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SAF – ABFA View

Glenn Johnston

Vice President Regulatory Affairs – Agrisoma Biosciences Inc

Chair – ABFA Regulatory Committee

Chair – ABFA ICAO Producers Group





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**Advanced
Biofuels
Association**

-The Advanced Biofuels Association (ABFA) represents 39 companies around the world in the business of producing, distributing, and marketing renewable fuels including Sustainable Aviation Fuels.

-ABFA was formed in 2007 and is headquartered in Washington, DC.

-The mission is to advance the commercialization and distribution of advanced biofuels with significant GHG reductions.

-The membership currently produces over 4 billion gallons every calendar year of renewable fuels world wide.

-ABFA created a technical expert committee to allow sustainable aviation fuel (SAF) producers, including non-ABFA members, to participate in the ICAO Committee on Aviation Environmental Protection (CAEP).



Advanced Biofuels Association

AgriSoma
 AltAir Fuels
 AMERICAN PROCESS
 bioX CORPORATION Better Fuel For A Cleaner World
 bp
 Brazilian TRADE LTDA.
 BS BIOS ENERGIJA RENOVÁVEL
 BYOGY RENEWABLES
 Cargill
 CASTLETON COMMODITIES INTERNATIONAL
 ECOENGINEERS People Driven Solutions
 ENSYN
 Fulcrum BIOENERGY
 gevo
 Honeywell UOP
 iCOR A member of Musim Mas Group
 LanzaTech
 LDC. Louis Dreyfus Company
 Loves Travel Stops
 NESTE MY #RenewableDiesel
 oberon FUELS
 Pilot. FLYING J
 RED ROCK BIOFUELS
 REG Renewable Energy Group
 SCD
 SpecOil
 Sprague
 TARGRAY
 Trillium CNG A PINEAUL COMPANY
 VELOCYS
 VICTORY RENEWABLES
 VIESEL MADE IN THE USA
 VIRENT
 Vitol
 weaver
 wilmar



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ASTM

Global Aviation Turbine Fuel Standards





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ASTM International- is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

ASTM Committee on Petroleum Products and Lubricants (D02)

-Created in 1904

-2500 industry professionals and experts from around the globe.

-Jurisdiction over 814 global standards – including:

ASTM D1655 Standard Specification for Aviation Turbine Fuels

ASTM D7566 Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons



How is Sustainable Aviation Fuel Incorporated into ASTM Specifications?

Tier 1



Specification Properties

Tier 2



Fit-for-Purpose

Tier 3



Rig/APU

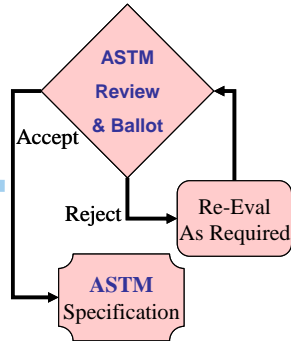
Tier 4



Engine/APU



ASTM Specification



Balloting Process



OEM Review & Approval



ASTM Research Report



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Global ASTM Conversion Processes for Sustainable Aviation Fuel

Five conversion processes for SAF production have been approved under the ASTM D7566 standard:

- Fischer-Tropsch Synthesized Paraffinic Kerosene (Abbreviation: FT-SPK)
- Hydroprocessed Esters and Fatty Acids (Abbreviation: HEFA-SPK)
- Synthesized Iso-Paraffins (Abbreviation: SIP-SPK)
- Fischer-Tropsch Synthesized Paraffinic Kerosene with Aromatics (Abbreviation: FT-SKA)
- Alcohol to Jet Synthesized Paraffinic Kerosene (Abbreviation: ATJ-SPK)

-Multiple feedstocks exist for each conversion process, and at different stages of commercialization.

-Additional conversion processes are working their way through the ASTM process.



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Global Certification Standards
Business as Usual





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The third party audit system envisioned in CORSIA is a well-known process in the industry.

Examples:

- Biofuel Producers today are required to demonstrate compliance with both European and German requirements for sustainable biomass.
- Certification provides proof of compliance with environmental, social and traceability criteria, and qualifies biomass or biofuel companies for legal recognition under the targets set by the European Renewable Energy Directive 2009/28/EC (EU RED).
- Biofuel producers in California are subject to third party audits to demonstrate compliance with GHG reductions.
- US EPA requires third party engineering reviews to register facilities for renewable credits (RINs)





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Sustainable Aviation Fuel Economics
Global View

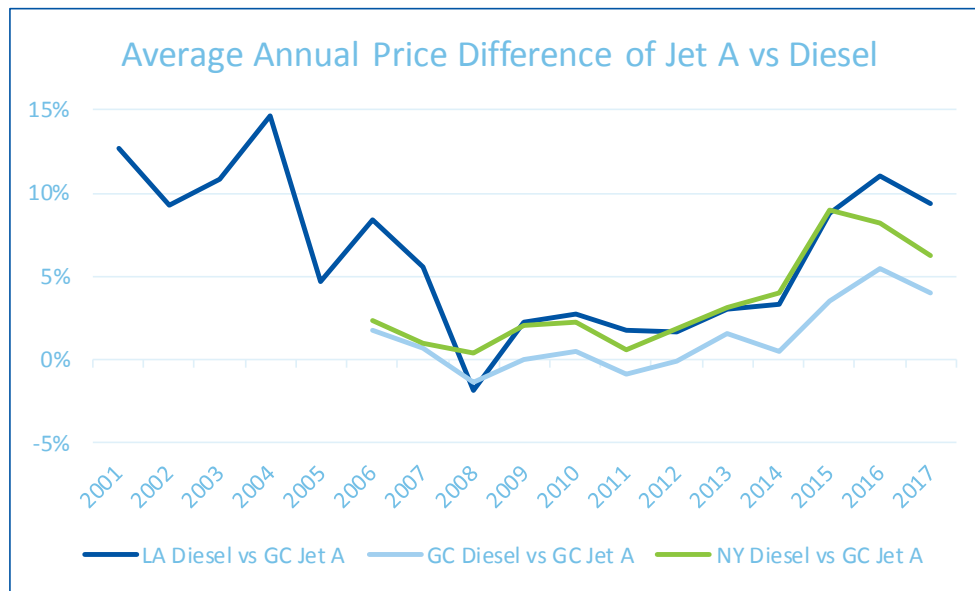




Comparative Economics of Sustainable Fuels

Given current market and policy structures, economics of sustainable fuels favor surface (road and marine) over aviation applications:

- Refinery profitability typically highest when configured around renewable diesel
- Selling price of diesel typically higher than jet fuel



Source: EIA, *Spot Prices for Crude Oil and Petroleum Products*, 2019.

Legend: GC - U.S. Gulf Coast, LA – Los Angeles, NY – New York



Comparative Economics of Sustainable Fuels

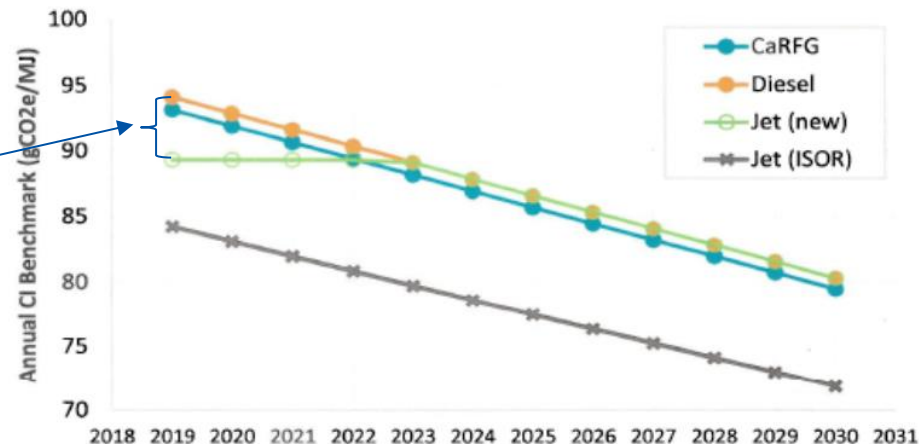
Most existing regulatory frameworks developed around sustainable fuels for use on surface applications

- Applicability to aviation fuels varies
- Even when included, aviation fuels may be disadvantaged

However,

- Examples exist of frameworks explicitly supporting sustainable aviation fuels (e.g., aviation multiplier in RED II)

Figure 1. Proposed Annual CI Benchmarks



Source: Graham Noyes. Proposed carbon intensity (CI) benchmarks for different fuels in the California Low Carbon Fuel Standard (LCFS)



Global SAF Policies

Canada

Clean Fuel Standard (in development)

SAF in pool of fuels with required carbon reductions
Multiplier over road transport being considered

Norway

0.5% SAF mandate in 2020

EU-28

Renewable Energy Directive II

SAF opt-in to meet renewable fuel targets
1.2X multiplier over road transport

United States

Renewable Fuel Standard

SAF eligible for tradeable renewable fuel credits

California

Low Carbon Fuel Standard

SAF opt-in to meet required carbon reduction targets in transportation fuel pool

Spain

(proposed)

2% SAF mandate in 2025





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Final Thoughts-

- Third party auditing and sustainability certification is business as usual and not challenging if harmonized with current industry practices.
- SAF production volumes are increasing and supporting policies could accelerate the growth of production capacity.
- ABFA stands ready to help industry and ICAO member states to move forward together on Sustainable Aviation Fuel.



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