

Addressing food wastage in the framework of the UN Sustainable Development Goals

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Waste management operators are able to see huge opportunities for energy and material recovery from the source-separated organic fraction of municipal solid waste (MSW), thanks to anaerobic digestion and composting. Still, when widening the perspective to the overall food chain, such benefits become negligible in comparison with the impacts of food production. Therefore, all efforts should be made at the different levels in order to address food losses and waste.

The food waste issue is a key part of the UN Sustainable Development Goal (SDG) number 12, ‘Ensure sustainable consumption and production patterns.’ Like all products, the environmental impacts related to food occur in the production, processing and distribution phases, as well as at the household level, that is, during the ‘use phase.’ But contrary to conventional items, food waste generation is intimately linked to other societal issues, such as dietary choices and eating habits, food culture and traditions. The problem is, in fact, overlapping with issues, such as overconsumption of food leading to obesity and consequent health issues, and to the unequal availability of food among rich and poor countries. According to the UN, 1.3 billion tonnes of food is wasted every year around the world, while almost 1 billion people go undernourished and another 795 million go hungry. At the same time 2 billion people globally are overweight or obese, with overconsumption of food being detrimental to human health and to the environment. The food sector accounts for around 30% of the world’s total energy consumption and for around 22% of total greenhouse gas emissions.

Ambitious targets have been set within SDG 12, which include implementing a 10-year framework of programmes on sustainable consumption and production, aimed at halving, by 2030, the per capita global food waste at the retail and consumer levels, and at reducing food losses along production and supply chains, including post-harvest losses.

The UN Food and Agriculture Organization (FAO) adds some key findings to the global picture of food waste. Among others, of particular interest are the differences between developing and developed countries. In the former, food waste and losses occur mainly at early stages of the food chain and are owing to financial, managerial and technical constraints in harvesting techniques as well as storage and cooling facilities. In developed countries, food is wasted and lost mainly at later stages in the supply chain, with the careless behaviour of consumers playing a major role. The wider availability of money and the aggressive marketing of food products, both at the level of the media advertising and of the large-scale retail industry, drive people to indulge in excessive purchase and in its consequent loss because of different reasons.

They include ineffective management of the household stock, personal tastes, excessive size of servings, and misunderstanding of the ‘best before’ or ‘sell by’ indications on labels.

Building up on such considerations, the Italian Ministry of the Environment funded, in 2015, a biennial project on food waste, targeting research, education and communication issues. The REDUCE project (the acronym standing for Research, EDUcation and Communication, in Italian language) aims at contributing to the prevention and reduction of food losses at the national level, according to the targets set by the national waste prevention programme. Such targets are defined in terms of total waste (not of individual fractions), and are envisaging a 5% decrease of municipal waste to be reached at 2020 with respect to 2010. The decrease is not to be calculated as an absolute value, but with respect to the gross domestic product (GDP) variation, in order to achieve decoupling of waste generation from macro-economic indicators.

The project is led by the University of Bologna, with three other academic partners and one public authority responsible for the food hygiene and nutrition.

Specific targets of the REDUCE project are:

- the improvement of the knowledge base on the amount and the reasons behind food losses, specifically targeting the downstream food chain (distribution, canteens, household), including the assessment methodologies;
- the analysis of food waste composition at the treatment plants where it is delivered;
- the estimate of the environmental impacts of food waste, accounted with the Life Cycle Assessment (LCA) LCA methodology;
- the promotion of food waste prevention criteria within regional waste prevention plans, as well as within public bids for collective catering services;
- the preparation of ‘manuals of good sanitary practices’ for food donation;
- to raise awareness among consumers on the topic of food waste;
- to increase knowledge among children about food waste by creating an educational kit;
- to promote the sharing of good practices for waste prevention.

Since the project is close to its end, some preliminary results are available. Analysis of food waste at the retail-chains level reveals major losses for fruit and vegetables (about 34%), for bread products (19%) and for dairy products (13%). Of the total food waste, it is estimated that about 35% by weight is suitable for human consumption, and then it can be recovered for donations. As for

the reasons for such losses, damages by customers and excessive internal production of food were outlined, in addition to the more traditional ones.

Food waste at school canteens was monitored in 73 schools across Italy, for a total of 250,000 individual servings. About 20% of prepared food was directly disposed, with 100 g of food wasted daily by each child. This corresponds to an estimated economic value of €230 per capita per year.

Wastage at the household level was monitored, for the first time in Italy, for a sample of about 400 families spread around the country, who were asked to self-account for their food wastage during 1 week of normal life. The recorded average was about 530 g per capita per week, with 60% of food waste turning out to be edible, that is, potentially avoidable. Once again, major losses were found for vegetables, milk and fruit. The first reason for edible food wastage was the exceedance of the expiry date, the second one the personal tastes.

Finally, waste composition analyses were carried out on the residual waste and on the organic fraction separated at the source. The total avoidable food waste turned out to be 27 kg per

inhabitant per year on average, dominated once again by vegetables (35%), bread (25%) and fruit (17%).

What has emerged is that raising awareness and educating are two major pillars for reducing food waste, in order to influence the consumers' behaviour. Awareness can be more easily raised by stressing the monetary value of food waste losses, but a proper communication of the environmental impacts can also help. Thanks to the results of the project, new methodologies for assessing wastage at the different stages of the food chain have been defined and will be made available to the Italian institutions, to allow for a systematic monitoring of food waste.

Waste Management & Research serves as a forum for exchanging research expertise and scientific ideas supporting the development and application of novel waste management options. Thus, *Waste Management & Research* invites researchers and practitioners to submit manuscripts focusing on ways to reduce food as well as other waste. Since the topic encompasses both technical aspects as well as societal ones, a holistic approach is essential in order to avoid the risk of oversimplifying the problem.



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