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**ALTERNATE FUELS – STRATEGY AND RESULTS**

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The US Air Force began evaluating alternative fuels for aviation for a second time in 2004. The first look at alternative fuels was in the late 1970's and 1980's and focused on fuels produced from oil shale and coal. Many things have changed since the 1980's such that today's alternative fuels for aviation must balance national energy security issues, the impact on climate change, and yet offer robust economic sustainability to insure long-term sustainable supplies.

The Air Force is working in partnership with the US commercial airlines through the Commercial Aviation Alternative Fuels Initiative to evaluate fuels produced from a variety of resources including biomass, coal, coal and biomass, and natural gas. Alternative fuels derived from these resources must meet aircraft performance, operation and durability requirements such that they are drop-in replacements for petroleum derived fuels. Recent work by the Air Force and the commercial sector has shown that 50/50 blends of Fischer Tropsch (FT) fuels with petroleum are drop-in alternative fuel blends and the Air Force is nearly finished the certification of these fuels. In addition, the commercial sector approved a new specification for a 50/50 blend for use in all US commercial aircraft.

Based on the success of the FT fuel program the Air Force and commercial sector are now looking at hydrotreated renewable jet fuels produced from fats and oils including those produced by algae. These biomass derived feedstock are chemically similar to FT and petroleum derived fuels and can be produced from a wide range of oil seeds as well as animal tallow. Laboratory analysis has started on fuels produced from cellulosic feedstocks, which offer the promise of a widely abundant feedstock for sustainable supply. Although biomass derived fuels offer advantages by recycling the carbon produced when they are burned, determining the life-cycle greenhouse gas footprint has proven challenging and some biomass fuels may be carbon friendly when direct and indirect land use change is considered in the evaluation. The challenge is to find biomass feedstocks that not only provide the ability to be converted into drop-in fuels but also offer reductions in the greenhouse gas footprint. To help better characterize alternative fuels, new metrics are being developed to compare complex parameters such as technology readiness, manufacturing readiness, life-cycle greenhouse gas footprint, sustainability, and the energy return on investment such that informed choices can be made for the use of these alternative fuels.