

EDITORIAL



Bio-waste and More Circular Economy

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Globally, organic waste comprises the majority of municipal solid waste, and the organic fraction tends to be highest in low-income countries (64%) and lowest in high-income countries (28%). The largest share of organic waste is food and garden waste, so-called bio-waste.

High-income countries generate relatively less food and green waste (32% of total waste) than middle- and low-income countries (53% and 56%). Waste volumes are increasing quickly, and the fraction of organic waste increases as the economic development level decreases.

Table 1. MSW Disposal (million tonnes)

Country by Income	Recycled	Compost	Incineration	Landfills	Dumps	Other
High Income	129	66	122	250	0.05	21
Upper Middle Income	1.9	1.3	0.18	80	44	8.4
Lower Middle Income	2.9	1.2	0.12	6.1	27	0.97
Low Income	0.02	0.05	0.05	2.2	0.47	18

It is one of the waste management challenges during COVID-19 and after it.

The figures presented in the 2012 report of the World Bank's Urban Development and Local Government Unit allow us to reflect on the great importance of sharing experiences, best practices and policy advice for appropriate waste management from developed countries to others. High-income countries have recycled 129 million tonnes of waste versus 3.82 million tonnes in other countries; composted 66 million tonnes versus 2.55 million tonnes in other countries.

Improper management of waste and a big sub-fraction of food waste contribute nearly 6% of global greenhouse gas emissions. According to the UN Food and Agriculture Organization (FAO), the carbon footprint of wasted food is 3.3 gigatonnes (2013) and around 14% of

food produced globally is lost between harvest and retail, with significant quantities also wasted at the retail and consumption levels.

The Sustainable Development Goals (SDGs) highlight the importance of reducing food waste in Goal 2 *Zero hunger* and Goal 12 *Ensure sustainable consumption and production patterns* that includes the objective to "halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains by 2030".

According to the European Environment Agency, 2020, approximately 88 million tonnes (173 kg per person) of food is wasted every year in the EU-28 along the entire food value chain. This corresponds to about 20% of all food produced. "It is a frequent misconception that technology is the solution to the problem of unmanaged and increasing

waste. Technology is not a panacea and is usually only one factor to consider when managing solid waste” (What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050, 2018). But without a wide usage of the best available technologies we cannot turn bio-waste into resource. There are two most widely applied treatment techniques: aerobic composting (that avoids the formation of methane) and anaerobic digestion (without oxygen; generated methane can either be flared or used to generate heat and/or electricity).

More than 3,400 composting plants, 800 anaerobic digestion (AD) and 133 combined composting and AD plants are in operation in Europe to treat bio-waste (ECN Status Report on European Bio-Waste Management, 2019). Composting dominates the treatment capacity, but the use of anaerobic digestion is increasing.

Technologies for delivering valuable soil-improving material and fertilizer as well as biogas (a source of renewable energy) from food and garden waste have a high potential

for contributing to a more circular economy. Treatment of bio-waste is also key for meeting the European Union’s target to recycle 65% of municipal waste by 2035.

Management of bio-waste in the transition to a circular economy and for turning challenges into opportunities is among key messages of current Europe’s investment in research and innovation that is announced via Horizon Europe – research and innovation framework programme.

An exclusive focus of Horizon Europe, the next EU research & innovation investment programme (2021–2027), will be on Pillar II – Global Challenges and European Industrial Competitiveness. It has the largest share in funding, more than 50%, and includes cluster on food, bioeconomy, natural resources, agriculture and environment.

The opportunities for turning bio-waste into valuable bio-products and biofuels are arising with the new research and innovation. Numerous challenges of this research can be tackled only with collaboration between researchers, industries and governments.