4th Annual Workshop

June 13-14th, 2012

Airbus France - Site de Saint Martin du Touch
316 Route de Bayonne, 31060 Toulouse, France

(ver. 15 – June 11, 2012)

Hosted by AIRBUS AN EADS COMPANY

Overview of the events

Event organized by EU-VRi

The 4th Annual Workshop is the last dissemination event organized by the Alfa-Bird consortium in the course of the project.

The invited participants are:

- All members of the consortium
- Members of the Advisory Board
- European Commission representatives
- Selected experts and stakeholders interested by Aviation & Environment

The meeting is hosted by Airbus Operation SAS and the participation is free but the registration by Monday 18, 2012 is mandatory.

June 13, 2012	June 14, 2012
9:00 -17:45 Technical Review Meeting	***8:30 -14:00*** Technical Review Meeting
20:00 – 22:00 Dinner La cave de la Maréchale	***14:00 – 15:30*** 4th General Assembly (reserved to Alfa-Bird members)

4th Annual Workshop

June 13th, 2012

08:00 – 08:30	**Arrival and formalities at the entrance of the site**
08:30 – 09:00	**Registration - Coffee**
09:00 – 09:30	**Welcome addresses – introduction of the 1st day**
	Y. Allouche, Airbus **O. Salvi, Alfa-Bird Coordinator** **K. Goddard, Airbus**
09:30 – 10:30	**SP1: Overview of potential alternative fuels (1/2)** **Knowledge gained on the alternative fuels** *Chairpersons: Nicolas Jeuland & Yohan Allouche*
20 + 5 min	**1. Rationale for the selection of the fuel candidates in the Alfa-Bird project** *N. Jeuland (IFPEn) & Y. Allouche (Airbus)*
15 + 5 min	**2. Standard and detailed fuel characterization of the fuel matrix** *N. Jeuland & L. Starck (IFPEn)*
10 + 5 min	**3. Projection of the fuel market to the mid-term (update)** *Cancelled*
10:30 – 11:00	**Break (offered by Airbus)**
11:00 – 12:00	**SP1: Overview of potential alternative fuels (2/2)** **Knowledge gained on the alternative fuels** *Chairpersons: Nicolas Jeuland & Yohan Allouche*
20 + 5 min	**4. Production of TAG by microbial processes** *S. Guillouet (INSA/LISBP)*
10 + 5 min	**5. New routes for production of alternative fuels** *F. Ghisoni (Lesaffre)*
20 min	**6. Questions and answers** *moderators: N. Jeuland (IFPEn) & Y. Allouche (Airbus)*
12:00 – 14:00	**Lunch (offered by Airbus)**

14:00 – 15:40	**SP2: Assess suitability of selected alternative fuels to the aircraft requirements (1/2)** *Chairpersons: Marina Braun-Unkhoff & Olivier Rouzaud*
10 + 5 min	**7. Overview of the compatibility of the selected fuels: Alfa-Bird approach** *P. Le Clercq (DLR)*
15 + 5 min	**8. Characterization of the fuel behavior inside the combustion chamber** *O. Rouzaud (ONERA)*
20 + 5 min	**9. Characterization of the combustion** *M. Braun-Unkhoff (DLR)*
10 + 5 min	**10. Pollutant emissions** *R. Chitkara (KIT)*
15 + 5 min	**11. Static and dynamic effects, Materials compatibility** *M. Sicard (ONERA)*
15:40 – 16:00	**Break (offered by Airbus)**
16:00 – 17:15	**SP2: Assess suitability of selected alternative fuels to the aircraft requirements (2/2)** **Chairpersons: Marina Braun-Unkhoff & Olivier Rouzaud**
15 + 5 min	**12. Thermal effects** *C. Wilson (USFD)*
15 + 5 min	**13. Fuel tests and analysis** *A. Curtin (Airbus UK) with inputs from G. Zalamansky (Dassault)*
15 + 5 min	**14. Safety, Standards and Regulation** *G. Marlair, A. Vignes (INERIS)*
15 min	**15. Questions and answers** *moderators: M. Braun-Unkhoff (DLR) & O. Rouzaud (ONERA)*
17:15 – 17:45	**General discussion on the results presented during the day** **Chairpersons: Y. Allouche, N. Jeuland, M. Braun-Unkhoff, O. Rouzaud**
	Questions and answers with the audience
17:45	**End of the 1st Day**
20:00	**Dinner at Les caves de la Maréchale (offered by Airbus)** 3 Rue Jules Chalande 31000 Toulouse, France

June 14th, 2012

08:00 – 08:30	**Arrival and formalities at the entrance of the site** **Registration – Coffee**
08:30 – 08:45	**Introduction of the 2nd day**
	Y. Allouche, Airbus
08:45 –10:30	**Environment and Socio-economical assessment (1/2)** **Chairpersons: Yohan Allouche & Olivier Salvi**
15 + 5 min	**16. Approach for the environmental and socio-economical assessment** *G. Marlair (INERIS)*
15 + 5 min	**17. Evaluation of Well to tank greenhouse gases emissions** *L. Thellier (IFPEn)*
15 + 5 min	**18. Impact evaluation and scenario-like emission predictions of alternative fuels** *F. Wolters (DLR)*
15 + 5 min	**19. Economic Assessment of Oil Substitutes Pathways** *P. Marion (IFPEn)*
20 + 5 min	**20. Dynamic, technology-competition model based, prediction of possible developments on aviation biofuel market up to 2050: The methodology, the tool and sample scenarios (low/high environmental incentives, business-as-usual)** *A. Jovanovic (EU-VRi/Steinbeis R-Tech)*
10:30 – 10:45	**Break (offered by Airbus)**

10:45 – 12:15	**Towards a strategy for alternative fuels for aviation** **Chairpersons: Yohan Allouche & Olivier Salvi**
15 min	**21. Alfa-Bird fuel matrix, results and ranking** *Y. Allouche (Airbus)*
15 + 5 min	**22. Overview of alternative jet fuel pathways: industrial capacity and suitability** *N. Jeuland & L. Starck (IFPEn)*
10 min	**23. Airlines' interests and involvement in biofuels** *T. Roetger (IATA)*
35 min	**24. Panel discussion**: **What is the way forward?** Yohan Allouche (Airbus) Emilie Basset (TurboMeca) Philippe Novelli (ONERA) Chris Lewis (Rolls-Royce) Olivier Penanhoat (SNECMA) Joanna Bauldreay (Shell) Carl Viljoen (Sasol) **Topics for the discussion:** • What are the horizons opened-up by Alfa-Bird? • Benefits of the knowledge and tools developed in the project to assess sustainable alternative fuels candidates? • What are the next challenges?
10 min	**25. Feedback from the Project Officer** *C. Bruynooghe (European Commission)*
12:15 – 14:00	**Lunch (offered by Airbus)**
14:00	**End of the 4th Annual Meeting**

LIST OF ABSTRACTS

Speaker:	**N. Jeuland & Y. Allouche**	**#1**
Company:	**IFPEN / Airbus**	
Title:	**Rationale for the selection of the fuel candidates in the Alfa-Bird project**	
Related to the WP:	**SP1**	
Abstract:	This presentation will provide an overview of the strategy for the selection of the fuel candidates in the Alfa-Bird project. The first fuel selection matrix has been designed around three main axes, covering a wide range of possible alternative fuels from short term to long term: • paraffinic fuels, with hydrotreated vegetable oils and synthetic fuels (XtL), in a short / middle term vision • naphthenic fuels, representative of new production processes such as coal or biomass liquefaction in a middle term vision • oxygenated fuels, such as higher alcohols or furanic compounds, in a long term vision. Several tests including the standard characterization of the 12 blends were used for the final selection of the 4 fuels that will be tested in the second phase (tests on engine components). The 4 fuels selected are **FSJF**, **FT-SPK, a blend of FT-SPK and 50% naphthenic cut, and a blend of FT-SPK and 20% hexanol**. This fuel matrix offers the possibility to evaluate the potential of different chemical families which are paraffinic compounds, naphthenic compounds and oxygenated compounds. This is also representative of a short, middle, and long term view. The information collected during the tests will be used **to prepare the environmental and economical impact assessment**, which will be the basis for the elaboration of the future strategy for the use of alternative fuels for aircraft.	

Speaker:	**N. Jeuland & L. Starck**	**#2**
Company:	**IFP EN**	
Title:	**Standard and detailed fuel characterization of the fuel matrix**	
Related to the WP:	**WP1.2**	
Abstract:	This presentation will be dedicated to the characterization (standard and detailed) of the fuel matrix.	

Speaker:	**Cancelled**	**#3**
Company:	**INERIS**	
Title:	**Projection of the fuel market to the mid-term (update)**	
Related to the WP:	**WP1.1**	
Abstract:	This presentation will provide an update of the fuel market based.	

Speaker:	**S. Guillouet**	**#4**
Company:	**INSA/LISBP**	
Title:	**Production of TAG by microbial processes**	
Related to the WP:	**WP1.4**	
Abstract:	Our objective was to produce specific fatty acids (FA) by intensive microbial conversion of renewable resources, according to the two strategies: microbial process engineering and metabolic engineering. We will give the complete set of results obtained within the frame of Alfabird the last 3 years.	

Speaker:	**F. Ghisoni**	**#5**
Company:	**Lesaffre**	
Title:	**New routes for production of alternative fuels**	
Related to the WP:	**WP1.4**	
Abstract:		

Speaker:	**P. Le Clercq**	**#7**
Company:	**DLR**	
Title:	**Overview of the compatibility of the selected fuels: Alfa-Bird approach**	
Related to the WP:	**SP2**	
Abstract:		

Speaker:	**O. Rouzaud**	**#8**
Company:	**ONERA**	
Title:	**Characterization of the fuel behavior inside the combustion chamber**	
Related to the WP:	**WP2.1**	
Abstract:	Experiments have been performed on a monodisperse droplet stream and sprays in a test chamber to characterize the behaviour of some alternative fuels (FSJF, FT-SPK, FT-SPK + hexanol, FT-SPK + naphthenic cut) in terms of atomization and evaporation. Temperature effects and pressure effects have been addressed by ONERA and TU-Graz. On the other hand, altitude relight and extinction have also been realized with the previous alternative fuels and compared with Jet A1 data.	

Speaker:	**M. Braun-Unkhoff**	**#9**
Company:	**DLR**	
Title:	**Characterization of the combustion**	
Related to the WP:	**WP2.1**	
Abstract:	Experiments were performed with respect to burning velocity and ignition delay time of existing (FT-SPK, FSJF) as well as of possible (FT-SPK+ hexanol and FT-SPK +napthtnic cut) alternative aviation fuel mixtures. A detailed reaction model developed by Alfa-bird partner P. Dagaut et al. (ICARE, Orleans, France) was used for a prediction of the measured data. Emission of pollutants will also be addressed. Results will be compared to those of Jet A-1, from crude oil.	

Speaker:	**R. Chitkara**	**#10**
Company:	**KIT**	
Title:	**Pollutant emissions**	
Related to the WP:	**WP2.1**	
Abstract:	The scope of this presentation is to provide the comparison of emissions performance and LBO limits of two existing fuels FT-SPK, FSJF and two possible aviation fuels FT-SPK+20% Hexanol and FT-SPK + 50% naphthenic with kerosene from crude oil at elevated combustor pressure.	

Speaker:	**M. Sicard**	**#11**
Company:	**ONERA**	
Title:	**Static and dynamic effects, Materials compatibility**	
Related to the WP:	**WP2.2**	
Abstract:	The suitability of an alternative fuel in the engine is not identified solely by its combustion performance. The fuel acts as a hydraulic fluid and provides a heat sink in the engine control system. Whilst doing this it comes into contact with a variety of material (tanks, pumps, gauges...) both metallic and non-metallic. These equipments are important components of the aircraft that doubly interact with fuel: they can deteriorate it, or they can be deteriorated by it. The general purpose of this work package was to evaluate the impact of alternative fuels on fuel system in order to assess the adequacy of the fuels with aircraft requirements. Static and dynamic test were undertaken on three major families of elastomers. FKM (fluorinated elastomer), NBR (nitrile butadiene rubber), and FVMQ (fluorosilicone rubber) were tested at elevated temperatures in the presence of four different alternative fuels (FSJF, FT-SPK, blend of FT-SPK and 20%v/v hexanol and blend of FT-SPK and 50% v/v of naphthenic cut). The effect of the same fuels on wetted metals (Inconel 625; Aluminium alloy 2024; Copper/Nickel alloy (90/10); Stainless Steel 304) found in the engine was also assessed with tests designed to accelerate any fuel-metal reactions present.	

Speaker:	**C. Wilson**	**#12**
Company:	**USFD**	
Title:	**Thermal effects**	
Related to the WP:	**WP2.2**	
Abstract:	Aviation fuel serves several purposes beside combustion within a modern aircraft engine. It also is used as a hydraulic fluid for engine and aircraft control and as a heat sink for the oil system and avionics. The thermal stressing of the fuel as it passes from tank to combustion chamber can cause the fuel to chemically alter, forming deposit precursors such as gums and carbonaceous deposits on the hotter surfaces of the engine. Within the Alfa-Bird project, candidate fuels were initially screened for thermal stability performance using the High Reynolds Number Thermal Stability (HiReTS) test. This test showed no appreciable difference in performance caused by the addition of hexanol, but suggested a worse performance for the addition of 50% Naphtene. Two fuels were selected for further testing at a larger scale on the Aviation Fuel Thermal Stability Test Unit (AFTSTU). These were the SASOL FSJF and GtL fuels. Although both fuels performed well, the FSJF gave results much closer to that of a 275degC JFTOT breakpoint fuel in the AFTSTU rig. This may be due to the fact that the fuel was stored for at least 18months in unlined 200L drums prior to the commencement of testing. Further analysis of the fuel samples is underway, although HiReTS results suggest no drop in thermal stability performance. The GtL performed very well in the AFTSTU rig and no deposit formation was observed	

Speaker:	**A. Curtin with inputs from G. Zalamansky**	**#13**
Company:	**Airbus UK / Dassault**	
Title:	**Fuel tests and analysis**	
Related to the WP:	**WP2.3**	
Abstract:	Testing to investigate the differences between the selected fuels (CTL (SASOL) FSJF, GTL (SHELL) FT-SPK, GTL (SHELL)/50% naphthenic, and GTL (SHELL)/20% hexanol) in relation to an Aircraft Fuel System and the in-tank materials. Tests include; pumping, filtering, icing, water solubility microbiological contamination, materials compatibility and gauging. From these tests, it can be concluded that: • CTL (SASOL) FSJF and GTL (SHELL) FT-SPK confirmed as drop in fuels, however further work to be performed on gauging, and materials compatibility for reference fuel. • GTL (SHELL) and 50% naphthenic cut not suitable as drop in, further blending required. • GTL (SHELL) and 20% hexanol cut not suitable as drop in current form. Further work on gauging, and the relationship between density, permittivity and temperature should be done. Testing of air solubility of existing Jet A1 and alternative fuels is recommended to gain a better understanding of air cavitation/evolution. The effect of additives and anti-oxidants on alternative fuels should be investigated as well.	

Speaker:	G. Marlair and A. Vignes	#14
Company:	INERIS	
Title:	Safety, Standards and Regulation	
Related to the WP:	WP2.4	
Abstract:	Alternative fuels produced from fossil, biomass, or a combination of both offer significant promise for increasing supply and offering feedstock and producer diversity in the marketplace. Since aircraft performance and safety cannot be compromised, safety criteria analysis for alternative fuels need to be considered carefully. In a first part, relevant safety criteria pertaining to kerosene are reviewed and in a second part, all the data gained in testing the alternative fuels will be analyzed with a main focus on safety issues. Results gained within the collaboration of DGATA with INERIS are also presented. Some recommendations are highlighted in order to ensure the future sustainable deployment of the selected AFs.	

Speaker:	G. Marlair	#16
Company:	INERIS	
Title:	Approach for the environmental and socio-economical assessment	
Related to the WP:	WP3.1 & WP3.2	
Abstract:	The aim of socio-economic analysis (SEA) is to provide information on benefits and costs to society that are related to the deployment of bio-jet fuels. Addressed features include: employment; gains in or impacts on public health; water-related issues (quantity and/or quality etc.). In essence, SEA deals with collective issues. SEA information is mostly based on a combination of indicators, possibly supplemented with a monetization step. SEA results come in addition and complementary to other sustainability assessment approaches, such as LCA. In Alfa-Bird, SEA results show that bio-jet fuels perform better in terms of GHG (a fact already known by LCA and combustion studies). However, SEA points to e.g. occupational risks and employment potential as sustainability issues deserving careful monitoring while deploying bio-jet fuels.	

Speaker:	L. Thellier	#17
Company:	IFP EN	
Title:	Evaluation of Well to tank greenhouse gases emissions	
Related to the WP:	WP3.1	
Abstract:	Greenhouse Gases (GHG) emissions and Energy consumption of a selection of alternative fuels are evaluated through a Life Cycle Analysis. Considered fuels are coal based (ICL, DCL) w/ and w/o Carbon Capture and Storage (CCS), gas based (GtL) w/ and w/o CCS, and biomass based (BTL). For all of them a Well to Tank (WTT) study is carried out. Then all neat fuels are compared to Jet fuel and to each other on a Well to Wake (WTW) basis. Regarding GHG emissions, neither coal based nor gas based fuels, even considering CCS during production process, can cope with Jet. Only BtL fuels emit less GHG than Jet on a WTW basis. However thanks to CCS, ICL and DCL can reach GHG emissions level close to GtL (w/ and w/o CCS). Regarding total energy consumption, none of the considered fuels cope with Jet A1 on a WTW basis. BtL is even the most energy consuming fuel. Considering non renewable energy, only BtL ranking evolves. From a non renewable energy consumption point of view, BtL becomes the least non renewable energy consuming fuel.	

Speaker:	F. Wolters	#18
Company:	DLR	
Title:	Impact evaluation and scenario-like emission predictions of alternative fuels	
Related to the WP:	WP3.1	
Abstract:	The impact of the selected alternative fuels within Alfa-Bird on aircraft engine fuel use and emissions has been investigated on engine and flight mission level. Moreover, investigations on the differences of total aircraft fleet emissions using alternative fuel were performed based on global scenario level. Simplified fuel models were generated to account for changed fuel heating value and burned gas compositions compared to conventional Jet-A1. The fuel and emission reduction potentials were assessed on a typical short-and long-haul flight mission simulation, taken snowball effects into account. Potential alternative fuel penetration scenarios were assumed and applied to the ICAO fuel burn forecast scenario.	

Speaker:	P. Marion	#19
Company:	IFP EN	
Title:	Economic Assessment of Oil Substitutes Pathways	
Related to the WP:	WP3.2	
Abstract:	A parametric study was run on 4 ex-petroleum jet fuel substitution pathways, including the impact of the CO2 constraint. Overall heat, material balances, CO2 emissions and economics were assessed based on : • "Nth Of A Kind" State of the art technology performances & costs elaborated from compiled sources (open literature and Alfa-Bird), • Autothermal plant configuration (no import, nor export energy except feedstock and liquid product), • A 12% project profitability. Mainly correlated to feedstock supply cost and the penalty for CO2 emissions, XTL pathways are economically justified for a crude oil price of about: - $180 to $240/barrel for BTL. This pathway requires strong government policy (tax incentives; specifications, sustained R&D efforts), or cheap biomass to reach profitability. - $70 to $85/barrel for GTL in realistic conditions of a natural gas available at $1 to $4/MMBTU. - $70 to $110/barrel for CTL (ICL or DCL).	

Speaker:	A. Jovanovic	#20
Company:	EU-VRi/Steinbeis R-Tech	
Title:	Dynamic, technology-competition model based, prediction of possible developments on aviation biofuel market up to 2050: The methodology, the tool and sample scenarios (low/high environmental incentives, business-as-usual)	
Related to the WP:	WP3.2	
Abstract:	Based on the aim to develop the use of alternative fuels in aeronautics of ALFA-BIRD project, the different tasks (Task 3.2.1, Task 3.2.2, and Task 3.2.3) within the WP3.2:.Economical Evaluation contribute to reach the general goal of the project and also, go beyond the initial expectations specified in the DoW of the project. The work performed develops a methodology which in not based in "static" scenarios and assumptions but on dynamical ones. A web based tool based on a dynamical competition model for fuel substitution has been developed. Investment and market factor are modeled by the Lotka-Volterra dynamical system for the substitution of fossil by alternative fuels. This is a paradigmatic modeling approach for systems where multiple technologies with limited production capacities compete in a confined market. In this model projections for the demand of a candidate fuel (and, by that, its market penetration) are outcomes of a dynamical model taking the overall supply of competing options and their price into account. The report integrates the approach of the SEA methodology, the development of the stakeholders' basis (350+stakeholders and 40+ countries worldwide), the results of Life Cycle Assessment, Multi-criteria Decision Making (MCDM) tool and the decoupling indicators.	

Speaker:	**Y. Allouche**	**#21**
Company:	**Airbus FR**	
Title:	**Alfa-Bird fuel matrix, results and ranking**	
Related to the WP:	**SP3**	
Abstract:	The technical, environmental and socio-economical assessments of the selected alternative fuels are presented in a synthesis matrix. Interesting conclusions are highlighted about the different processes. We have now a good idea of the advances for each field in terms of techniques, impact on environment and cost-efficiency at industrial scale-up. Considering all the results, it is therefore possible to give some recommendations for implantation strategy of alternative fuels as it will be explained by IFPEN. However, there are some limitations for using this matrix such as criteria weighting. Fuel ranking and comparison are also difficult because of differences in maturity levels for evaluation fields. The technical assessment is standardized and there is no problem to give results and interpretation. For the environmental evaluation, the standards are in development within professional collaboration such as RSB for instance for building an efficient LCA tool. Finally, for the economical assessment, prediction models are more difficult to set up due to the uncertainty concerning oil price, fuel market and environmental incentives in the future. Contribution from all aviation stakeholders will help to develop a strategy for integrating alternative fuels.	

Speaker:	**N. Jeuland & L. Starck**	**#22**
Company:	**IFP EN**	
Title:	**Overview of alternative jet fuel pathways: industrial capacity and suitability**	
Related to the WP:	**WP3.3**	
Abstract:	This presentation will be dedicated to an overview of alternative jet fuel pathways regarding industrial capacity and suitability. The alternative jet fuel pathways studied are those listed by Marc Rumizen at the CAAFI meeting of December 2011 such as FT synthesis, hydroprocessing, fermentation...	

Speaker:	**T. Roetger**	**#23**
Company:	**IATA**	
Title:	**Airlines' interests and involvement in biofuels**	
Related to the WP:	**WP3.3**	
Abstract:	The aviation industry has committed to ambitious CO2 reduction goals (carbon-neutral growth from 2020, 50% reduction of the worldwide net emissions by 2050 compared to 2005). Sustainable aviation biofuels ("biojet fuels") are one of the most promising solutions that contribute to these goals. Moreover, they could reduce airlines' dependence on oil companies and the strong fluctuations of fossil fuel prices. Numerous airlines have carried out biofuel test flights and, since these are certified for commercial use, also extended series of passenger flights using biojet fuels. Biojet fuels must meet the same strict technical requirements as conventional jet fuel, e.g. in terms of temperature behaviour and energy density. In the short to mid-term biojet fuels need to meet the drop-in requirement, i.e. be mixable with conventional jet fuel and compatible with today's aircraft and fuel supply infrastructure. Installing a parallel infrastructure for biojet fuels would require investments of prohibitive costs. Only in the longer term biofuels that are not fully "drop-in" could be envisaged if there is enough transition time for aircraft and infrastructure to adapt, and if the economic benefits (price, availability) justify this transition. Meeting sustainability requirements is highly important for operators using biofuels, for reasons of corporate responsibility and also because only sustainable biofuels are eligible for public incentives. Various regulatory and voluntary standards (EU RED, RSB) cover environmental, societal and economic aspects of sustainability. The current main challenges for the deployment of biojet fuels are not so much of technical nature, since various types of drop-in biojet fuel exist, but rather political and economic in order to bridge the current price gap between conventional and biojet fuel. However, the search for new feedstock and process solutions should continue in order to find affordable solutions for the future.	

Speaker:	**Y. Allouche**	**#24**
Company:	**Airbus FR**	
Title:	**Introduction to the panel discussion**	
Related to the WP:	**WP3.3**	
Abstract:	Aiming a sustainable growth for aviation with regards to the impact of fossil fuels on the environment and also in the context of oil prices that are highly volatile, impacting the whole aeronautics community, Airbus R&T technical role is to prepare the whole company to alternatives fuels integration and use. Airbus R&T is also focused on reaching the IATA environmental targets: a carbon neutral growth by 2020 and reducing by half the 2050 CO2 emissions based on 2005 levels. Our objectives are to investigate and support the development of aviation alternative fuels. Hence, Airbus is actively participating in the European Advance Biofuels Flightpath in order to set up a sustainable production of 2 million tons a year of biofuels from European feedstock by 2020. Selecting the right pathways of production and monitoring them with the right maturity scale will help us to reach our environmental targets. Airbus encourages R&T partnerships to support promising ways to produce alternative fuels by participating in several successful projects such as the SWAFEA study, Alfa-Bird, BurnFAIR and the Dream SP5.	