The REFERTIL Consortium

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- Stichting Dienst Landbouwkundig Onderzoek (DLO), Netherlands (www.pri.wur.nl)
- Aarhus University, Denmark (www.agrsci.au.dk)
- Knowledge Center for Agriculture, Denmark (www.vfl.dk)
- Universita Degli Studi Di Torino, University of Torino -Agroinnova, Italy (www.agroinnova.unito.it)
- Gottfried Wilhelm Leibniz Universitaet Hannover, Germany (www.uni-hannover.de)
- Biomasa del Guadalquivir S.A, Spain (www.bpeninsular.com)
- TWI Ltd., United Kingdom (www.twi.co.uk)
- WESSLING Hungary Kft., Hungary (www.wessling.hu)
- KOTO proizvodno in trgovsko podjetje, d.o.o., Slovenia (http://kotoweb.si)
- Comune di Grugliasco (Municipality, Torino), Italy (www.comune.grugliasco.to.it)
- Renetech Bioresources Ltd., Ireland (www.renetech.net)
- Profikomp Environmental Technology Plc., Hungary (www.profikomp.hu)

Project duration

48 months: October 1, 2011 – September 30, 2015

Coordinator contact

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Reducing mineral fertilisers' and chemicals' use in agriculture by recycling treated organic waste as compost and bio-char products

REFERTIL
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SEVENTH FRAMEWORK PROGRAMME

Photo: Edward Someus

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Background

Intensive farming practice and human activities have disturbed the natural cycles of nitrogen and phosphorus. Industrial agriculture relies on continual inputs of mined and non-renewable phosphorus and energy-intensive nitrogen supply. It is estimated that human activity has doubled the global amount of reactive nitrogen in circulation; while tripled the amount of phosphorus since the industrial revolution. There is a strong need for increased sustainability and closing the nutrient loop in agriculture with the creation of a virtuous cycle between urban and rural areas. In this context, reducing the use of mineral fertilisers and chemicals in agriculture are key priority objectives that can be achieved by recycling and reusing treated organic waste as compost and biochar products.

Purpose of the project

REFERTIL has the mission to contribute to the transformation of urban organic waste, food industrial by-products and farm organic residues from a costly disposal process into an income generating activity. This includes an EU-27 standardized, advanced, and comprehensive bio-waste treatment and nutrient recovery process towards zero emission performance. The improved output products will be safe, economical and standardized compost and biochar products containing phosphorous and nitrogen that can be economically and beneficially used by farmers. As a result, both food and environmental safety is improved, while a new economy is generated.

Photo: 3R zero emission biochar production unit, by Edward Someus

What is biochar material and how is it made?

Biochar originates from different types of plant and/or animal waste biomass origin carboniferous materials, used for multi functional soil enhancement, water retention, natural fertilization and/or carbon negative economical agricultural applications. Biochar is produced under low temperature carbonization conditions at an average 500°C in the absence of air and based on advanced zero emission or near zero emission process design, where all material element streams are recycled and reused into natural and safe products. As biochar is a nutritious source of carbon it strongly indicates that land application would improve soil fertility and crop characteristics.

What is compost material and composting process?

Compost is as humified solid particulate material, which has been sanitised and stabilised; and which confers beneficial effects when it is added to soil, used as growing media constituent, or used in another way in conjunction with plants. **Composting** is a process of controlled decomposition and humification of biodegradable materials under managed conditions, which are aerobic and which allow the development of temperatures suitable for mesophilic and thermophilic bacteria as a result of biologically produced heat.

What are the 'End-of-Waste' criteria?

The revised Waste Framework Directive (2008/98/EC) introduces the possibility that certain waste streams that have undergone a recovery operation can cease to be waste, if they fulfil certain criteria - called *"End-of-Waste"* (EoW) criteria. The EoW criteria are the requirements that have to be fulfilled by a material derived from waste, and which ensure that the quality of the material is such that its use is not detrimental to human health or the environment.

Project activities

This project is organised into 10 work packages (WP) which coherently integrate knowledge and experience from 10 EU countries, which will reveal the possibilities of producing standardised, safe and economical compost and/or biochar meeting the EU EoW criteria.

WP no.	Activities
1	**Identification, sampling and quantification** of the main urban organic waste and agriculture organic residue flows and logistic systems in the participating countries
2	Development of a **detailed pyrolysis technology and biochar product matrix database** ranking the available biochar producing technologies. A biochar policy supporting report
3	Development of a **detailed composting technology and compost product matrix database** ranking the available compost production technologies. A compost policy supporting report
4	**A microbiological strategy** will be developed for fungus, bacteria and mycorrhizal fungi for compost activator and compost nutrient enrichment application incl. selection of inoculants and the development of inoculation technology
5	**Improvement of the biochar production and treatment process** towards high quality standardised 'end-of-waste' quality biochar production and zero emission performance
6	**Composting process optimisation and product improvement** for nutrient retention and emission minimisation, including identifying and proposing good operational practices and technological improvements
7	**Best available technology „BAT" demonstrations and trials** will be conducted for improved and sustainable compost and biochar production including small scale microbial inoculum trials
8	**Validation of the improved technologies and recycled products** against 'end-of-waste' criteria will be made with compost and biochar in field crop trials under different conditions, including environmental viability and safety evaluations
9	Setting up a framework for **common quality standard requirements and new application methods** for biowaste treatments and compost/biochar products to guarantee a high level of protection of human health and the environment
10	Extensive **EU-wide dissemination and end-user involvement** specifically for SME's and farmers as end-users. A range of networking and field demonstrations will be established to reach as many stakeholders as possible