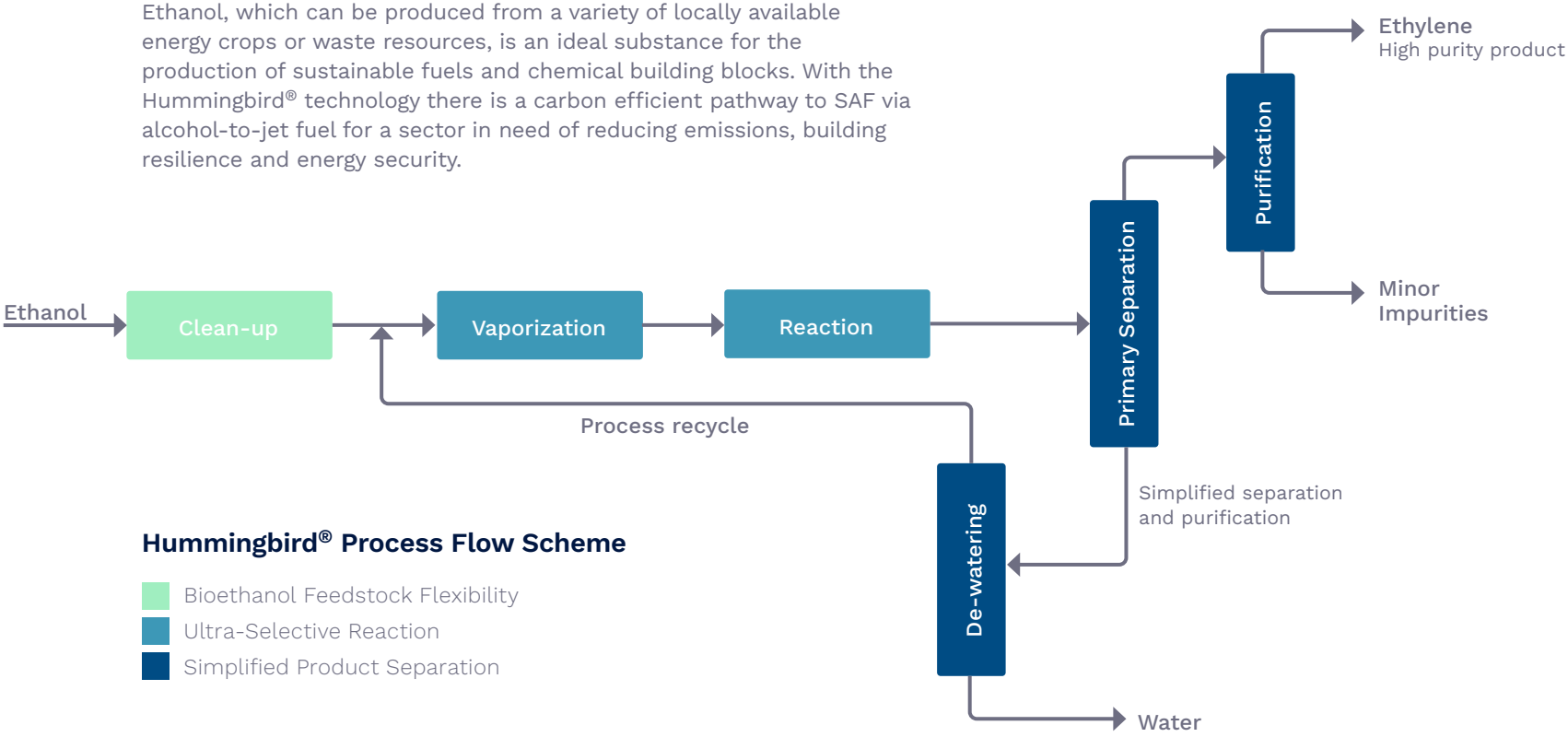
Technip Energies' Hummingbird® technology provides an efficient, low-cost process for dehydrating bioethanol to ethylene at a polymer grade specification if required. This process step is one of the required process units in LanzaJet's alcohol-to-jet plant scheme.

The Hummingbird® technology was selected among competitors, based on its ability to provide on-spec bioethylene product, as proven in a demonstration plant with over 36,000 hours of operation with an ultra-high selectivity for conversion of more than 99% of the feed ethanol into bioethylene.

Solutions

Providing a carbon-efficient, renewable source to make SAF

Ethanol, which can be produced from a variety of locally available energy crops or waste resources, is an ideal substance for the production of sustainable fuels and chemical building blocks. With the Hummingbird® technology there is a carbon efficient pathway to SAF via alcohol-to-jet fuel for a sector in need of reducing emissions, building resilience and energy security.



Hummingbird® Process Flow Scheme

- Bioethanol Feedstock Flexibility
- Ultra-Selective Reaction
- Simplified Product Separation

Results

The PDP project was delivered on schedule and to budget. The client has now progressed through their final investment decision gate and is progressing with the project EPC, which Technip Energies continues to support in a Licensor advisory capacity, together with proprietary catalyst supply.

The LanzaJet Alcohol-to-Jet technology has a unique place in the market with its specific focus on sustainable aviation fuel (SAF), critical to decarbonizing the aviation sector. Technip Energies' partnership has been critically important on our journey in scaling-up the technology. While our focus is on the operationalization of the Freedom Pines Fuels biorefinery, the demand on our technology is significant with projects in various stages of development across the globe. We're proud of the work we continue to do together and the impact we're having in the industry."

Jimmy Samartzis

Chief Executive Officer, LanzaJet