



# Waste Not, Want Not: An Overview of Food Waste

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## Introduction

More than 1 billion people (one-sixth of the world's population) suffer from chronic hunger. It is not a problem of supply, since the food system continues to provide enough food to feed the world.<sup>1</sup> One of the reasons for this disconnect is simply waste. By many estimates, one in three food calories is currently wasted.

To feed a world of 9 billion people by 2050, to ensure people do not go hungry, and to safeguard food security, significant changes need to occur throughout the current food system, from crop management and harvesting, to processing and consumption. These required changes are global in scale and not confined to a single commodity or region. Reducing the amount of food that is wasted in the system—in upstream cultivation and harvesting, midstream production, and downstream consumption—represents one important lever to help solve the current and expanding food crisis.

The U.K. government recently estimated that 30 percent of all food grown worldwide may be lost or wasted before it even reaches the end consumer. Some estimates place this loss as high as 50 percent.<sup>2</sup> While estimates of the scale of global food waste across the system vary, there is consensus at least that waste is substantial. Given the scale of the problem, there are significant opportunities for solutions to be considered by companies, by policy makers, by farmers, and by consumers.

This brief provides a high-level view into:

- » Where food waste occurs
- » The effects of food waste
- » Actions businesses are taking to combat food waste

## Overview

### FOOD WASTE THROUGHOUT THE SYSTEM

It is estimated that simply halving the current amount of food waste by 2050 could reduce the projected amount of food required to feed 9 billion people by 25 percent compared to today's production numbers.<sup>3</sup> Doing so, however, requires a better understanding of where food waste occurs and its root causes.

<sup>1</sup> U.K. Government Office for Science, "The Future of Food and Farming: Challenges and Choices for Global Sustainability," January 2011.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

### Low-income countries

In poorer countries, much of the food waste occurs on the farm or soon thereafter. Depending on the crop, an estimated 15 to 35 percent of food may be lost in the field because of poor agricultural techniques and other factors, including droughts, flooding, and pests. Another 10 to 15 percent is lost during processing, transport, and storage given a lack of modern facilities, trucks, and access to refrigeration. Indeed, in many poorer countries storage infrastructure, such as grain silos is worse than it was 30 years ago, the net result of reduced government investment in agriculture.

### High-income countries

In richer countries, the problem results less from a lack of technical know-how and financial resources than behavior. Cultivation and harvesting is more efficient than in low-income countries, but post-harvest waste downstream is significant. Around 30 percent or more of food is discarded in processing, transportation, the retail environment (supermarkets and restaurants), and people's kitchens.

- » In the United States, 34 million tons of food waste is generated each year. With 97 percent ending up in landfills or incinerators, food represents nearly 14 percent of the total municipal solid waste stream.<sup>4</sup> U.S. per capita food waste has increased approximately 50 percent since 1974, reaching more than 1,400 kcal per person per day or 150 trillion kcal per year.<sup>5</sup>
- » In the EU, 47 percent of food waste occurs at the household level (agriculture is excluded from this calculation). Looking at it another way, food that ends up being discarded by households represents 25 percent of food purchased (by weight) according to Waste and Resources Action Programme (WRAP).<sup>6</sup>

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### What's on the Menu to Waste Today, Honey?

Consumers in rich countries throw away a large proportion of the food they buy. A breakdown of this waste by food type follows:

- » Salad: 50 percent wasted
- » Bread: 33 percent wasted
- » Fruit: 25 percent wasted
- » Vegetables: 20 percent wasted

Source: *The Economist*, "Waste Not, Want Not," Special Report on Feeding the World, February 24, 2011.

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### THE EFFECTS OF FOOD WASTE

Given the current scale of food waste in the system, its effects are broad and significant.

#### We're literally throwing money away

In the United States, as much as 30 percent of food, worth around US\$48.3 billion, is thrown away on an annual basis. At the household level, 25 percent of the food we bring into our houses ends up in the trash. This discarded food adds up to approximately US\$2,200 annually of a household's food bill.<sup>7</sup> At the retail level, there is also significant food loss. A study in the United States found that

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<sup>4</sup> <http://www.epa.gov/osw/conservation/materials/organics/food/fd-basic.htm>

<sup>5</sup> Hall KD, Guo J, Dore M, Chow CC (2009) The Progressive Increase of Food Waste in America and Its Environmental Impact. PLoS ONE 4(11): e7940. doi:10.1371/journal.pone.0007940

<sup>6</sup> Waste and Resources Action Programme, [www.wrap.org.uk/index.html](http://www.wrap.org.uk/index.html).

<sup>7</sup> Jonathan Bloom, *American Wasteland: How America Throws Away Nearly Half of Its Food (And What We Can Do about It)*, Da Capo Press, 2010.

the average estimated food loss for fruit and vegetables at supermarkets in 2006 was a little more than 8 percent,<sup>8</sup> while fresh meat, poultry, and seafood had a lower average loss rate of 4.5 percent. Losses also occur in other food categories, notably dairy, that rely heavily on conservative “best before” labels to mitigate the risk of food safety issues. There’s a cost to this not only in terms of food that is not sold, but also the added cost of waste removal fees. While inventory management has improved significantly over the past decade, these waste figures still amount to significant losses.

**We’re contributing to climate change**

When excess food is disposed of in a landfill, it decomposes and is a significant source of methane gas, which is 20 times more effective at trapping heat in the atmosphere than carbon dioxide. Last year, food waste in the United States accounted for slightly more than 100 metric tons of methane originating from landfills.<sup>9</sup> At the European level, the overall environmental impact is at least 170 metric tons of CO<sub>2</sub> equivalent emitted per year (close to the total greenhouse gas emissions of Romania or of the Netherlands in 2008 and approximately 3 percent of total EU27 emissions in 2008). This calculation includes all steps of the life cycle of food waste (agricultural steps, food processing, transportation, storage, consumption, and end-of-use impacts).

**We’re wasting energy**

Wasted food is wasted energy. The calories in wasted food are never consumed, and the energy that went into growing the food, processing it, packaging it, and transporting it to the consumer is also wasted. Each year, U.S. food waste represents the energy equivalent of 350 million barrels of oil,<sup>10</sup> enough to power the whole country for a week.

**We’re needlessly exacerbating the global water crisis**

Wasted food is also wasted water. Water losses accumulate as food is wasted before and after it reaches the consumer. Calculations estimate that food waste accounts for more than a quarter of total freshwater consumption globally. To meet current food demand, more than 3,000 liters of water per person per day are used in crop production.<sup>11</sup>

As the following table shows, food waste occurs along the value chain:

Stage in Food Value Chain		Examples of Food Waste
Upstream	Harvesting	Edible crops left in fields, ploughed into fields, and eaten by birds or rodents, as well as suboptimal harvest timing
		Crops damaged because of poor harvesting technique
	Threshing	Poor technique
	Transport and distribution	Poor transport infrastructure (loss because of spoiling or bruising)

<sup>8</sup> Jean C. Buzby, Hodan Farah Wells, Bruce Axtman, and Jana Mickey, “Supermarket Loss Estimates for Fresh Fruit, Vegetables, Meat, Poultry, and Seafood and Their Use in the ERS Loss-Adjusted Food Availability Data,” EIB-44, U.S. Dept. of Agriculture, Economic Research Service, March 2009.

<sup>9</sup> EPA, *Methane and Nitrous Oxide Emissions from Natural Sources*, April 2010.

<sup>10</sup> Amanda Cuellar, and Michael Webber, “Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States,” *Environ. Sci. Technol.* 2010, 44, 6464-6469, American Chemical Society, July 2010

<sup>11</sup> Lundqvist, J., C. de Fraiture and D. Molden, “Saving Water: From Field to Fork—Curbing Losses and Wastage in the Food Chain,” Stockholm International Water Institute (SIWI) Policy Brief, 2008

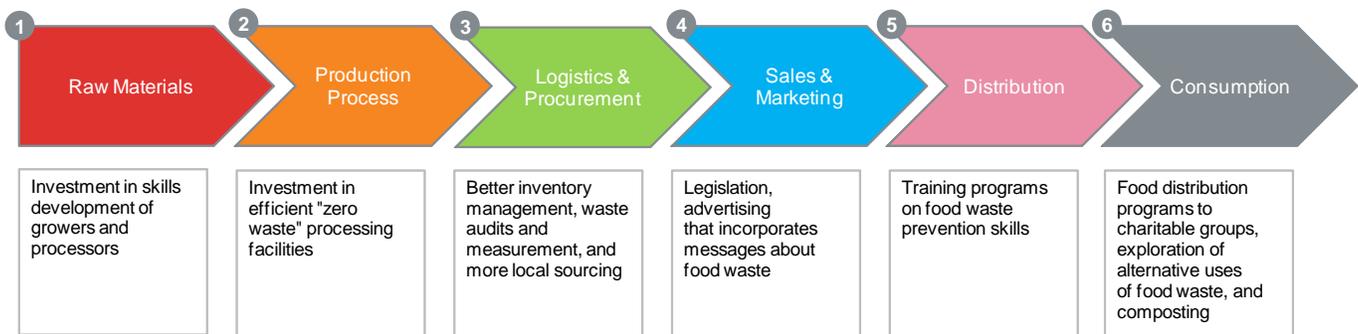
	<b>Storage</b>	Pests, disease, spillage, contamination, and natural drying out of food
<b>Midstream</b>	<b>Primary processing (cleaning, classification, pounding, grinding, packaging, soaking, drying, and milling)</b>	Contamination in process that causes loss of quality
	<b>Secondary processing (mixing, cooking, frying, and cutting)</b>	Contamination in process that causes loss of quality
	<b>Product evaluation (quality control)</b>	Product discarded and out-grades in supply chain
	<b>Packaging (weighing, labeling, and sealing)</b>	Inappropriate packaging that damages produce Grain spillage from sacks Attacks by rodents
<b>Downstream</b>	<b>Marketing (publicity, selling, and distribution)</b>	Damage during transport
		Losses caused by lack of cooling and cold storage
	<b>Post consumer (discards and consumer education)</b>	Plate scrapings (at home and away from home)
		Poor storage and stock management in homes
		Poor food preparation technique
		Food discarded in packaging because of confusion over “best-before” and “use-by” dates
<b>End of use (disposal of food waste)</b>	Food waste inconsistently treated, resulting in significant mixing with other wastes	

Source: Adapted from Parfitt et al., “Food Waste Within Food Supply Chains: Quantification and Potential for Change to 2050,” the Royal Society, 2010.

### COMBATING FOOD WASTE

Tackling food waste requires increasingly smart management approaches across the food system to avoid needless losses while also preserving food quality and maintaining food safety levels. On the consumption side, it requires behavioral change. This may be the hardest to influence given the entrenched practices and norms of food consumers around the world.

The schematic below provides an overview of areas of action to reduce food waste along the chain, from harvesting through consumption. While these actions are not currently on the scale needed to address food waste comprehensively, they do show some of the incremental innovations being explored and implemented, and the important role business plays in this regard.



### Private-sector actions

Private sector actions are taking place from “farm to fork.” Some practices to note include:

- » **Investing in growers and processors to increase skills, share technical knowledge, and build capacity:** There are more than 500 million smallholders involved in agriculture around the world.<sup>12</sup> To diversify supply, companies are recognizing the importance of these smallholders. Yet inefficiencies abound, resulting in food loss in the harvesting and storage process. To address such inefficiencies, companies are investing in capacity building measures, including on-farm training, partnerships with technical NGOs, and improved management systems that promote more sustainable practices.

A lack of knowledge about better practices also often results in food waste in processing facilities, especially in developing countries. General Mills founded the Partners in Food Solutions program, which helps improve the capacity and expertise of local food processors through the sharing of scientific, technological, and food-innovation knowledge. In a flour mill in Tanzania, for example, the installation of a quality control lab and improvements made to washing and pre-drying operations increased the capacity from one metric ton per day to five.

- » **Rethinking production processes:** Food loss is occurring in production processes when meat scraps, bruised fruits and vegetables, and other damaged finished products are discarded. Unilever is looking at its factories to use all materials more efficiently. In South Africa, it was able to reduce by 50 percent the amount of food waste being sent to the landfill. The waste—which includes tea dust, spice, and stock powders—is being used in municipal compost schemes with the resulting compost used by nonprofit food initiatives like the Buhlebemvelo Community Garden Forum. Other companies are also building “zero-waste” facilities and incorporating food into these zero-waste goals.
- » **Addressing food waste in sales and marketing:** Companies are encouraging less wasteful behavior through promotions and awareness campaigns. Tesco, the U.K.-based supermarket, launched a “Buy One, Get One Free Later,” campaign during 2010 to offer a deferred benefit to customers buying a particular product. This strategy was a new spin on traditional “buy one, get one free” deals that often result in products spoiling before consumers can use them.

<sup>12</sup> Oxfam International, “Think Big. Go Small. Adapting Business Models to Incorporate Smallholders into Supply Chains,” 27 May, 2010

- » **Providing training programs for foodservice staff:** Some foodservice providers are training staff in skills to prevent waste from occurring in the restaurant environment. Sodexo, for example, has designed kitchen and dining hall management systems to minimize waste in food storage and preparation. The company has also established programs to compost waste from foodservice operations. Through its Better Tomorrow Plan, the company is investing heavily in the sharing, replication, and consistent implementation of best practices across its footprint.
  
- » **Reducing in-store food losses:** As noted previously, food losses are a regular occurrence in the supermarket environment. Walmart has set a goal to reduce food waste in its stores in emerging markets by 15 percent and by 10 percent in other markets by 2015. This can be accomplished through better ordering and in-store inventory management as well as partnering with food donation programs and others in the community for whom food waste is a resource (e.g. local farmers). Other companies are using food waste as a source of fuel. For example, in 2009, Sainsbury's (a U.K.-based supermarket chain), collected the food waste from its Scottish stores and converted it into biofuel at a site in Motherwell, Scotland.
  
- » **Establishing food redistribution programs:** Companies are partnering with food shelters and charitable groups to redistribute food that would otherwise go uneaten. Leading supermarkets in the United States are donating products to domestic hunger relief organizations like Feeding America. Similarly, restaurants such as Pret à Manger, a casual sandwich chain, actively promotes sustainable treatment of food that would otherwise be wasted. In London, for example, sandwiches that are not sold by the end of the day are delivered to local food banks by the company's fleet of electric vans.

## CONCLUSION

Companies are increasingly exploring solutions to food waste—in light of the financial and environmental impacts as well as emerging regulatory measures. In the EU, related policies include the revised Waste Framework Directive, Landfill Directive, and the Communication on bio-waste management. Requirements for separate collection of food waste are being evaluated and building upon existing efforts in places like Ireland, parts of Canada, and several cities in the United States.

Additional solutions to food waste diversion and generation remain to be explored both upstream and downstream, and in high- and low-income countries. Given the range of challenges, addressing the problem of food waste in a systemic way will also require that new forms of collaboration are developed at the farm, factory, retail, and consumer levels.