



REFERTIL



**COMPOST and BIOCHAR
EU28 standardization
for low carbon economy
and reducing mineral
fertilisers/chemicals
use in agriculture.**



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THE REFERTIL CONSORTIUM

The REFERTIL partnership is bringing experts, researchers and SMEs industrial partners from a variety of sectors together with local stakeholders.



Participant organization	Country	Activity
TERRA HUMANA Kft. - Coordinator & biochar key tech RTD + designer	HU	Company
Plant Research International, Wageningen	NL	RES
Aarhus University	DK	University
The Knowledge Centre for Agriculture	DK	Advisory Centre
University of Torino, Agroinnova	Italy	University
Gottfried Wilhelm Leibniz Universitaet Hannover	DE	University
Biomasa del Guadalquivir S.A.	E	SME
TWI Ltd.	UK	RES
WESSLING Lab Hungary Kft.	HU	Company
KOTO d.o.o.	SLO	SME
Comune di Grugliasco	Italy	City Council
Renetech Bioresources Ltd.	IRL	SME
Profikomp Zrt	HU	SME



<http://www.refertil.info>



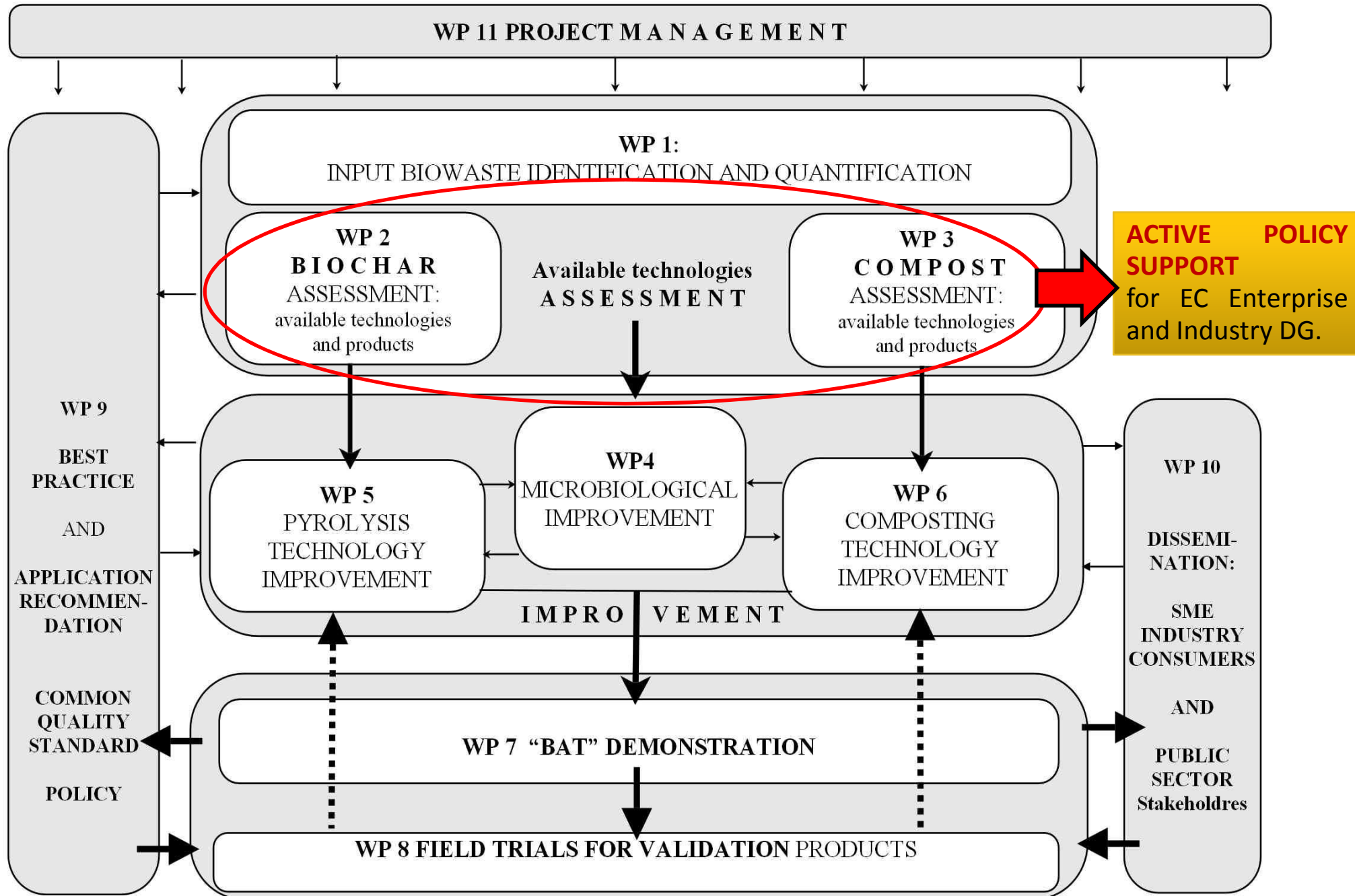
REFERTIL FOCUS

The **REFERTIL** project is

- recycling of biowastes into biochar and compost products that reduce the dependence on mined and non renewable Phosphorus and energy-intensive Nitrogen supply resources,
- **contributing to the transformation of the organic bio-waste streams** from Europe's agriculture and food industries,
- **contributing to the international standardization of compost/ biochar** products, and
- providing strong **policy support to the European Commission Enterprise and Industry DG + other DG's** for regulation of compost and biochar products under the **NEW FERTILIZER REGULATION** and **EU28 law harmonization**.



THE REFERTIL ACTIVITIES: markets, products and policies



Biochar produced by modern zero emission pyrolysis process



THE REFERTIL OBJECTIVES

- **IMPROVEMENT** of the currently used composting treatment and biochar production processes (technical and cost) efficiency and (environmental and human health) safety, with SME user specific and practical field method results.
- Objective driven **zero emission processing** goal of compost and biochar productions and maximised efficient recovery of nutrients, such as **phosphorous** and **nitrogen**.
- **Technical-economical-environmental evaluation of 7 biochar processing technologies and 15 compost treatment technologies.**
- **IMPROVEMENT** of the quality and safety of the final products (compost and bio-char application value and results from the field) with established common quality standards for EU28 applications.



Measurable and verifiable REFERTIL performance

The REFERTIL is applied science & technology knowledge generation for environment & market based economical developments and EU28 EC/MS law harmonization support in the field of improved & safe organic waste management.

- All EU available and economically important **bio-waste feed materials characterization >200 million t/y in EU28.**
- **BAT technical-economical-enviro evaluation of 7 biochar processing technologies and 15 compost treatment technologies.**
- **2000 tons input bio-waste treatment** from which 600 tons different types of high quality compost production.
- **100 m3 of different types of biochar production** from different inputs.
- **3 economically important food crop plant growth field tests** from year two in 6 counties.



THE REFERTIL BENEFITS FOR EUROPE

- Improving technical, field economical and environmental efficiency of the bio-waste processing and nutrient recycling by **advanced and integrated biochar and composting technologies.**
- Increasing the **competitiveness of agricultural and bio-waste management industries.**
- **Ecosafe organic products for affordable market price.**
- Biochar/compost products **for SME farmer EU28 applications.**
- **Establish clean understanding for all stakeholders, especially SME's and farmers**, possibly differentiated for different European climatic and economic area considerations.
- **New and progressive opportunities** reached by improved and novel biochar activated composts, which is safer, better, faster and more economical.
- Establish **enhanced common quality standard requirements for bio-waste treatment, compost and bio-char quality and trading requirements.**
- **The valorisation of organic waste and converting it into safe biochar/compost products is a profitable new industrial sector that creates new jobs even in economically difficult times.**



REFERTIL POLICY SUPPORT - THE MAIN CHALLENGES

- Minimizing or substitution of agro chemical and chemosynthetic inputs in safe food crop production.
- Ensuring an **EQUIVALENT PROTECTION** of the **ENVIRONMENT, PLANT AND HUMAN HEALTH** throughout the EU with **harmonised system** of controls **covering all fertilising materials** including mineral fertilisers, organic fertilisers and soil improvers.
- **GUARANTEE** to farmers **fair information and reliability** about the **minimal nutrient content**.
- **INTRODUCE** more detailed environmental and human health safety requirements.
- Establishing **ESSENTIAL SAFETY** and **AGRONOMIC EFFICIENCY REQUIREMENTS**.



SAFETY ISSUE

CURRENT LEGAL SITUATION: Article 14(c) of current Fertilisers Reg. (EC) No 2003/2003: “*A type of fertiliser may only be included in Annex 1 if: [...] (c) under normal conditions of use it does not adversely affect human, animal, or plant health, or the environment*” but it **does not include a detailed methodology on how to address these risks.**

FURTHER REVISION IS NEEDED:

- to introduce more detailed environmental safety requirements for biochar products.

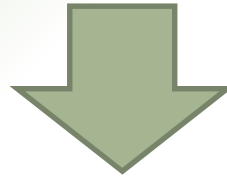
PROBLEMS & CHALLENGES:

- **The term ‘safety requirements’ is neither defined in the EU legislation nor is a common understanding in place.**
- **ABSENCE of an accepted risk assessment methodology on biochar products.**
- Complexity of the biochar safety and a lack of common understanding of what safety assessments should include.



BASIC LEGAL SITUATION – need for policy support

1. **MINERAL FERTILIZERS HAVE BEEN REGULATED AT THE EU 27** level Reg. (EC) No 2003/2003.
2. **NATIONAL PROVISIONS** for marketing of FM = ‘national fertilisers’.



- **ABSENCE** of a harmonized system for all FM.
- The **Fertilisers Regulation** does not affect the ‘national fertilisers’.
- **MS SPECIFIC** Legislations → Large differences
- **PRODUCERS CAN CHOSE:** ‘EC fertilisers’ OR ‘national fertilisers’.
- **MUTUAL RECOGNITION** (Reg. (EC) No 764/2008) for **intra-community** movement of national registered fertilisers.
- National MS **LEGISLATIONS ARE NOT IDENTICAL** throughout the EU27 → **POTENTIAL BARRIERS** to mutual recognition.



THE 7 BIOCHAR AND COMPOST POLICY OPTIONS

1. **BASELINE SCENARIO (NO POLICY CHANGE)** – national legislation coexists with the EU legislation. – **not suitable for compost and biochar regulation**
2. **REPEAL** of the existing **2003/2003 Reg.** reliance on other existing EU and national legislation. - **not suitable for compost and biochar regulation**
3. **VOLUNTARY COMMITMENT BY INDUSTRY** in addition to existing legislative framework. - **not suitable for compost and biochar regulation**
4. **FULL HARMONISATION OF FM - BASED ON THE CURRENT FORMAT** of 2003/2003 Reg. – **no flexibility – limited alternatives – not supporting innovative but safe solutions.**
5. **FULL HARMONISATION for all FM – AUTHORISED LIST OF INGREDIENTS AND ADDITIVES.** – made for chemical industry and not suitable for bio-substances with substantial variations.
6. **FULL HARMONISATION for all FM – NEW APPROACH, SAFETY REQUIREMENTS: Human and animal safety, respect of the environment, AGRONOMIC CRITERIA – best suitable for biochar and compost adaptation and safe regulation**
7. **COMBINATION of 1-6.** - over-complex



REFERTIL related EU legislations

- **REACH** Regulation (EC) No 1907/2006;
- **Waste Framework Directive** 2008/98/EC – **EoW criteria**;
- Legislation on health rules as regarded animal by-products and derived products not intended for human consumption - Regulation (EC) No 1069/2009;
- Eco-label for growing media and soil improvers - Regulation (EC) No 66/2010;
- Council Regulation (EC) No 834/2007 on organic production and labelling of organic products;
- Plant Protection Products Regulation (EC) No 1107/2009;
- **POPs Regulation (EC) No 850/2004**;
- Regulation (EC) No. 1881/2006 setting maximum levels for certain contaminants in foodstuffs;
- Directive 2000/29/EC on plant health;
- Landfill Directive 99/31/EC;
- Industrial Emission Directive (IED 2010/75/EU)



Based on the REFERTIL results distinction should be made between bone biochar and plant biochar:

Plant biochar:

- >90% w/w high carbon content plant origin
- micro and meso porous (1 nm – 50 nm) carboniferous product,
- high water holding and nutrient retention capacity and C sequestration,
- no soil fertilization effects. **Can be recognised as soil improver? YES**

ABC: Animal Bone bioChar NPK-C ORGANIC FERTILIZER

- The input **animal bone meal** is food grade category 3 rendering by-product with economical importance, produced in large industrial scale (2-3 million t/y) which **concentrated high P content apatite** is an critically and strategically important inside EU natural and **RENEWABLE RESOURCE**.
- <20% w/w low carbon and high calcium phosphate/ apatite mineral content
- macro porous (50 nm – 63k nm)
- **Containing significant amount of MINERAL nutrients.**
- **Can be recognised as organic fertiliser? YES**



ABC -- vs -- Plant Biochar: Fertilization effect comparision between the application doses

If the land needs 61.5 kg P₂O₅/ha

Biochar	Amount (kg/ha)
ABC-bc/7	211
ABC-bc/10	202
G-bc/1	32 430
G-bc/2	16 783
Dk-bc/1	583 742
Dk-bc/2	274 001
Fertiplus-bc	20 655
Fr-bc/1	6 103
Fr-bc/2	63 181
It-bc/1	98 359
UK-bc/1	86 900



CONCULSIONS:

1. **ABC** is full value organic P fertilizer, NPK-C.
2. **Plant based biochar** having direct fertilizer value only at extreme high doses. Dose: =5 t/ha but <20 t/ha.
3. Enduser farmer point of view **ECONOMY** is key driver.



End-user farmer point of view ECONOMY is the key BIOCHAR driver



SAFETY REQUIREMENTS for COMPOST AND BIOCHAR

PRODUCT SAFETY EVALUATION: determination of the potential key contaminants having negative effects on the human, plant health and the environment.

Accredited analysis in Wessling laboratory:

- **>25 different compost** products from 6 countries
- **18 different biochar** products from 7 countries.

MAIN CRITERIONS:

- **Criterion 1: HEAVY METALS**
 - Minimum indicators: Cd, Ni, CrVI, Cr total, Hg, Pb, As + Cu, Zn (manure !) and Se
- **Criterion 2: ORGANIC POLLUTANTS**
 - Minimum indicators: **PAHs**, PCBs, PCDD, PCDF
- **Criterion 3: MICROBIOLOGICAL PARAMETERS**
 - Minimum indicators: Salmonella spp, E. coli.





THANK YOU!

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