

Honeywell

U



P

FUEL A CHANGE FOR THE BETTER

Reduce the carbon footprint of existing refining operations with complete co-processing solutions from Honeywell UOP.

Honeywell
UOP

CO-PROCESSING TECHNOLOGIES

As the world strives to reduce global greenhouse gas emissions (GHG), governments across the world have framed policies that incentivize or mandate the production and use of renewable fuels.

In the United States, the Sustainable Aviation Fuel Grand Challenge targets 100% of aviation fuel to be SAF by 2050. At the same time, the EU's RefuelEU regulation targets increasing SAF percentage up to 70% in 2050. Additionally, 114 countries have signed on to the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to achieve net zero emissions in the aviation sector by

2050. The United Arab Emirates (UAE), in partnership with the World Economic Forum, has created a roadmap for the production of SAF and renewable hydrogen that will meet up to 73% of the fuel demand of flight refueling in the country by mid-century.

Due to these mandates and policies, demand for sustainable fuels like renewable diesel and sustainable

aviation fuel is on the rise. This is where co-processing fits in. Co-processing doesn't require a large investment and can be done today using your existing assets. By combining renewable feedstocks with traditional ones in existing facilities, Honeywell's co-processing solutions enable swift, cost-effective access to the growing renewable fuel market.

WHAT IS CO-PROCESSING?

Co-processing involves the utilization of fossil feedstock alongside renewable feedstock, such as vegetable oil, animal fat, used cooking oil, other waste oils and pyrolysis oil from biomass. It has been commercially proven and requires minimal investment while capitalizing on renewable carbon credits.

HOW CAN CO-PROCESSING HELP YOU MEET YOUR OBJECTIVES?

Honeywell UOP's DHT Co-Processing Technology simultaneously hydrotreats renewable feedstocks together with petroleum-derived feedstocks, resulting in a net (scope 1 – 3) CO₂ reduction of 3.8 wt% per year by co-processing 5.4 wt% (5 vol%) renewable feedstock.^{1,2,3,4} It is a commercially proven solution that, in most cases, requires few or no additional pieces of equipment to enable co-processing.

1. Based on a fossil feedstock density of 850kg/m³ and a renewable feedstock (100% UCO) density of 922 kg/m³.
2. Based on a 50,000 BPSD (331 m³/hr) DHT (Unionfining™) Unit using EIA energy equivalent of fossil diesel and renewable diesel (used cooking oil) at 102 and 30 gCO₂e/MJ, respectively, resulting in a net (scope 1 – 3) CO₂ reduction of 223,000 t/y.
3. Based on considering Scope 3 impact of products combustion only.
4. Based on 80% of renewable carbon feedstock going to fuel products.



CHOOSE YOUR CO-PROCESSING PATHWAY

Depending on the market requirements and your existing assets, Honeywell UOP can help you co-process in different units. Whether you choose hydrotreating, hydrocracking or fluid catalytic cracking, Honeywell UOP has the expertise and experience to enable you to effectively achieve your goals.

HYDROTREATING

Hydrotreating can co-process a variety of free fatty acids (FFA) to produce renewable diesel that meets market specifications with minor cloud point adjustment.

HYDROCRACKING

Hydrocracking can co-process a variety of FFA to maximize SAF yield without revamp by utilizing fractionation and hydrogen make-up facilities.

FLUID CATALYTIC CRACKING (FCC)

FCC can co-process lipidic and cellulosic-derived bio-oils to produce low-carbon, partially renewable fuels and olefins with low capital cost and low technical complexity.

DETERMINE THE RIGHT LEVEL OF CO-PROCESSING

Every sustainability journey is different. If you're just getting started or moving from intermediate to advanced co-processing levels, we'll help you pick the right scope of work for your refinery's needs.

HYDROPROCESSING CO-PROCESSING SOLUTIONS

To maximize the use of existing hydroprocessing assets for any amount of biofeed, we offer three co-processing solutions that can be customized to your operations:

CATALYST REPLACEMENT	MINOR UNIT MODIFICATIONS	REVAMP SOLUTION FOR HIGHER RENEWABLE FEED CONTENT
<ul style="list-style-type: none"> Typically, <5% co-processing Requires feed rate adjustment or lower cycle length to manage planned cycle No unit revamp, uses Unity catalyst system including BioGuard™ 	<ul style="list-style-type: none"> Typically, 5-10% co-processing Requires minor compressor modifications and metallurgy upgrades in few locations Uses Unity catalyst system, including BioGuard for quick implementation 	<ul style="list-style-type: none"> Typically, 10-20% co-processing Requires new equipment with metallurgy upgrades Industry-renowned SchA package for quick implementation Uses Unity catalyst system, including BioGuard

FCC CO-PROCESSING SOLUTIONS

OPTIMIX™ GF Feed Distributor is an innovative solution by Honeywell UOP for co-processing. It addresses the challenges related to introducing biogenic feed into fluid catalytic cracking units. OPTIMIX™ GF offers dedicated injection through specialized nozzles at different elevations, preventing polymerization, coking and ensuring optimal feed distribution. This technology enhances co-processing efficiency and reactor performance while maintaining temperature control, resulting in reliable and efficient operations.

Honeywell UOP Oxygenate Removal Unit (ORU) is a crucial component in co-processing systems designed to handle biogenic feedstocks. Biogenic feedstocks contain high levels of oxygenates that can cause various downstream issues. The ORU includes an extraction step to eliminate emulsions, fouling and unwanted oxygenates immediately before the sulfur treating system. A regenerable adsorbent system can be added as needed to further remove oxygenates from FCC LPG. This system enhances downstream processing efficiency while capturing energy through thermal oxidation, making it a cost-effective and essential solution for co-processing.

CASE STUDY

In 2014, UOP was approached by a customer with interest in co-processing biogenic material in a Honeywell UOP-licensed FCC. UOP led a battery of pilot plant testing of various available feedstocks, including

pyrolysis oil and other biogenic oils. In 2016, UOP supported a commercial co-processing trial in the unit. Now, with UOP support, the unity is continuously co-processing, reaching biogenic feed rates over 20%.

A RENEWABLE SOLUTION FOR REFINERIES

Honeywell UOP has over 100 years of experience developing technologies for the refining and petrochemical industries. Moreover, we have transformed refining by bringing renewable fuel production to a larger scale with our successful Ecofining™ technology. Similarly, with Honeywell UOP Co-processing Technologies, we can help to improve renewable hydrocarbon production in existing assets reliably and profitably.



For more information

For more information, please contact your UOP representative or visit us online at uop.honeywell.com

**UOP LLC,
A Honeywell Company**

25 East Algonquin Road
Des Plaines, IL 60017-5017, U.S.A.
1.847.391.2000
uop.honeywell.com

© 2023 Honeywell International Inc.

**THE
FUTURE
IS
WHAT
WE
MAKE IT**

Honeywell