



Aviation Biofuels Deployment: An ATA/CAAFI Progress Report

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What Our Airlines Want in Alternative Fuel

- **Four Criteria – Feedstock and Technology Neutral**
 - **Safety/Fuel Quality**
 - **Supply Reliability**
 - **Cost Competitiveness**
 - **Environmental Benefit**
- **Each Poses Challenges to Commercial Deployment**
- **Efforts Have Focused on Overcoming the Challenges**

Sample Cooperative Efforts to Accelerate Deployment

- **Commercial Aviation Alternative Fuels Initiative (CAAFI) Teams:**

- Certification & Qualification (e.g., jet fuel specs)
- R&D (e.g., suitable feedstocks and fuels)
- Business & Economics (e.g., finance/commercial terms)
- Environment (e.g., methodologies, case studies)



- **ATA-Defense Energy Support Center (DESC) Strategic Alliance for Alternative Fuels**

- Environment
- Deployment & Logistics
- Contracting & Finance

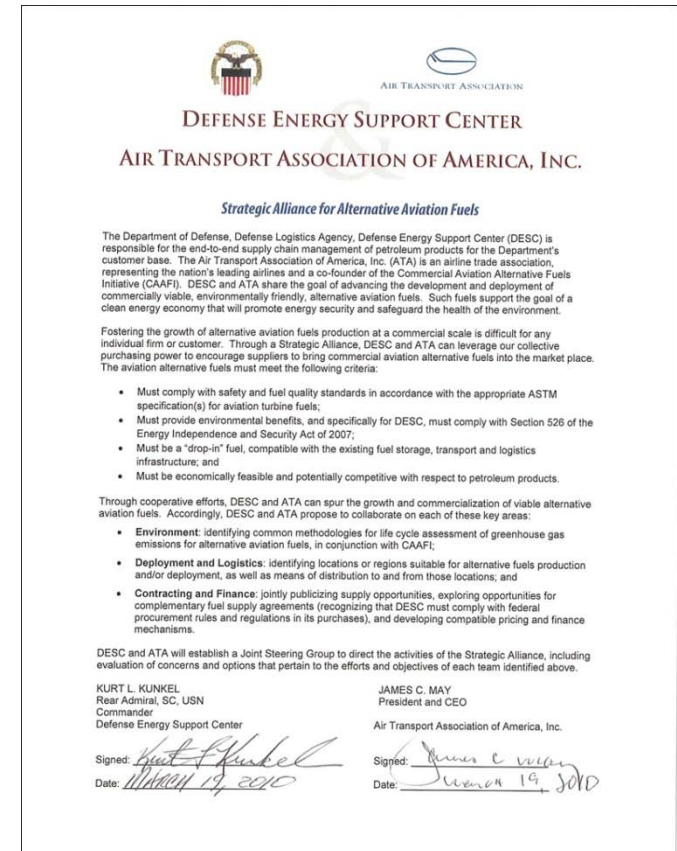
ATA and DESC Sign Strategic Alliance for Alternative Fuels

http://www.airlines.org/news/releases/2010/news_3-19-2010.htm

http://dlavideoprograms.hq.dla.mil/videos/DESC_Press_Conference.wmv



RDML Kurt Kunkel and ATA President and CEO James C. May sign the Strategic Alliance for Alternative Aviation Fuels (Mar. 19, 2010)



“Through cooperative efforts, DESC and ATA can spur the growth and commercialization of viable alternative aviation fuels. Accordingly, DESC and ATA propose to collaborate on each of these key areas: (1) **Environment:** identifying common methodologies for life cycle assessment of greenhouse gas emissions for alternative aviation fuels, in conjunction with CAAFI; (2) **Deployment and Logistics:** identifying locations or regions suitable for alternative fuels production and/or deployment, as well as means of distribution to and from those locations; and (3) **Contracting and Finance:** jointly publicizing supply opportunities, exploring opportunities for complementary fuel supply agreements (recognizing that DESC must comply with federal procurement rules and regulations in its purchases), and developing compatible pricing and finance mechanisms.”



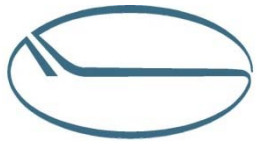
Progress and Challenges: Certification

- **Progress: New Jet Fuel Specification (ASTM D7566)**
 - **Initial issuance for Fischer-Tropsch (FT) Fuels**
 - **Ballot and research report for Bio-SPK / hydrotreated renewable jet (HRJ) now being reviewed**
 - Targeting approval by 2011; working through technical issues
- **Challenges**
 - **Acceptance of ASTM standard (e.g., UK Def Stan 91-91)**
 - **Need data and progress for other promising processes**
 - Hydrolysis/fermentation
 - Lignocellulosic bioconversion
 - Pyrolysis/liquefaction
- **How to Address Challenges**
 - **More collaboration, more funding sources, etc.**



Progress and Challenges: Research & Development

- **Progress**
 - **Drop-in-fuel approach and jet fuel specification establish/provide targets for R&D to meet**
- **Challenges**
 - **Need data and progress for other promising processes**
 - **Demonstrating feedstock readiness (i.e., crops support programs, farmers willing to produce)**
- **How to Address Challenges**
 - **Utilizing technology readiness scale for processes**
 - **Developing feedstock readiness scale (FeRL scale)**
 - **Conduct more research and secure more funding**



Progress and Challenges: Supply Reliability/Cost

- **Progress: Market Signals**
 - **Clear demonstration of airlines as willing buyers (e.g., December 2009 MOUs for future purchase agreements)**
 - **Airports as concentrated nodes of demand (for fuel)**
 - **ATA/DESC alliance leverages military role**
- **Challenges**
 - **Competing with other industries for supply**
 - **Feedstock costs and capital costs/financing for facilities**
- **How to Address Challenges**
 - **Demonstrate aviation as a terrific customer**
 - **Need more and more and more government funding for feedstock, facilities and resultant fuel**



Progress and Challenges: Environmental Benefit

- **Progress**
 - Lifecycle analysis (e.g., USAF, “Framework and Guidance for Estimating Greenhouse Gas Footprints of Aviation Fuels”)
 - Case studies (e.g., April 2010 PARTNER report)
- **Challenges**
 - Regulatory agreement on lifecycle assessment methodology
 - Need for crediting of any environmental benefit
 - Crediting must go to purchaser (commingling)
 - Potential for different criteria in different countries/regions
 - Need broader (but reasonable) sustainability criteria
- **How to Address Challenges?**
 - More collaboration; working on contractual environmental certification process, with link into regulations

Industry Approach to Promote Alternative Fuel

- **It would be difficult for an individual airline to replicate the CAAFI process**
- **Industry approach spreads financial risk for airlines and potential suppliers**
 - **Pricing risk for the airlines**
 - **Credit risk for the suppliers**
- **Accelerates deployment of projects**
 - **Identify various sources of supply while remaining feedstock neutral and technology neutral**
 - **Can work on multiple projects in different parts of the country**
- **Develop a consistent methodology for greenhouse gas “lifecycle analysis” (LCA)**

Agreement with Rentech: Ground Fuel

- **AA along with seven other airlines entered into a five-year agreement with Rentech & ASIG on the Rialto Project**
 - **Technology will be Fischer-Tropsch**
 - **Feedstock will be urban woody waste**
- **Opportunity to test our industry approach**
 - **The volume is small**
 - **Operational by end of 2012**
 - **Diesel will be used for our ground equipment at LAX**
 - **This agreement was less complex than a jet fuel deal**



Agreement with AltAir: Aviation Fuel and Ground Fuel

AA along with 11 other airlines entered into a memorandum of understanding with AltAir to purchase jet fuel and diesel

- Crop oils will be refined at a facility located at an existing refinery on the West Coast
- Feedstock will be camelina or other non-food crops

Utilized our industry approach

- The volume is 75 million gallons per year (jet fuel and diesel)
- Estimated facility will be operational by end of 2014
- Much more complexity associated with the deal



Challenges

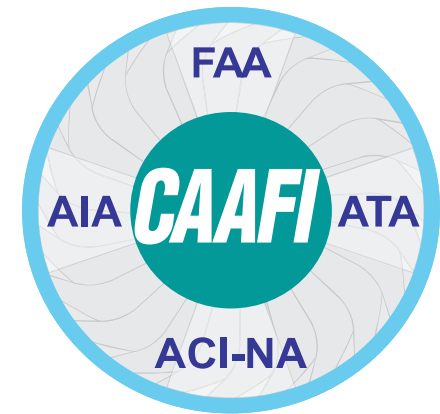
Even though we have been successful utilizing the industry approach to help promote the production of alternative jet fuels, some key challenges remain in reaching fuel supply agreements.

- Approval of the HRJ jet fuel specification by ASTM
 - At this time expected by 2011
- Development of a pricing structure acceptable to the airlines and to suppliers/investors; requires:
 - Multi-year tax and environmental credits
 - Government loan guarantees and/or purchase rebates
- The appropriate infrastructure must be in place for supplying jet fuel
- An industry standard methodology for LCA must be developed
 - Need to develop metrics/standards to measure the impact on the environment

Concluding Thoughts

- **Alternative jet fuels are key for the following reasons:**
 - Increase security of supply from domestic sources
 - Diversifies feedstock sources
 - Integral part of meeting our environmental commitment
 - Lessens volatility associated with petroleum-based jet fuel
- **We have created a process to guide the discussions with potential suppliers**
- **While we are excited about our progress so far, we recognize there are still several challenges to overcome**
- **The airlines must be proactive in shaping the future of alternative jet fuels**

If You Want to Feel Good About the Future, Look Up!



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