HONEYWELL UOP eFINING™

UOP eFINING ENABLES HIGHLY SELECTIVE, LOW CARBON INTENSITY PRODUCTION OF SAF FROM CO_2 OR SYNGAS FOR eFUEL PROFITABILITY

The global effort to achieve carbon-neutrality in the aviation sector is creating the need for new renewable fuel sources. Honeywell UOP is expanding its SAF portfolio to include new methanol to jet fuel technology.

NEW TECHNOLOGY MAKES USE OF ABUNDANT CO_2

Global renewable fuels commitments from corporations and policy makers are already outpacing triglyceride feedstock capacity, and meeting global SAF demand will require multiple feedstocks and pathways. Honeywell UOP eFining will enable "power to liquids" conversion of CO_2 to electro-Sustainable-Aviation-Fuel (eSAF).

When blended with conventional jet fuel, eSAF made from UOP eFining technology is a drop-in replacement fuel that requires no changes to aircraft technology or fuel infrastructure. The new, ready-now solution can reduce greenhouse gas (GHG) emissions by 88% compared to conventional jet fuel to address the rapidly growing demand for eFuels.[i]

Honeywell UOP eFining is a reliable, scalable and economical solution for customers who aim to produce eFuels that meet CO_2 reduction and fuel sustainability targets while also taking advantage of available government incentives.[ii]

WHAT SETS UOP eFINING APART

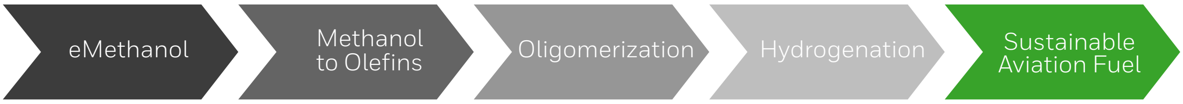
Honeywell's UOP eFining technology uses eMethanol—a useful, transportable intermediate made from captured CO_2 and green hydrogen—to produce eSAF reliably and at scale. This innovative technology achieves high selectivity to jet product through selective recycle flow schemes. UOP eFining has high feed- and product-slate flexibility and can produce low-carbon-intensity SAF from methanol that is derived from captured CO_2 or from municipal waste. The process features a highly integrated design, with minimal CAPEX and plot space compared to the Fischer-Tropsch pathway.

Honeywell UOP eFining is built on Honeywell UOP's commercially demonstrated methanol to olefin technology (MTO) and decades of experience with oligomerization technologies such as CatPoly, InAlk™, and Catolene™. Honeywell UOP has leveraged learnings from its 37 years of combined MTO operating experience and decades of oligomerization unit designs to develop a highly selective, low carbon intensity approach to jet fuel production.

FEATURES & BENEFITS

- Built on existing commercially proven technology
- Low carbon intensity SAF production
- High SAF yield and selectivity
- Minimized CAPEX and plot space
- Reliable, scalable process steps
- Highly integrated process design
- High-efficiency equipment
- High-value, transportable intermediates enable hub and spoke approach

PROCESS FLOW SCHEME



Built on Success

Honeywell UOP eFining builds on decades of fully commercialized technologies that convert methanol to olefins and that oligomerize olefins into fuel blendstocks.

UOP's MTO technology converts methanol into ethylene and propylene in a fluid catalyst cracking style unit. There are 7 commercial units today, operating at a range of capacities up to 2.5 million metric tons of methanol feed per year.

UOP's suite of commercialized oligomerization technologies spans decades (including Cat Poly, InAlk™, and Catolene™). UOP eFining fine-tunes that experience for jet fuel production.

Operating MTO unit in Nanjing, China

Meeting SAF Requirements

Honeywell SAF product qualities all meet or exceed the qualities of petroleum aviation fuel required in ASTM D7566 Annex 5.

The UOP eFining process successfully converts many types of low-carbon methanol, regardless of the synthesis method, into on-spec, renewable jet fuel. This flexibility gives fuel producers the option to choose the hydrogen, CO_2, and/or syngas source, or even the option to combine multiple feed sources as best suits their location and operation goals.

SAF PROPERTIES

Property		Value
Total Acidity KOH, mg/g	Max	0.015
Density at 15°C, kg/m³		730 - 770
Flash Point, °C	Min	38
Freezing Point, °C	Max	-40
Cycloparaffins, wt%	Max	15
Aromatics, wt%	Max	0.5
Distillation, °C		
T10	Max	205
FBP	Max	300
T90-T10	Min	21

INFLATION REDUCTION ACT (IRA) IMPLICATIONS FOR UNITED STATES PROJECTS

The Inflation Reduction Act's provisions supporting SAF will greatly enhance the opportunities for developing fuel sustainability in the aviation industry. Market participants can stack IRA credits on top of the California LCFS and Renewable Fuels Standard RIN credits. In 2021, the Biden Administration announced its Sustainable Aviation Fuel Grand Challenge for the U.S. aviation fuel supply sector to produce at least three billion gallons of SAF per year by 2030 and 35 billion gallons of SAF per year by 2050.[iii]

REFUELEU AVIATION INITIATIVE PUTS THE EU ON THE PATH TO CLIMATE NEUTRALITY

The European Council released its ReFuelEU Aviation rules as part of the 'Fit for 55' package, which aims to increase the share of sustainable fuels at EU airports from a minimum of 2% in 2025 to 70% by 2050, with an additional subtarget for eSAF of 1.2% by 2030 and 35% in 2050.[ii]

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[i] Reduced GHG emissions is based on UOP carbon intensity analysis, derived from a 3rd-party study of methanol production from green hydrogen and CO_2 captured from biomass processing, in comparison to fossil fuels.

[ii] Fuel sustainability targets and government incentives refer to the EU's RefuelEU Aviation initiative, which targets 6% of aviation fuel supply from SAF and 1.2% of supply from eSAF by 2030, and to the US Inflation Reduction Act (IRA) legislation, which provides incentives for SAF.

[iii] https://www.energy.gov/eere/bioenergy/sustainable-aviation-fuel-grand-challenge

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