Biofuels take off

Produced using non-food crops, biofuels improve aviation's carbon footprint. Snecma (Safran) is participating in their certification by testing them on its engines.

In 2013, an Airbus A321 flying from Toulouse performed a routine landing at the Paris Air Show (see box). The novelty was that one of its CFM56\(^1\) engines was powered by kerosene containing 10% farnesane. This substance is derived from the transformation of sugar cane into basic molecules (farnesene) thanks to microorganisms acting during fermentation. Once hydrogenated, the farnesene molecule becomes farnesane and may then be directly incorporated into an aviation fuel such as kerosene.

This flight was a first, but Safran has been experimenting with other types of biofuels on its engines for some time now. Indeed, as early as 2007, it conducted ground tests, followed by a first flight two years later. "There are several families of biofuels certified for aviation," explains Francis Couillard, Director of Environmental Policy at Snecma. "Whatever the manufacturing process, it is important that the biofuels produced meet the same specifications as standard kerosene with regard to temperature resistance, viscosity and so on. Using them should not require any adaptation of our engines."

**Sustainable biofuels**

Two biofuel production processes have now been certified. The first, HEFA (Hydroprocessed Esters and Fatty Acids) produces biofuel from oils extracted from oleaginous plants or microalgae. The second is based on the new Fischer-Tropsch process, which produces synthetic fuels from lignocellulosic biomass (straw, forest residues, dedicated crops, etc.), natural gas or coal. The only common aspect to all these techniques is that all the vegetal matter used comes from non-food crops.

**Snecma, actively involved in certification**

As an engine manufacturer, Snecma is a member of the international fuel certification body, as well as of the industrial networks CAAFI\(^2\) and SWAFEA\(^3\). "Our participation takes two forms," comments Francis Couillard. "First, we define the specifications for these fuels. Second, we perform tests on our engines to ensure that our recommendations have been followed. Indeed, we have occasionally issued a negative opinion for a biofuel that does not meet specifications."

During the certification process, farnesane successfully passed the first tests: the analysis of the engine parameters recorded during the Toulouse-Le Bourget flight and subsequently during ground testing of the SaM146\(^4\) engine was conclusive. Farnesane is due to receive its certification in summer 2014.

**A complementary solution**

While the production of biofuels is still expensive, likely increases in oil prices could make them a more attractive option. "Today, we are limiting ourselves to blends of 50% biofuel/50% kerosene," says Francis Couillard. "We are also limited by the production capacities of biofuels, which are still insufficient to supply regular flights. However, I remain convinced that these alternative fuels will continue to develop because they make a necessary contribution to our efforts to reduce our greenhouse gas emissions."

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1. The CFM56 engine is co-manufactured by Snecma (Safran) and GE through CFM International.
3. Sustainable Way for Alternative Fuels and Energy for Aviation - This three-year program was completed in 2011.
4. The SaM146 is co-manufactured by Snecma and NPO Saturn, through Powerjet.

**French manufacturers give boost to sustainable biofuels**
By organizing the flight "Joining our Energies – Biofuel Initiative France" at the 2013 Paris Air Show, Airbus, Air France, Safran and Total wished to illustrate the technical ability of French industry to incorporate aviation biofuels. The four groups have confirmed the need to strengthen research on the development of sustainable biofuels for the creation of a French biofuel industry. France has all the resources at hand to create an innovative value chain: fuel suppliers, engine manufacturers, airframers and airlines, all of whom are global leaders in their fields.

- See the video "Safran takes part in biofuel demonstration flight"
- Read the press release "Airbus, Air France, Safran and Total team up to develop sustainable aviation biofuels in France"