# ToFuel

## An Integrated Biorefinery for Sustainable Aviation Fuel Production from Tomato Residues

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**11**
**Partners**
from 7 European countries

**48**
**Months**
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Tomatoes are the second most-consumed vegetable worldwide, after potatoes. The European Union is the third largest global producer, harvesting approximately 17 million tonnes annually.

Tomato pomace, consisting mainly of seeds, peels and fibrous material, is typically underutilised. The project collects and characterises this biomass to ensure it can be efficiently processed within a decentralised and scalable biorefinery concept.

Sustainable Aviation Fuels (SAF) derived from renewable feedstocks are essential to reducing $CO_2$ emissions from aviation. Across the EU, available tomato pomace could potentially supply up to 3% of Europe's SAF demand by 2030.

ToFuel is a Horizon Europe research project developing an integrated biorefinery concept to convert tomato production residues into Sustainable Aviation Fuel (SAF) and valuable byproducts.

By transforming agricultural waste into renewable fuel, ToFuel supports the decarbonisation of aviation while creating new value streams for the agricultural and bio-based sectors.

The project combines advanced processing technologies, carbon capture and circular resource management to deliver a carbon-neutral and economically viable solution.


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## Core technologies

**All key technologies are demonstrated at Technology Readiness Level 5 (TRL 5), preparing the system for industrial uptake and scale-up.**

**Biomass fractionation**
Tomato residues are processed through extrusion and hydrothermal liquefaction to unlock fermentable and lipid-rich fractions.

**Microbial lipid production**
Engineered microorganisms convert sugars into lipids under robust and adaptable conditions.

**Algae-based carbon capture**
$CO_2$ generated during processing is captured and utilised through algae cultivation, increasing overall carbon efficiency.

**Lipid purification and upgrading**
Lipids are purified and catalytically upgraded via the HEFA route into Sustainable Aviation Fuel.

**Water management and simulation**
Closed water cycles, advanced membrane systems and full process simulation ensure efficient resource use and no fresh water demand during operation.

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