

Aircraft fuels must be sustainable in the future

December 2 2014, by Mette Minor Andersen



In the near future car traffic will be able to run on electricity but air traffic remains dependent on liquid fuel. The National Food Institute, Technical University of Denmark aims to develop new and environmentally friendly liquid fuels for aircraft based on biomass from plant material. Innovation Fund Denmark has granted 21 million kroner for the project.

Our society is dependent on energy e.g. for transportation. This energy comes almost exclusively from [crude oil](#), which is a limited resource that has been formed from biomass in a process that spans several million

years. During our lifetime we are not able to produce more crude oil and forecasts from the oil industry predict that we have already used up more than half the world's supplies.

Given our current consumption the world's stores of accessible crude oil will have been depleted during this century. Furthermore the burning of oil and other fossil fuels leads to more carbon dioxide and greenhouse gasses in the atmosphere and thus to global warming.

Jet aircraft require special fuel

There is a need for environmentally sustainable alternatives, and therefore the National Food Institute is initiating a project to develop new and environmentally friendly liquid fuels for aircraft from plant material.

Many transport sectors use alternative energy sources, such as natural gas and batteries for wind and solar power. However, none of these alternatives are sufficiently energy dense or have the physicochemical properties, which are necessary for [jet aircraft](#) fuel.

Finding the best building blocks for jet aircraft fuel

Crude oil has been formed from plant biomass, and plant biomass will also be the research project's base material. In the project, excess from plant production will be broken down into components that can be used as a nutrient for microorganisms.

"In the project we will work on microbiological production of longer-chain alcohols. We can then use these longer-chain alcohols as building blocks to synthesise so-called ether molecules, tests of which have shown to be useful as jet fuels," professor Peter Ruhdal Jensen from the

National Food Institute says.

"The alcohols are produced naturally by certain microorganisms, but only in limited quantities. In the research project we will work on optimising the amount of alcohol and examine which of them would make the best [building blocks](#) for jet fuels," Peter Ruhdal Jensen adds.

Reduces the emission of unhealthy particles

Both alcohols and ethers are valuable industrial chemicals in themselves, and a secondary objective of the [research project](#) is therefore to create a sustainable production platform for these chemicals.

"When aircraft of the future fly on fuel from sustainable biomass the result will be a reduction of CO₂ emissions into the atmosphere for the benefit of the environment. We also expect that the new types of ether-based jet fuels will lead to reduced emissions of unhealthy particles into the environment," Peter Ruhdal Jensen explains.

The environmental benefits will make the new types of [jet fuels](#) attractive alternatives for the international aviation industry, which is expected to soon start struggling to meet their needs for jet aircraft fuel from [fossil fuels](#).

The project has a budget of 29 million kroner. Innovation Fund Denmark has granted 21 million kroner and the rest of the money will come from the Technical University of Denmark, University of Copenhagen, Aalborg University, Aarhus University, Novozymes, Airbus, Clauson-Kaas og Cumulus Bio. SAS and Atlantic Airways also support the project by supplying reference jet fuel. The project will run for four years.

Provided by Technical University of Denmark

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