

THE U.S. MUST CREATE ENERGY INDEPENDENCE THROUGH INVESTMENTS IN ALTERNATE FUELS AND IMPROVEMENTS IN ENERGY EFFICIENCY: An AIAA Information Paper

ABSTRACT

The American Institute of Aeronautics and Astronautics (AIAA) recognizes that aviation must have reliable sources of energy and use that energy efficiently to enable aircraft and an air transportation system to meet growing demand in an economic fashion. Since the energy crisis of the early 1970's, the use of alternative aviation fuel has been under discussion. However, growing concerns about future availability of jet fuel (which could be a major security risk) and rising prices have driven a renewed interest in potential alternative sources for aviation fuel for both military and commercial use. Improved fuel efficiency reduces the demand for fuel and has a positive impact on the environment. There are three ways to improve aircraft fuel efficiency: increase aircraft lift-to-drag, reduce engine specific fuel consumption and reduce airframe and engine weight. In order to achieve any or all of these improvements, research investments will be required.

ISSUE

As a significant consumer of petroleum, aviation has been dramatically impacted by volatile oil prices and supply concerns. Our dependence on foreign oil continues to be both a monetary and national security issue. A key energy issue that goes along with fuel cost and availability is aviation energy efficiency. Efficiency gains can be achieved at the aircraft level as well as the air space system level. New energy sources and more energy efficient aircraft are needed. The U.S. must have the national will to invest in the research and development required to achieve energy independence.

BACKGROUND

Our dependence on fossil fuel has severely impacted by civil and military aviation. Airlines have lost vast sums of money or even gone bankrupt because of rising oil prices, and unexpected spikes have had substantial and detrimental impact on the U.S. Department of Defense budgets. While recent drops in oil prices have provided some relief, they are likely temporary, and our dependence on foreign sources continues to be a significant national security risk. Development of alternative fuels would have a dramatic impact on the sustainability of the aviation enterprise. However, continuous and sustained research is required to identify and develop alternative aviation fuels, which will ensure ample supply, reduce costs, and make the enterprise more environmentally sound. Biofuels, such as those based on algae, offer huge potential in this area without negatively impacting the food supply.



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“Drop-in” alternate fuels – those that can be substituted directly for conventional fuels without any changes to aircraft, engines or fuel delivery systems - are best suited for both military and commercial aviation; however, there are currently no U.S. suppliers capable of delivering the quantities that would be required. No one source of alternative fuel will be sufficient to meet the nation’s needs. Investment must be made in identifying and developing alternate sources of aviation fuel. Current NASA programs are focused on increasing aircraft efficiency for reduced energy consumption and emissions through improvement in the efficiency of both the aircraft and propulsion systems. The Technical Addendum to the National Aeronautics R&D Plan identifies energy availability and efficiency as critical research areas, but NASA’s aeronautics budget in this area continues to be woefully under-funded.

The U.S. Air Force is the leading consumer of aviation fuels with costs currently exceeding \$10 million per day. While cost remains an issue, national security issues have driven the Department of Defense to require that by 2016 50% of USAF domestic fuel supply be from alternate sources. As a result, they are beginning to invest in the development of alternate fuels.

RECOMMENDATIONS:

- AIAA recommends that Congress provide NASA and FAA with sufficient funding to achieve the goals set forth in the National Aeronautics Research and Technology Plan, and specifically, to address the challenges detailed in the Technical Appendix released in December 2008.
- AIAA recommends that the DOD develop and implement – with appropriate Congressional funding support – a comprehensive multi-year program to develop and qualify alternative fuels as well as associated production, extraction, and refining technologies to enable fleet use within ten years.