**Alfa-Bird**

**Alternative Fuels and Biofuels for Aircraft Development**

Coordinator: EU-VRi - The European Virtual Institute for Integrated Risk Management (EEIG)
Website: www.alfa-bird.eu-ri.eu Contact: alfabird@eu-ri.eu
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**PARTNERS:**

**Main Beneficiaries (Partners):** 24

1. European Virtual Institute for Integrated Risk Management, EU-VRi, Germany
2. Airbus Operations SAS, Airbus F, France
3. Airbus Corporate Centre, Airbus CE, France
4. Airbus Operations Limited, AUK, United Kingdom
5. Avio S.p.A, AVIO, Italy
6. Centre National de la Recherche Scientifique CNRS, CNRS, France
7. Technologica Group- European Technical Joint Venture c.v., Technologica, Belgium
8. Dassault Aviation, DASSAV, France
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10. Institute National de l’Environnement Industriel et des Risques, INERIS, France
11. Institut National des Sciences Appliquées de Toulouse, LISBP, France
12. IFP Energies Nouvelles, IFPEN, France
13. Lesaffre International, LESAFFRE, France
14. MTU Aero Engines GmbH, MTU, Germany
15. ONERA, the French Aerospace Lab, ONERA, France
16. Rolls-Royce PLC, ROLLS-ROYCE, United Kingdom
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18. Shell Aviation Limited, SHELL, United Kingdom
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20. University of Sheffield, USFD, United Kingdom
21. Karlsruhe Institut fuer Technologie, UNIKARL, Germany
22. Graz University of Technology, TU Graz, Austria
23. University of Toronto, TORONTO, Canada
24. Institut National de la Recherche Agronomique, INRA, France

**Partners participating through Main Beneficiaries:** 5

EU-VRi: Steinbeis Advanced Risk Technologies GmbH, R-Tech, Germany
Airbus SAS: Airbus Deutschland GmbH, AirbusDE, Germany
CNRS: Institut des Sciences et Industries du Vivant et de l’Environnement, AgroParis Tech, France

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**The project – basic idea and objectives**

ALFA-BIRD aims at developing the use of alternative fuels in aeronautics. In a context where the price of oil is increasing and with impact of fossil fuels on climate change, the sustainable growth of the civil aviation is conditioned by the respect of the environment. In this context, using biofuels and alternative fuels in aeronautics is a great challenge, since the operational constraints (e.g. flight in very cold conditions) are very strict, and due to the long lifetime of current civil aircraft (almost 50 years).

The main objective of ALFA-BIRD is to develop the use of alternative fuels in aeronautics with a long-term perspective, to help improving each country’s energy independence, help lessening global-warming effects, and to help softening the economic uncertainty of crude oil peaking. ALFA-BIRD will investigate new approaches and new alternative fuels to power aircrafts with the possibility to revisit the fuel specifications and reconsider the whole aircraft system composed by the triplet: fuel, engine and ambience.

In operational terms, ALFA-BIRD addresses the following objectives:

- To identify and evaluate possible alternative fuels to petroleum kerosene, considering the whole aircraft system;
- To assess the adequacy of a selection of up to 5 alternative fuels with aircraft requirements, based on series of tests and experiments;
- To evaluate the environmental and economical performance of selected alternative fuels;
- To set the path towards industrial use of the "best" alternative fuels.
A lot of alternative solutions can be proposed for jet fuels. The selection process is very complex, due to multiple criteria (physical properties, economical issues, environmental issues, etc.). An important research work remains compulsory in order to select the most promising fuel(s). The possible evolution of fuels for aviation can then be described as follow:

**Short term:**
- XTL / Hydrotreatment of Oils / Napthenic compounds from Coal liquefaction

**Middle term:**
- Napthenic compounds (Biomass liquefaction) / Sugar derivatives / higher alcohols

**Long term:**
- Hydrogen, Cryogenic fuels, etc.

The kinetic dataset will be used to propose and validate a kinetic scheme for the oxidation of these jet fuels.

Testing the compatibility of fuel system fuel wetted materials is an essential part of the assessment of new candidate fuels, fuel blends and/or additives.

The main purpose of this part is to assess the suitability of a given alternative fuel with respect to aircraft requirements. The reduction of the overall impact on the environment is also of primary importance.

A large set of data on the kinetics of oxidation of a variety of fuels has been measured over a wide range of conditions using a JSR. Data on pollutants formation were also obtained.

The use of alternative fuels and biofuels in aviation will have a strong impact on the emissions of CO₂. Alfa-Bird project contributes to produce knowledge to address this issue. The members of the consortium are developing a strategy that will define the future of alternative fuels.

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