Sustainable Alternative Jet Fuel Development and Deployment

Presented to: Aeronautics & Space Engineering Board
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Aviation, Environment and Energy

- Aviation impacts include noise, air quality, water quality, and the global climate
- Environmental impacts from noise and emissions will be a critical constraint on capacity growth
- Trend towards stricter environmental standards and mitigation of impacts
- Fundamental changes ongoing in energy markets

The challenge is to increase mobility with reduced environmental impacts and enhanced energy efficiency and security. Alternative fuels could be critical to this.
## Alt fuels relevance to FAA D2025

<table>
<thead>
<tr>
<th>Aspiration</th>
<th>Performance Metrics (2018)</th>
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<tbody>
<tr>
<td>Sustaining our Future</td>
<td>One billion gallons of renewable jet fuel is used by aviation</td>
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<td>Population exposed to significant aircraft noise around airports reduced to less than 300,000.</td>
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<td>Aviation emissions contribute 50% less to significant health impacts and are on a trajectory for carbon neutral growth using a 2005 baseline</td>
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<td>Improve NAS energy efficiency (fuel burned/miles flown) by at least 2% annually</td>
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Alt fuels relevance to U.S. Climate Action Plan

**Actions to Reduce GHGs**

- Aircraft & Engine Technology Improvement
- Operational Improvements
- Alternative Fuels Development & Deployment
- Policies, Standards & Measures
- Scientific Understanding & Modeling/Analysis
Challenges for Sustainable Alternative Fuels

- Feedstock Availability
- Competitive cost for alternative fuel
- Approved for performance/safety
- Environmentally sustainable
- Commercially produced
Coordinating USG Efforts across Supply Chain

Facilitating Deployment and Investment

- **Feedstock Production**
- **Feedstock Logistics**
- **Fuel Conversion**
- **Conversion Process Scale-up/Integration**
- **Fuel Testing/Approval**
- **Environment Assmt**
- **Enable Production**
- **End User/Buyer**

### Programs and Initiatives

**Agriculture:**
- Biomass Crop Assistance Program & Crop Insurance Program
- Feedstock Development Center Grants

**Energy & Defense:**
- R&D grants
- C/Q Fuel testing

**Agriculture & Energy:**
- R&D grants
- Enviro Analysis

**FAA & Defense:**
- C/Q Fuel testing

**FAA, Defense, & NASA:**
- Enviro Analysis
- Defense Production Act and Biorefinery Program

**Agriculture, Navy, & Energy:**
- Defense Production Act and Biorefinery Program

**FAA, Guidance for Airports**
- FAA: Renewable Fuel Standard

**Defense & Airlines:**
- Fuel purchase

**EPA:**
- Renewable Fuel Standard
Supply Chain – FAA Role

FAA address key aspects
- Enable government & aviation industry coordination
- Conduct environmental and cost analysis/tools
- Fund Cert/Qualification testing to inform ASTM

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<th>Agency</th>
<th>Interest</th>
<th>Role</th>
<th>Goal</th>
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<td>FAA</td>
<td>Enabling aviation growth by reducing aviation air quality and GHG impacts and energy security with alternative aviation fuels.</td>
<td>Emissions certification &amp; standards for aircraft, engines; Facilitation of qualification/certification of aviation fuels at ASTM Intl; Environmental impacts assessment &amp; measurement, analysis &amp; analytical tools development; maturation of promising alt. fuel candidates; Info exchange/coordination; key sponsor of CAAFI.</td>
<td>1B gallons by 2018. CO₂ neutral growth by 2020 using a 2005 emissions baseline. Net reductions of air quality health &amp; welfare impacts despite aviation growth.</td>
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Example: C/Q Road to Future Alt Fuels

- Plant/Animal Oils
- Corn stover
- Forest waste
- Coal
- Natural gas
- Sugarcane
- Sugar

Catalytic Hydrothermolysis (CH)
Hydrotreated Depolymerized Cellulosic Jet (Pyrolysis) (HDCJ)
Direct Sugar to HC’s (DSHC)
Alcohol to Jet (ATJ)
SPK w/ Aromatics (SKA)

Federal Aviation Administration
Summary

- USG & industry leadership in sustainable alt fuels has led to significant successes
  - ASTM approval of two alt fuels
  - Drawing focus to aviation
  - Inclusion of alt jet fuels in GREET
- Advancing use of alternative jet fuels is key for meeting environmental goals
- Public private coordination and interagency collaboration vital to success (e.g. via CAAFI)
- Testing efforts help accelerate alt fuel development
- Analysis efforts improve environmental impacts quantification and decision-making
- Global engagement vital to meeting sector goals