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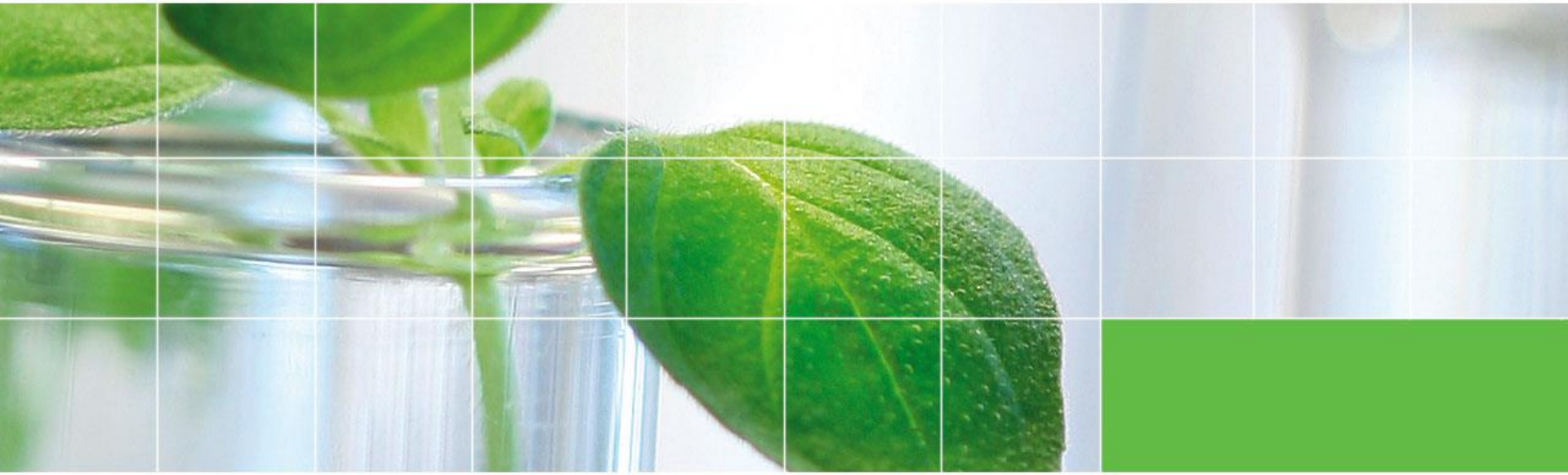
Discussion Panel I: Supply Chain Development and Deployment of Alternative Fuels



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1. Background

The 2020 European Energy strategy:

- ↓ GHG by 20%
- ↑ share of renewable energy 20%
- Energy savings of 20%

To achieve these objectives **EU Advanced Biofuels Flightpath** sets up the objective to achieve **2 million tons of sustainable biofuel per year in 2020**.

A key point is to promote and create an efficient **supply** chain, from **OFFER** - **biomass cultivation and conversion-** up to **DEMAND** (airlines and standards).

Several projects will work in this supply, one project, ITAKA, will link supply and demand by connecting the full value-chain: feedstock grower, biofuel producer, distributor and airlines.

1. Background

Core-JetFuel is a CSA aiming at:

- Acting as a contact point between all stakeholders to give recommendations to the Commission.

Its a collaborative project framed in the implementation of **GLOBAL**, **EU** and **NATIONAL** policies:

2009: 1st International Conference on Aviation Biofuels held by **ICAO**

2011: The **EC** presents the **EU Advanced Biofuels Flightpath**

2011: Solar-Jet Starts

2012: ITAKA starts

2013: Core-JetFuel and Forum-AE Start

2014: Biofefly Starts

2015: BSFJ (Swedish Biofuels)

2. Value Chain Development

- Flights:

- Lufthansa: 1189 flights Frankfurt-Hamburg – July-December 2011
- Air France: weekly flight from Toulouse to Paris-Orly with 10% farnesane during 1 year starting in 2014
- KLM: May 2014 Series of 20 flights
  March 2016 Series of 80 flights

- Production (EU)

- Neste: by batches
  - Frankfurt-Hamburg (6 months) 1189 flights Lufthansa 800 tons,
  - Itaka (2012-2016, ~ 1000 tons)

Projected:

- Biorefly (2000 tons/year, 2nd gen.) BioChemtex
- BSFJ (4000 tons/year , Swedish Biofuels)

2. Value Chain Development

- Projects at EU level for Development of the Supply Chain

Solar Jet
(2011-2015, biofuel forom a solar reactor)

ITAKA
(2012-2015, production + flight)

Biorefly
(2 000 t + flights)

- Coordination Efforts

Coordination and Support Actions

Synthesize demo flights

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- **OBJECTIVES**: Demonstrate the capability of the whole value chain.
- **Feedstock:** Focus on camelina plantations/UCO
- **Conversion technology**: Using an existing plant (Neste Oil's Porvoo Refinery)
- **Logistics and Large Scale Use**: addresses all downstream logistics (i.e. blending, transport, storage and airport supply operations) at large scale
- **Engine and fuel systems testing**: Flight-testing is being carried out and relevant datasets shall be collected for the final assessment
- **Sustainability Assessment:** ensure that at least 60% GHG savings are reached by means of a lifecycle assessment. The socio-economic effects of the biofuel production will be addressed.

Linked to national initiatives:

bioqueroseno.es
Iniciativa española para la producción y consumo de bioqueroseno para la aviación

Bioport Holland

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BIOREFLY

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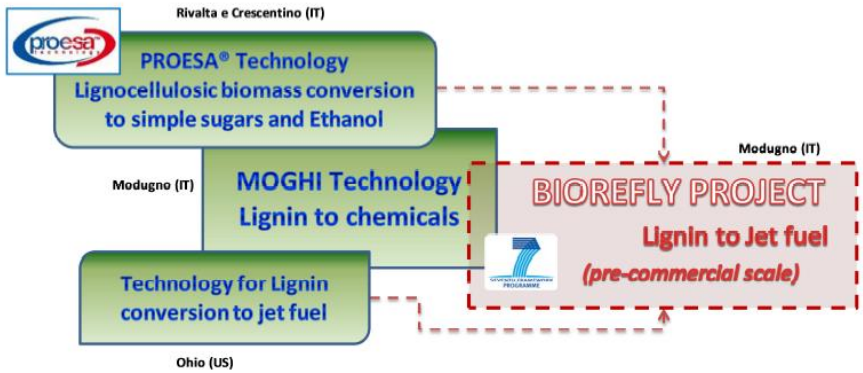
Demonstrating the thermo-chemical conversion of lignin to jet fuel in an integrated industrial demo scale plant. Objective: construction of a 2,000 ton/y bio jet fuel plant

- Validation at pre-commercial scale of novel technologies for lignocellulosic-based aviation fuel production.
- Design, construction and operation of a first in its kind paraffinic fuel industrial based on innovative second generation technologies
- Address the complete value chain, thus including the conversion of lignocellulosic energy crops and agro residues into biofuel
- Test of jet fuel use in turbines and engines including demonstration flights.



biochemtex

ETH zürich

KLM

RE-CORD

SkyNRG

WIP

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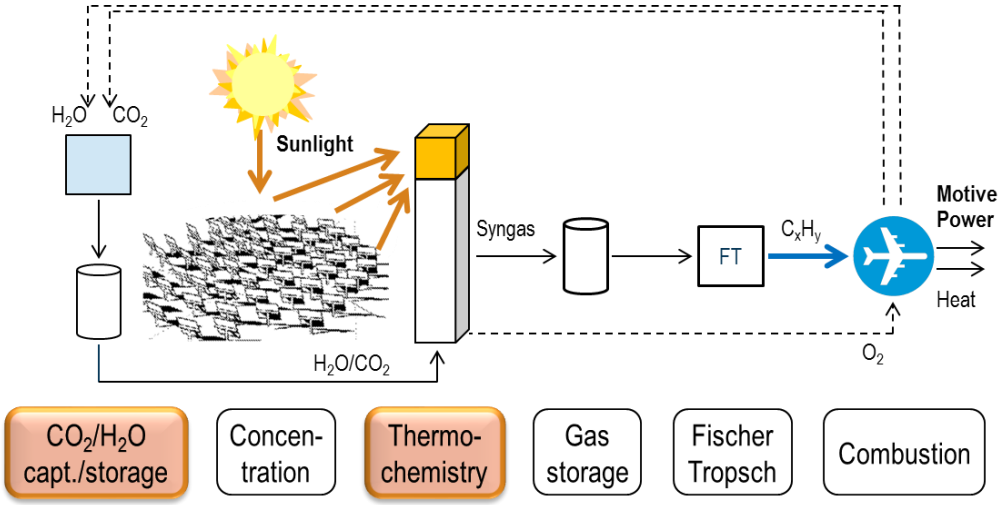
SOLAR-JET
Zero-carbon jet fuel from sunlight

- R&D project to demonstrate on a lab-scale a process that combines concentrated sunlight with CO_2 captured from air and H_2O to produce Kerosene

- Work being carried out:
  - Assessment of the technological potential of solar kerosene
  - Prototype Reactor and Experimental Demonstration
  - Optimized solar chemical reactor design for syngas production
  - Identification of further technology requirements and an initial assessment of the economic potential.



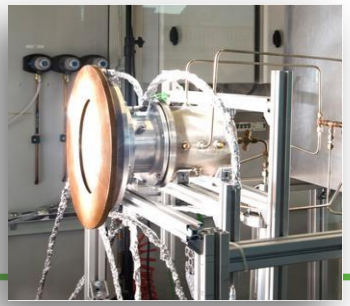
Develop solar-thermochemical conversion and CO2 capture

Bauhaus Luftfahrt
Neue Wege.

ETH zürich

DLR

ARTTIC
INTERNATIONAL MANAGEMENT SERVICES



Solar reactor of Prof. Steinfeld's group at ETH Zürich

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3. National initiatives

	Region	Stakeholder Action Group	Feasibility Study	Research and Development	Deployment
Aireg	Germany	✓		✓	
Nisa	Nordic Countries	✓	✓		
Bioport Holland	Netherlands	✓	✓		✓
Bioqueroseno	Spain	✓	✓		✓
Lab'Line for the Future	France				✓
ISAFF	Italy	✓			

- National initiatives usually count with a direct support from governmental institutions, public companies plus participation of industrial partners

3. National Initiatives: Bioport Holland

- Objective: Schipol airport working as a demand centre in the form of an airport and its airlines that is supplied by a dedicated regional supply chain
  - Schipol airport is intended to be logistically supported by the Port of Rotterdam, creating an integrated system
  - Work carried out to account biojet fuel under the RED specifications
  - Current work to set up a government/industry program of 80M Euro to help scaling up the Dutch bio jet industry

SkyNRG KLM NESTE Port of Rotterdam Schiphol Amsterdam Airport

3. National Initiatives: Lab'Line for the Future

- Lab'Line for the Future came up as a platform to present the good practices of Air France and its partners

- Carried out a societal study to measure the acceptance of the public

- Launch of a 1 year long program (48 flights) to use 10% farnesane blend on a specific route (Total-Amyris SIP)
  - Route: Toulouse to Paris-Orly
  - 1 flight/week
  - Starting on Sept 2014
  - Total is the partner that validates the supply chain and the logistics
    - Farnesane handling and analytics
    - Blending and analyses
    - Delivery of the blend at the airport
    - Delivey of the blend to the wing with a dedicated re-fueller

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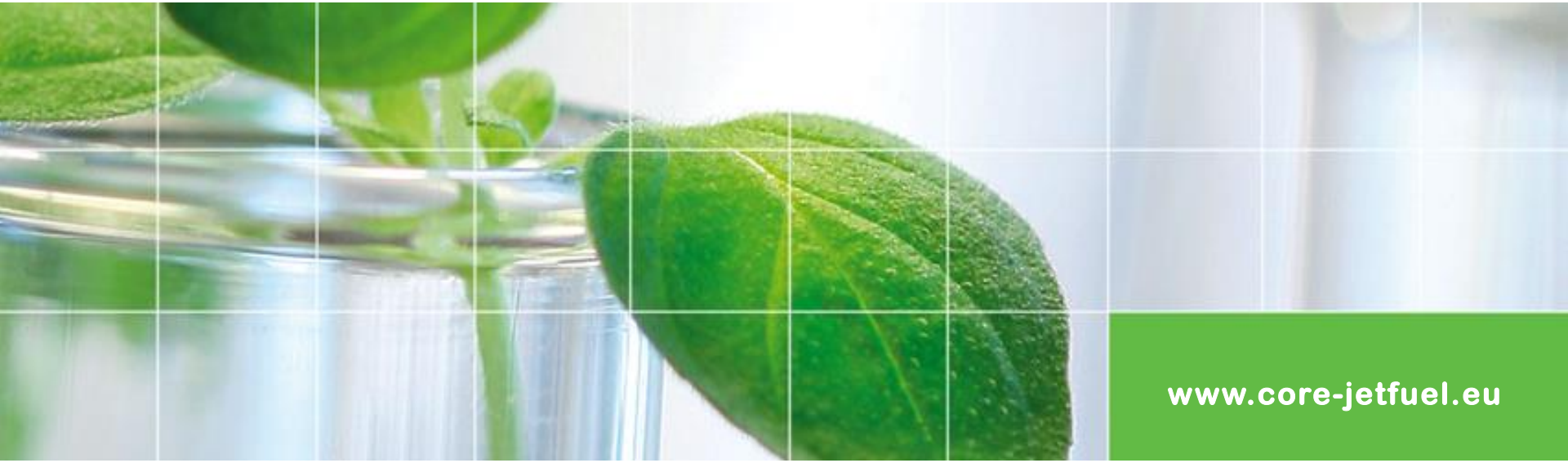
IFP Energies nouvelles SENASA

THANK YOU!



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