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Implementation Guides May 2019

How to manage food waste and organics on the path towards zero waste

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Effective food- and organic-waste management is integral to any city's zero waste roadmap. A third of food produced globally is lost or wasted, and food waste accounts for around 8% of global greenhouse gas (GHG) emissions.¹ It is a major urban source of methane, an extremely potent GHG. Separating organic waste from dry recyclables like plastic and glass allows cities to recover and process this waste. Organic waste is also a valuable resource for cities, as it can be used to produce renewable energy, reduce hunger through food surplus programmes, restore nutrients and moisture to soils and more. Cities including Vancouver, Dubai, Buenos Aires and San Diego all have aggressive waste diversion goals with a strong emphasis on organic waste.²

This article sets out how cities can implement food and organic waste management initiatives effectively, including assessment, collection and transport, treatment, and communications and public engagement. Also read [How cities can reduce food waste by households and businesses](#), which looks at ways to limit the volume of food that becomes waste.

This article deals with food *waste* – the inedible parts of food left over after consumption, and edible food purchased and wasted by consumers. It does not address food *loss*, which refers to edible food that is lost or damaged in the production, storage, processing and distribution phases of the food lifecycle, before it reaches consumers. Food waste is most common in global north cities, while food loss is most common in global south. This article is aimed at global north cities.

How to manage food and organic waste in Global South cities looks at both food waste and food loss and is aimed at cities with less advanced waste management systems.



English

Set ambitious food- and organic-waste reduction goals

A food- and organic-waste reduction goal is usually set as part of cities' wider waste reduction goals, rather than being established separately. The goal can be an absolute reduction, or more commonly, a reduction in the total percentage of organics being sent to disposal.

Ideally, **aim for zero waste**. Read *Why cities need to advance towards zero waste* to understand the need for this goal, and for examples of cities already working toward it, such as San Francisco, Auckland and Oslo.³

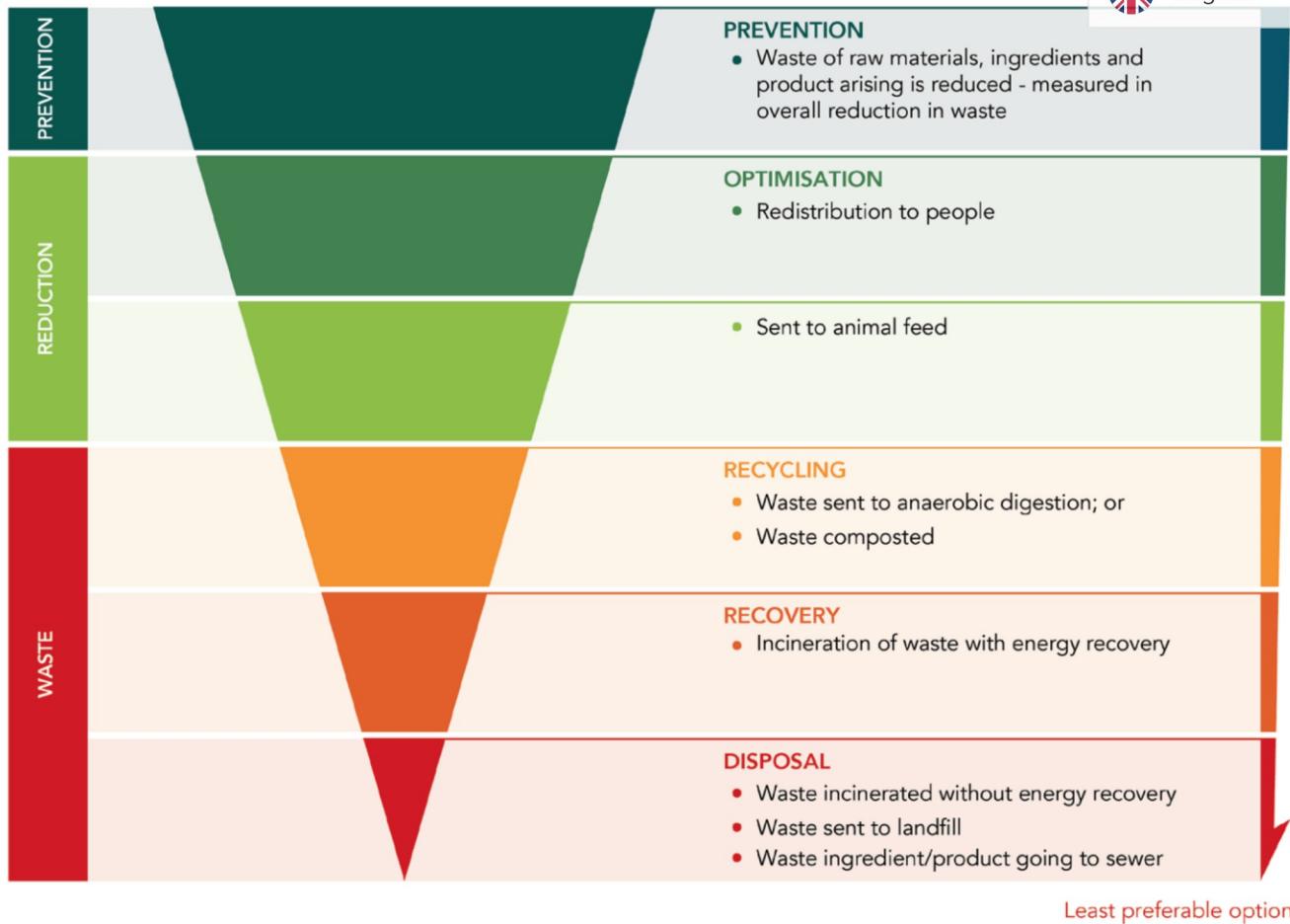
To get started, the best-practice standard in line with Sustainable Development Goal 12.3 is to **target a 50% reduction in food lost and wasted by 2030, achieving at least a 25% reduction by 2025**. This target has been adopted by *C40 Good Food Cities Declaration* signatory cities.

Include wider systemic benefits and revenue-generation potential in your evaluation of the costs of diverting and treating organic waste

Investment in the treatment of organic waste can be costly, but the benefits of diverting and treating food waste and organics outweigh the costs when assessed across the urban system.

Diverting organic waste from landfill reduces disposal and site maintenance costs, and extends the operational life of the site and equipment. In addition, establishing separate, efficient collection and treatment systems for organics enables cities to reap the benefits highlighted in *Why cities need to advance towards zero waste*. The food waste management hierarchy sets out the options that deliver the biggest benefits.

The food waste management hierarchy



Source: World Biogas Association and C40, 2018

The wider benefits must be incorporated into any evaluation of costs and benefits. An innovative example of this is Oslo's Climate Budget, first implemented in 2017, which adopts a budget in accordance with the city's climate strategy.

Cities should also consider the revenue they can generate from the outputs of organic waste treatment systems. These projects can earn revenue by selling:

- **Biogas and renewable natural gas**, which can be used as a supplement to natural gas supplies for cooking, heating and lighting, or as fuel for municipal or commercial fleets.⁴
- **Electricity**, from the generation of power from biogas.
- **Heat**, which is a by-product of the anaerobic digestion process, can be supplied to industrial and residential buildings, greenhouses and for industrial processes. Cities and towns such as Polderwijk, Netherlands and Este, Italy are successfully using heat generated in this way in district heating projects.
- **Digestate**, which is a by-product of the anaerobic digestion process and can be used as a bio-based supplement for food production.
- **Compost**, which is produced from the aerobic treatment of waste and is valuable as a soil



Read Chapter 6 of *Global Food Waste Management: An implementation guide for cities* for more information about these products and how to use them to raise revenue.

In summary, cities' evaluation of the costs and benefits of systems to divert and treat organic waste must include cognisance of these wider benefits.

Early ambition in Milan, Italy

Milan was an early adaptor of food waste collection and treatment, implementing separate food waste collection for households in 2012. After a 1.5-year trial, food waste collection was introduced city-wide. Today, every household and business in Milan has access to food waste collection, reaching 1.4 million inhabitants and totaling 140,000 tons of food waste collected annually.⁵

Assess your city's organic waste sources and the characteristics of organic waste they generate

By measuring and understanding food waste and its sources, cities can inform policies to reduce and divert this waste and track the effectiveness of these efforts. The *Food Loss and Waste Accounting and Reporting Standard* provides a framework that cities can use to shape their approach to this data collection. Methods for quantifying and characterising organic waste generally target a broad sample of commercial and residential generators to approximate results for the city as a whole. Methods such as weighing and waste composition analysis require direct access to waste, but a survey is often sufficient to fill data gaps and to begin engaging local stakeholders. Surveys can also be valuable tools for gathering information on willingness-to-pay and openness to change in waste handling, as well as on food waste quantities, current methods of disposal and the major industries producing edible and inedible food waste.

Cities should analyse this data to identify the biggest producers of organic waste, trends, and the best opportunities for organic waste recovery. This is a vital step for informing the approach to diversion and treatment, including effective logistics for collection, transfer and treatment.

Develop and pilot a multi-approach strategy for organics collection and gain the support of waste-management operators

A strategy for organics should incorporate a variety of approaches, informed by your organic waste assessment, any existing experience with organics diversion and treatment, existing regulations and infrastructure, and available resources and objectives. The main approaches are:

- Residential ‘bring-schemes’, where organics are deposited at collection points by
- Kerbside residential collection and commercial collection.
- Commercial-only collection focused on restaurants, institutions and other large-scale hospitality operations.
- Combined green and food waste collection, and integrated home-composting.

Pilots enable cities to test, validate and adapt collection approaches, participation models and pricing, ahead of an eventual city-wide rollout. They also provide a way to build alliances and to counter opposition.⁶ Cities should consider targeting the pilot at areas that are likely to have higher participation rates, with phased introduction of the scheme across the rest of the city enabling lessons learnt to be incorporated into the next phase of investment.

During this initial phase it is important to gain the support of waste-management operators. Work closely with waste collection and recycling companies to design the pilot. If collection operations are contracted, incorporate contractual language that supports diversion objectives. A great example of this is San Francisco’s partnership with Recology, the city’s sole municipal solid waste collector, which works with the city to support its kerbside recycling and composting effort. Efficiency is a main concern for waste collection and hauling companies, so it is important to seek approaches that maintain tonnages while minimising distance travelled.⁷

Read Chapter 3 of *Global Food Waste Management* and *Municipal Curbside Compostables Collection: What Works and Why* for more guidance on food waste collection, including on gaining the cooperation of waste-management operators and generators.

A 2,000 household pilot in Auckland, New Zealand led to a city-wide rollout in 2018

Auckland’s food waste accounts for 40% of its total waste. To meet its objective of zero waste by 2040 set out in the *Auckland Waste Management and Minimization Plan*, Auckland launched a pilot food waste collection programme focused on 2,000 households, with the plan to scale up to a city-wide focus in 2018. The pilot gave officials insights into rates of participation, volumes, contamination levels, waste generator behaviors and overall satisfaction. It enabled the city to determine best practices that work locally. Food waste volumes are expected to reach 50,000 tonnes per year by 2020, up from 2,500 tonnes in 2018.⁸

Using incentives and nudges to encourage – or require – waste generators to separate organics

To maximise diversion and be effective, food- and organic-waste systems need high rates of participation by large-scale waste generators in organics separation and collection schemes, to provide large quantities

of high-quality organic waste (which is not contaminated with other materials). Incentives and rewards to encourage their participation can be operational, financial or a combination, but measures that rely on positive reinforcement typically work better than punitive measures like fines.⁹

The main ways that cities can encourage the separation of organics and maximise diversion are:¹⁰

- **Creating a clear price differential.** Volume-based schemes, such as Pay-as-you-throw (PAYT) systems are effective ways to do this, and have been used successfully in cities around the world – cities charge a fee for collecting waste, but exempt organics (and often other recyclables). The fee should be split into a base minimum fee (which helps to minimise illegal dumping) and a variable component.
- **Providing more frequent organic collection** than regular trash collection. This has proven effective where fees are not an option, but can also be used alongside a fee-charging scheme.
- **Requiring businesses to segregate their waste, and banning commercial organic waste from landfills.** Establish requirements for large, commercial waste generators over a certain capacity to separate their waste, with penalties such as fines for those that don't comply. Since 2014 the state of Massachusetts, for example, has banned commercial organic-waste disposal to landfills by businesses generating one tonne or more of food waste a week.¹¹

Cities can also lobby for changes to laws, typically set at national level, to incentivise commercial waste producers to prevent and reduce food waste, particularly:¹²

- **Good Samaritan Laws.** Pass laws to limit the liability of food donors, enabling more recovery of surplus edible food to be redistributed to foodbanks and other donors, avoiding it becoming waste.
- **Tax credits and tax deductions for food redistribution.** Provide tax and fiscal incentives for food donation. For example, in France and Spain, up to half of the value of donated food can be deducted from the taxable revenue of the donor.

PAYT in Aschaffenburg, Germany

The county of Aschaffenburg has implemented a pay as you throw system for its kerbside waste collection for over 20 years, leading to increased food waste capture and reduced residual waste. The county's total waste-management fee has decreased over this period, as the reduced residual waste has led to lower expenses.¹³

Invest in treatment technology that is right for your city, and explore opportunities to leverage existing treatment infrastructure

Determine which type of organics processing facility is best suited to the city's expected waste stream, and

the available budget and space. The two most common ways to process organic waste are  English, composting and anaerobic digestion.

- **Anaerobic digestion** is a process through which organic waste is broken down to produce biogas for biofertilizer in a sealed, oxygen-free tank. It is used to process large volumes of food waste, and is therefore appropriate for city-wide organics collection efforts. It is particularly well suited to cities where land is expensive and where renewable energy can be sold at a premium.
- **Composting** is a simpler process that can be used to treat any volume of organic waste. Cities with better access to land that have lots of green waste may find large-scale windrow composting to be a good alternative.

The World Biogas Association and C40's report *Global food waste management, an implementation guide for cities* explains these options and their costs in more detail.

Before building a new facility, cities should assess whether the construction of a dedicated facility is necessary. In cities where waste treatment facilities are already operating nearby, cities should determine whether the operating firms have sufficient additional treatment capacity to accept the volume of food waste generated by the city, whether they are permitted to handle food waste, the tip fee costs, and the quality requirements for food waste that the facility can accept. In cities where wastewater facilities are already digesting sludge from wastewater treatment, the co-digestion of food waste at these facilities is also an option if the wastewater operators have available digester capacity and the space available for waste reception and pre-treatment.¹⁴

Other technical resources cities can use to work out the appropriate treatment system are:

- Technical guidance on the operation of organic waste treatment plants.
- OrganEcs – a cost estimating tool for managing source-separated organic waste.

Locate a treatment facility close to the city and existing waste-management sites

Organic waste is heavy, due to its water content. It is less economical to transport organic waste over larger distances. Identifying an organic waste processing facility, or locating a new processing facility, close to the city and near existing waste-management sites is important for its viability. This also helps to minimise traffic and other disruptions associated with operations.

A short-term solution for cities that are unable to locate the processing facility close to the city is to create local transfer stations. These collect waste from multiple local haulers, ensuring that trucks travelling to distant facilities can operate at maximum capacity, and reducing the financial burden on local haulers until

a more local processing facility can be built.



Raise awareness and engage stakeholders with tailored communications campaigns

Communications campaigns are required to convince waste generators of the need for these systems, and to communicate how they are encouraged or expected to participate in them. Communications efforts should be on-going over the lifespan of any initiative, and should evolve over time to encourage more aggressive separation and minimisation efforts.

Communications strategies need to be targeted for different groups, informed by data about their waste generation and an understanding of the messages that resonate and motivate. Convene local representatives of community groups, consumers, businesses and the informal sector, as well as environmental and health advocates, to determine the benefits that should be promoted to each group. Identify and consult these groups early to ensure their buy-in, establish a common understanding, identify opportunities for collaboration and gain their support in implementation.

The main local benefits that cities typically highlight are:

- **Climate and environmental sustainability.** In addition to reduced greenhouse gas (particularly methane) emissions, these systems help to reduce impacts on the quality of surface and groundwater, odours and the presences of vermin, birds and other carriers of communicable disease at dumpsites.
- **Anti-hunger and food security.** Edible surplus food – food that has been produced but that can't be sold or used by the producer and would therefore otherwise become waste – can be redistributed to people through food banks and charities that provide food to those in need.
- **Local renewable energy generation.** The opportunity to use organic waste to generate local renewable energy, which can improve local energy security and, depending on utilities structure, potentially lower energy bills.

Cities can:

- Develop simple informational materials. For example, Sao Paulo produced a [Handbook for Schools on Organic Waste Management](#).
- Run targeted educational sessions with schools, community groups and business coalitions.
- Raise awareness through social media campaigns.



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