

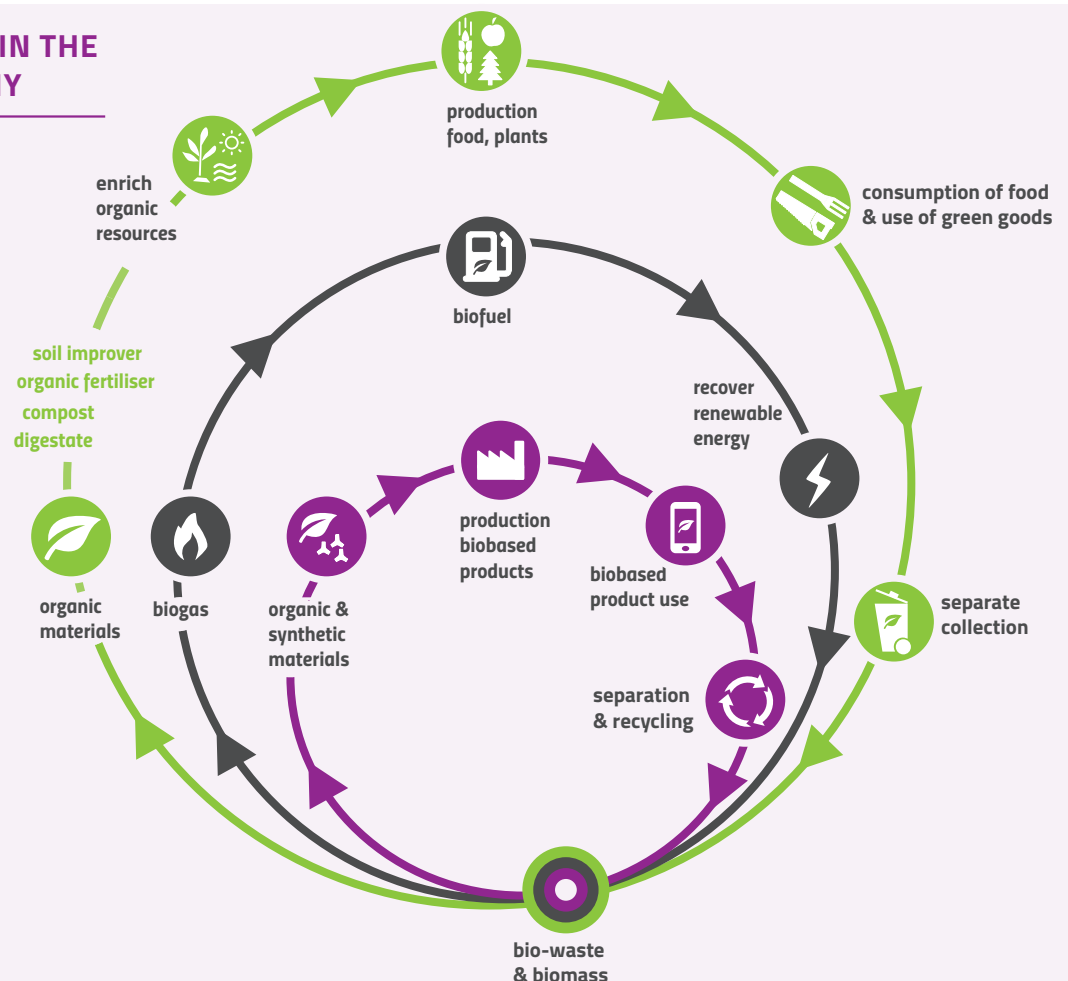
BIO-WASTE: THE VALUABLE ORGANIC RESOURCE IN A CIRCULAR ECONOMY

Life on earth is dependent on carbon and nutrient cycling. Ecosystems rely upon the availability of organic and inorganic matter for assimilation by living organisms. Organic materials are decomposed and humified to accumulate organic matter in soils. Mineralization and humification processes represent the most important processes in the soil carbon cycle. During decomposition nutrients and carbon gets available for plants, animals and microorganisms and are incorporated in the soil organic matter pool. Besides the continues delivery of carbon

and nutrients, soil organic matter improves the soil structure through increasing the water holding capacity and increasing the living conditions for all organisms in soils.

Humans set the natural balance of the soil carbon cycle under stress by intensive use of land, harvesting plant material for food, feed and other applications. Mostly, the residues of these activities end up as 'bio-waste'.

BIOLOGICAL CYCLE IN THE CIRCULAR ECONOMY



BIO-WASTE AN ESSENTIAL RESOURCE

Bio-waste, due to definition in the Waste Framework Directive (WFD 2008/98/EC), includes food and kitchen waste from households and restaurants, caterers, retailers, garden and park waste and comparable industrial organic residues from food processing plants.

EU Member States produce between 118 and 138 Mio tonnes of bio-waste each year. Bio-waste comprised up to 50% of municipal solid waste. Currently, approximately 75% of this material is landfilled. Disposal in landfill leads to the diversion of carbon and nutrients in the bio-waste away from ecosystems, making it unavailable for reuse. In addition, the uncontrolled decomposition of organic materials in landfills leads to the emission of greenhouse gases such as methane.

BIO-WASTE IN THE CIRCULAR ECONOMY

In a circular economy, bio-waste is not landfilled. Instead, it forms a resource for organic soil improvers, fertilisers, growing media component and bio-based products. The carbon and nutrient contents of bio-waste are mainly concentrated in organic fertilisers, soil improvers and growing media, or can be extracted, modified or transformed into a range of different bio-based products, too. All these secondary products can replace fossil-based products such as mineral fertilisers, peat and fossil fuels. After use, the residues of these products can flow back safely into the biosphere, thereby closing carbon and nutrient cycles.

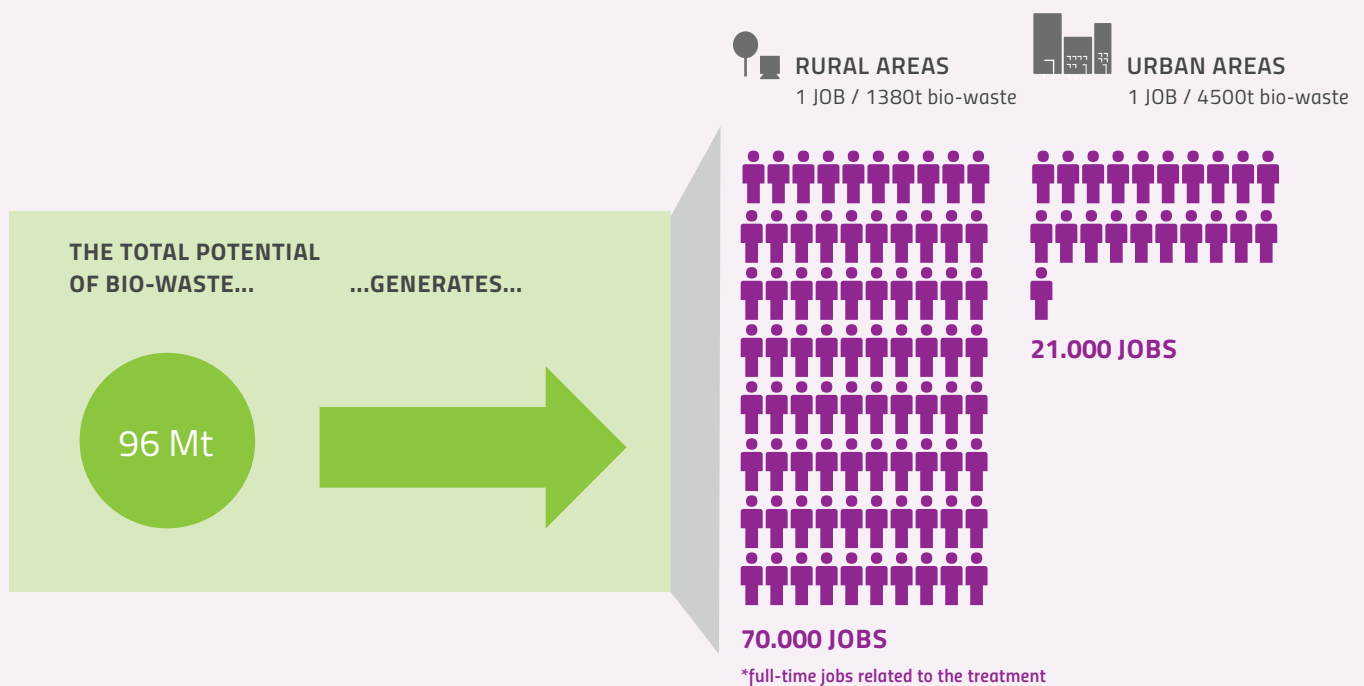
BIO-WASTE CONTRIBUTES TO CIRCULAR ECONOMY OBJECTIVES

Recycling of bio-waste contributes significantly to circular economy objectives:

1. It closes biological material cycles, and reduces the linear economy of landfilling and incineration of bio-waste.
2. It contributes to long term soil fertility and C-sequestration by production of quality soil improvers and organic fertilisers.
3. It produces bio-based products which can replace fossil based products such as mineral fertilisers, peat and fossil fuels.
4. It creates a local economy with sustained jobs. Based on experience in countries with established bio-waste recycling infrastructure, additional recycling of 100 Mio tonnes would lead to approx. 20,000 jobs. In addition, it contributes to improving farmers' incomes and to distributed jobs in rural regions.
5. It contributes to climate change mitigation, by replacing of fossil energy and fuel, peat and mineral fertilisers, sequestration of carbon in soil and by avoided landfill gas emissions.
6. Separating of bio-waste from the residual waste also enables increased recycling rates of other waste materials (glass, plastics, paper and metals).

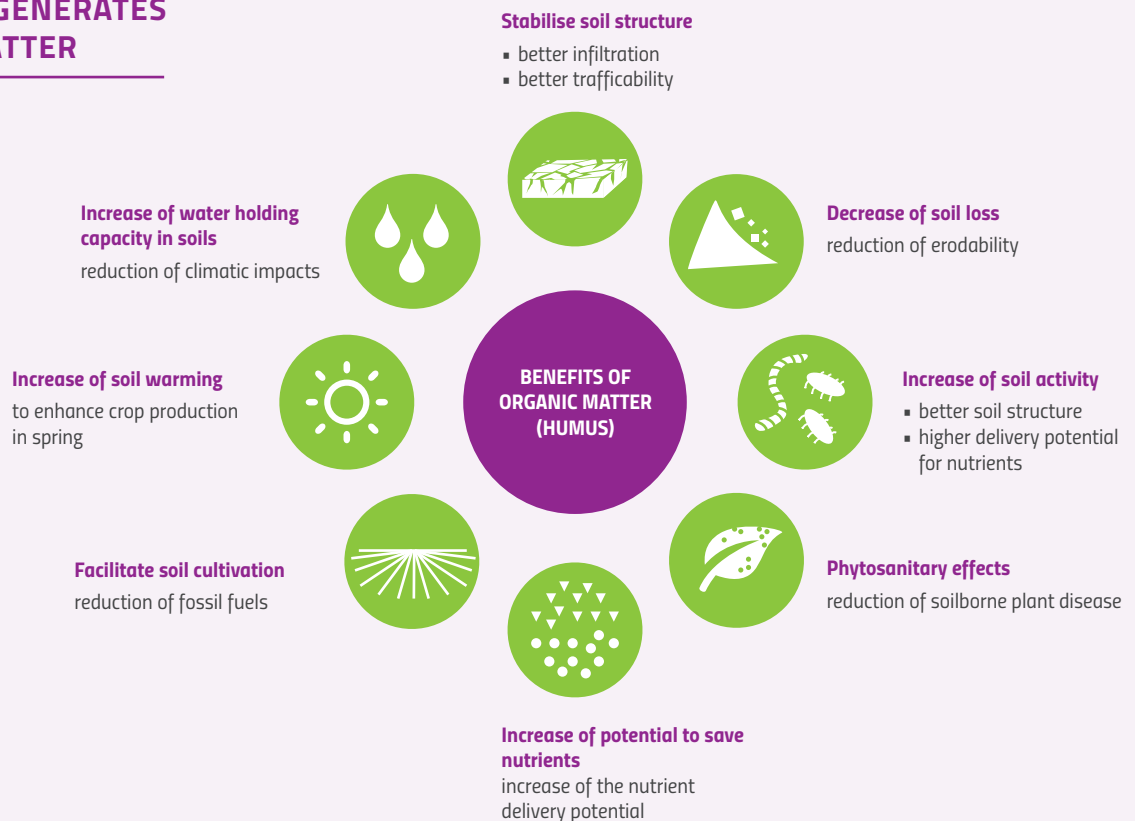
BIO-WASTE GENERATES JOBS

POTENTIAL DIRECT JOBS* IN THE BIO-WASTE SECTOR



For further information ECN has published an ECN Factsheet on 'Biowaste Generates Jobs', which can be accessed from the ECN website www.compostnetwork.info
http://www.compostnetwork.info/wordpress/wp-content/uploads/2016/06/ECN-Factsheet_-Biowaste-Generates-Jobs.pdf

BIO-WASTE GENERATES ORGANIC MATTER



BENEFITS OF APPLYING COMPOST AND DIGESTATE ON SOILS

Organic matter in European soils is decreasing. This negatively affects soil productivity. Organic matter contents can be maintained and raised by adding organic soil improvers or organic fertilisers.

Compared to other soil improvers, compost contains a high proportion of stable organic matter (humic substances). Due to hygienisation during processing, compost and digestate are

free of pathogens and weeds, and therefore safe to use for food production and other applications. In addition, by applying compost and digestate a basic fertilisation of the soils and plants with nutrients is guaranteed.

Extensive research on **compost**¹ and **digestate**² products has shown a variety of related benefits to soil quality.

¹ ECN INFO PAPER No. 02/2010: *Sustainable Compost Application in Agriculture*
http://www.compostnetwork.info/wordpress/wp-content/uploads/2011/05/ECN-INFO-02-2010_Sustainable_Use_of_Compost_in_Agriculture_LTZ-Project.pdf

² WRAP 2016: *Digestate and compost in agriculture (DC-Agri) project reports*
<http://www.wrap.org.uk/content/digestate-and-compost-agriculture-dc-agri-reports>

INCREMENTAL ADDED VALUE CREATION FROM BIO-WASTE

Experience in countries with established bio-waste recycling shows that the first and preferred option for bio-waste recycling shall be compost production. Compost production is relatively easy and cost-effective to implement at local, regional or supra regional level. Compost production can go hand in hand with production of biogas, i.e. via processes of anaerobic digestion, if organic material with high biogas-potential is available. This could increase the economic value generated per tonne of bio-waste.

Once a composting and anaerobic digestion infrastructure has been established, this provides a solid basis of bio-waste

management, to which novel technologies can be coupled. Examples include biorefinery processes in which bio-waste serves as a source of bio-based chemicals, fibres and nutrients.

In future biorefinery and other technologies could be developed in conjunction with existing composting and anaerobic digestion infrastructure. This is necessary as only a limited percentage of heterogeneous bio-waste will technically be suitable for the production of high value products such as bioplastics, biochemical and bio-based materials. The remaining part of organic residues respectively will still be turned into compost and digestate products, thus closing biological cycles and improving soil quality and health.

THE NEED FOR A COHERENT LEGAL FRAMEWORK

The EU Circular Economy Package recognises bio-waste recycling as an important element of integrated waste management. However, the proposed measures to promote bio-waste recycling are insufficient to achieve the envisaged transition from landfilling to recycling.

It is necessary to establish a coherent legal framework which includes:

1. Separate collection and the management of bio-waste (composting / anaerobic digestion) shall be mandatorily binding for all Member States.
2. Separate collection is a pre-requisite to obtain clean organic resources suitable for quality recycling. The more than 20 years experiences of some member states in separate collection of bio-waste shows, that separate collection of bio-waste is feasible in both urban and rural areas, under various geographic and climatic conditions.
3. Specific recycling targets for separate collected bio-waste for phasing out landfilling of organic materials and to promote the Circular Economy are essential.

4. A 'Fertilising Product Regulation' which acknowledges the value of compost and digestate products, and sets clear quality criteria for secondary raw materials is needed for establishing a market for compost and digestate, which can be used as organic fertilisers, soil improvers or as component in growing media.

THE NEED FOR QUALITY ASSURANCE

Besides separate collection of bio-waste as a precondition for achieving high quality products, a quality assurance scheme supervising input materials, the treatment process and the quality of the recycled products is needed. For placing compost and digestate as soil improver, organic fertiliser or as growing media component on the market, ECN has set up a European Quality Assurance Scheme for compost and digestate (ECN-QAS). The ECN-QAS is registered as Trade Mark for certified quality assurance organisations, compost and digestate products at the European Register of Community Trade Marks ('OHIM 2012/210: TM No 011007168').

FROM WASTE TO PRODUCT



ABOUT ECN

The European Compost Network (ECN) is the leading European membership organisation promoting sustainable recycling practices by composting and anaerobic digestion of organic resources and guarding over the quality and safe use of the recovered organic fertilisers/soil improvers.

The European Compost Network is a membership organisation with 70 members from 27 European Countries. Members include all European bio-waste organisations and their operating plants, research, policy making, consultants and authorities. ECN represents 22 bio-waste organisations (compost and digestate quality assurance organisations)

from 14 European countries and two from abroad, 25 companies producing bio-based products (organic fertilisers, soil improvers, growing media and biodegradable plastics), 9 non-governmental organisations of environmental protection organisations, 11 academic (research) institutes in environmental, agricultural and natural sciences and 3 environmental agencies.

Via the member organisations, ECN represents more than 3000 experts and plant operators with more than 30 million tonnes of biological waste treatment capacity.