



ORGANIKO - Revamping organic farming and its products in the context of climate change mitigation strategies - LIFE14 CCM/CY/000990

<http://organikolife.com/en/>

4rd Legislative and technological Workshop: Buildings, Renewables and Energy Efficiency for the Organic Farming

FORUM QUALENERGIA

Rome, Wednesday 29 of November 2017

9:30 – 12:00

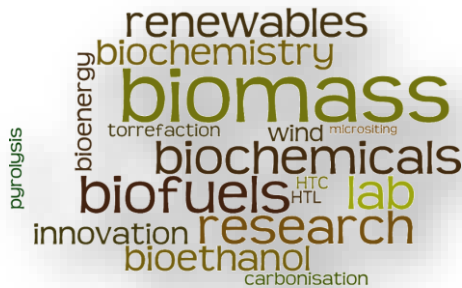
Prof. David Chiaramonti – Coordinamento FREE



In collaboration with



Perspectives of the national Coordination FREE



David Chiaramonti

RE-CORD

Renewable Energy Consortium for
Research and Development
c/o Dept. of Industrial Engineering
Florence, Italy

FREE Coordination Coordination for Renewables Sources and Energy Efficiency

Currently, it includes as members **24 Associations** totally or partially active in these sectors, and a wide range of **Bodies** and Associations that asked to join as Participants (without any decision-making function) and it is **the biggest sector's Association in Italy.**

SOCI

- ADICONSUM
- AGROENERGIA
- AICARR
- AIEL ASSOCIAZIONE ITALIANA ENERGIE AGROFORESTALI
- ANEST
- Anev
- ASSIEME
- ASSISTAL
- ASSOEBIOS
- ASSOCIROELETRICA
- ASSOCIAZIONE TECNICI
- Commissione Italiana Voci: Elettrici Stradali e Batterie, Bifidi e a Cella a combustibile
- CIB
- ELETRICITÀ FUTURA
- FederIdroelettrica
- GIGA
- ITABIA
- ITALIA solare
- Kyoto Club
- LEGAMBIENTE
- MOVIMENTO DIFESA del Cittadino
- ISES ITALIA

ADERENTI

- SI ALLE ENERGIE RINNOVABILI
- CHIMICA VERDE
- SAPIENZA
- CSI
- UNIVERSITÀ DEGLI STUDI DI PALERMO
- FEDERAZIONE ITALIANA PER L'UO RAZIONALE DELL'ENERGIA
- GREENPEACE
- ie
- Politecnico di Milano
- RE-CORD
- Sotto il Rapace
- WWF
- LIFE

FREE represents actually the **92%** of active bodies in the area and, through its members, around **4.000 companies** employing **150.000 people.**

- ✓ **Public-private no-profit research Institution**
- ✓ **Members:** Univ.of Florence (CREAR, Az.Agr.Montepaldi) Spike, Eta-Florence, Bioentech

- **R&D on Biomass, Bioenergy, Biofuels & Bioproducts**
- **Valorization of EU-IT know-how and young trained scientists**
- **Transfer of know-how and Innovation to Stakeholders**
- **Policy Development:** support to EU and National Institutions, Industry & Stakeholders
- **Dissemination and Communication**
- **Training & Education**



- **Milling & Briquetting unit** (100 kg/h)
- **Torrefaction/Carbonisation unit** (50 kg/h)
- **Methanation reactor**
- **Hydrothermal Liquefaction HTL** (12-15 l/h) **reactor** (with Spike)
- **Microreactor system** for hydrothermal carbonization & liquefaction
- **1.5 kg/h Intermediate Catalytic Pyrolysis**
- **Open-top twin-fire gasifier** (100 kg/h, 70-100 kW_e)
- **Downdraft Imbert-type gasifier** (10 kW_e)
- **Capstone Microturbine** converted to biofuels (30 kW_e)
- **Garret Microturbine** converted to biofuels (40 HP, 20 kW_e)
- **External Combustion Microgasturbine** (50-100 kW_e)
- **Pure Veg.Oil MicroCHP** (5 kW_e/10 kW_{th})
- **Pure Veg.Oil generators** (7 e 50 kW_e)
- **Anaerobic digestors** (2l-dynamic, BMP-static)
- **Algae pilot plants** (with DISPAA/F&M)
- **Solar simulator for algae** (SOSIA)





INSTRUMENTS AND ANALYTICAL LABORATORY RE-CORD

RE-CORD system provides the skills and resources (laboratories and equipments) of its members, creating a critical mass capable to develop research and activities of primary-level science and technology.

Main analytical chemistry laboratory equipment

Strumentazione

- Atomic Absorption
- HPLC and GC-MS
- Ion chromatography
- Portable Micro GC
- CHNS
- TGA
- Viscometer
- Hydrometer
- Karl Fischer and Electrochemical analysis Instrumentation
- Chemical fume hood
- Biohazard Hood
- Calorimeter
- Ash melting furnace
- Ultrapure Water System
- Vacuum Filtration System
- Hydrogen Generator
- Centrifuge
- Muffle furnace
- Moisture Analyzer

Possible applications

- Determination of metals contamination on food, beverages, land. Quality control of industrial products, paints, ceramics, glass. Environmental Analysis (Particulate matter, sewage sludge), clinic analysis...
- Analysis of liquid fuels, biological molecules, quality control on chemical products and pharmaceutical organic pollution analysis
- Analysis of water, separation of amino acid mixtures
- Analysis of soils, solid chemical or biological materials
- Recognition of substances, thermal decomposition of organic molecules, polymers and inorganic species study

Main instruments solar and wind laboratory

- Pyrheliometer for direct solar radiation
- Verification and testing photovoltaic systems and three-phase multipurpose tool
- Anemometry tower (30 m)

Other instruments

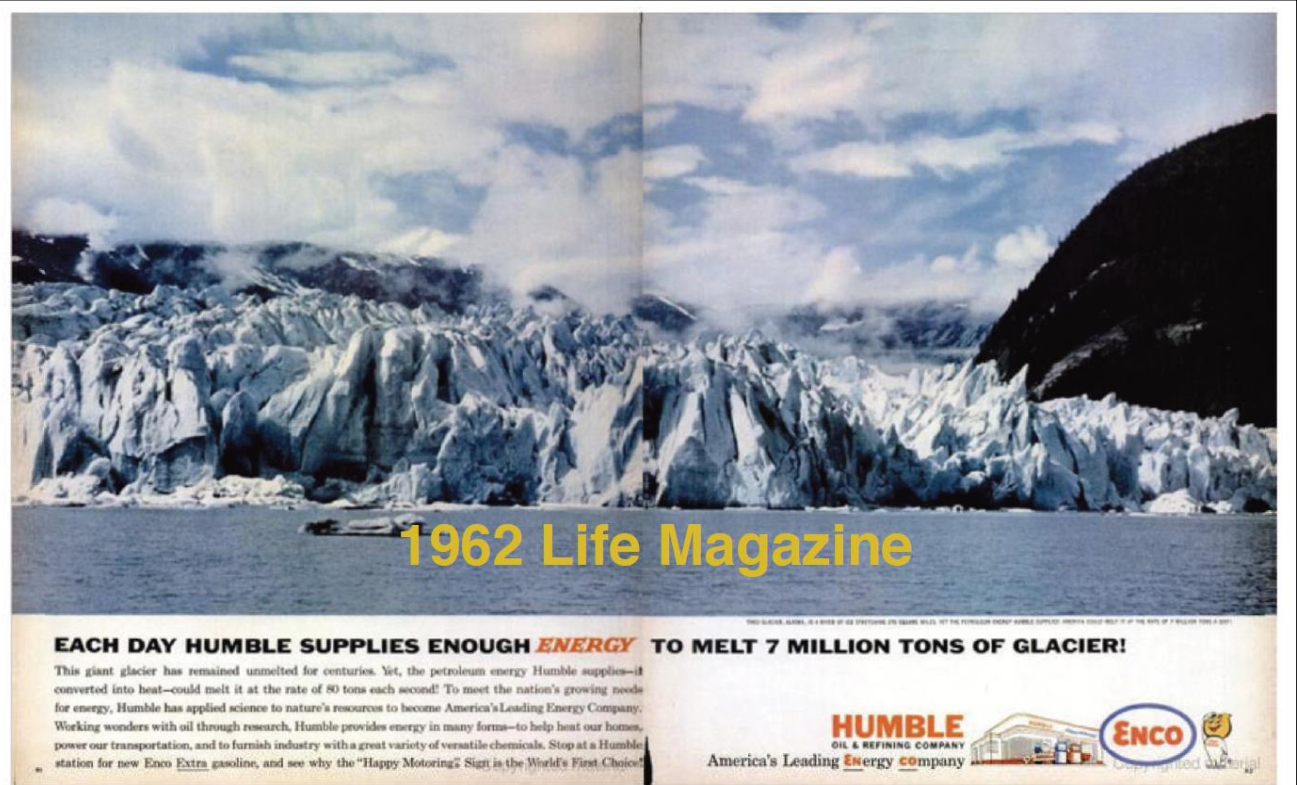
- Gaseous emissions analysis tool
- Analysis of flows in pipes
- Doppler effect 2D-3D speed measuring tool

Pilot and demo plants

- Several bio-fueled microturbines
- Cogeneration / liquid fuel engines
- Gasifier
- Pyrolyzer / torrefaction roaster

BET Analyzer, NDIR/Electrochem Producer Gas Analyzer, Portable MicroGC Gas Analyzer, Portable Tar sampling collection system

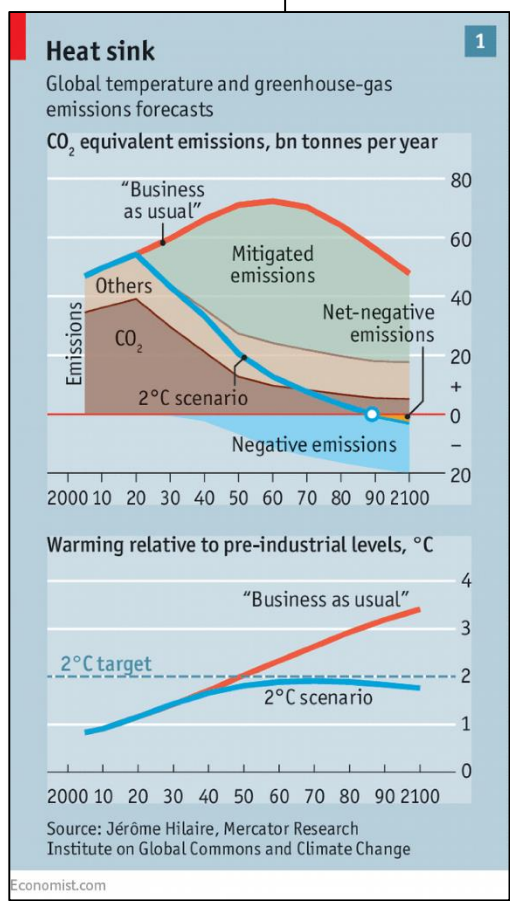
1962-2017..
So much has
changed
since then...



WEO-2015 550 G\$ annual fossil subsidy
is 4 x the support of renewables

Carbon NEGATIVE The Challenge

Since Paris-COP21 the science's world asked for developing **C-negative** actions. As of today, the **C-neutral** paths has been the preferred practices, being less expensive... **but it is no longer enough!**



Sucking up carbon Greenhouse gases must be scrubbed from the air

Cutting emissions will not be enough to keep global warming in check



Print edition | Briefing > Nov 16th 2017 | BONN

[...] No scenarios are at all likely to keep warming under 1.5°C without greenhouse-gas removal. "It is built into the assumptions of the Paris agreement," says Gideon Henderson of Oxford University. [...]

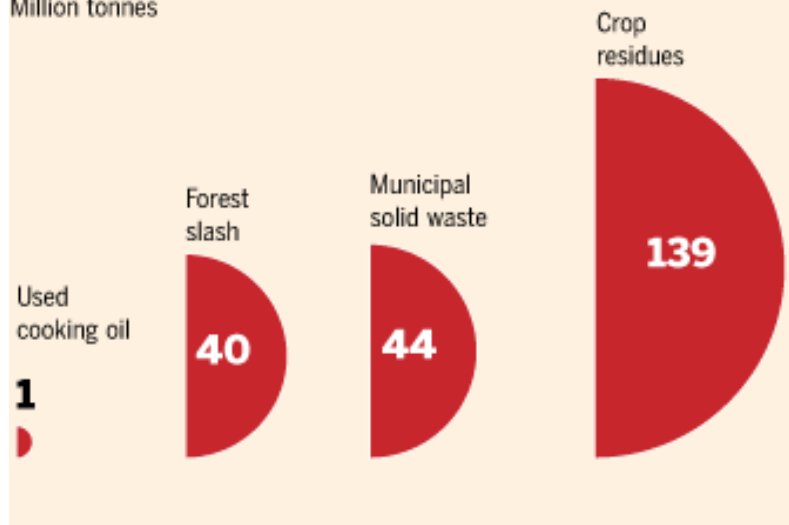
Residual Raw materials for energy and bio-based products, including agriculture

- A large amount of organic waste is available in EU
- There is a constantly increasing attention on these raw materials
- Cascade approach: an opportunity, but also a challenge
- Competition among raw materials and complementarity between bioenergy and bio-based products (mutual benefits to be identified)
- Developing integrated policies is necessary, along with the prioritisation of the BP choices... Green Economy/Bio-based products? Bio-based electricity? Transport decarbonization? Heat/CHP?
- The systems set themselves up differently according to the main markets
- Actors and stakeholders must be proportionated to the market
- Important: Bring value to the primary sector!

Remains fully availables in the EU

Estimates of wastes and residues in the EU in 2030

Million tonnes



Other sources (2015) estimate **105 Mt/y** of bio-waste produced every year in the EU, 1/3 of them enhanced in AD (**35 Mt/y**), 2/3 of them not used yet (**70 Mt/y**)

Meyer-Kohlstock D, Schmitz T, Kraft E. Organic Waste for Compost and Biochar in the EU: Mobilizing the Potential. Resources 2015, 4, 457-475; doi:10.3390/resources4030457

... However, there are residues and specific classes of waste availables for hundreds of thousands t/y in the EU...

- Totally, it has been estimated **900 Mt/y** of waste&residues in the EU, a quarter of them available for energy, e.g. about **220 Mt/y**.
- The technical potential if converted in biofuels for transportation: **16% of the total of the fuels estimated at 2030**

OFMSW & Compost

The Italian situation *(source: Consorzio Italiano Compostatori, www.compost.it)*

- ✓ **6.71 Mt/y of organic wastes recovered** (2015) of around **9 Mt/y** (of 14 Mt/y RD)
 - **4 Mt/y OFMSW** + **2.71 Mt/y green wastes** ($66+34=100$ kg/pers/y)
- ✓ **1.761.000 t/y of produced and immediately used compost** in agriculture.
 - **71%** from OFMSW composting, **29%** from AD + composting
- ✓ **Anaerobic Digestion: ~1700 plants** realized (agriculture + sewage + waste + industrial)

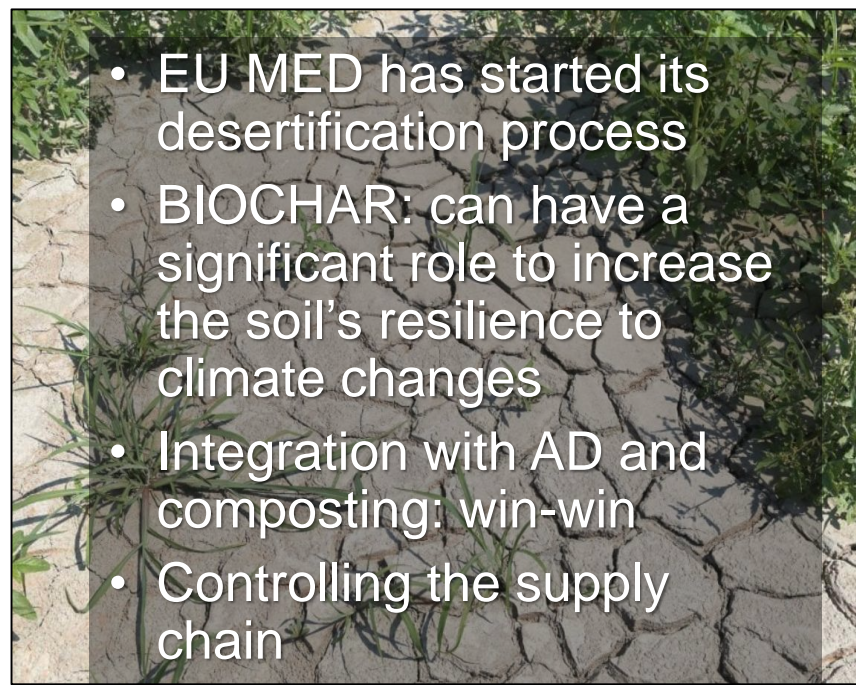
(source: L.Maggioni/CIB, 2017)



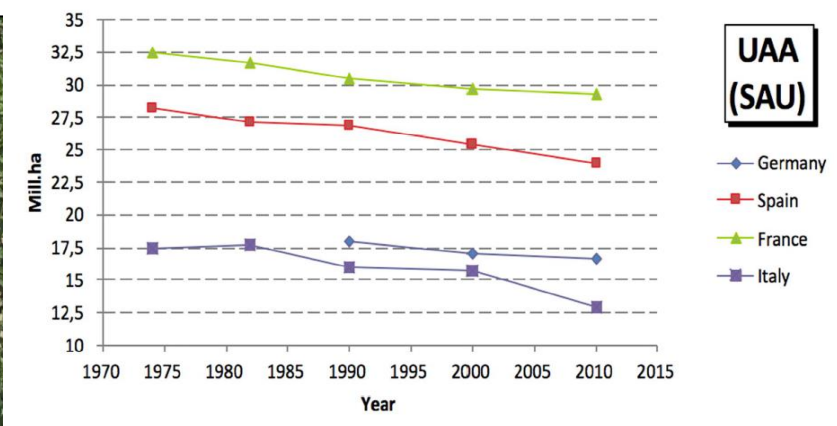
Complexity and Market uptake: Scale matters...

- Industrial Biorefining could be Fuel- or Product- oriented
- Scale & Volumes, Technological Complexity, CAPEX/OPEX & Markets varying accordingly.
- The operators should confront themselves with Technology and Markets to have successful businesses.
- The financial aspects change considerably according to the different situations.
- More complexity through the Bio- and Thermo- processing integration (new process paths)
- Scale matters...

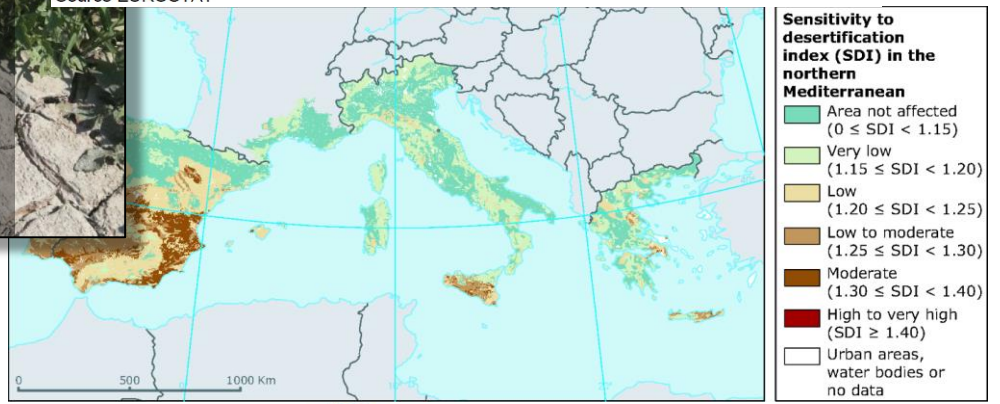
The Biochar case in Farming in the MED Area: Impressive potential.



- EU MED has started its desertification process
- BIOCHAR: can have a significant role to increase the soil's resilience to climate changes
- Integration with AD and composting: win-win
- Controlling the supply chain



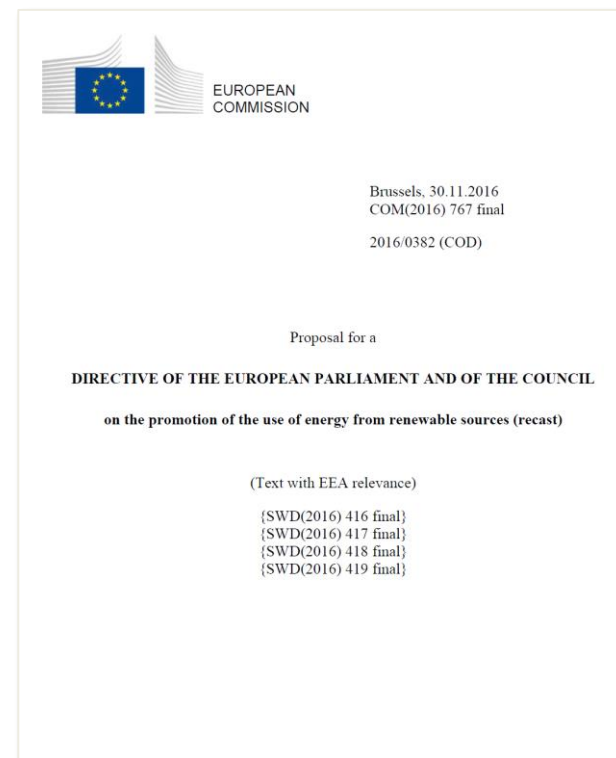
Source EUROSTAT



EU MED: 8.5 Mha Marginal areas
(source: S2Biom)

The new RED II Directive

- It is being discussed at the EU Parliament and later on at the European Council
- It will regulate this topic on the 2020-2030 period
- The innovative Biofuels will be defined in the Directive (Residual biomass)
- Integration with bioeconomy and agriculture



15.9.2015 Official Journal of the European Union

I
(Legislative acts)

DIRECTIVES

DIRECTIVE (EU) 2015/1513 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 9 September 2015

amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources

(Text with EEA relevance)

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(Text with EEA relevance)

ANNEX IX – Definition of Innovative Biofuels: based on the raw material only

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 thereof in relation to Article 1(3) to (13) and Article 2(5) to (7) of this Treaty,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee⁽¹⁾,

After consulting the Committee of the Regions,

Acting in accordance with the ordinary legislative procedure⁽²⁾,

Whereas:

(1) Pursuant to Article 3(4) of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/54/EC, Member States are to ensure that the share of energy from renewable sources in all least 10 % of the final consumption of energy in transport in that Member State of the methods available for Member States to meet this target, and is expected that Directive 2009/28/EC also stresses the need for energy efficiency in the transport sector because a mandatory percentage target for energy from renewable sources is difficult to achieve sustainably if overall demand for energy for transport continues to grow. The Commission is encouraged to include more detailed information on energy efficiency in their reports to be submitted in accordance with Annex IV to Directive 2009/28/EC and of the Council⁽³⁾ and other Union legislation with relevant efficiency in the transport sector.

⁽¹⁾ OJ C 198, 10.7.2013, p. 56.

⁽²⁾ Position of the European Parliament of 11 September 2013 (not yet published in the Official Journal) and decision of the Council of 13 July 2015.

⁽³⁾ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/54/EC.

⁽⁴⁾ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

ANNEX IX

Part A. Feedstocks and fuels, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:

- (a) Algae if cultivated on land in ponds or photobioreactors.
- (b) Biomass fraction of mixed municipal waste, but not separated household waste subject under point (a) of Article 11(2) of Directive 2008/98/EC.
- (c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households collection as defined in Article 3(11) of that Directive.
- (d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including meat and bone meal, and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in Annex.
- (e) Straw.
- (f) Animal manure and sewage sludge.
- (g) Palm oil mill effluent and empty palm fruit bunches.
- (h) Tall oil pitch.
- (i) Crude glycerine.
- (j) Bagasse.
- (k) Grape marc and wine lees.
- (l) Nut shells.
- (m) Husks.
- (n) Cobs cleaned of kernels of corn.

- (o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil.
- (p) Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2.
- (q) Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs.
- (r) Renewable liquid and gaseous transport fuels of non-biological origin.
- (s) Carbon capture and utilisation for transport purposes, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.
- (t) Bacteria, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.

Part B. Feedstocks, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:

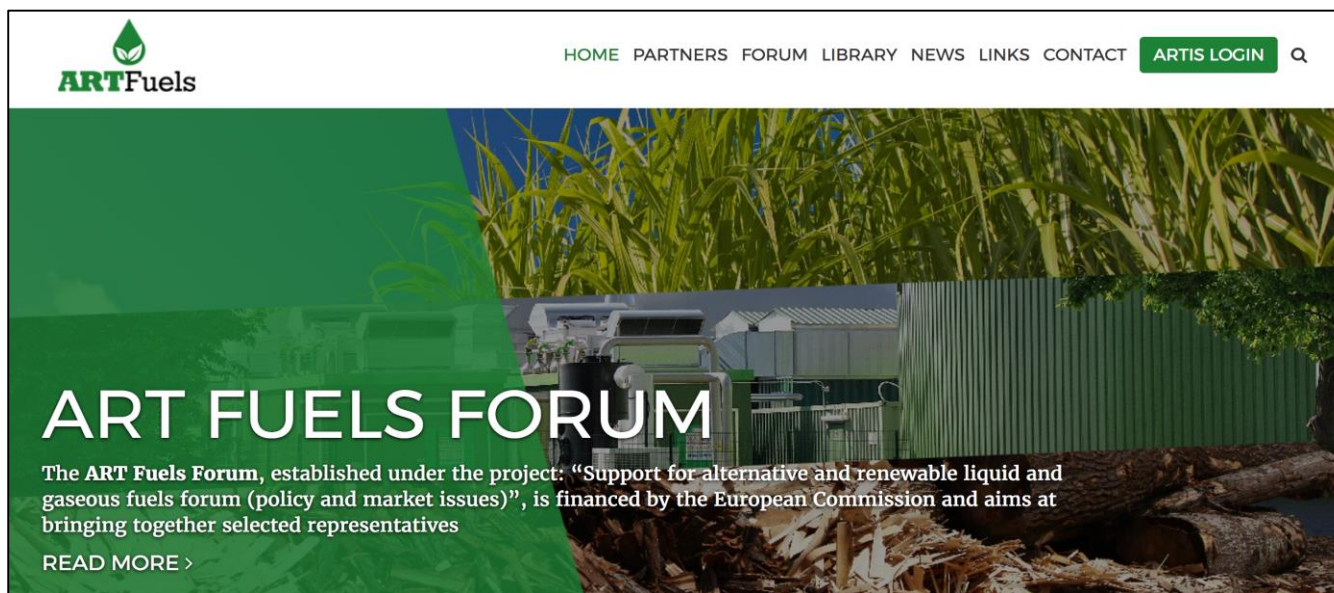
- (a) Used cooking oil.
- (b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council^(*)

^(*) Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009, p. 1).

ART Fuels Forum

- Alternative and Renewable Fuels Forum – supported by EC-DG Energy
- FOCUS: Market & Policies post 2020 (to 2030).
- ~ 100 participants (Members, Affiliate, Observers).

<http://artfuelsforum.eu/>



Key Messages on RED II Proposal

ART Fuels
KEY MESSAGES ON RED II PROPOSAL

INTRODUCTION

TARGETS, MANDATES and PENALTIES

EMISSIONS and SUSTAINABILITY CRITERIA

ADVANCED BIOFUEL DEFINITION

POLICY FRAMEWORK and SUPPORT SCHEMES

Project financed by the

ART Fuels www.artfuelsforum.eu

KEY MESSAGES FROM Alternative Renewable Transport Fuel Forum Teams on REDII proposal

ART Fuel Forum (AFF)	Consolidated Key Messages on REDII – SECTOR SP
AFF Scientific Coordinator	David Chiaramonti

SECTOR-SPECIFIC KEY MESSAGES
(listed not in order of importance but according to AFF team numbering)

All sectorial teams provided comments on REF II on a general basis, but some teams - as listed below - provided additional messages, specific to the main focus of these teams (also named sectorial groups).

Pyrolysis

- LARGE SCALE DEPLOYMENT** - For large scale production of pyrolysis oil and its applications in the transport sector, the whole ecosystem (technology, sustainability, finance, economics, logistics, organisation, etc.) should be properly addressed.
- CO-PROCESSING** - Co-processing of pyrolysis oil in existing and new refineries (including co-hydrotreating) is possible. Interesting and competitive solutions are within reach and RTD and investment programs should be facilitated to investigate, further develop, demonstrate and integrate pyrolysis oil processing and upgrading.
- STAND-ALONE PYROLYSIS OIL BASED REFINERIES** - Beside the parallel development of co-processed limited amounts of pyrolysis oil in existing or new refineries, a program for stand-alone pyrolysis based refineries needs to be developed to overcome the initial investment barrier for oil markets. The not-profitable CAPEX being assessed at some hundreds of million Euro's.

Biochemical

- ETHERS-RELATED MEASURES** – REDII should encompass the deployment potential of the developed "100% bio-ethers" chain. REDII should be the proper occasion to revise the parts of the Annex III and Annex V of RED I relevant to Fuel-Ethers.

Lipid-based biofuels

- ADVANCED BIOFUEL DEFINITION** - The definition of Advanced Biofuels elaborated by SGAB and endorsed by AFF, as reported at General Section point 2, is welcome, in particular given the relevance of waste and residue material for the lipid-based biofuel sector.
- CAP ON ANNEX IX-PART B TO BE REMOVED** - The cap on Annex IX part B should be removed as a counter-productive proposal that can only restrict the use of development of the waste-based production facilities and act as an inhibitor to investment in new waste streams. The ILUC effect has promoted the use of Annex IX part B biofuels, which has led into industry investments. These biofuels should be included into advanced biofuel definition (as SGAB advanced biofuel definition does).

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ART Fuels www.artfuelsforum.eu

KEY MESSAGES FROM Alternative Renewable Transport Fuel Forum Teams on REDII proposal

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AFF Scientific Coordinator	David Chiaramonti

KEY MESSAGES FROM THE INTERNATIONAL PERSPECTIVES

Canada - International

- On Biomass** – There should be more emphasis on supplying biomass. It feels that in the REDII proposal biomass is a given and it is assumed that it will be there and available. However, the REDII document focuses on all types of energy going from heat, cold, electricity up to liquid fuel. The REDII document clearly states that emphasis should be given to the production of HEAT and COLD. A mechanism should be established in order to help the industry that will establish for the production of ART fuels to have access to biomass at a fair price. Considering the fact that these biorefineries will be 3-5 times the OPEX of first generation it would be very detrimental for them to pay disproportionate prices for biomass. There is concern that assuming that biomass will be available and at a good price is a huge mistake and without biomass, there is no fuel (unless e-fuels rise dramatically).
- On Policy** – The answer may be as simple as carbon tax. If you add a carbon tax you penalize the oil, coal and natural gas industry. Of course, the consumers will end up paying for this but the point is that these funds need to be invested back into renewables in order to help them make sense out of the economics of advanced renewable transportation fuels. In Canada, price of carbon should reach 50\$/tonne in 2022, this mechanism could be very beneficial, especially to establish technologies such as e-fuels where CO2 will become a negative value feedstock. The more you ask for carbon tax the more you can invest back into new technologies. It will be a hard and painful transition which will require a close interaction with the population that will end up paying for this. However, carbon tax should be reduced once the objectives are met. Another point on the policy and in that sense I agree with the SGAB report that there should be less drastic transitions between the first and second generation biofuels. First generation biofuels are essential to reach the GHG reduction objectives. Hence it would be a big mistake to put them aside right away. Overall, the main message is to penalize carbon emission to support GHG reduction options.
- On technology** – Funding should be reviewed by teams of external reviewers that will ensure that the project make sense prior to fund them. Following biomass supplies I think this may be the second most problematic aspect assuming that policy is settled.

USA - International

- A policy permitting periodic revision of goals and targets on a time horizon of less than 15 years is stifling to investment. Projects breaking ground in 2020 will not start generating revenues

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Conclusions

- Bioeconomy, bio-based products, bio-energies, bio-refineries, the integrated renewables systems are crucial elements of a modern greenhouse gases reducing strategy and of the sustainable development.
- Soon, FREE will institute a bio-economy working group, to which organic farming provides a large contribution in Italy.

THANK YOU FOR YOUR ATTENTION

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