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Science for Environment Policy

Food waste: prevention in the service sector would have major environmental benefits

Approximately 88 megatonnes (Mt) of food are wasted every year in the European Union[1], causing 186 metric tons (Mt) carbon dioxide equivalent (CO2-eq) — a universal measure for all greenhouse gases. The impact of food waste on the climate, acidification and eutrophication is around 15–16% of the environmental impact of the entire food chain. In developed countries, food waste is high at the point of consumption— so significantly reducing food losses would require a food-waste reduction in households and the food-services sector.

The United Nations Sustainable Development Goals (SDG) include a target for halving global food waste by 2030 compared to 2015 (SDG 12.3). The European Commission's (EC) goal is more ambitious —to halve food waste by 2020 and reduce resource input into the food chain by 20% by 2020 (as outlined in the EC Resource Efficiency Roadmap).

To achieve the UN's SDG goal, the food-service sector would need to implement significant food-waste reduction measures. This study aims to assess the impact of such measures in 13 case studies to establish whether the UN goal is achievable and to examine the associated environmental benefits. Food waste within this study was defined as food which is produced for human consumption but is then re-directed for non-food use (including animal feed) or waste disposal. Food-waste prevention does not include the inedible parts of food, such as shells, bones and fruit and vegetable peel.

The researchers examined studies analysing food waste from food services in Switzerland, Germany, Austria, Finland and the UK, examining how food services can reduce food waste across the entire supply chain. The reduction scenarios were based on 13 case studies in Germany and Switzerland, with a full assessment of the environmental impacts in Switzerland. All food categories were considered, excluding alcohol due to a lack of data. Food-waste quantification includes data from 2005–2017, with 2017 used as the status quo scenario, as this year has the most data in the literature.

The 13 case studies included 20 datasets from food-waste measurements in 29 food-service sub-sectors (including three health, five education, four staff catering, 13 hotels and four restaurants). Eight datasets were collected by the researchers, eight were collected by food services internally and four were collected in school canteens by students.

For most datasets, food waste was sorted into categories of waste type and by the main ingredient of the food. Food-waste reduction was estimated for each sector individually and was calculated by measuring food waste before and after introducing food-waste reduction measures, such as smaller portion size or different serving systems (plate-serving versus buffet canteen).

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Food waste: prevention in the service sector would have major environmental benefits *(continued)*

In addition to the 13 case studies, a progressive restaurant, focusing on food-waste minimisation, was used to estimate the long-term potential of food-waste reduction. Over-production is avoided in this restaurant by using the sous-vide technique of cooking. Meals are packaged in small, vacuum-packable quantities and cooked in a water bath at a regulated temperature; the vacuum packaging extends the shelf-life of both the uncooked and the cooked food and allows it to be cooked in batches of one to five portions — amounts that are sure to be consumed. Plate waste is reduced by serving smaller portions (350–400g) with the option of refills. The customers are also given information on the impacts of food waste. The restaurant aims to use around 77% of unmarketable vegetables and products close to their store shelf lives to prevent waste. Staff are trained in efficient food-waste-cutting techniques.

Food waste in food services in Europe was calculated using data from 1 024 food-service sub-sectors (healthcare, hotels, restaurants, staff catering, school and university canteens) across Austria, Finland, Germany, Switzerland and the UK. The composition of status quo food waste in each sub-sector was based on 13 measurements.

To calculate the status quo food-waste amounts per meal in Europe — first the average food waste per meal per sub-sector was calculated; with a weighting per sub-sector added based on the share of main meals served per year. For the lifecycle assessment (LCA) food-waste amounts per subsector were multiplied by the per-kilo environmental impacts of the corresponding sub-sectors. Lifecycle impact assessment (LCIA) was completed for climate change impacts using the Intergovernmental Panel on Climate Change's (IPCC) global warming potential 100a method[2] for regionalised land and water impacts on biodiversity and for an aggregated summary of groups of data. Land and water use for food production can lead to loss of biodiversity, so this is also considered by the study.

Existing avoidable food waste was found to be 108 g/meal (13% of purchased food), causing 238 g CO2-eq) per meal. Food-waste reduction achieved in the case studies was, on average, 38% of status quo, with 32% for the education sub-sector and 62% in the business sub-sector. The 38% average food-waste reduction lowers its climate impacts by 41% and its biodiversity impacts by 30%. In the study's extended reduction scenario, food services use 50% non-marketable vegetables that would otherwise be wasted. In combination, food-waste amounts are reduced by 70% with potential climate savings of 239 kilotonne (kt) CO2-eq (67% of total food-waste impacts in Swiss food services).

The researchers conclude that the UN's SDG goal is realistic and can even be exceeded in the long term. However, meeting the goal would require food-service providers, large and small, to participate, requiring implementation of effective measures and training over the course of the decade. Initial investments and political support are important to reach all smaller food-service providers, but, for relatively little effort, there can be big gains for the environment, and customers' motivation to reduce their own food waste can also be positively affected. Aside from environmental benefits, the researchers note that food-waste reduction in food services could offer considerable potential for financial savings.

1. Data for 2012, concerning whole food, including inedible parts, and excluding food used for animal feed.

2. A measure of how much heat a greenhouse gas traps in the atmosphere for up to 100 years, relative to CO2. For more information see: IPCC Fifth Assessment Report, 2014 (AR5): https://www.ipcc.ch/report/ar5/syr/