Sustainable Alternative Jet Fuel Certification and Qualification

Washington, DC

October 25, 2016

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COMMERCIAL AVIATION ALTERNATIVE FUELS INITIATIVE

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Cert-Qual Sessions Overview

You Are Here

Plenary

SAJF Certification and Qualification

- Certification Overview
- SAJF Approval Status
- The Path Forward

Unconference 1

Enhancing Fuel Qualification Process

- OEM Review Process
- Stakeholder Engagement
- Approval Process Improvements

Unconference 2

Key Fuel Qualification Challenges

- Key Technical Issues
- SAJF Compositional Considerations

Cert-Qual Breakout

- Centralized Mgt of D4054 Test & Review Process
- Generic Spec

Building a Bridge Over Technology's Valley of Death

Ref: Presentation AFRL (W. Harrison), 8/15/06

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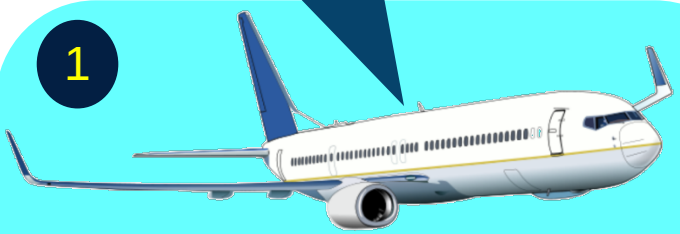
How do we Certify SAJF?

THEN:
New SAFJ Approved to Use on Virtually All Existing Aircraft

THEN:
Annex with New SAFJ Added to D7566 Drop-In Fuel Spec

IF:
New SAJF Determined to Be Equivalent to Conventional Jet Fuel Using D4054 Industry Process

1



Conventional Jet Fuel Specification

4

Drop-In SAJF Specification

Annex

Annex

Annex

3

SAJF Evaluation Process

Each New SAJF

GIVEN:
Aircraft are Certified to Operate on a Specified Fuel

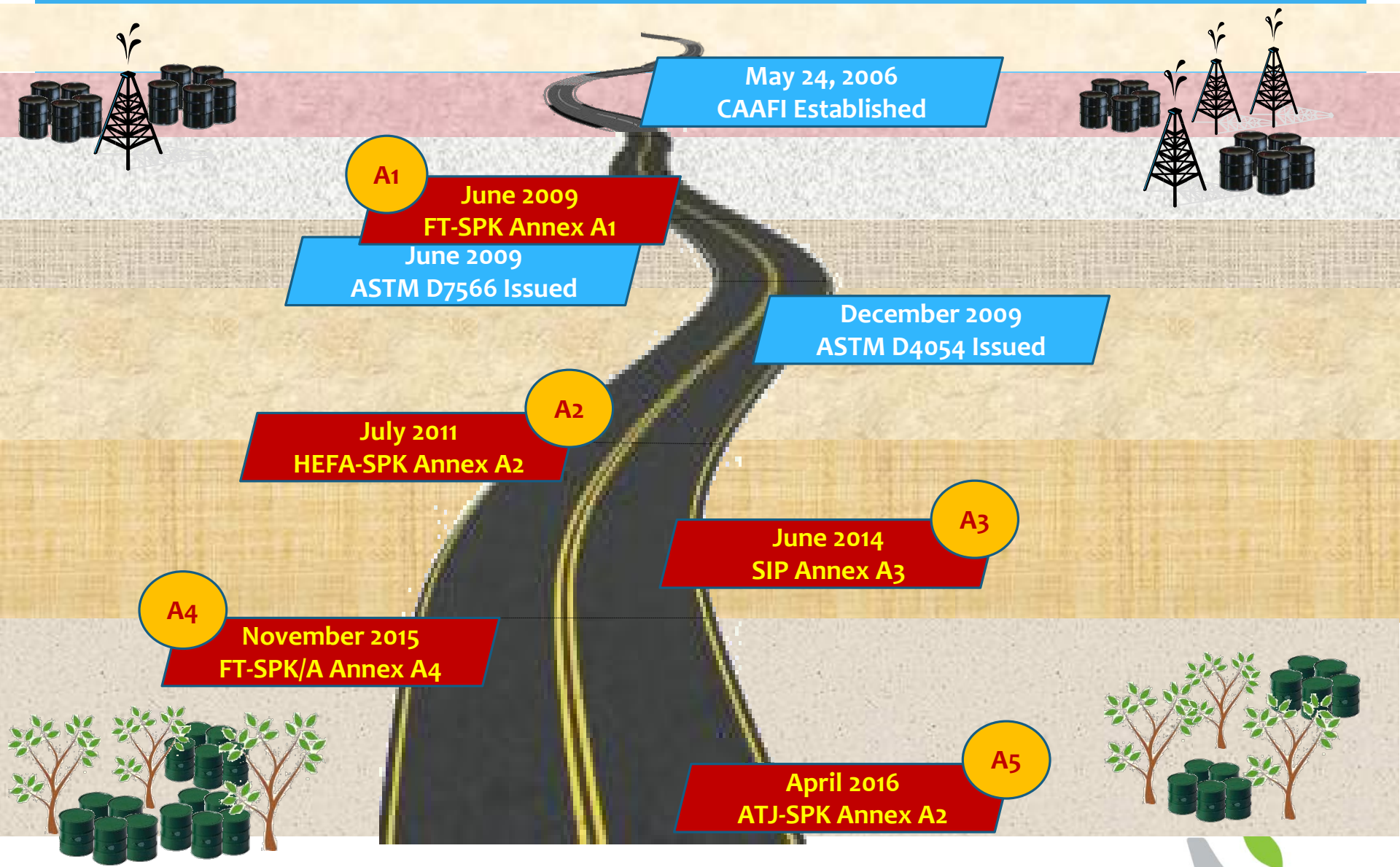
2

Conventional Jet Fuel Specification

Drop-In SAJF Specification

GIVEN:
D7566 Drop-In Fuels Also Meet Conventional Fuel Spec

A Decade of Alternative Jet Fuel



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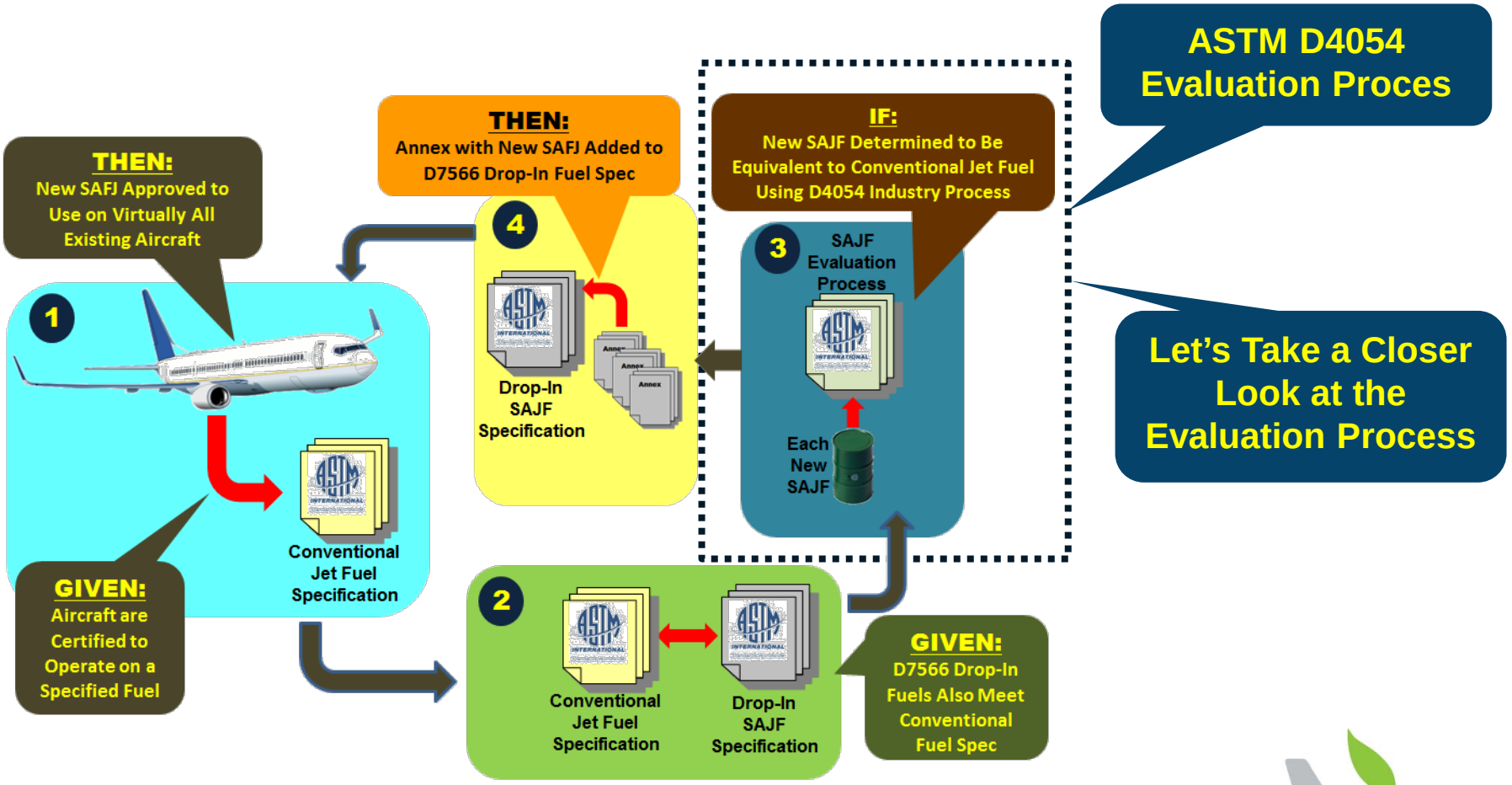
Current Challenge



D4054 Qualification Process

Tier 1

Specification Properties

Tier 2

Fit-For-Purpose Properties

Phase 1 ASTM Research Report

SAFRAN, BOEING, Honeywell, Rolls-Royce, AIRBUS

OEM Review & Tier 3 & 4 Requirements

Tier 3

Component/Rig Testing

Tier 4

Engine/APU Testing

Phase 2 ASTM Research Report

SAFRAN, BOEING, Honeywell, Rolls-Royce, AIRBUS

OEM Review & Approval

ASTM Balloting Process

ASTM Review & Ballot

Accept

Reject

Re-Eval As Required

ASTM Specification

ASTM Specification

ASTM INTERNATIONAL Standards Worldwide

FAA Review

FEDERAL AVIATION ADMINISTRATION

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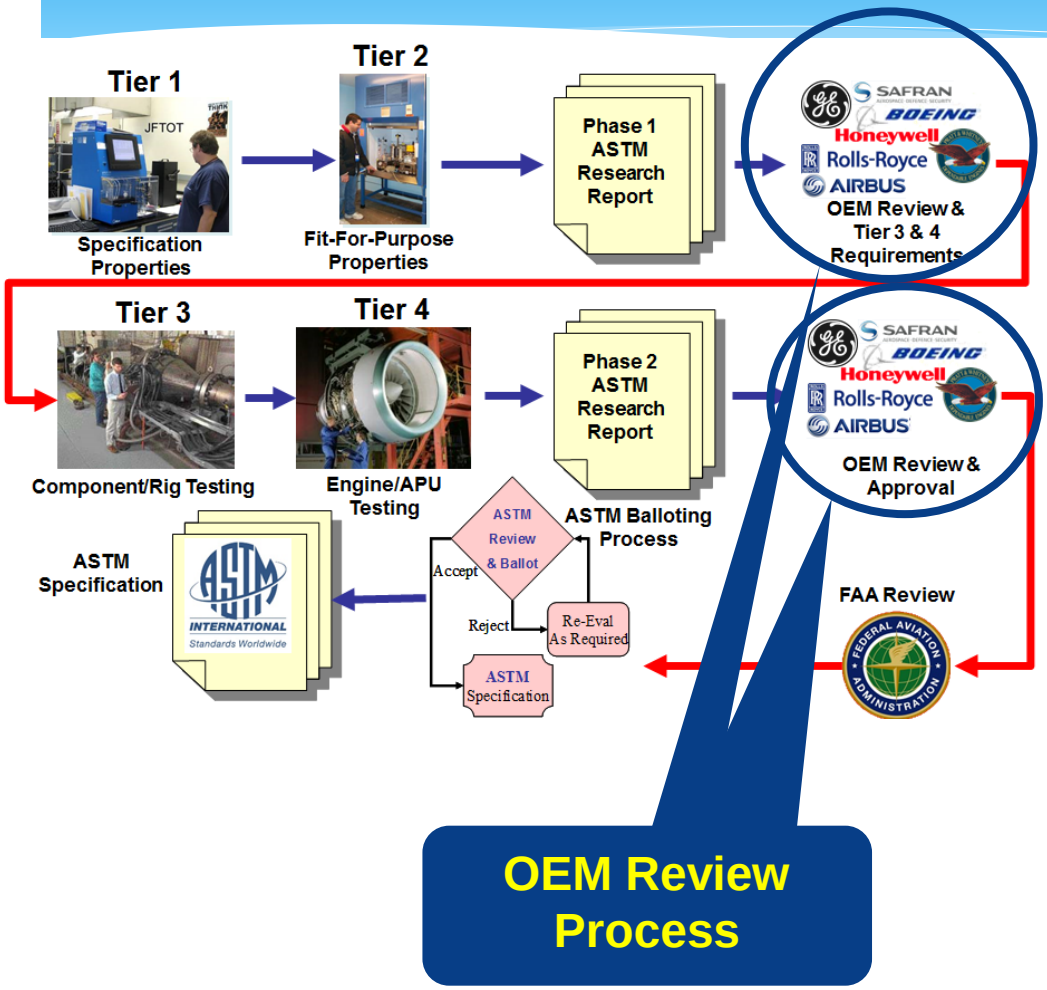
OEM Review Process



- Provides Feedback on Suitability of Product for Use on Aircraft/Engines/APUs
- Necessary for FAA to Make a Determination that D1655 will Continue to Provide Airworthy Fuel
  - Certification Basis is Maintained on All Aircraft/Engines
- Required for Proposed Alternative Fuel to Advance to ASTM Balloting

FAA Acceptance of D7566 SAJFs

FAA
Aviation Safety

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

SAIB: NE-11-56R2
Date: May 19, 2016

SUBJ: Engine Fuel and Control - Semi-Synthetic Jet Fuel

This is information only. Recommendations aren't mandatory.

Introduction

This Revised Special Airworthiness Information Bulletin (SAIB) advises aircraft operators, fixed base operators, certificated repair facilities, Flight Standard District Offices, Certificate Management Offices, and Foreign Civil Aviation Authorities that jet fuel made from the following synthetic blending components that meet the requirements of ASTM International Standard D7566 are acceptable for use on aircraft and engines certificated for operation with D1655 Jet A or Jet A-1 jet fuel if they are re-identified as D1655 fuel:

- Fischer Tropsch synthesized isoparaffinic kerosene (FT-SPK),
- hydroprocessed fatty acid esters and fatty acids (HEFA),
- synthesized isoparaffins (SIP),
- Fischer Tropsch synthesized kerosene with aromatics (FT-SKA), and
- alcohol to jet (ATJ).

When D7566 jet fuels are re-identified as D1655 fuel, they meet all the specification requirements of D1655 fuel and, therefore, meet the approved operating limitations for aircraft and engines certificated to operate with D1655 fuel, unless otherwise prohibited by the engine or aircraft type certificate (TC) holder. We are revising this SAIB to add FT-SKA and ATJ as synthetic blending components that conform to ASTM International Standard D7566.

SAJF Status

Global BioEnergies?

POET?

SBI BioEnergies?

Joule?

GSR/GTI?

Vertimas?

Collecting Tier 1 & 2 Data & Developing Reports

HDCJ (KiOR) (Inactive)

ATJ-SKA (Byogy, (Swedish Biofuels)

Green Diesel (HEFA Plus)

Currently In Review Process

Virent SAK

ATJ-SPK (Ethanol) (LanzaTech)

ARA CHJ

Collecting Tier 3 & 4 Data & Developing Reports

Virent SK

Tier 1

Specification Properties

Tier 2

Fit-For-Purpose Properties

Phase 1 ASTM Research Report

SAFRAN BOEING Honeywell Rolls-Royce AIRBUS

OEM Review & Tier 3 & 4 Requirements

Tier 3

Component/Rig Testing

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ASTM Specification

ASTM Specification

ASTM INTERNATIONAL Standards Worldwide

FAA Review

FEDERAL AVIATION ADMINISTRATION

Approved Fuels

Annex A5 ATJ SPK (Isobutanol)

Annex A4 FT-SKA

Annex A3 SIP

Annex A2 HEFA

Annex A1 FT-SPK

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October 25, 2016

The Path Forward

* Stakeholder Support/Engagement Necessary to Keep Certification Approval Process Moving
  * Fuel Producers:
    * Build Pilot/Demo Plants and Make Fuel
  * Airlines:
    * Establish SAJF as a Priority with Suppliers
  * Engine/Aircraft OEMs:
    * Allocate Resources to Support Testing of Fuels and Review of Data

Thank You

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