FOOD FORWARD NDCs

Reducing food waste in gastronomy sector, retail and at household level

Overview

The UN Environment Programme **estimates** that 19 percent of total global food production may end up as *food waste* at the retail and consumer stages. **Food waste** refers to the food fit for human consumption yet is lost due to spoilage or being discarded at the retail and consumption stage of the supply chain. In contrast, **food loss** refers to any loss of edible food at the production, harvest, transport or processing stages in the food chain, and also resulting from certain retail practices and purchase criteria (e.g., selling decisions resulting in edible produce not being harvested).

Concrete measures to implement

Reducing food waste at the gastronomy, retail and household level requires a mix of policy measures to improve practices and change behaviours in how food is handled, prepared and consumed. Programs should be designed to ensure that all populations, particularly those groups most at risk of food insecurity and malnutrition (e.g., children), have equitable access to adequate, culturally appropriate, sufficient, affordable, safe and nutritious food for healthy diets. Planning and policy development should consider power imbalances and inequalities between different actors within agriculture and food systems. Measures include:

- Implement regulatory requirements:
    - Mandate food waste and surplus reporting and reduction targets for retailers, especially large corporations.

- Set **organic waste bans** that prohibit food waste from being sent to landfills, encouraging retailers and other downstream supply chain actors to reduce their food waste. Legislation could require the distribution of unsold edible food to charities or food banks. A more moderate policy option would be to disincentivise waste by instituting landfill tipping fees.
- Date labelling regulation for retailers and food processors. (See ***Regulating food quality and safety***).
- Set expiration dates more closely related to the real shelf life of products. However, this may require further research. For instance, the US Food and Drug Administration (FDA) has acknowledged that food date labels are generally not based on exact science, so the development of more accurate expiration dates will likely require **gathering of new information** from laboratory-based experiments, predictive modelling and risk assessments, among other sources.
- Reject regulations that prohibit the removal of discarded food (i.e., "dumpster diving") while keeping in accordance with health and safety standards.

- Implement incentive and disincentive programmes:

  - **Payments or rewards** given to households to encourage them to waste less food represent an alternative to **PAYT schemes**. These payments or rewards typically consist of either vouchers paid to individuals or waste management fee refunds paid back to individuals. Unlike PAYT schemes that impact households with different levels of problem awareness, reward schemes tend to reach mostly the households that have a high level of problem awareness and act responsively.
  - Incentivise retailers to sell locally produced food: Selling food produced closer and more directly to consumers – for example, at farmers' markets or farm shops – reduces the amount of good-quality food that is rejected for not meeting the strict product standards of supermarkets in terms of weight, size and appearance. Local supply chains can improve access to nutritious foods for all consumers at affordable prices, if accompanied by additional public support to build the necessary **equity-sensitive infrastructure** for food storage and transport.

- Provide fiscal incentives (e.g., tax credits or a reduction in waste collection tax) for businesses that reduce food waste or donate surplus food.
- Incentivise retailer's use of **price discounts** for food nearing its "best before" or "use by" date.
- Incentivise retailers to reduce food waste by supporting food waste reduction and recovery programmes in the retail markets, for example, via funding for food storage facilities, educational programming and waste audits.
- **Pay-as-you-throw schemes** (PAYT) apply the "polluter pays" principle and charge households based on the amount of residual, organic and bulky waste they send to third-party waste management. To be effective, PAYT schemes should define proper waste separating practices, include well-developed infrastructure to collect different waste types (e.g., residual waste, paper and cardboard, plastics, bio waste, green cuttings and many recyclables), a good level of citizen awareness and an appropriate pricing scheme (e.g., **weight-based pricing** with variable rates dependent on waste type to provide the right incentives). PAYT schemes can be applied specifically to food waste and can be made more effective by providing individuals/households with **feedback** (e.g., detailed information about waste generation habits), as well as a transparent, fair and realistic price policy design. It is important to incorporate context specific behavioural insights into the development of PAYT schemes.
- Avoid any potential negative externalities in the design of economic incentive schemes, i.e. increased purchases of (ultra-)processed foods rather than healthy, perishable foods.

- Integrate requirements for food waste prevention in public procurement: Public sector buyers can make procurement contracts – for example, for public schools or hospitals – conditional upon the adoption of food waste prevention targets and measures taken by companies. In addition, public procurement contracts could also require companies to advance broader goals for healthier diets, more sustainable production and more equitable, inclusive sourcing that benefits local communities, smallholders, peasants, family farms, women, Indigenous Peoples and youth. For additional guidance on public procurement, see ***Integrating healthy and sustainable diets in public procurement***.

- Develop a market to redistribute unsold products, discarded by retailers but still safe for consumption, to charities or food banks. It is important that food redistribution programmes focus on providing fresh, nutritious and decent foods and are formulated in a way that is not demeaning to recipients.
    - To encourage retailers to donate unmarketable food, **retailers need to be unburdened from uncertainties regarding legal liability** through the right policy framework. For example, the U.S. has a relevant law in place – the so-called Good Samaritan Act – to limit donors' liability.
    - **Food banks** absorb surplus food and channel it to those in need. To strengthen food banks, more funding support and assistance in building a network with relevant organisations, public institutions, firms and stakeholders are necessary.
    - **Surplus food management systems** channel surplus food from manufacturers or retailers to charities. These systems can be tied to economic incentives.
        - Offer tax benefits to companies that have set up a surplus food management system.
        - Provide financial support to charities that prefer suppliers with surplus food management systems.
    - Support the creation of **social supermarkets** (SSMs). SSMs are a retail formula where retailers receive surplus food and other consumer goods from partners (e.g., manufacturers and retailers) for free and sell them at discounted prices to people living in (or at risk of) poverty.
- Promote **redistribution of unsold or uneaten foods for animal feed** (e.g., for livestock or pets). Policy programmes can facilitate connections between donors and recipients (i.e., logistical support) and provide tax incentives to donors. Such programmes could be paired with regulations and educational programmes to ensure donated foods are safe for animal consumption.
- Promote **public institution reforms (e.g., at the school-level)**, including:
    - Support food waste reduction and recovery programmes in schools; for example, via funding for food storage facilities, educational

programming and waste audits. In designing reforms, incorporate behavioural insights into programming.

    - Implement "Offer Versus Serve" (OVS) meal reimbursement model which allows students to decline some of the food offered in a reimbursable lunch or breakfast.

- Fund targeted awareness and education campaigns that provide consumers/households with clear, consistent and easy-to-follow information. They can prevent over-purchasing and overconsumption by inducing behavioural changes, increase the acceptance of "imperfect produce" (fruits and vegetables) and clarify confusions – for instance, about date labelling.
- Work with retailers to create retail environments enabling consumers to reduce food waste in households, where most food waste occurs. Promoting the use of a greater variety of package sizes made with recyclable materials can accommodate diverse consumer needs and contribute to reduced food waste and plastic waste at the household level. A Swedish study found that around one quarter of food waste could be related to package size. An FAO study in the Philippines found that consumers' ability to purchase small quantities can reduce their food waste. Conversely, bulk quantities often lead to high levels of retailer/consumer food waste.
- Promote development and use of advanced software and infrastructure for tracking, quantification and analytics of food waste.

Enabling governance measures

- Adopting a national strategy for reducing food waste: This national action plan for preventing and reducing food waste within national borders should include programmes, policies, practices, incentives and/or related measures to influence the actions of farmers, companies, consumers and political bodies. One recommended approach for designing national strategies is the so-called Target-Measure-Act approach. Targets establish the overall goals to be achieved. Measures define the scope, methods, base year, end year, milestones, frequency, entities and reporting mechanisms related to measuring progress. Acts include actor-specific interventions, public policies, public-private partnerships and investment. To be effective, a national strategy requires political support, financial resources, monitoring and an accountability mechanism.

- Coordination on the design and implementation of food waste programmes and food waste policy frameworks at different levels of government.
- Integrated appraisal of policy options. For example, WRAP have produced a **Wales Food Waste Routemap** outlining the policies required to deliver food waste reduction targets.
- Better infrastructure for redistribution and repurposing of unused food.

Tools and MRV systems to monitor progress

Calculators and trackers

FLW Value Calculator

The Food Loss and Waste Protocol ("FLW Protocol") provides tools for measuring food loss/waste, including the FLW Value Calculator.

Link: https://www.flwprotocol.org/why-measure/food-loss-and-waste-value-calculator/

FLW Standard

The Food Loss and Waste Protocol ("FLW Protocol") provides tools for measuring food loss/waste, including the FLW Standard. The FLW Standard enables a wide range of actors (including companies, countries and other organisations) to measure how much food loss/waste is created and identify where it's occurring, thus enabling targeted food loss/waste reduction efforts.

Link: https://www.flwprotocol.org/flw-standard/

ReFED Insights Engine

The ReFED Insights Engine provides a number of tools, including the Impact Calculator, which helps to quantify the climate, natural resource, and food security impacts of wasted food at various levels (farm, retail, residential, etc.).

Link: https://insights.refed.org/?_ga=2.237381315.2126543555.1694102636-2006014956.1694102636

Data resource

WRAP Waste & Resources Action Programme

Development of country-level food waste databases and reports, such as those prepared by the UK NGO Waste & Resources Action Programme (WRAP).

Link: https://wrap.org.uk/taking-action/food-drink/actions/action-on-food-waste

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Food Waste Atlas

The Food Waste Atlas provides information for companies and governments to understand how food loss/waste is occurring. It allows access to data at different levels (global, regional and national) and supports alignment of measurements with international standards

Link: https://thefoodwasteatlas.org/

Smart Scales

Smart scales to weigh/categorise food waste, identify contributing factors and calculate costs of the waste. For PAYT programmes, radio frequency identification (RFID) can be used to weigh the volume of waste generated per household and bill accordingly.

Link: https://flwprotocol.org/case-studies/ikea-food-food-precious-food-waste-initiative/

Guides and handbooks

FAO

FAO Technical Platform on the Measurement and Reduction of Food Loss and Waste includes a variety of publications (case studies, reports, discussion papers, etc.) addressing food waste.

Link: https://www.fao.org/platform-food-loss-waste/resources/publications/en

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Food Waste Index Report

A 2024 assessment by UN Environment Programme for measuring global food waste across retail, food service and household sectors. In addition to establishing a baseline for progress tracking, the report provides global and national estimates of food waste, offers guidance for measuring food waste and suggests effective approaches to reducing food waste, with an emphasis on public-private partnerships.

Link: https://www.unep.org/resources/publication/food-waste-index-report-2024

Consumer Behaviour Guide (2022)

Guide produced by UN Environment Programme and World Resources Institute (WRI) that enables key stakeholders across the food system to assist consumers in decreasing food waste through behavioural changes.

Link: https://champions123.org/publication/guide-changing-behavior-help-more-people-waste-less-food

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Climate change mitigation benefits

- Interventions at the retailer and consumer stage have the **greatest impact** on lowering emissions in terms of return per unit of avoided food loss/waste.
- A **study of PAYT schemes at the municipal level in Germany** estimates that implementation of PAYT schemes, including but not exclusive to food waste, can reduce GHG emissions by 91 kg CO_2e per capita per year.

Other environmental benefits

- Potential reduction of water, energy and other inputs used for crop production.
    - Reduced risk of **eutrophication** due to reduced agricultural production. Eutrophication is the process by which aquatic systems become over-enriched with nutrients such as nitrogen and phosphorus due to the run-off of agricultural inputs (e.g., fertilisers into water systems). There are several types of emissions associated with eutrophication, including air pollution (e.g., sulphur dioxide and

nitrogen oxides) and water pollution (e.g. nitrates, ammonium, nitrogen and phosphorus).

- Reduced **acidification** due to reduced inputs associated with agricultural production (e.g., fertilisers and pesticides). Types of emissions associated with acidification include sulphur dioxide, ammonia and nitrous oxides.
- Reduced use of fertilisers and fossil energy sources improves air quality.

Adaptation benefits

- Food waste reduction **contributes to long-term food system resilience** and adaptation through:
  - Reduction of resource use and GHG emissions, particularly methane, a potent greenhouse gas associated with disposal of food in landfills. Methane has a warming effect **more than 80 times** more powerful than carbon dioxide in the first two decades of its lifespan.
  - Reduced pressure on ecosystems and biodiversity.

Other sustainable development benefits

- SDG 2 (Zero hunger): End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- SDG 12 (Responsible consumption and production) and SDG 12.3 to "by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses."
- **Less direct SDG benefits** could fall under:
  - SDG 1 (No poverty)
  - SDG 6 (Clean water and sanitation)
  - SDG 8 (Decent work and economic growth)
  - SDG 10 (Reduced inequalities)
  - SDG 11 (Sustainable cities and communities)

- SDG 13 (Climate action)
- SDG 14 (Life below water)
- SDG 15 (Life on land)

Main implementation challenges and potential negative externalities and trade-offs

- Establishing and operating PAYT systems can require significant resource inputs from municipalities. Costs are not always easy to predict since the price of collection, transport and treatment of waste can vary for various reasons (e.g., fuel prices). These schemes are also affected by geography. For instance, in a country with a hot climate, biowaste must be collected more frequently for hygiene reasons, potentially leading to higher collection costs. Other challenges include clear communication of pricing; perceived fairness of pricing; geographical differences in waste management systems; monitoring of functionality of waste management system and PAYT scheme; and implementation of technologies that identify and weigh waste.
- Increase in availability of food through reduced food waste could have a **negative impact on incomes of farmers and other supply chain actors**, as it could lead them to sell less and/or receive less for their products due to reduced retailer/consumer demand. This could offset the initial gains in food loss reductions.
    - In international food supply chains, reduced waste by consumers and/or retailers in high-income countries could **lower prices and incomes of farmer and supply chain actors in lower-income countries** from where the products were sourced.
- In high-income countries, access to food itself is much less of an issue than access to healthy, nutritious food. Therefore, reduced food waste in these countries is **not necessarily going to benefit food-insecure groups** as much as improving access to nutritious food.
- PAYT and other economic incentive schemes may **incentivise** people to “cheat” the system by moving waste to neighboring communities or engaging in illegal dumping.

Measure to address challenges and potential negative externalities and trade-offs

- Undertake more studies to address uncertainties regarding costs/pricing of PAYT schemes in different contexts, and to inform the design of more dynamic, accurate pricing schemes. Incorporate behavioural insights into policies and programs.
- Increased **consumer awareness** of food waste, particularly in developed countries where the problem is more severe.
- In **high-income countries**, food waste interventions should involve a targeted approach focusing on food redistribution and healthy foods. Eliminating food insecurity in these countries will also necessitate a broader set of social policies beyond the food system to account for inequities, poverty and the marginalisation of some groups.
- Use of "**safety nets**" (e.g., cash transfers) to protect farmers and other groups impacted by revenue losses that could result from the implementation of food waste interventions.

Implementation costs

- For PAYT schemes, "unrecovered costs" are the difference between total costs of implementing the scheme and the total revenues generated from the scheme. Given proper governance and operating measures, it is **possible** to keep unrecovered costs low while maintaining high rates of food waste collection.
- In a **study** of over 6,000 Italian municipalities, overall waste management costs fell by roughly 10% per capita after adopting PAYT schemes. This represented a cost reduction of 20-40%.
- The City of **Treviso** in Italy adopted PAYT and other food waste-related measures. In 2015, the average waste fee per household in Treviso was 186 euros, while the average for the rest of Italy was 305 euros.
- The City of **Seoul** has installed radio frequency identification (RFID) bins for their municipal PAYT scheme. As of 2016, each bin costs 1.7 million won (approximately USD 1300) to install and can service 60 households. As of 2016, each of the 10 litre bags commonly used for the PAYT bins cost

between 170-800 won (approximately USD 0.1 – 0.6 per bag), with wealthier districts paying more.

    - As of 2023, in Seoul, there is a fee of **2,800 won** (slightly over USD 2) for every 20 litres of food waste.

- The national **South Korean food waste programme** (which includes PAYT schemes) costs about USD 600 million per year to operate.

Interventions in practice

- UNEP's West Asia office collaborated with Hilton hotels in Dubai to pilot "Green Breakfasts" and "Green Ramadan" campaigns, modelled after UNEP's **Recipe of Change**. Changes to plate size, food presentation and food service prompted guests to reduce waste. The highly successful pilots resulted in a more than 60% reduction of guest plate waste, as measured by Winnow's AI food waste measuring platform.
- There are several national-level initiatives for reducing food waste. Examples include the UK's **Food Waste Reduction Roadmap** (private initiative), the **United against Food Waste** initiative in the Netherlands, Germany's **National Strategy for Food Waste Reduction**, and the Australian **National Food Waste Strategy**
- The **UK supermarket Tesco uses packages that prolong the shelf life of fruit**. The package comes with a strip coated with a natural product that absorbs ethylene, a hormone that plants produce for ripening fruit. The package has been successfully tested on tomatoes and avocados, and it does not result in any extra costs for consumers.
- WWF Philippines' **"SoilMate"** project offers smart management solution for diverting unavoidable organic wastes from landfills, reducing greenhouse gas (GHG) emissions and building healthy soil by connecting businesses and households in Metro Manila to a mobile application-based composting subscription service.
- **WRAPs research** on the separation of food waste collections suggests a correlation between separated food waste collection from households and lower levels of overall household food waste.

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