SWAFEA
European Study for Alternative fuels in Aviation
Main outcomes

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ICAO
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Sustainable Way for Alternative Fuel and Energy in Aviation

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The SWAFEA stud

- **A study for the European Commission DG MOVE**
  - ⇨ February 2009 – April 2011
- **Purpose : "Feasibility Study and Impact Assessment on the Use of Alternative Fuels for Aviation"**
  - Comparative assessment of the possible options
  - Possible vision and roadmap for deployment

  ⇨ **Ultimate goal: information and decision elements for policy makers**
- **Multidisciplinary approach:** suitability, sustainability and economics
- **20 organisations involved**
  - ☞AIRBUS, AIFFRANCE, ALTRAN, BAUHAUS LUFTFAHRT, CERFACS, CONCAWE, DLR, EADS-IW, EMBRAER, ERDYN, IATA, INERIS, IFP, ONERA, PLANT RESEARCH INTERNATIONAL, ROLLS-ROYCE, SHELL, SNECMA, University of Sheffield

Main focus of the stud

- **Fuel suitability**
  - ☞ In 3 years, move from "technical feasibility" to "deployment issue"
  - ⇨ Investigation of solutions beyond FT-SPK and HEFA 50% blends
- **Sustainability**
  - –Life cycle GHG emissions (BTL & HEFA)
  - –Biomass availability
  - –Atmospheric impacts
- **Economics**
  - ⇨Business case (BTL & HEFA)
- **Deployment outlook**

Alternative fuels and climate chang

- **Significant GHG emissions reductions achievable with biofuels…**
  - Confirmation of BTL high potential of reduction (> 80%)
  - HEFA's LCA dependence on feedstock
    - ⇨ Major importance of cultivation practices
  - Paramount impact of Land Use change Emissions
    - ⇨Unsolved issue of Indirect Land Use Change

… and emissions reductions call for biofuels

- **Atmospheric impact**
  - ☞ Soot emissions reduction with decreased aromatics content
  - ⇨ Positive impact on contrails radiative impact of soot emissions reduction

Emissions reductions target and biomass availabilit

- **Halving emissions in 2050 calls for:**
  - New sources of biomass
  - More efficient process
- **Achieving biomass potential needs:**
  - Significant effort in agriculture development
  - Times

⇨ **Biomass production development likely to be a bottleneck**

⇨ **Need for research and innovation**

☞ **Strong expectations on algae, but still requiring research and confirmation**

The short term barrier of economic

- **Initial lack of competitiveness of BTL and HEFA ⇨ 1.5 to 2 x kerosene price**
- **Strong influence of feedstock price**
  - **HEFA:** Dominating impact of oil price ⇨ Secure "low cost" feedstock
  - **BTL:** Capital intensive ⇨ Cost decrease expected with development
    ⇨ Barrier for initial development
- **Need to develop efficient and economic processes**
  ⇨ Expectation from “fermentation” routes
- **Critical impact of biomass production**

The short term barrier of economic

- **No start-up of biofuel without incentive policy**
  - ⇨ Currently, ETS effect not seen as sufficient

- **Connexion with automotive fuel to be considered**
  - ☞ No process producing only aviation fuel
  - ⇨ Required and possible synergy
  - ⇨ Competition due to higher attractiveness of road transportation

Possible additional route

SWAFEA assessment : potentially "Drop-in" fuel

- **Economic interest of an initial low blending ratio strategy**

  Low ratio ⇨ Lower specification on the blendstock ⇨ Higher process efficiency

- **Upper blending limit of SPK**
  - Seals and density are the main issue
  - Current trend : synthetic aromatic
- **Interest of naphtheno-aromatics from liquefaction**
  - Viable option as a blendstock with HVO
  - Potential for aromatics substitution

  ⇨ Further works recommended
- **Limited potential of FAE inclusion**

☞ *"Fermentation routes" not tested but of real interest*

Conclusions

- An actual potential for GHG emissions reduction
- Mid/long term issue : availability and development of biomass production
- Short term issue: competitiveness of biofuels

⇨ A determined policy is required

- Define a sectoral goal for 2020
- Promote a number of "end to end" projects
- Combine incentive policies
- Use ETS revenue to fund the initial deployment plan
- Support research and innovation
- Harmonisation of sustainability rules at international level would help

⇨ **SWAFEA reports available at :**

www.swafea.eu

Credit IFPEN

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