Advanced Sustainable Biofuels for Aviation: the Eu H2020 Bio4a Project

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RE·CORD

European Biomass Conference and Exhibition

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 789562.

The BIO4A project

RE·CORD TOTAL SkyNRG CENER etaflorence renewableenergies Camelina Company | España European Commission

Project Acronym: **BIO4A** Project Number: **789562** Call: LCE-20-2016-2017 Topic: Aviation Biofuels
Project title: **Advanced sustainable BIOfuels for Aviation**

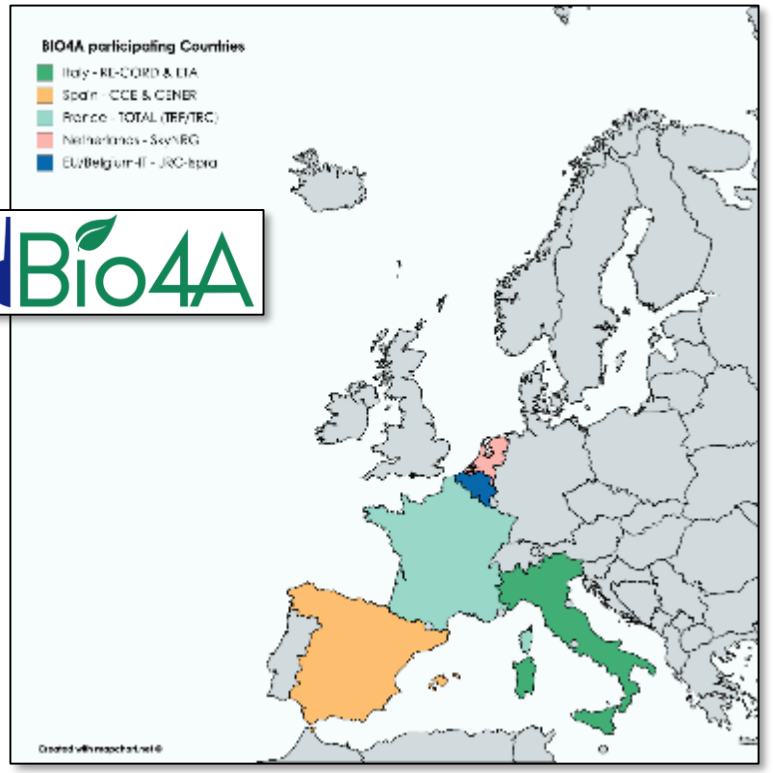
Specific Challenge

Accelerate the deployment of Aviation Biofuels, enabling **commercial production**. Supporting the accomplishment of **pre-commercial plant(s)** for advanced biofuels for aviation based on **sustainable biomass feedstock**.

Technological approach of the Project

Main goals:

1) To bring **HEFA-based SAF to full commercial scale in new plant using sustainable lipids, e.g. UCO (new additional capacity);**
2) To investigate alternative supply of **sustainable feedstocks recovering EU MED marginal land in combination with drought resistant crop production**;
3) To **test the entire chain and logistic at industrial scale**, and **assess environmental performances**.



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Ground-breaking nature of BIO4A

WP1 – Feedstock supply and large-scale industrial production of SAF-biojet [TOTAL]
WP2 – R&D Long-Term Strategy for SAF production [RE-CORD]
WP3 – Downstream logistics & Use [SkyNRG]
WP4 – Evaluation [CENER]
WP5 – Market scaling strategy [SkyNRG]
WP6 – Management, dissemination and exploitation [RE-CORD]

INDUSTRIAL R&D

- Increase EU bio-based fuel production capacity by ~500 kt/y of diesel or 300-350 kt/y of SAF-biojet, depending on policy framework in places and markets conditions (WP1)
- First-ever test of Axens' Vegan™ HEFA-technology at full industrial scale
- SAF storage and despatch facilities to be in placed in La Mède before the industrial production milestone.

SUSTAINABLE LIPID SUPPLY R&D

- Recovery of EU MED marginal land with Biochar and COMBI & Selection of Camelina varieties
- Experimental tests of Camelina cultivation on recovered soil in 2 sites in Spain and lysimeters

ASSESSMENTS

- Assessment of potential of recovered marginal areas in EU for lipid production
- Assessment of SAF at full industrial chain
- Policy interaction part of the R&D work during WP3 and WP5

REDII policy framework

REDII main elements and key provisions driving biofuel market development.

REDII main biofuels' related elements	Key provisions
Min share of Renewable Transport Fuels at 2030	*14% (3.5% of which Advanced Biofuels, Annex IX-A)*
Minimum GHG savings	*Advanced Biofuels: 65% from 1.1.2021. RFNBO: 70%. RCC: to be defined in Delegated Act (with Methodology)*
Biofuels that may Double Counted by MS	*Annex IX-A and B, with B capped at 1.7%*
Multipliers in specific end-use sectors	*Biofuels in Aviation and Maritime: 1.2* *Electricity in road: 4* *Electricity in rail: 1.5*
Advanced Biofuel growth pathway	*0.2% at 2022, 1% at 2025, 3.5% by 2030*
Food-feed crop-based biofuels	*7%* max
Food-feed crops for biofuel production	*Cap at 7%*
High-ILUC risk biofuels	*<2019 consumption at REDII entry into force. From 31.12.2023 gradually phased out to 0% at 2030*
Low-ILUC risk biofuels	*Exempted from phasing out*
Additional elements in Annex IX-A	*Cover/ley cropping*

- **The key issue for HEFA today is sourcing Sustainable Lipids to feed large scale industrial plants**
- **REDII will phase out high ILUC risk feedstock**
- **There is a strong need to set up new sustainable supply chains**
- **Potential exist**

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Sustainable Lipids for Industrial Production - UCO

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- Jet fuel: HCs composition

Ideal Carbon Length C8-C16

Paraffins 70 - 85%
Normal Paraffins · Iso-paraffins · Cyclic Paraffins

Aromatic < 25%

Olefins < 5%

S, N, O containing Compounds < 5%

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Recovery of EU MED Marginal land and Camelina for Sustainable Lipids

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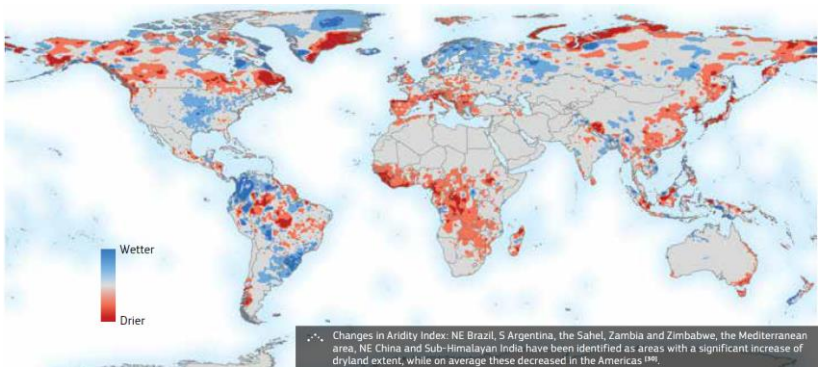
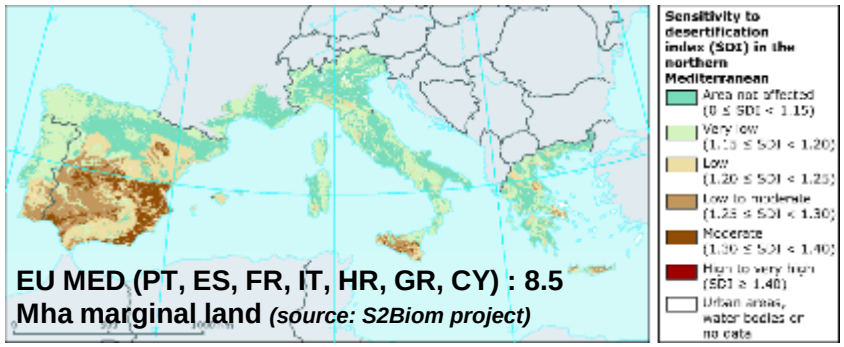


Source: EC-JRC. World Atlas of Desertification, 3rd Edition. Mapping Land Degradation and Sustainable Land Management Opportunities. 2015. http://wad.jrc.ec.europa.eu

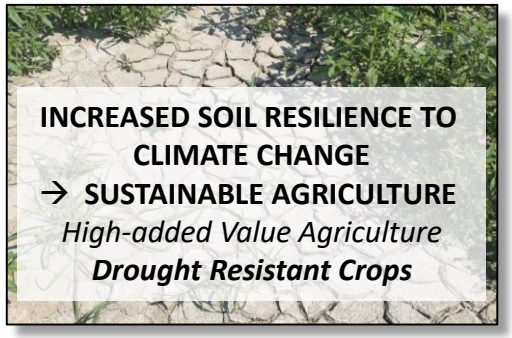


EU MED (PT, ES, FR, IT, HR, GR, CY) : 8.5 Mha marginal land ***(source: S2Biom project)***

Residual biomass (agri-woody)

CARBONIZATION (Innovative Oxidative Slow Pyrolysis System)

Biochar & Digestate co-composting (**COMBI**)



CAMELINA oil

SAF biojet

ENERGY

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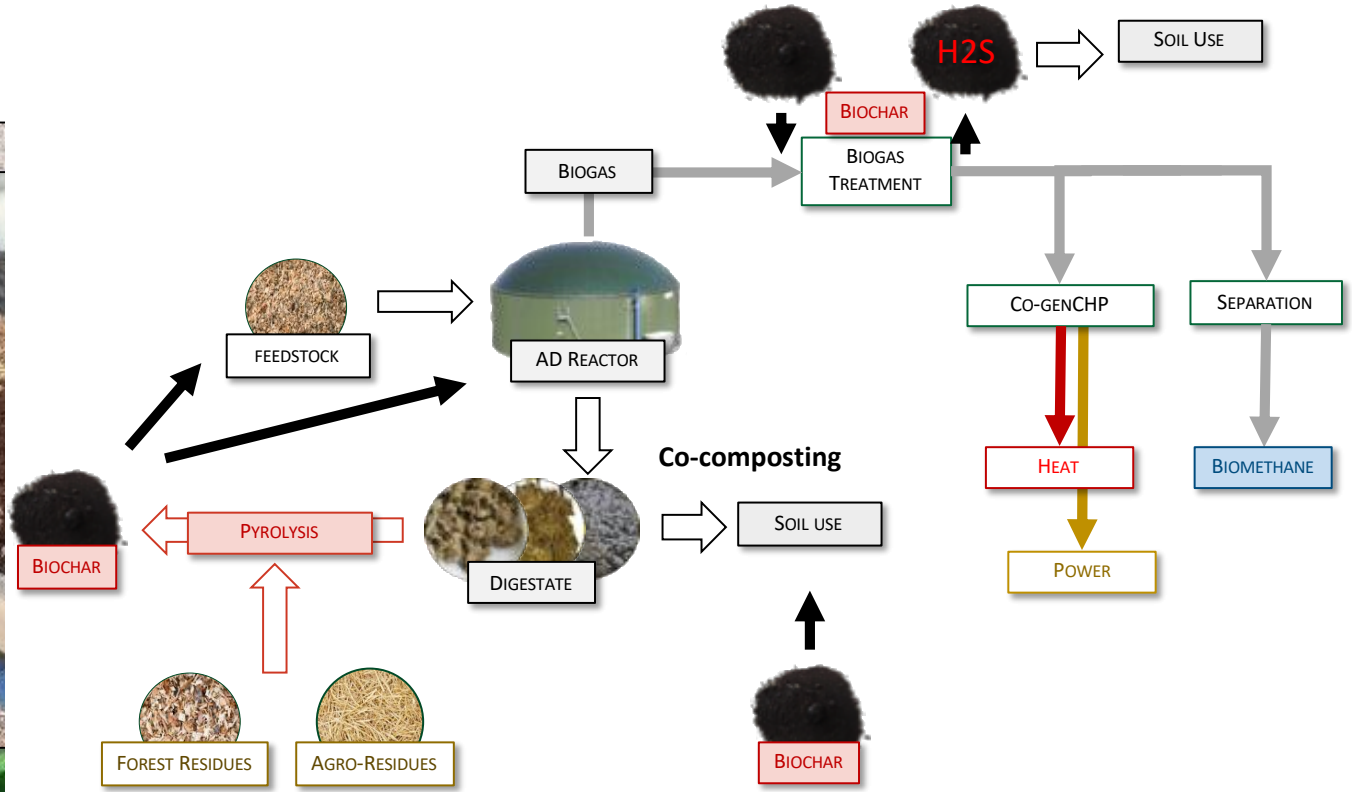
BIOCHAR and co-composting



If successfull, next step (future project) is to scale-up the process to full agricultural scale (i.e. ha-scale) and carry out detailed cost assessment according to REDII and new PAC

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Agronomic Experimental Protocol

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	Rep 1	Rep 2	Rep 3	Rep 4
No fertilization	1	2	3	4
NPK	5	6	7	8
10% Biochar + Compost	9	10	11	12
15% Biochar + Compost	13	14	15	16
20% Biochar + Compost	17	18	19	20
100% Biochar + NPK	21	22	23	24
100% Compost	25	26	27	28

A B C D

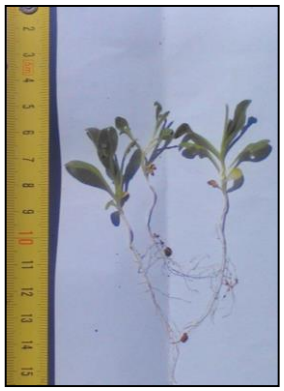
Field trials: Ciudad Real (ES)

Background fertilization: 11/01/19

Seeding date: 14/01/19 Camelina Company | España

Tests in Lysimeters and controlled chambers to be developed in next years, together with Camelina variety selection

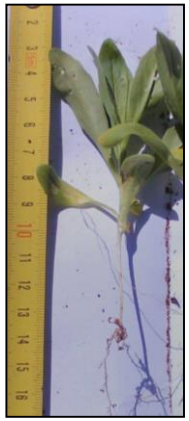
No fertilization



Mineral fertilization

100% Compost

100% Biochar



Biochar+ Compost 10%

Assessments

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✓ Entire value chain evaluated →

KPIs
Key Performance Indicators

TL
RE-CORD CENER
TOTAL

a set of measurable values to demonstrate the achievements of the bio kerosene production

TECHNOLOGICAL	SOCIO ECONOMIC	ENVIRONMENTAL
• T1: new installed annual production capacity • T2: ASTM compliance • T3: GIS mapping production marginal lands	• SE1: Improvement of the economic viability • SE2: sustainability standards • SE3: set of sustainability indicators marginal lands	• E1: GHG emissions saving • E2: set of sustainability indicators marginal lands

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Conclusions

- **BIO4A just completed its first project year**
- **La Mède refinery expected to start soon production of renewable diesel**
- **Supply of UCO planned in sufficient amounts**
- **Contractual matters and logistical aspects under study, but dependent on the shift from RED to REDII, and MS incorporation**
- **Biochar and COMBI have been produced and Camelina planted in two test sites in Spain**
- **First assessments of sustainable lipid production starting this summer for the first planted sites**
- **Rotation with Barley will follow**

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Project Partners

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