ICAO Colloquium on Aviation and Climate Change

ACT GLOBAL

ICAO: UNITING AVIATION ON CLIMATE CHANGE

Perspective on the Alternative Fuel Development

Guilherme Freire

ICCAIA

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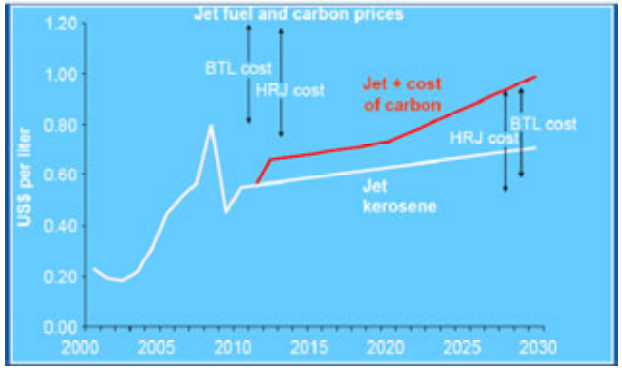
Alternative fuels are part of the solution

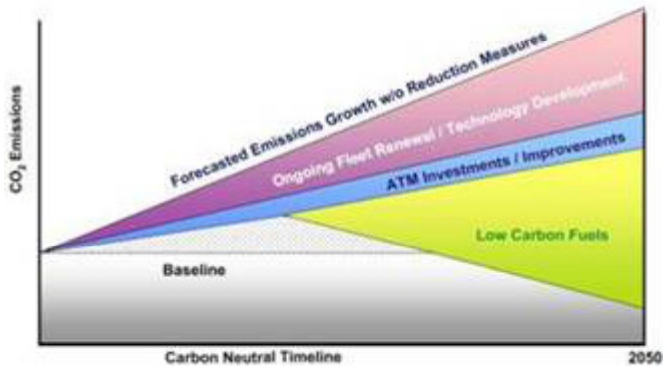
- Today, CO_2 emissions are proportional to fuel burn
- The ultimate goal is to reduce CO_2 emissions through
  - Continuous improvements in fuel burn reduction
    - Engine improvements (SFC, lower weight and drag…)
    - Aircraft weight reduction
    - Airplane aerodynamic improvements
    - Better integration and simulation techniques in design process
  - Reduce the amount of CO_2 per unit of fuel: the role of alternative fuels for aviation
  - Industry engaged to foster the commercialisation of biofuels for aviation
- Need support from government through public initiatives to foster R&D synergies, including incentives towards a scalable introduction of alternative fuels for aviation

Alternative fuels implementation - major challenges

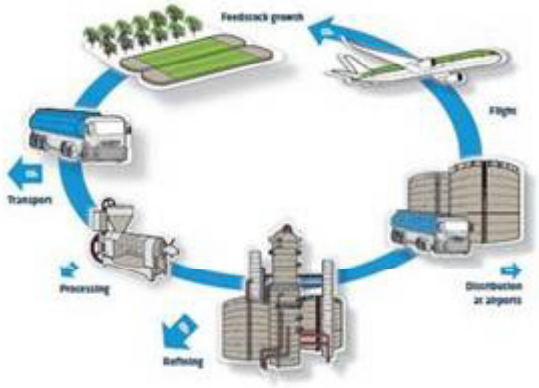
Oil and carbon price



Pressure for low carbon fuels



Positive CO2 life cycle



Biomass availability

Competition for alternative fuels

Biojet fuel

x Biodiesel

Scaling up production

Technology maturity needed

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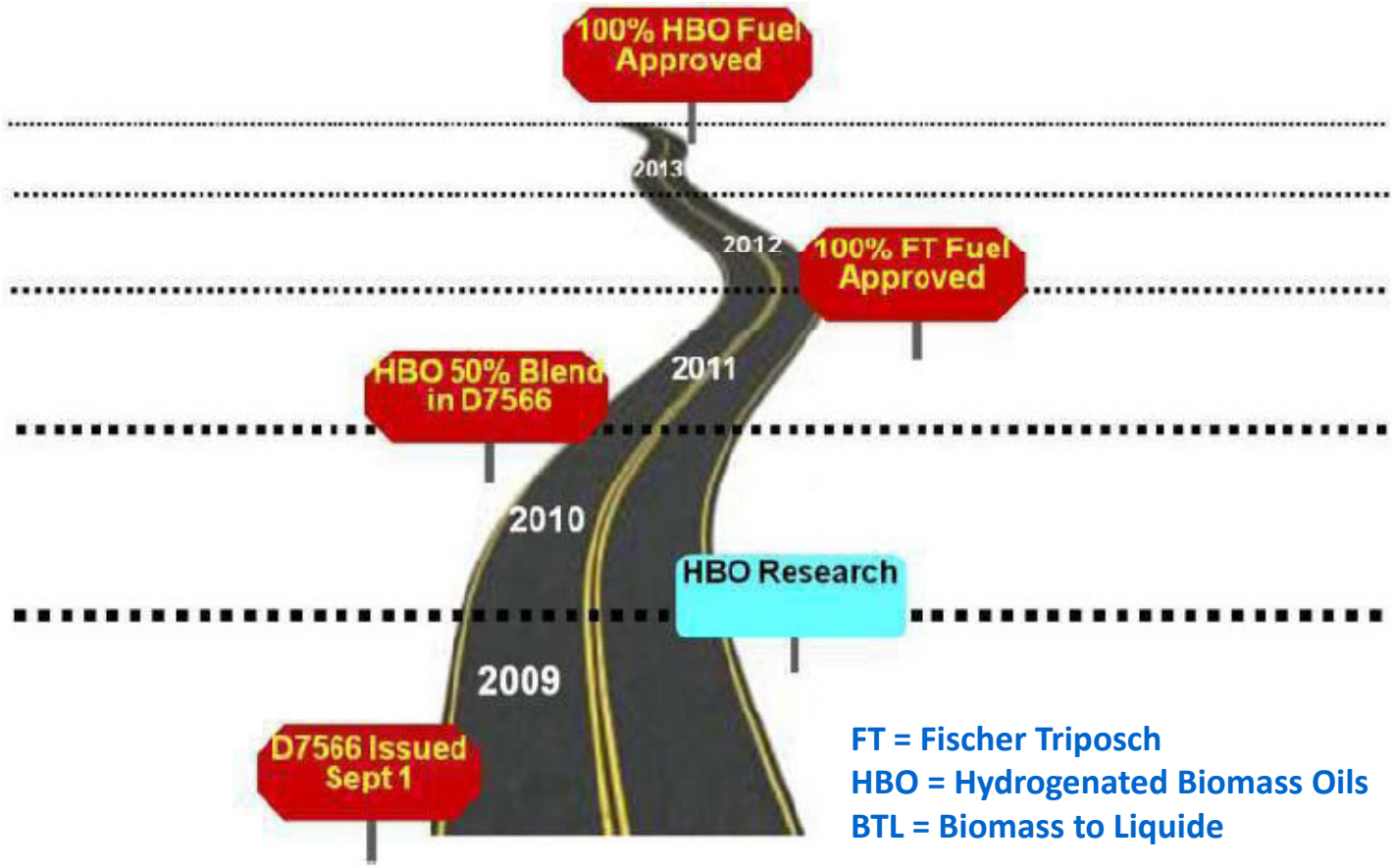
Where we are... Fuel approval targets (ICAO 2009)

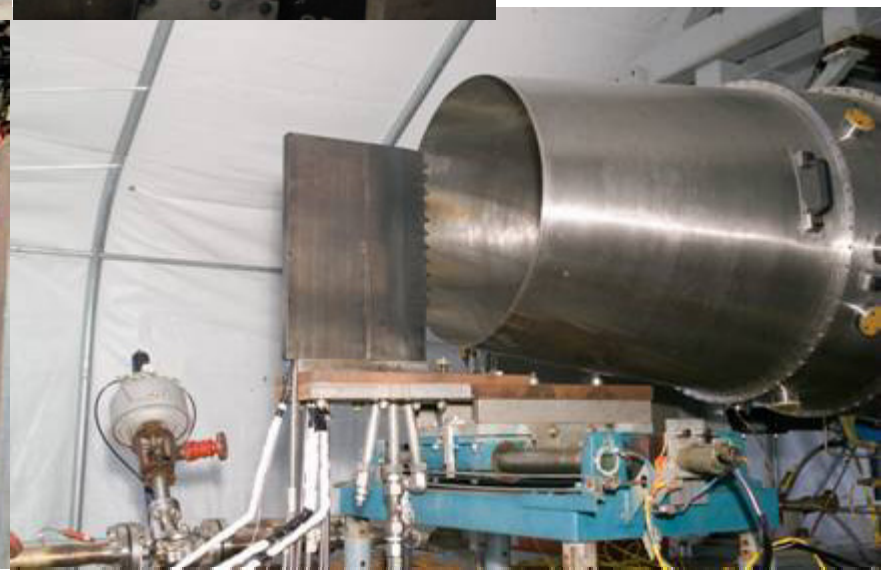


FT = Fischer Triposch
HBO = Hydrogenated Biomass Oils
BTL = Biomass to Liquide

ASTM BTL approval exists today and HBO fuels soon!

Engine tests conducted by the different OEMs



Demonstrate technical feasibility - 2008

- Feb 1st, 2008
  - Airbus A380 – Rolls-Royce Engines
  - Blend 40% GTL (Shell Technology Centre – UK)

- Feb 24th, 2008
  - Virgin Boeing 747-400 – GE Engines
  - Blend 20% - Gen-1 FAME, babassu nuts and coconuts

- Dec 30th, 2008
  - ANZ Boeing 747-400 – Rolls-Royce Engines
  - Blend 50% - HRJ from jatropha

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Demonstrate technical feasibility - 2009

- Jan 7th, 2009
  - Continental Boeing 737-800 – CFM Engines
  - Blend 50% - HRJ from algae / jatropha

- Jan 30th, 2009
  - JAL Boeing 747-300 – P&W Engines
  - Blend 50% - HRJ from camelina / jatropha / algae

- Nov 23rd, 2009
  - KLM Boeing 747 – GE Engines
  - Blend 50% - HRJ from Camelina

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Revenue flights – October, 2009

- October, 9th, 2009
  - Qatar Airbus A340-600
  - Engines: Rolls-Royce
  - Engines: Blend 50% - GTL (all four engines)

Demonstrate technical feasibility - 2010

- April 30th, 2010
  - United Airbus A319
  - Engines: IAE V2500
  - Blend 40% - GTL (one engine)

Flight test – Check objectives

Before the flight

- extensive pre-test analysis of the fuel
- demonstrate the viability of the fuel
- Material testing

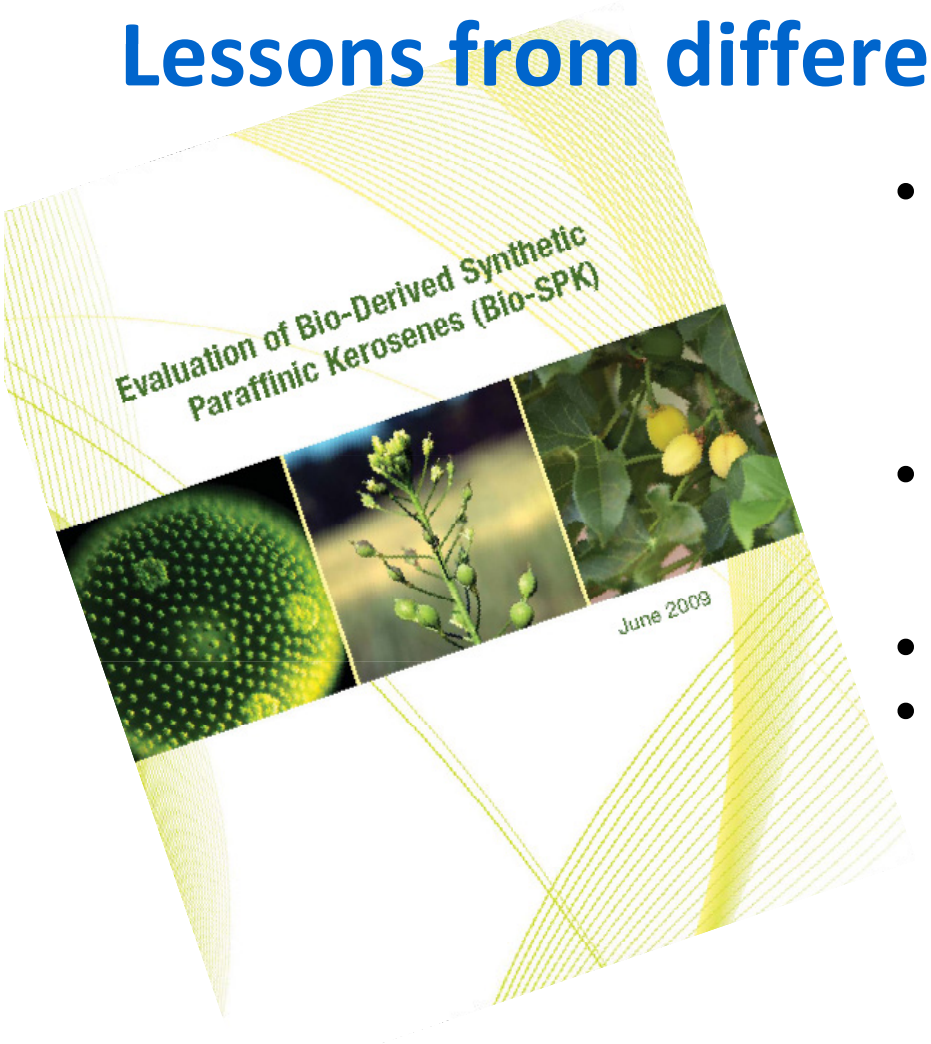
During the flight

- Engine running on alternative fuel was highly challenged (accelerate, decelerate, wind-mill restart…)
- A list of various parameters recorded

After the flight

- Report of engine performance and behaviour
- No major difference when compared to conventional fuel
- Analysis of the parameters

Lessons from different tests



- Technical Viability
  - Variety of potential feedstocks
  - Different production routes
  - Draw attention of suppliers for alternative fuels
- Important to address sustainability analysis
  - Pending standardization
- Local vs Global Solutions
- Substantive information for qualification and certification issues:
  - ASTM D7566 – "Specification for Aviation Turbine fuels containing Synthesised Hydrocarbons" – Sept09
  - HRJ (Bio-SPK) under review by ASTM - fuel spec for up to 50% blend expected to be approved by the end of 2010

Future flights

- 2nd Half, 2010
  - TAM Airbus A320 – CFM56-5B
  - Blend 50% - Jatropha
  - Set the value chain in Brazil
  - Sustainability analysis from RSB

- 1st Half, 2012
  - AZUL Airlines Embraer E-190 – GE CF34-10E
  - Blend 50% - Renewable Jetfuel from Sugar cane
  - First demo flight using a sustainable biojet fuel from fermentation process
  - Feedstock with large scale production

Next steps towards the alternative fuels developments

- Additional tests, using:
  - Other types of blends
  - Higher blend levels
  - Monitor the repetitive usage of alternative fuels (labs, rigs, engine tests…)
  - Other types of fuels / process (FRJ, BTL, ….)
- Participation on development / revision of alternative fuel certification standards (Global and regional level)
- Work towards the Roundtable Sustainable Biofuels to support tasks related to alternative fuels sustainability
- Availability, affordability and sustainability of sufficient quantities of feedstock are necessary → SAFUG and ABRABA

Conclusions (1/2)

a) Proven technical feasibility of using alternative drop-in fuels – It works!

b) Encourage certification of new drop-in fuels

c) Foster the utilization of different feedstock and production processes

d) Support ICAO recommendations at ICAAF

e) Support harmonization of alternative aviation fuel sustainability standards

Conclusions (2/2)

f) Encourage governments to establish public policies that:

- foster appropriate investments and incentives
- accelerate R&D and commercial scale production
- specifically target alternative drop-in fuel use for aviation
- stimulate aviation alternative fuels implementation in a successful case