Sustainable Alternative Jet Fuels

Update on ASTM Approval

Nate Brown
U.S. Federal Aviation Administration
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How a Fuel Gets Approved

- Specification Properties
- Fit-For-Purpose Properties
- Component/Rig Testing
- Engine/APU Testing

ASTM D7566 Revision

ASTM Balloting Process

- ASTM Review & Ballot
  - Accept
  - Reject
  - Re-Eval As Required

ASTM Specification

FAA & OEM Review & Approval

ASTM Research Report

Federal Aviation Administration
Progress to Date

- **ASTM D7566** Sept 1, 2009
- **FT** Sept 1, 2009
- **HEFA** July 1, 2011

Also Called HRJ or Bio-SPK

Drop-In Fuel Spec

2009

Coal

Natural Gas

Biomass

Plant/Animal Oils
Future Alternative Aviation Fuels

D1655

Petroleum

Fischer-Tropsch (FT)
Coal
Gasify
Syn Gas
(CO, H₂)
FT Process

D 7566
Annex A1

D 7566
Annex A2

Hydroprocessed Esters & Fatty Acids (HEFA) from Bio-Oils

Plant/Algae
Oil Extraction

Hydroprocesssing

Conventional Refinery Processes

Crude Oil

Syn-Crude

Bio-Crude

Jet Fuel

D 7566
Future Annexes

Alcohol to Jet (ATJ)

Direct Sugar to Hydrocarbons (DSHC)

Hydrotreated Depolymerized Cellulosic Jet (HDCJ)

Catalytic Hydrothermolysis (CH)

Catalytic Conversion of Sugar
Future Aviation Fuel Pathways at ASTM

- **Plant/Animal Oils**
  - ARA
  - Catalytic Hydrothermolysis (CH)
  - Hydrothermolysis Depolymerization Cellulosic Jet (Pyrolysis) (HDCJ)

- **Lignocellulose**
  - KiOR
  - Hydrotreated Depolymerized Cellulosic Jet (Pyrolysis) (HDCJ)

- **Corn Stover**
  - Amyris
  - Direct Sugar to HC’s (DSHC)

- **Switchgrass**
  - GEVO
  - Alcohol to Jet (ATJ)

- **Forest Waste**
  - Byogy
  - Other Catalytic Conversion Processes

- **Sugarcane Sugar**
  - Virent

Years:
- 2012
- 2013
- 2014
- 2015

Processes:
- Alcohol to Jet (ATJ)
- Direct Sugar to HC’s (DSHC)
- Hydrotreated Depolymerized Cellulosic Jet (Pyrolysis) (HDCJ)
- Catalytic Hydrothermolysis (CH)
- Other Catalytic Conversion Processes
Thank you!

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www.caafi.org/information/fuelreadinesstools.html