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ALFAFUELS

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Sustainable jet fuels from CO2 by micro-algal cell factories in a zero-waste approach

DESCRIPTION

ALFAFUELS is a Horizon Europe European project which seeks to develop innovative Sustainable Aviation Fuels (SAF) technology to reduce aviation's reliance on fossil fuels. By addressing key challenges like high production costs and sustainability issues, the project incorporates breakthroughs such as microbial fuel precursor production and solar-driven photochemistry.

ALFAFUELS aims to reach Technology Readiness Level 5, utilising novel bioreactors, pilot-scale trials, and industry collaboration for accelerated upscaling.

IMPACTS

Aviation Decarbonisation: The project will play a key role in decarbonising the aviation industry by providing a sustainable alternative to conventional fuels, and reducing greenhouse gas emissions associated with flights.

Climate Change Mitigation: By capturing and using CO_2 directly in Sustainable Aviation Fuels (SAF) production, ALFAFUELS contributes to climate change mitigation, reducing reliance on fossil fuels in favour of renewable carbon sources.

Technological Efficiency and Sustainability: ALFAFUELS stands out for developing innovative and sustainable technological solutions at every stage of the SAF production process, enhancing overall efficiency and sustainability in the aviation value chain.

Circular Economy and Resource Efficiency: Applying a circular and zero-waste approach, the project maximise resource efficiency by valorising all cellular components in a biorefinery, and co-producing valuable products like starch and hydrogen from CO_2.

Cost Reduction: ALFAFUELS aims to lower production costs by minimising raw material expenses, optimising process efficiency, and incorporating innovative technologies, contributing to the long-term economic viability of sustainable aviation fuels.

TECHNOLOGICAL INNOVATIONS

To face high production costs, sustainability issues, and technological constraints, ALFAFUELS will develop three technological innovations:

Microbial Production:
This approach involves using microorganisms to convert CO_2 into a fuel precursor. Microorganisms perform this process sustainably, which means it has a lower environmental impact.

Solar-Powered Photochemistry:
In this method, the energy of the sun is harnessed to convert CO_2-derived molecules into kerosene-like fuel. Instead of using conventional chemical methods, which can be costly and less environmentally friendly, this technique uses solar light to carry out the conversion.

Biorefinery Approach:
Rather than wasting any part of the cells of microorganisms used in the process, all parts are used efficiently. This includes the production of starch and hydrogen indirectly from CO_2. In summary, resources are maximised, and waste is reduced.

METHODOLOGY