

THE BUSINESS CASE FOR REDUCING FOOD LOSS AND WASTE

A report on behalf of Champions 12.3

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



SUMMARY

According to available estimates, approximately one-third of all food produced in the world intended for human consumption is lost or wasted. This level of inefficiency in the global food system has significant economic, social, and environmental impacts. It amounts to economic losses of \$940 billion per year. It means that more than a billion tons of food never gets consumed each year, while one in nine people remains undernourished. In addition, food loss and waste is responsible for an estimated 8 percent of annual greenhouse gas emissions; if it were a country, food loss and waste would be the third-largest emitter after China and the United States.

Reducing food loss and waste therefore can generate a triple win: for the economy, for food security, and for the environment. But why is food loss and waste reduction not already being implemented at sufficient scale by countries, cities, and companies? Interviews with public and private sector decision-makers indicate that one reason is many leaders may not be aware—or may not believe—that there is a solid “business case” for reducing food loss and waste. For instance, the associated costs of food loss and waste may be buried in operational budgets, accepted as the “cost of doing business,” or considered not worth the investment needed to achieve reductions.

Our analysis of historical data indicates, however, that there is a robust business case for countries, cities, and companies to reduce food loss and waste. Consider the United Kingdom (UK). In 2007, the country launched a nationwide initiative to reduce household food waste. By 2012, it had achieved an astounding 21 percent reduction in household food waste relative to 2007 levels. The ratio of purely financial benefits to financial costs attributable to the UK initiative was more than 250:1 (250 to 1), a very substantial return on investment. In other words, every £1 invested in efforts to catalyze household food waste reduction resulted in savings of £250.

ABOUT THIS PUBLICATION

Prepared on behalf of Champions 12.3, *The Business Case for Reducing Food Loss and Waste* analyzes the financial impacts of historical food loss and waste reduction efforts conducted by a country, a city, and numerous companies. The results show that the financial benefits of taking action often significantly outweighed the costs. This publication also identifies a number of complementary strategic benefits of reducing food loss and waste. It concludes by outlining how governments and companies can embark on reduction efforts.

AUTHORS

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Cities also can realize high returns on their investment in food waste reduction. In 2012–13, six West London boroughs implemented an initiative to reduce household food waste. The initiative resulted in a 15 percent reduction, with a benefit-cost ratio of 8:1 when considering just the financial savings to the borough councils. In other words, for every £1 invested in the effort, £8 was saved. The benefit-cost ratio was even higher, 92:1, when the financial benefits to households located in the boroughs were included.

For companies, the return on investment in food loss and waste reduction also can be high. We analyzed nearly 1,200 business sites across 17 countries and more than 700 companies, representing a range of sectors including food manufacturing, food retail (e.g., grocery stores), hospitality (e.g., hotels, leisure), and food service (e.g., canteens, restaurants). This publication is the first time these data have been made available. We found that 99 percent of the sites earned a positive return on investment. The median benefit-cost ratio—where half of the sites achieved a higher ratio while half achieved a lower ratio—was 14:1. In other words, half of the business sites earned greater than a 14-fold financial return on investment. Thus, for every \$1 (or other relevant currency) invested in food loss and waste reduction, the median company site realized a \$14 return. Company sites with the highest returns tended to be restaurants. Hotels, food service companies, and food retailers tended to have ratios between 5:1 and 10:1.

There also is a nonfinancial business case. Our interviews with government and business leaders indicate that there are a number of strategic yet nonfinancial motivators for reducing food loss and waste. These relate to food security, waste regulations, environmental sustainability, stakeholder relationships, and a sense of ethical responsibility. Although these benefits may be hard to quantify in monetary terms, our interviews indicate that these nonfinancial reasons are an important part of the business case for action.

In light of this demonstrated business case for reducing food loss and waste, public and private sector decision-makers should proceed to target, measure, and act:

- **TARGET.** Targets set ambition, and ambition motivates action. Governments and companies should adopt a reduction target of 50 percent by 2030, which is aligned with Target 12.3 of the Sustainable Development Goals.
- **MEASURE.** What gets measured gets managed. If they have not already started, governments and companies involved in the food supply chain should start to measure their food loss and waste, and monitor progress toward achieving the target over time. *The Food Loss and Waste Accounting and Reporting Standard* can help entities proceed with measurement.
- **ACT.** Action is what ultimately matters. Governments and companies—working alone and together—need to take bold measures to reduce food loss and waste through every stage in the food supply chain. There is something for everyone to do.

Target, measure, and act. If enough countries and companies do this, the world will take a big step toward a future that improves financial performance, food security, environmental protection, and prosperity for all.

THE CHALLENGE

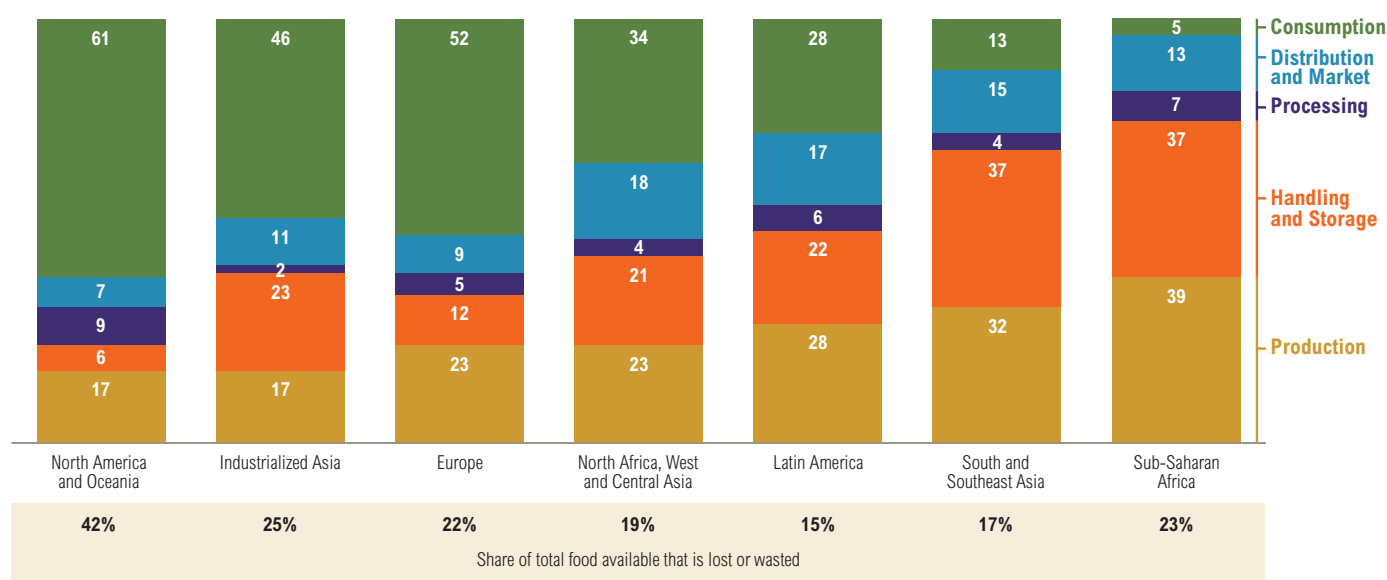
Food loss and waste is a challenge of epic proportions. According to the best available global estimates compiled by the Food and Agriculture Organization of the United Nations (FAO), approximately one-third of all food produced in the world in 2009 was lost or wasted.¹ In this context, “food loss and waste” refers to food intended to be eaten by people that leaves the food supply chain somewhere between being ready for harvest and being consumed—often referred to as “farm to fork” (Box 1). This huge level of inefficiency has substantial impacts.

Consider the economic costs. Food loss and waste results in roughly \$940 billion in economic losses globally per year.² In Sub-Saharan Africa, postharvest grain losses total up to \$4 billion per year.³ In the United States, the average family of four wastes roughly \$1,500 worth of food annually,⁴ while in the United Kingdom, the average household with children discards approximately £700 of edible food each year.⁵

Consider food security. In some regions, such as Sub-Saharan Africa and South Asia, food losses near the farm are predominant (Figure 1) and can reduce farmers’ income and, at times, even their ability to feed their families. In other places—including Europe and North America—food wasted near the fork can affect local people who are food-insecure when the food is not donated or redistributed. Regardless of where the food loss and waste occurs, in a world where one in nine people is undernourished,⁶ the fact that more than a billion tons of food never gets consumed is a travesty.⁷

Consider the environment. Food that is harvested but ultimately lost or wasted consumes about one-quarter of all water used by agriculture each year.⁸ It requires cropland area the size of China to be grown.⁹ And it generates about 8 percent of global greenhouse gas emissions annually.¹⁰ To put this in perspective, if food loss and waste were a country, it would be the third-largest greenhouse gas emitter on the planet—surpassed only by China and the United States.

FIGURE 1. Losses near production are more prevalent in developing regions while food waste near consumption is more prevalent in developed regions (Percent of total kcal lost or wasted per region, 2009)



Note: Numbers may not sum to 100 due to rounding.

Source: WRI analysis based on FAO. 2011. *Global Food Losses and Food Waste—Extent, Causes, and Prevention*. Rome: UN FAO.

BOX 1. Definitions of food loss and waste

“Food loss and waste” refers to food intended to be eaten by people that leaves the food supply chain somewhere between being ready for harvest and being consumed. Some definitions also include the associated inedible parts of food.

“Food” refers to any substance—whether processed, semiprocessed, or raw—that is intended for human consumption or, more specifically, ingestion. “Inedible parts” refers to components associated with a food that, in a particular food supply chain, are not intended to be consumed by people. Examples of associated inedible parts could include bones, rinds, and pits. What is considered

inedible depends strongly on the cultural context. In this publication we note if associated inedible parts are included in the data.

The distinction between food loss and food waste is not always sharply defined but where used is primarily based on the underlying reasons for material leaving the food supply chain. “Food loss” is typically considered unintended and caused by poor functioning of the food production and supply system or by poor institutional and legal frameworks. Examples include food that rots in storage because of inadequate technology or refrigeration, or food that cannot make it to market because of poor infrastructure and

goes unconsumed. “Food waste” occurs due to intended behaviors—by choice, poor stock management, or neglect. Examples include food that has spoiled, expired, or been left uneaten after preparation.

The term “food loss” is often used with reference to what occurs between the farm and the retail store, while “food waste” is often used with reference to what occurs from the retail store through to the point of intended consumption. However, given that food can leave the food supply chain unintentionally and intentionally anywhere from farm to fork, both “food loss” and “food waste” can apply anywhere along the food supply chain.

Source: Food Loss & Waste Protocol. 2016. *The Food Loss and Waste Accounting and Reporting Standard*. Washington, DC: World Resources Institute; Global Initiative on Food Loss and Waste Reduction. 2016. *Definitional Framework of Food Loss and Waste*. Rome: FAO.

THE OPPORTUNITY

Reducing food loss and waste can generate a “triple win.” It can save money for farmers, companies, and households. It can help feed more people. And it can alleviate pressure on water, land, and climate.

Avoiding food loss and waste to begin with or diverting the loss and waste that does occur to higher value uses (hereafter collectively referred to as “reducing food loss and waste”) can generate so many benefits that the United Nations General Assembly highlighted it as a priority on the global agenda. In September 2015, countries of the world formally adopted a set of 17 Sustainable Development Goals (SDGs) as part of the 2030 Agenda for Sustainable Development—global goals to end poverty and hunger, protect the planet, and ensure prosperity for all.¹¹ SDG 12 seeks to “ensure sustainable consumption and production patterns.” The third target under this goal, Target 12.3, calls for halving per capita global food waste at the retail and consumer levels and for reducing food losses along production and supply chains (including postharvest losses) by 2030.

But if it can generate so many benefits, then why are countries, cities, and companies not already doing more to reduce food loss and waste? Interviews with public and private sector decision-makers suggest one reason is that leaders may not be aware of or may not believe there is a solid “business case” for reducing food loss and waste. For instance, the associated costs of food loss and waste in some cases are too often buried in operational budgets and are accepted as a “cost of doing business.” In other cases, decision-makers may believe that the costs of taking action—such as identifying food loss and waste hotspots, purchasing new equipment, or implementing process or behavioral changes—outweigh the benefits.

Through this publication, we seek to address this issue. First, we provide quantitative evidence from historical examples that there can be a strong financial business case for countries, cities, and companies to take action to reduce food loss and waste. Second, we provide evidence of the nonfinancial business case for action. Third, in a call to action, we recommend steps for accelerating food loss and waste reduction efforts to realize the business case.

THE FINANCIAL BUSINESS CASE

Our quantitative research, complemented by interviews with more than two dozen leaders in government and business,¹² found that there is often a strong—sometimes very strong—financial reason to pursue food loss and waste reduction. The underlying logic is relatively basic. It takes financial resources to grow, harvest, store, process, transport, market, and purchase food. Therefore, when food exits the food supply chain before reaching its intended use—consumption by people—some entity is not recouping a return on the investment it made.

To illustrate, suppose farmers grow and harvest rice but it gets damaged by pests during storage. The farmers incur a financial loss because they cannot sell that rice on the market. If a food manufacturer procures milk from dairies but then some of that milk spoils or spills during processing, then the manufacturer will not earn a market return on that portion of its purchased raw milk; it is essentially raw material waste. If the bakery in a supermarket bakes bread in excess of demand and it remains unsold, then the retailer does not capture a financial return on the ingredients, energy, and staff time spent baking that bread. Likewise, consumers that throw out purchased but uneaten food are essentially throwing away a portion of their disposable income. In addition, in some circumstances, an entity incurs direct financial costs when disposing of uneaten food, such as payments to a waste management company to collect surplus food or tipping fees to transfer uneaten food to a landfill.

However, taking steps to reduce food loss and waste often requires financial expenditures. It takes money to conduct an inventory to identify where and how much food is being lost and wasted, to determine what actions to take, and to implement those actions. These costs can include expenditures on staff, consultants, new equipment, process redesigns, awareness campaigns, or other activities.

Target 12.3 of the Sustainable Development Goals calls for halving per capita global food waste at the retail and consumer levels and for reducing food losses along production and supply chains (including postharvest losses) by 2030.

Therefore, in order for there to be a financial business case for taking action to reduce food loss and waste, the financial benefits of taking action need to outweigh the financial costs. So do they? And if they do, to what degree? In this section, we address these questions.

Based on the suite of real-world, historical examples for which we could obtain both financial benefit and cost data, we estimate the “benefit-cost ratios” of taking action to reduce food loss and waste for a country, a city, and a large number of companies. The “country” analysis takes the perspective of a national government implementing a food waste reduction initiative. Its scope is the initiative itself and thus includes the costs incurred and benefits accrued by government agencies, private sector actors, and the citizens the government represents. The scope of the “city” analysis is similar in terms of costs and benefits, but it is presented from the perspective of a city government implementing an initiative. Each “company” analysis takes the perspective of a company—particularly that of a corporate site such as a manufacturing facility or retail outlet—since this is often the locus of where investment decisions are made. Box 2 summarizes the methodology, data set, and limitations for the benefit-cost ratio analyses in this publication.

BOX 2. Methodology for quantifying benefit-cost ratios

The analyses of benefit-cost ratios have the following parameters:

- **BENEFITS AND COSTS.** Our analyses factor in both the benefits and the costs of reducing food loss and waste. Decision-makers want to know both in order to assess if the benefits of action outweigh the costs of action and, if so, to what degree.

Costs include how much an entity pays to quantify where and how much food is being lost and wasted, identify which actions it will take, and implement those actions. This includes expenditures on staff, consultants, equipment, process redesigns, product redesigns, awareness campaigns, and more.

The benefits are the financial gains from reducing food loss and waste. This includes optimizing food or raw material purchases (since more of what is purchased is consumed or used in a sellable product), lowering waste collection and management costs, reducing disposal fees (e.g., “tipping” fees), adding revenue from higher value food sales, and more.

- **INDIVIDUAL ENTITIES.** The benefit-cost ratios we develop are for individual entities such as countries, cities, and company sites. For example, through our engagement with entities led by Champions 12.3 and with other experts in the food loss and waste arena, we were able to find and access financial cost and benefit data for the United Kingdom and London. We were unable to access similar data for other countries and cities in part because targeted food loss and waste reduction efforts at the country and city level are a relatively new phenomenon. Even for those that have started to take action, too few have compiled and made available data on both the costs and the benefits of reducing food loss and waste.

We were able to access financial cost and benefit data for nearly 1,200 business sites spread across more than 700 companies and 17 countries (Australia, Belgium, China, France, Indonesia, Ireland, Italy, the Netherlands, Norway, Pakistan, the Philippines, Poland, Singapore, Thailand, the United Kingdom, the United States, and Vietnam). The data are from companies representing a range of sectors across the food supply chain, including manufacturing, food retail, hospitality, and food service. Companies range in size from low million US dollars to multiple billion US dollars in revenue. The sources of the data points are treated anonymously to preserve commercial confidentiality.

- **FINANCIAL FOCUS.** We recognize that food loss and waste can contribute to environmental impacts such as greenhouse gas emissions and social impacts such as food insecurity. Both types of impacts impose economic costs on society. Nonetheless, our benefit-cost ratio analyses focus only on the tangible financial cash flows of the costs and benefits of food loss and waste reduction. We do this because we observe that chief financial officers and budget directors often only consider financial cash flow analyses when making capital, process, or programmatic decisions.
- **WHO PAYS VS. WHO BENEFITS.** Our analyses assess who benefits and who pays for the food loss and waste reduction activity. This is an important consideration because motivation to act may not arise if the entity that would pay for food loss and waste reduction is different from the one that would benefit. The distribution of costs and benefits matters to public and private sector decision-makers and should not be overlooked when designing food loss and waste reduction initiatives. Where we identify instances in which those who

pay and those who benefit are different entities, we assess what interventions occurred to align motivations to act.

- **HISTORICAL DATA.** Our analyses are based on historical data, not modeled or pro forma calculations. Thus, our analyses reflect the actual costs entities incurred and the actual benefits realized via food loss and waste reduction efforts.
- **TIME PERIOD.** For each individual entity for which a benefit-cost ratio is calculated, we use the time period of the food loss and waste reduction effort. For instance, the United Kingdom’s nationwide initiative on reducing household food waste discussed in detail in this publication occurred over the five-year period from 2007 to 2012. Therefore, we included the available financial costs incurred and financial benefits realized during that five-year period. To the degree that some of the costs were one-time costs while some of the benefits continue to be realized after the fifth year, our approach results in conservative benefit-cost ratios. For the data from individual business sites, we standardized the data provided to us by calculating the financial costs and the financial benefits cumulated over a three-year period. Using a three-year time period enables us to capture the fact that for many sites, the majority of the costs occur in the first year and decline thereafter, while the financial savings start in the first year and continue each year thereafter. Nonetheless, a three-year time horizon is conservative to the degree that cost savings continue after year three with minimal continued investment.
- **DISCOUNT RATE.** For the business sites, the benefit-cost ratio is the ratio of the three-year cumulated discounted flow of financial benefits to the three-year cumulated discounted flow of financial costs. We apply a conservative 10 percent per annum discount rate.¹³

BOX 2. Methodology for quantifying benefit-cost ratios (continued)

Data limitations

To the best of our knowledge, our analyses to determine benefit-cost ratios over a large number of business sites using historical, nonmodeled data are the first of their kind. That said, while a step in the right direction, we faced limitations in data availability. First, a preponderance of the data we found and could access are for companies that are “closer to the fork” in terms of the food supply chain. These companies include food retailers, restaurants, food service providers, and hospitality firms. We have data on some food manufacturers, but it is a small share. We faced a large gap in available historical data from companies involved in the agricultural production, storage, and processing stages of the food supply chain. Second, the majority of data points (about 90 percent) are from developed economies, so there is a gap in historical financial data from developing economies. Third, when it comes to countries and cities, our worldwide search only found one of each with adequate data to develop benefit-cost ratios.

This publication includes all the data points from countries, cities, and companies that we could access after approaching many of the leading research institutions, governments, and private sector players engaged in the food loss and waste issue. We did not “cherry pick” a sample subset of data points from a wider population. Rather, we used all the data points we could find.

The challenge with data acquisition is four-fold. First, too few public and private sector entities have yet pursued dedicated food loss and waste reduction efforts. Second, for those that have, some are too early in their efforts to have generated benefit and cost figures. Third, even for those that have been taking action for some time, some have not been sufficiently recording financial data, most notably the financial costs incurred. Fourth, although we did not face this obstacle, some may be unwilling to share data.

Data recommendations

We seek to build upon this publication by expanding the scope of analysis. To do so,

however, requires more original data to become available. More countries, cities, and businesses need to not only implement food loss and waste reduction efforts but also record the financial costs and benefits of doing so. We strongly recommend that public and private sector decision-makers do this. Such information could improve the ability to assess the financial business case for food loss and waste reduction, could facilitate understanding differences in financial returns between types of entities, and could inspire entities to start tackling food loss and waste.

Key data gaps to fill include the financial benefits and cost data for:

- Countries
- Cities
- Private sector entities involved with agricultural production and processing—all types of private sector entities “close to the farm”—and those from developing countries
- Farmers in the developing world.

For a country

After scanning the world, the one country for which we could find both financial benefit and cost data is the United Kingdom. In 2007, the United Kingdom launched a nationwide initiative to reduce household food waste. By 2012—just five years later—it had achieved an astounding 21 percent reduction in household food waste¹⁴ relative to 2007 levels (Table 1).¹⁵

A cornerstone underpinning the UK initiative was the “Love Food Hate Waste” radio, TV, print, and online media campaign run by the Waste and Resources Action Programme (WRAP).¹⁶ “Love Food Hate Waste” raised awareness among consumers about how much food they waste, how it impacts their household budgets, and what they can do about it. For instance, the campaign educated consumers about proper food storage, freezer usage, preparation of the appropriate amount of food,

date labeling, and options for leftovers. The initiative’s collaboration with food manufacturers and food retailers stimulated innovations such as resealable salad bags, zip-lock cheese packs, subdivided packs for salads and meat slices, vacuum packs for meat and poultry, smaller-sized loaves of bread, meal planning tips, and food storage tips printed on grocery store plastic bags. The initiative also financed research to quantify the amount of household food and drink waste in the United Kingdom for 2007¹⁷ to establish base-year data, and financed research again in 2009¹⁸ and 2012¹⁹ to monitor progress.

The total cost of implementing these and other initiative-related activities during the five-year period of 2007–12 is estimated to be £26 million (Box 3).²⁰ Those incurring these expenditures were UK government agencies,²¹ local government authorities, and private sector signatories to the voluntary Courtauld Commitment (Box 4).

TABLE 1. **Business case: United Kingdom**

BACKGROUND	
SCOPE	Household food waste (excluding associated inedible parts) in the United Kingdom
TIME PERIOD	2007–12 (five-year period)
INVESTORS*	UK governments, local government authorities, and Courtauld Commitment signatories (food and drink manufacturers, food retailers)
ACTORS**	WRAP, local government authorities, Courtauld commitment signatories, community groups, and households
ACTION	Wide range of actions and activities including the public-facing “Love Food Hate Waste” campaign, a suite of actions by the private sector (including changes to date labeling, pack size and formats, in-store messaging, and TV and digital media advertising that included “Love Food Hate Waste” messaging), and quantification of food waste to monitor progress
FOOD WASTE REDUCTION	Household food waste (excluding associated inedible parts) in 2012 was reduced by 1.1 million tons relative to 2007 levels (a 21 percent reduction)
FINANCIAL IMPACT	
COST SAVINGS FROM FOOD WASTE REDUCTION	• £6.5 billion savings to households over 5 years attributable to the UK food waste reduction initiative - Savings reflect the purchase value to households of food waste that was prevented - Reflects the purchase value of the food waste only, not of the avoided packaging waste • £86 million savings to local UK government authorities over 5 years attributable to the UK food waste reduction initiative - Savings reflect avoided food waste disposal costs
COSTS OF REDUCTION	• £26 million over 5 years - Costs reflect the expenditures incurred by the actions of WRAP, local authorities, Courtauld Commitment signatories (food and drink manufacturers, retailers), and community groups
BENEFIT-COST RATIO	• More than 250:1
ENVIRONMENTAL IMPACT	
GHG EMISSIONS	3.4 million tons of greenhouse gases (CO ₂ e) avoided per year. This is equivalent to taking 1.4 million passenger cars off the road for a year.
WATER USE	1 billion m ³ of water saved. This is equivalent to 400,000 Olympic-sized swimming pools per year.
LAND USE	Avoided use of 430,000 hectares of land per year for food production. This is equivalent to an area twice the size of Luxembourg.

*Investors are entities that spend money to take action themselves and/or to drive behavior change of others to reduce food loss and waste.

**Actors are entities that implemented actions and made behavior changes resulting in food loss and waste reduction.

Source: WRAP analysis

BOX 3. Assessing costs in the UK initiative

Costs covered in the UK analysis are those associated with a wide range of actions including the “Love Food Hate Waste” campaign, date labeling changes, pack size and format changes, in-store messaging by food retailers, TV and digital media advertising that included “Love Food Hate Waste” messaging, and periodic quantification of food waste to monitor progress.

The UK analysis does not capture all of the theoretically possible costs since some are not easily quantified or monetized. For example, there is a financial cost to a food retailer or restaurant if it is unable to supply products to customers due to stock-outs, and this cost is likely higher than the cost of the wasted food that would occur if the company overstocked. The net financial impact will be related to the size of the markup on the food product. But whether stock-outs occurred and the net financial impact is very difficult to ascertain. Such “buffer stock” or “insurance against stock-out” motives also can apply to households where buffer stock costs are weighed against the cost of making extra trips to the store.

The UK analysis does not include some other forms of costs (and benefits). For instance, data were not available to assess the cost of time required to make a shopping list versus the benefit of saving time while in the store because one has a shopping list. Likewise, data were not available for the cost of learning new “waste efficient” cooking skills versus the benefits of acquiring these skills.

The total financial benefits of the reduction in food waste during the five-year period are estimated to be around £13 billion.²² These financial benefits were primarily the savings to households of the food waste that was prevented, measured by retail purchase value. Econometric analysis by WRAP indicates that approximately half of the reduction in food waste—and thus half the financial benefits—were due to factors beyond the UK initiative. These factors included higher food prices in the United Kingdom and the global financial crisis that triggered a recession in the country during this period.²³ The remaining benefits to households, £6.5 billion, were attributable to actions by WRAP and other initiative partners. Local authorities in the United Kingdom realized an additional £86 million in savings from avoided food waste disposal costs²⁴ attributable to the national initiative over the five-year period.²⁵

BOX 4. The Courtauld Commitment

The Courtauld Commitment is a voluntary agreement aimed at improving resource efficiency and reducing waste within the UK grocery sector. The agreement is funded by governments in the United Kingdom and delivered by WRAP. It supports the UK government’s objective of a “zero waste economy” as well as national climate change objectives to reduce greenhouse gas emissions. WRAP is responsible for the agreement and works in partnership with leading food and drink retailers, manufacturers, and suppliers who sign up and support the delivery of the targets. Phase I launched in 2005. With the Courtauld 2025 commitment, the agreement is now in its fourth phase. For more information, see: <<http://www.wrap.org.uk/content/courtauld-commitment-2025>>.

The resulting benefit-cost ratio attributable to the UK initiative was therefore £6.6 billion to £26 million, or more than 250:1 (250 to 1), a very substantial return on the investment made. In other words, for every £1 invested in efforts to catalyze household food waste reduction, more than £250 was saved.

As Figure 2 illustrates, the direct financial costs of taking action to reduce food waste were borne roughly equally by the private sector (i.e., food and drink manufacturers, food retailers) and by the public sector (i.e., national and local governments). The vast majority of the financial benefits were accrued by households. Thus who paid was quite different from who benefited. But this misalignment was bridged by the actions of the national and local governments, such as helping finance the “Love Food Hate Waste” campaign and funding WRAP, which in turn brought the private sector, government agencies, and technical expertise together in collaboration. National and local governments effectively acted on behalf of households—a logical role since governments represent households and are financed in part by household taxes.

Local government authorities (“councils”), however, were in a position wherein who paid was the same as who benefited. This arose primarily because councils avoided some of the disposal costs of household food waste within their jurisdictions. As Figure 2 indicates, councils on average more than made up financially for their investment.

FIGURE 2. Distribution of benefits and costs: United Kingdom*



* Benefits and costs attributable to the UK household food waste reduction initiative implemented by WRAP and partners.

** Food manufacturers and retailers realized financial benefits from increased product shelf-life and reduced product losses both in stores and in their supply chains. But given available data, it is not possible to accurately quantify the financial magnitude of these benefits. Interviews with managers highlight that these companies realized a number of nonfinancial benefits, too, such as strengthened customer relationships.

Source: WRAP analysis

What about the private sector? Figure 2 includes the benefits and costs to those companies that participated in the UK initiative.²⁶ Food manufacturers and retailers invested approximately £13 million over five years. But why would food manufacturers and retailers participate in an initiative that encourages households to consume more efficiently, which might lead to less food sales? More broadly, if households were going to save money due to eating more of the food they purchased and therefore buying less food overall, then would not the prospect of forgoing revenue have prevented companies in the food supply chain from participating?

A number of factors help to explain why companies nonetheless participated:

- First, interviews with managers of food manufacturing and food retail businesses that were involved indicate that they achieved financial benefits from longer product shelf-lives (due to improved packaging) and reductions in product losses, both in stores and in their supply chains. But given available data, it is not possible to accurately quantify the financial magnitude of these improvements.

- Second, interviewees highlighted that a number of nonfinancial benefits—such as strengthening customer relationships, boosting employee pride, and satisfying a sense of ethical responsibility—were clear motivators of action. For instance, once consumers realized—due to the UK “Love Food Hate Waste” media campaign—that they could save money by reducing their food waste, they expected retailers to help them do it. Retailers received feedback to this effect from surveys and via their websites. In response to this demand, retailers started informing customers how to reduce household food waste and thereby demonstrated that they were trying to help customers save money. We discuss this and other nonfinancial aspects of the business case further below.
- Third, the reduction in food sales to households did not translate into an equivalent loss of revenue to food retailers or companies further upstream. An econometric study by WRAP indicates that approximately 50 percent of the savings households accrued through the UK initiative were spent again in retail stores, often on higher-value foods (called “trading up”) or on nonfood items.²⁷

- Fourth, any losses in sales by the food industry that came as a result of consumers buying less food during 2007–12 seemed to have been offset by UK population growth during that time period. Data indicate that the overall quantity of food purchased in the United Kingdom remained stable during that time period.²⁸

In essence, to the degree any companies might suffer lost food sales, this was offset by other nonfinancial benefits and/or not considered enough to prevent them from participating in the initiative. Indeed, many of the companies continue to be involved in pursuing further reductions in food waste via the ongoing Courtauld 2025 initiative, and additional companies have joined since 2012. One can conclude, therefore, that some combination of the above factors created, and continues to create, a sufficient business case for company involvement with food loss and waste reduction efforts that go beyond a company's own operations.

What was the importance of having governments and business work together in partnership? The fact that the benefit-cost ratio was so high for the United Kingdom (more than 250:1) suggests that market failures with regard to food waste reduction existed prior to 2007, including lack of sufficient information (largely on the part of households) and misaligned incentives to act (who pays versus who benefits). Such failures imply that the “market” alone could not be relied upon to tackle food waste at the household level. Business-to-business, business-to-consumer, and government interventions were needed.

The reduction in food waste in the United Kingdom also generated a host of other benefits. For instance, it avoided an estimated 3.4 million metric tons of greenhouse gases each year, emissions that otherwise would have arisen from decaying food in landfills and the emissions associated with growing and processing the wasted food.²⁹ In addition, it saved 1 billion cubic meters of water and avoided the need to utilize 430,000 hectares of land for food production.³⁰

It is important to note that the magnitude of the impact experienced by the United Kingdom from 2007 to 2012 may not necessarily be exactly replicable in other countries. The magnitude of impact anywhere will be a function of several variables, including the nature and scale of the food waste reduction interventions, the initial level of public awareness, cultural factors, how long ago previous food waste reduction efforts (if any) had been pursued, the financial cost of disposing food waste (e.g., tipping fee rates), and prevailing economic conditions.

It also is important to note that early large-scale successes may reflect capturing the proverbial “low-hanging fruit,” but such fruit can run out. For instance, figures published in January 2017 indicate that household food waste reduction in the United Kingdom stalled during 2012–15, after the period covered by the economic analysis above.³¹ This trend highlights that sustained reductions in food waste require regular evaluation, review, and adjustment of approaches. Nonetheless, although detailed financial analyses have yet to be conducted, early estimates suggest that the benefit-cost ratio for the 2007–15 period was still around 80:1. In other words, £80 was saved for every £1 spent on actions to reduce food waste.³²

For a city

London is the one city for which we could find both benefit and cost data for food loss and waste reduction initiatives. In 2012, six West London boroughs started a targeted initiative to reduce household food waste, much like what had been done for the entire United Kingdom previously. Activities included various forms of communication and outreach to resident households, practical tips on managing food, and more. After just six months of activity, the initiative helped catalyze a 15 percent reduction³³ in total household food waste relative to preinitiative levels (Table 2).³⁴

The total cost of implementing initiative-related activities after one year was £168,500.³⁵ The financial benefits of food waste reduction to the West London borough councils during that year was £1.3 million. These benefits reflect the boroughs' avoided waste management and disposal costs.³⁶ The benefit to citizens was an additional £14.2 million, reflecting the avoided purchase value of food that otherwise would have been wasted.³⁷ Thus the total financial benefits to the London boroughs and their citizens amounted to £15.5 million.

The resulting benefit-cost ratio attributable to the London initiative was approximately 8:1 when considering only the cost savings to the West London boroughs, and 92:1 when adding in the benefits to households.³⁸ Both are substantial returns on investment. For every £1 invested by government authorities, they saved themselves £8. And when including the benefits to households in the boroughs, every £1 invested by government authorities generated £92 in benefit to themselves and the citizens of participating boroughs.

TABLE 2. **Business case: West London**

BACKGROUND	
SCOPE	Household food waste (excluding associated inedible parts) in six metropolitan boroughs of West London, UK (~600,000 households)
TIME PERIOD	2012–13
INVESTORS*	UK Department for Environment, Food and Rural Affairs; London Waste and Recycling Board
ACTORS**	London Waste and Recycling Board, Recycle for London, West London Waste Authority, Greater London Authority, Greater London Volunteering, WRAP, specific West London boroughs (i.e., Brent, Ealing, Harrow, Hillingdon, Hounslow, Richmond-upon-Thames), and households
ACTION	Local food waste reduction campaign involving radio, digital, and print advertising; 50 public relations activities, events, and community engagements; information on meal planning, checking food stocks, making shopping lists, correct use of refrigerator and freezer for storage, recipes for leftovers, cooking the right amount of food, and date labeling; quantification of food waste to monitor progress
FOOD WASTE REDUCTION	Total household food waste was reduced by 12,350 tons per year (a 15 percent reduction)
FINANCIAL IMPACT	
COST SAVINGS FROM FOOD WASTE REDUCTION	• Avoided disposal costs to participating London boroughs (£1.3 million) • Purchase value to households of food waste (excluding associated inedible parts) that was prevented (£14.2 million)
COSTS OF REDUCTION	• £168,500 - Costs reflect the expenditures incurred by the actors
BENEFIT-COST RATIO	• 8:1 for participating London boroughs • 84:1 for households living in participating boroughs • 92:1 for participating boroughs and households combined
ENVIRONMENTAL IMPACT	
GHG EMISSIONS	21,000 tons of greenhouse gases (CO ₂ e) avoided over a six-month period. This is equivalent to taking 9,000 passenger cars off the road.
WATER USE	6.1 million m ³ of water saved over a six-month period. This is equivalent to 2,500 Olympic-sized swimming pools.
LAND USE	Avoided use of 2,600 hectares of land for food production. This is equivalent to 2,200 European football fields.

*Investors are entities that spend money to take action themselves and/or to drive behavior change of others to reduce food loss and waste.

**Actors are entities that implemented actions and made behavior changes resulting in food loss and waste reduction.

Source: WRAP analysis

FIGURE 3. Distribution of benefits and costs: West London*



* Benefits and costs attributable to the food waste reduction initiative for six West London boroughs.

Source: WRAP analysis

As Figure 3 illustrates, the financial costs of the West London food waste reduction initiative were borne by the borough councils and national government, with financial support from the Department for Environment, Food and Rural Affairs and the London Waste and Recycling Board. The financial benefits were accrued by the boroughs and by households. Even when considering only the benefits and costs to the payer (national and local governments), incentives for action were aligned and sufficient; direct returns to the payer outweighed the costs to the payer. Action on food waste prevention in London continues through the TRiFOCAL London project,³⁹ funded by EU LIFE.

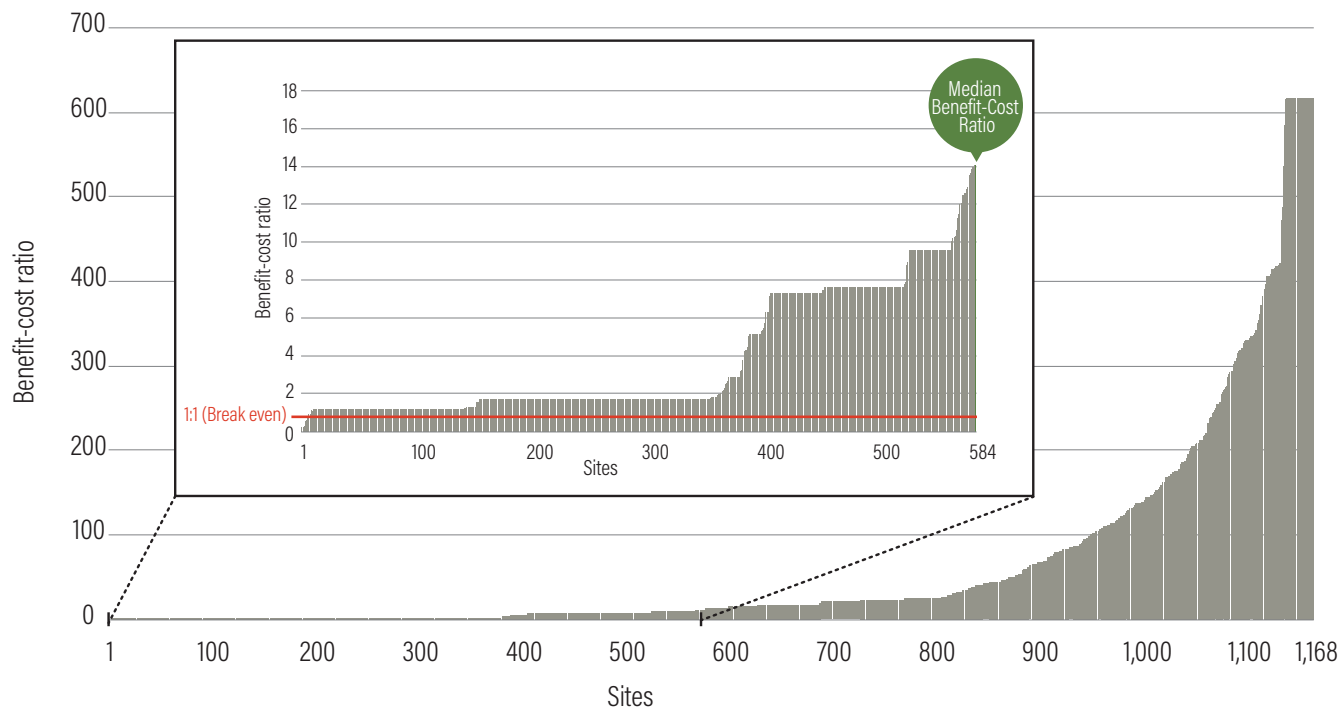
For companies

Through our engagement with companies whose leaders are members of Champions 12.3 as well as engagement with a number of other companies, we were able to access historical financial cost and benefit data for food loss and waste reduction efforts of nearly 1,200 business sites spread across more than 700 companies. These sites are located across 17 countries, ranging from Australia, China, and Vietnam to Ireland, the United Kingdom, and the United States.⁴⁰ These data come from companies representing a variety of sectors, including food manufacturing, food retail (e.g., grocery stores), hospitality (e.g., hotels, leisure), and food service (e.g., business canteens, restaurants).

More than 99 percent of the sites had a net positive financial return; that is, a benefit-cost ratio greater than 1:1. The median benefit-cost ratio—where half of the sites achieved a higher ratio while half achieved a lower ratio—was 14:1 (Figure 4). Thus, for every \$1 (or other relevant currency) invested in food loss and waste reduction, the median company site realized a \$14 return (Figure 5). Expressed in terms of return on investment (ROI), this is a 1,300 percent return on investment.⁴¹ Such a high return indicates that there can be a strong financial business case for companies to pursue efforts to reduce food loss and waste.

Across the company sites analyzed, the ratios vary widely, from 0.2:1 all the way to 618:1. Sites that are “closer to the fork” tended to have higher median ratios than those sites that are “closer to the farm” (Table 3). Moreover, company sites with higher ratios tended to have one or more of the following features: the location had not recently conducted a food loss and waste reduction effort (and therefore “low-hanging fruit” was available), required only simple changes in employee food management practices, or needed low or no capital investments since it already had equipment in place to monitor or reduce food loss and waste (e.g., scales, containers, refrigeration units). At the other end of the spectrum, one trait interviewees observed associated with some sites with lower ratios was that they already had conducted targeted, successful food loss and waste reduction efforts in the past. The low-cost reduction opportunities, thus, had already been captured.⁴²

FIGURE 4. Financial benefit-cost ratios for company sites



Source: WRI and WRAP analysis

Although specifics varied between sites, the financial costs incurred by company sites in this analysis included:

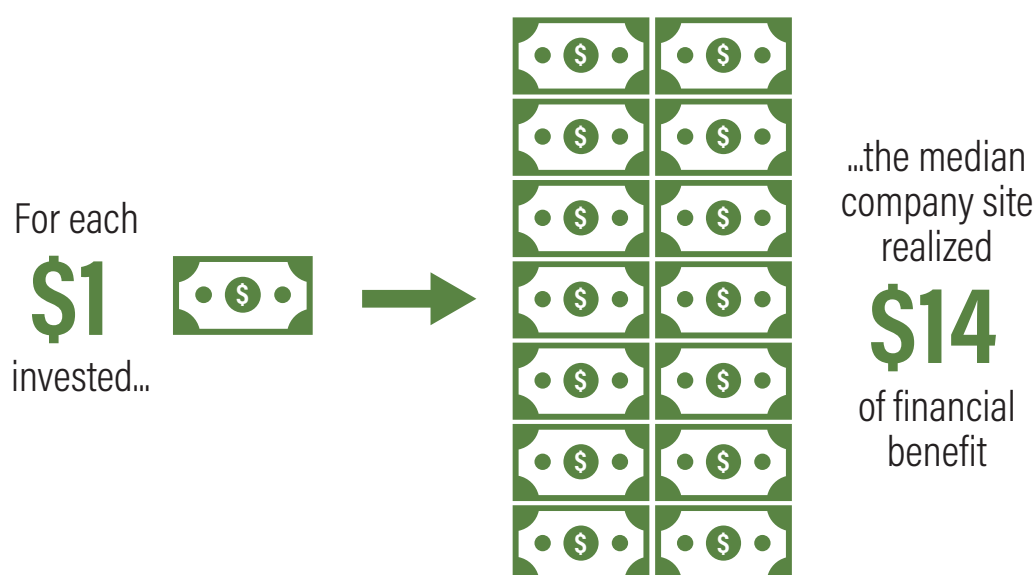
- Conducting food loss and waste quantification (“inventories”) in order to identify how much and where food was being lost and wasted, prioritize hotspots, and monitor progress over time
- Purchasing or leasing on-site equipment to quantify food loss and waste
- Training staff on food loss and waste reduction practices
- Purchasing equipment as part of material flow process redesigns or improved storage
- Changing food storage, handling, and manufacturing processes
- Changing packaging to extend shelf-life
- Changing date labeling on packaging
- Pursuing other staff and technology investments to reduce food loss and waste.

The financial benefits realized by the company sites included:

- Avoiding the costs of buying food (as ingredients or directly for sale) that previously had been lost or wasted without being sold
- Increasing the share of food purchased or prepared that gets sold onward to customers
- Introducing new product lines made from food that otherwise would have been lost or wasted
- Reducing food waste management costs (including labor) and tipping fees
- Realizing other modes of reducing input costs or increasing output sales.

Box 5 profiles a few case examples. The financial costs and financial benefits of the food loss and waste reduction efforts were realized by the individual companies and/or their specific sites. For the most part, there was generally no split between who pays and who benefits. For most sites evaluated, the food loss and waste reduction effort was focused on internal operations; thus, incentives for action were aligned. In a few cases, such as the second and third examples in Box 5, companies made investments outside the confines of their own sites but still reaped a financial benefit for themselves.

FIGURE 5. The median financial benefit-cost ratio for company sites was 14:1



Source: WRI and WRAP analysis

TABLE 3. Median benefit-cost ratios of company sites varied between sectors

Sector	Example entities	BENEFIT-COST RATIO			Number of sites
		Low	Median	High	
Food service (for public sector clients)	Education institutions, hospitals, government restaurants	1.2	1.2	169.0	166
Food production/manufacturing	Crop-producing companies, food and beverage processors	1.1	1.3	318.0	5
Food retail (and manufacturing)*	Grocery stores	5.1	5.1	5.1	10
Hotel	Hotels	6.3	7.6	38.2	74
Restaurant	Restaurants, cafés	0.2	8.3	617.7	88
Food service (for private sector clients)		7.3	9.6	17.4	137
Hospitality	Nonhotel leisure, casinos	10.7	22.7	327.1	15
Workplace canteen	Canteens and restaurants located on company premises	1.7	24.7	618.1	673

*Involves four food retailers working in collaboration with six of their food manufacturers. The benefit-cost ratio is the average across all. The source data did not enable separation of benefit-cost ratios between them.

Source: WRI and WRAP analysis based on data provided by companies for 1,168 business sites

BOX 5. Profiles of selected sites

The following provides a brief summary of some of the business sites included in the analyses:

- A food and drink manufacturer conducted a food loss and waste inventory or “audit” at a UK site to identify where and how much food it was losing or wasting. The company found that on average 7 percent of the weight of ingredients remained as residue when its bulk containers were being removed from the production system, even though the containers were deemed “empty.” The company invested in staff training and a simple process redesign to reduce residues. Given the high value of the residues and the low costs of investment, the company’s benefit-cost ratio was 318:1.
- Four major food retailers collaborated with six food manufacturers in their shared supply chains to reduce food loss and waste. They conducted inventories to identify food loss and waste hotspots in the supply chain. They then jointly designed, piloted, and rolled out a series of actions to tackle these hotspots. Key activities included better matching forecasts of supply and demand between the manufacturers and the retailers, changes to food packaging formats and labeling, stock reductions, and increased product lifetimes. Combined, the actions resulted in a benefit-cost ratio of 5:1 across the ten participating companies.
- A food manufacturer conducted a food loss and waste inventory of its dairy supply chain in Pakistan. After identifying the hotspots of food loss and waste, the company pursued a number of actions such as improving cooling and storage, strengthening dairy farmer training and best practice sharing, and implementing lean management processes. The resulting benefit-cost ratio realized by the company for its actions was 1.25:1—equivalent to a 25 percent return on investment.
- A food services company operating in workplace restaurants across 23 sites in a western European country quantified its food loss and waste, finding hotspots due to overproduction, out-of-date food, and uneaten meals by customers. Reduction efforts included using more semiprepared food, improving meal forecasting, training staff, and engaging consumers. Across these sites, the benefit-cost ratio of the actions implemented was nearly 25:1.
- The average annual reduction in food waste costs was 41 percent among 60 small to medium-sized hospitality and food service establishments, including restaurants and canteens. For another cohort of around 500 hospitality and food service company sites, the average annual reduction in food waste costs was 35 percent.⁴³

As noted in Box 2, understanding the financial business case for companies can be improved going forward if companies operating “closer to the farm” made data available. The majority of the companies in Table 3 are those active “closer to the fork” in the food supply chain, including food retailers, restaurants, food service providers, and hospitality firms. We have data on some food manufacturers, but it is a small share. There is a strong research need for historical data from companies involved in the agricultural production, storage, and processing stages of the food supply chain. Likewise, there is a strong research need for historical data from companies operating in developing countries, since the vast majority of sites in Table 3 are located in developed countries.

THE NONFINANCIAL BUSINESS CASE

Our interviews with government and business leaders indicate that there are a number of other strategic yet nonfinancial reasons for reducing food loss and waste as well. The most noted reasons related to food security, waste regulations, environmental sustainability, stakeholder relationships, and a sense of ethical or social responsibility. Although quantifying these types of benefits in financial terms is difficult, our interviews indicate that they are nevertheless considered an important part of the business case for action.

Food security

Food security is a highly relevant goal to governments and companies for political and humanitarian reasons. Reducing food loss and waste at various stages in the food supply chain can help increase the amount of food that remains available for human consumption. More people thus can be fed from a given level of agricultural input, improving food security. For instance, reducing food losses during storage can increase the amount of food that farmers and communities can later eat or sell on the market—earning income that in turn can be used to buy food and other necessities. Donating unsold (yet still safe) food to charity—instead of disposing of it in landfills—can help people in need who live within a charity’s service area.

Increased food security can result in further household benefits, especially for women. In areas where women predominate the farming workforce, food loss reductions near the farm can increase the return on investment of time spent in fields and can reduce the total time needed to work in fields to achieve a given level of food security. Food waste reductions near the fork can reduce total household expenditures needed for food, freeing up resources for health, education, and other benefits.⁴⁴

Waste regulations

In some political jurisdictions, government agencies and companies are obligated to abide by regulations regarding the disposal of waste material. Under these regulations, “waste” can include uneaten food and/or associated inedible parts. In the United States, for example, Massachusetts limits companies to sending just one ton of organic material per week to a solid waste disposal facility.⁴⁵ Japan’s Food Recycling Law, enacted in 2001, includes incentives for companies to recycle food loss and waste into animal feed, fertilizer, and energy, and also sets legally binding targets for producers of over 100 tons of waste annually.⁴⁶ Legislation introduced in 2016 in France makes it illegal for retailers above a certain size to destroy or landfill food, and requires them to establish relationships to redistribute or treat surplus foods.⁴⁷ These regulations often create a legal incentive and, when fines for noncompliance are involved, an additional financial business case for reducing food waste.

Environmental sustainability

Reducing food loss and waste can improve local, regional, and global environmental sustainability. Food loss and waste reduction can reduce unnecessary levels of the following:

- Greenhouse gas emissions
- Water consumption by agriculture
- Land area needed for cultivation
- Fertilizer and pesticide applications
- Landfill demands.

These reductions can benefit public and private sector efforts to curtail climate change, conserve freshwater resources, protect biodiversity, minimize pollution, and reduce land-use pressure. Thus, food loss and waste reduction can help governments and companies meet mandatory and/or voluntary commitments they have to these environmental issues, such as zero-waste-to-landfill commitments, the Paris Agreement on Climate Change, and the Sustainable Development Goals.

Stakeholder relationships

Companies note that food loss and waste reduction efforts can improve relationships with stakeholders up and down the supply chain. For example, some company managers highlighted that implementing efforts to help their upstream suppliers reduce food loss and waste increases the degree of collaboration between the two entities—collaboration that can spread beyond the effort itself. They also noted that food retailers that help customers reduce food waste at home can strengthen customer relationships, retention, and loyalty—to the degree that customers recognize that the retailer is trying to help them save money.

Media coverage also can help strengthen stakeholder relationships. Coverage of food loss and waste reduction efforts can build a company’s brand as a responsible business—improving its social license to operate—and can reach a wide audience of existing and prospective customers. Likewise, donating unsold (but still safe) food to charities can strengthen a company’s brand, public reputation, and employee pride in where they work. According to interviewees, all of these forms of strengthened stakeholder relationships, in turn, can lead to improved business performance.

Ethical responsibility

Interviews with both public and private sector leaders highlighted yet another nonfinancial business case: reducing food loss and waste is simply “the right thing to do.” Executives note this, as do staff. Tesco’s CEO, Dave Lewis, made this point in a speech to The Consumer Goods Forum in mid-2016:

“Why wouldn’t we want to have a look at this [food loss and waste reduction]? We can look at it through commercial sensibility, because waste ultimately has to be paid for, so if we eradicate it we can lower our costs. We might even be able to improve the margins if that’s the thing that really drives us. But there’s also a bigger goal which is how we might make a contribution to that massive inequality that exists already in terms of those who have food and those that don’t. Both of them, I think, are enough for us as an industry to motivate ourselves, engage ourselves, and innovate against this need.”⁴⁸

A CALL TO ACTION

Our analyses find that there can be a strong business case for governments and companies to reduce food loss and waste. These findings should encourage public and private sector decision-makers to start seriously exploring what they can do within their own borders, operations, and supply chains to reduce food loss and waste. What then are next steps? We recommend that public and private sector decision-makers follow a three-step approach: (1) target, (2) measure, and (3) act.

1. Target

Targets set ambition, and ambition motivates action. With the adoption of the SDGs in 2015, all nations implicitly have agreed to SDG Target 12.3. But since the SDGs have a total of 169 targets, adoption of all the SDG targets means food loss and waste reduction may not yet be garnering sufficient decision-maker attention and focus. To create the needed focus, therefore, governments and companies should adopt explicit food loss and waste reduction targets aligned with SDG Target 12.3.

“Reducing food loss and waste not only helps Nestlé secure its supply of agricultural raw materials, but it will also have a positive impact on society by supporting rural development, water conservation, and food security.”

— Paul Bulcke, Chairman Designate and Member of the Board of Directors, Nestlé SA

How much progress has been achieved to date? In terms of governments, the United States, the European Union, and the African Union⁴⁹ have now adopted specific food loss and waste reduction targets consistent with Target 12.3. Courtauld 2025, a voluntary commitment among more than 100 businesses and government agencies in the United Kingdom, has a target for food loss and waste reduction that will put the country on a trajectory to deliver Target 12.3.⁵⁰ In terms of companies, The Consumer Goods Forum and “2030 Champions,” a newly formed U.S. business partnership, have set reduction targets.⁵¹

What is needed going forward? To date, targets consistent with SDG Target 12.3 have been adopted in a few regional blocks and among some of the largest multinational companies. Yet if focus and ambition are to be realized, every government—as well as all companies involved in food supply chains—should adopt SDG Target 12.3. Notable gaps in explicit adoption include the following:

- Targets by developing and middle-income countries outside of Africa
- Targets set as part of implementing a country’s Nationally Determined Contribution (NDC) to the Paris Agreement on Climate Change (only Rwanda’s NDC currently includes a quantified food loss and waste reduction target as part of its strategy)⁵²
- Targets at the subnational level, including cities
- Targets among agribusiness companies.

2. Measure

An old adage is that “what gets measured gets managed.” This holds true for food loss and waste, too. Quantifying food loss and waste within borders, operations, or supply chains can help decision-makers better understand how much, where, and why food is being lost or wasted. Such information provides an evidence-based foundation for developing and prioritizing food loss and waste reduction strategies. In addition, measurement is necessary for entities to know whether or not they are on track to realizing SDG Target 12.3. Therefore, every government and company should start to measure its food loss and waste and monitor progress and trends over time.

Some may suggest that one should measure first and thereafter set a reduction target based on knowing base-year food loss and waste amounts. However, because of SDG Target 12.3, the food loss and waste reduction target for the world and all entities therein has already been set.

How much progress has been achieved to date? Some companies, cities, and a few countries have started quantifying their food loss and waste and are publishing the results. Country leaders include the United Kingdom, the United States, and the European Union. Cities besides London that are starting to measure include Denver, Jeddah, Nashville, and New York. In terms of companies, although many measure and report on overall material waste levels, few specifically measure food loss and waste and report on it separately. Some, however, do. Since 2013, for instance, Tesco—one of the world’s largest food retailers—has been conducting an annual food loss and waste inventory for its operations and publicly reporting the results.⁵³

What is needed going forward? Governments—at national and subnational levels—and companies that have not yet done so should start to quantify and report on their food loss and waste. Doing so is now easier than ever given the release of the Food Loss & Waste Protocol’s⁵⁴ *Food Loss and Waste Accounting and Reporting Standard* in mid-2016. The *FLW Standard* provides global requirements and guidance for quantifying and reporting on the weight of food and/or associated inedible parts removed from the food supply chain (see www.flwprotocol.org).⁵⁵ The *FLW Standard* empowers countries and companies to create base-year food loss and waste inventories and quantify progress over time toward meeting Target 12.3 or any other goals they may have.

Measurement does not need to be a complex and resource-intensive exercise. Quantification and periodic monitoring can be integrated with other resource monitoring programs that governments and companies have in place. And as the financial benefit-cost ratio analyses above indicate, measurement can have a large positive payback.

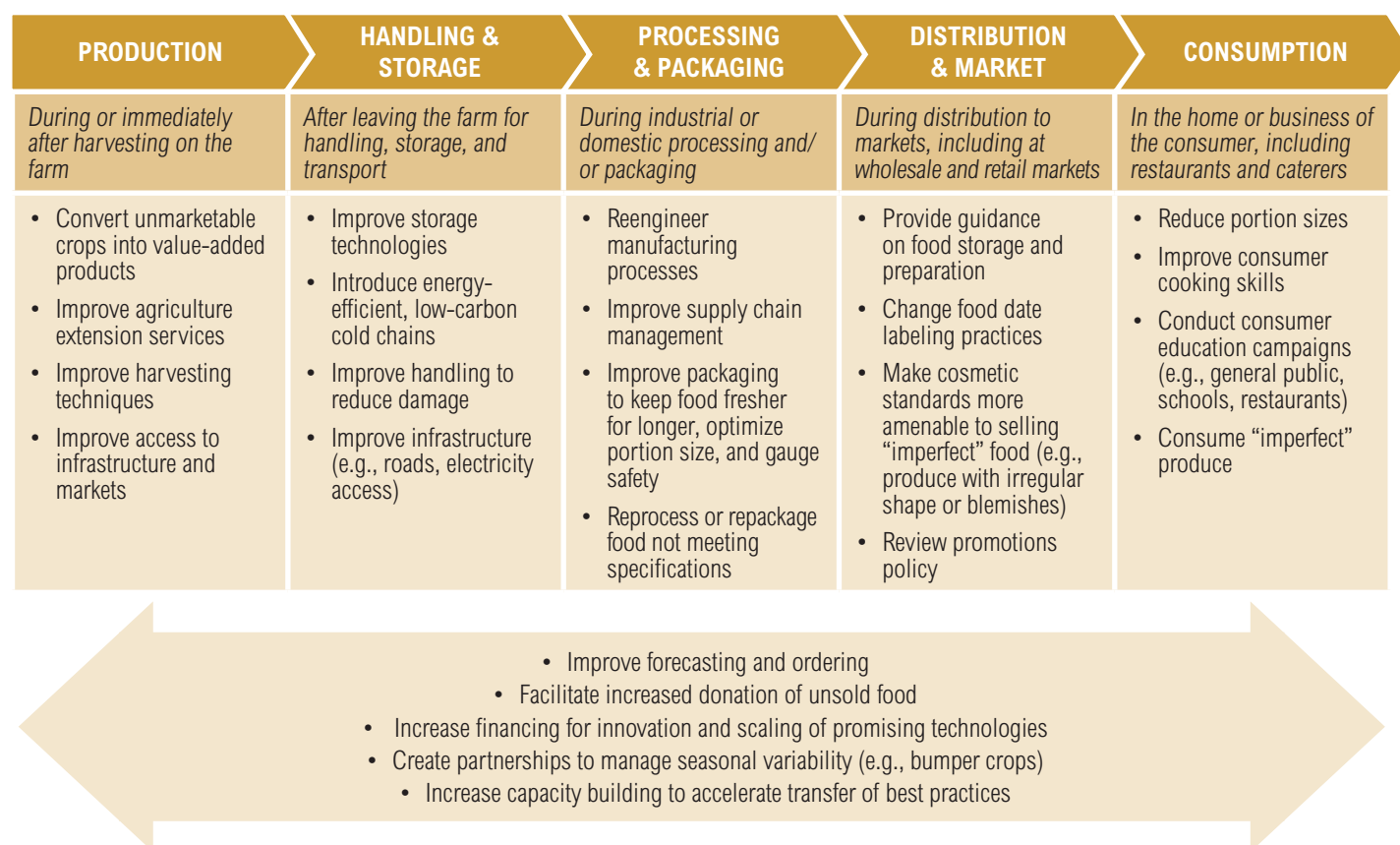
3. Act

Adopting the target and measuring food loss and waste are important. But what ultimately matters is action. Therefore, governments and companies need to follow through on implementation.

How much progress has been achieved to date? Efforts to address food loss and waste are not new, and activity in many places has been ongoing for some time. But since the launch of the SDGs in 2015, there have been a number of new actions by governments and businesses to tackle this issue. For instance, food retailers now are selling imperfectly shaped but perfectly nutritious produce that in previous years would have been discarded at the farm because the produce did not meet cosmetic standards. Internet-based apps are now being used by food retailers and restaurants to get unsold—yet still safe—food quickly to charities, feeding those in need and avoiding food waste. Coalitions involving food service companies such as Sodexo are now working collaboratively to reduce food waste in schools and elsewhere.⁵⁶ Moreover, innovations in crop storage continue to gain popularity in Africa.⁵⁷

What is needed going forward? Given the scale of the food loss and waste challenge, *more* action by *more* entities across *more* regions needs to occur. Exactly what should be done varies between entities and by stage in the food supply chain. In many developing regions, a majority of food loss occurs from the point of harvest until the food reaches the market. Thus investing in better infrastructure and technologies to improve storage, processing, and transportation will be critical. In developed regions, as well as in rapidly growing urban areas just about everywhere, a significant share of food waste occurs closer to the consumption stage of the food supply chain. Thus steps to prevent the production of surplus food, facilitate food donations, improve packaging, streamline food date labeling, and better educate consumers will be vital. Figure 6 provides examples of approaches per stage in the food supply chain that would help reduce food loss and waste.

FIGURE 6. Possible approaches for reducing food loss and waste (not exhaustive)



Source: Based on Lipinski, B., C. O'Connor, C. Hanson (2016). *SDG Target 12.3 on Food Loss and Waste: 2016 Progress Report*. Champions 12.3

Moving forward

Historical evidence from a country, city, and a suite of companies indicates that the return on investment for taking action to reduce food loss and waste can on average be very high. In addition, there are a number of nonfinancial reasons for action. A strong overall business case therefore exists.

In light of this business case, governments and companies that have not already done so should start to adopt the target of a 50 percent reduction by 2030, measure to manage, and take action. If they do this, they will take a big step toward a future that improves their own financial performance, achieves food security, strengthens social conditions, protects the planet, and contributes to prosperity for all.

“We can only deliver the Sustainable Development Goals if we change how we grow, produce and consume our food. Food waste is a huge part of that. If we tackle food waste, we can create a food system which is more efficient, resilient and sustainable. We are working in partnership with farmers, suppliers and consumers to help tackle this challenge and create a brighter future for all.”

— Paul Polman, CEO, Unilever

ENDNOTES

1. One-third as measured by weight. FAO (Food and Agriculture Organization of the United Nations). 2011. *Global Food Losses and Food Waste—Extent, Causes and Prevention*. Rome: UN FAO.
2. FAO. 2015. *Food Wastage Footprint & Climate Change*. Rome: UN FAO.
3. World Bank. 2011. *Missing Food: The Case of Postharvest Grain Losses in Sub-Saharan Africa*. Washington, DC: World Bank.
4. Buzby, J.C., H.F. Wells, and J. Hyman. 2014. *The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States*. Washington, DC: USDA Economic Research Service.
5. WRAP (Waste and Resources Action Programme). 2015. *Estimates of Food and Packaging Waste in the UK Grocery Retail and Hospitality Supply Chains*. Banbury, UK: WRAP.
6. World Food Programme. 2016. “Hunger Statistics.” Accessible at: <https://www.wfp.org/hunger/stats>.
7. FAO. 2016. “Food Loss and Food Waste.” Accessible at: <http://www.fao.org/food-loss-and-food-waste/en/>.
8. Kumm, M., H. de Moel, M. Porkka, S. Siebert, O. Varis, and P.J. Ward. 2012. “Lost Food, Wasted Resources: Global Food Supply Chain Losses and Their Impacts on Freshwater, Cropland, and Fertiliser Use.” *Science of the Total Environment* 438: 477–489.
9. FAO (Food and Agriculture Organization of the United Nations). 2013. *Food Wastage Footprint: Impacts on Natural Resources*. Rome: UN FAO.
10. FAO. 2015. *Food Wastage Footprint & Climate Change*. Rome: UN FAO.
11. See: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.
12. The authors gathered input via in-person and phone discussions with representatives of companies (including food producers, manufacturers, retailers, and service providers from three different continents), governments (city and country), and research institutions.
13. Ten percent is a conservative discount rate when compared with the average cost of capital for market sectors covered by the business sites in our data set (see appendix). Authors’ calculations for listed private sector companies to January 2016 based on five-year financial performance data from NYU Stern Business School’s international data, accessible at: http://people.stern.nyu.edu/adamodar/New_Home_Page/data.html.
14. “Household food waste” in this analysis refers to food and drink purchased for use in the home that could have been eaten at some point but was thrown away. It excludes the associated inedible parts of food, such as peels, skins, and bones. In previously published reports by WRAP, this food waste was called “avoidable household food waste.”
15. WRAP. 2012. “Household Food and Drink Waste in the UK.” Accessible at: <http://www.wrap.org.uk/sites/files/wrap/hhfdw-2012-main.pdf.pdf>.
16. The Waste and Resources Action Programme (WRAP) is a registered UK nonprofit organization that works with governments, businesses, and communities to improve resource efficiency. See: <http://www.wrap.org.uk>.
17. WRAP. 2008. “The Food We Waste.” Accessible at: <http://www.wrap.org.uk/thefoodwewaste>.
18. WRAP. 2009. “Household Food and Drink Waste in the UK.” Accessible at: http://www.wrap.org.uk/sites/files/wrap/Household_food_and_drink_waste_in_the_UK_-_report.pdf.
19. WRAP. 2012. “Household Food and Drink Waste in the UK.” Accessible at: <http://www.wrap.org.uk/content/household-food-and-drink-waste-uk-2012>.
20. This figure comes from analysis based on: http://www.wrap.org.uk/sites/files/wrap/Information%20sheet%20-%20reducing%20household%20food%20waste%20in%20the%20UK%202012_0.pdf. This figure does not include possible losses in sales by the food industry as a result of consumers buying lower quantities of food. During 2007–12, UK population growth meant that the overall quantity of food purchased remained stable. Moreover, WRAP analysis indicates that approximately 50 percent of the savings households accrued through the UK initiative were respent back in retail stores, often on higher-value foods or on nonfood items. For more, see WRAP (2014). *Econometric Modelling and Household Food Waste*. Accessible at: <http://www.wrap.org.uk/sites/files/wrap/Econometrics%20Report.pdf>.
21. WRAP’s “Love Food Hate Waste” initiative received funding from DEFRA (Department for the Environment, Food and Rural Affairs) and the devolved administrations of Northern Ireland, Scotland, and Wales.
22. Accessible at: <http://www.wrap.org.uk/content/household-food-and-drink-waste-uk-2012>.
23. WRAP. 2014. “Econometric Modelling and Household Food Waste.” Accessible at: <http://www.wrap.org.uk/sites/files/wrap/Econometrics%20Report.pdf>.
24. The magnitude of the financial impact on government authorities differs between central and local governments. Food waste reduction led to savings on waste disposal costs (e.g., tipping fees) for local authorities. Table 1 and Figure 2 reflect these savings as “benefits” but exclude the impact of landfill taxes. In the United Kingdom, where there is a landfill tax per ton of waste disposed to landfill, food waste reduction leads to a loss of tax revenues to the central government. The landfill tax savings achieved by local authorities are thus equivalent to the loss of that revenue to the central government. Our analysis considers this a “net zero” impact from the perspective of “central and local governments” combined.
25. See http://www.wrap.org.uk/sites/files/wrap/Information%20sheet%20-%20reducing%20household%20food%20waste%20in%20the%20UK%202012_0.pdf.
26. Figure 2 encompasses all the actors in the UK initiative, including the food manufacturers and major food retailers. It does not illustrate any lost sales to farmers or to nonparticipating companies. But those entities were not part of the UK initiative. Nonetheless, dramatic declines in food loss and waste still occurred. So any financial losses to these nonparticipating entities did not affect the decisions of those actors involved in reduction efforts.
27. WRAP. 2014. “Econometric Modeling and Household Food Waste.” Accessible at: <http://www.wrap.org.uk/sites/files/wrap/Econometrics%20Report.pdf>.
28. WRAP. 2014. “Household Food and Drink Waste: A Product Focus.” Accessible at: <http://www.wrap.org.uk/content/household-food-drink-waste-%E2%80%93-product-focus>.
29. WRAP. 2012. “Methods Annex Used for Household Food and Drink Waste in the UK 2012.” Accessible at: <http://www.wrap.org.uk/sites/files/wrap/Methods%20Annex%20Report%20v2.pdf>.
30. See: <http://www.wrap.org.uk/sites/files/wrap/Agreeing%20an%20attribution%20factor%20for%20WRAPs%20work%20to%20reduce%20household%20food%20waste.pdf>.
31. The estimated amount of household food waste in the United Kingdom for 2015 was 7.3 (+/- 0.3) million tons, compared with 7.0 (+/- 0.3) million tons in 2012, an apparent increase of 4 percent. On a per-person basis, the apparent increase was 2 percent. Neither of these increases was statistically significant at a 95 percent confidence level. WRAP. 2017. “The Courtauld Commitment 3: Delivering Action on Waste (Final Report).” Accessible at: http://www.wrap.org.uk/sites/files/wrap/Courtauld_Commitment_3_final_report_0.pdf.

32. Authors' calculations.
33. The 15 percent reduction in total household food waste is not solely attributable to the campaign. Other factors may have also influenced the reduction in food waste to some degree. Examples of other factors include the impact of seasonality or of a "research effect"—people involved in the research become more aware of food waste than those just exposed to the campaign messaging. That said, the magnitude of the measured reduction is consistent with other local UK food waste campaigns in Hereford and Worcester; see: <http://www.wrap.org.uk/sites/files/wrap/WRAP_herefordshire_worcestershire_LFWH_v31.pdf>, which found that a range of actions—including awareness raising and household engagement—led to substantial reductions in household food waste.
34. WRAP. 2013. "West London Food Waste Prevention Campaign Evaluation Report." Accessible at: <http://www.wrap.org.uk/sites/files/wrap/West%20London%20LFWH%20Impact%20case%20study_0.pdf>.
35. See: <www.wrap.org.uk/content/west-london-food-waste-campaign>.
36. WRAP. 2013. "West London Food Waste Prevention Campaign Evaluation Report." Accessible at: <http://www.wrap.org.uk/sites/files/wrap/West%20London%20Food%20Waste%20Campaign%20Evaluation%20Report_1.pdf>.
37. WRAP. 2013. "West London Food Waste Prevention Campaign Evaluation Report." Accessible at: <http://www.wrap.org.uk/sites/files/wrap/West%20London%20Food%20Waste%20Campaign%20Evaluation%20Report_1.pdf>.
38. A key uncertainty in estimating the benefit-cost ratio attributable to the initiative in West London is the extent to which engaging households to quantify and monitor the initiative's impact actually triggered additional behavior change beyond that caused by the intervention itself. Such "research effects" would result in an overestimation of the actual impact attributable to the West London initiative. However, to illustrate the robustness of the financial case for West London, if one assumes that the savings attributable to borough residents and councils were one-fifth of our estimates, the benefit-cost ratio overall would still be at least 18:1.
39. TRIFOCA London is a three-year initiative begun in 2016 led by Resource London (a partnership between WRAP, the London Waste and Recycling Board (LWARB), and Groundwork London). It will develop holistic communications campaigns to encourage sustainable food systems in cities including, for the first time, messages around healthy diets, food poverty, food security, and consumption as part of its food waste communications to prevent food waste by changing planning, shopping, storage and meal preparation behavior; promote healthy and sustainable eating by changing food purchasing and food preparation practices; and recycle unavoidable food waste. A key output of the initiative will be an interactive, multistakeholder food waste behavioral change "Resource Bank" to enable action of food waste prevention to be replicated across other major cities.
40. The full list of countries is Australia, Belgium, China, France, Indonesia, Ireland, Italy, the Netherlands, Norway, Pakistan, the Philippines, Poland, Singapore, Thailand, the United Kingdom, the United States, and Vietnam.
41. A benefit-cost ratio of 2:1 is equivalent to a 100 percent return on investment (not a 200 percent return on investment as may be mistakenly believed). With a 2:1 ratio, the entity expends \$1 of costs and receives \$2 worth of benefits. The ratio is the same with a 100 percent return on investment. The investor invests \$1 and receives \$2 in return. The pure profit is \$1 while the investment itself is another \$1, thus the profit is 100 percent more than the investment.
42. However, the companies surveyed did not have the financial cost and benefit data captured or available from these older, previously conducted food loss and waste reduction efforts—so only data from the more recent efforts were included.
43. Of the nearly 1,200 sites in our data set, these were the only sites for which we had access to the total annual cost of food waste per site—thereby enabling us to calculate the percent reduction in costs—and not just access to the amount of food waste cost savings.
44. Lipinski, B., et al. 2013. *Reducing Food Loss and Waste*. Washington, DC: World Resources Institute.
45. MassDEP (Massachusetts Department of Environmental Protection). 2014. "Solid Waste Facility Regulations." 310 CMR 19.000.
46. Kobayashi, S. n.d. "Food Recycling Law in Japan." Tokyo Environmental Public Service Corporation. Accessible at: <http://www.asianhumannet.org/db/datas/201501_resource_recycling/07_FoodRecyclingLaw_e.pdf>.
47. See: <<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000032036289&categorieLien=id>>.
48. "No Time to Waste." Speech delivered by Dave Lewis (Group CEO of Tesco) at The Consumer Goods Forum Annual Summit, Cape Town, South Africa, June 15, 2016.
49. In 2014, the 54 member states of the African Union issued the Malabo Declaration, a set of agriculture goals aimed at achieving shared prosperity and improved livelihoods. Part of the Malabo Declaration is a commitment "to halve the current levels of post-harvest losses by the year 2025." Although this target does not match SDG Target 12.3 directly, since the numeric target applies to food losses and not to food waste, it is "in the spirit" of SDG Target 12.3 in that it calls for a 50 percent reduction—and even five years earlier than the SDGs. Moreover, focusing on food loss is arguably justified since, as Figure 1 indicates, food losses during production and storage are currently a larger issue in Africa than food waste at the market or consumption stage.
50. See: <<http://www.wrap.org.uk/content/courtauld-commitment-2025>>.
51. Lipinski, B., C. O'Connor, and C. Hanson. *SDG Target 12.3 on Food Loss and Waste: 2016 Progress Report*. Washington, DC: Champions 12.3. For information about 2030 Champions, see: <<http://www.usda.gov/wps/portal/usda/usdahome?navid=NEWSROOM>>.
52. Republic of Rwanda. 2015. "Intended Nationally Determined Contribution (INDC) for the Republic of Rwanda." Accessible at: <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Rwanda%20First/INDC_Rwanda_Nov.2015.pdf>.
53. Lipinski, B., C. O'Connor, and C. Hanson. *SDG Target 12.3 on Food Loss and Waste: 2016 Progress Report*. Washington, DC: Champions 12.3.
54. The Food Loss & Waste Protocol (FLW Protocol) is a partnership that has developed the global FLW Standard for quantifying and reporting on food and/or associated inedible parts removed from the food supply chain. FLW Protocol partners are The Consumer Goods Forum, EU FUSIONS, FAO, the United Nations Environment Program, the World Business Council for Sustainable Development, and WRAP. WRI serves as the FLW Protocol's secretariat.
55. The FLW Protocol website, accessible at: <<http://www.flwprotocol.org>>, provides access to the FLW Standard, supporting tools, case examples, and training material.
56. Recognizing the need for collaborative action, actors in the food service industry created the International Food Waste Coalition to reduce food loss and waste all along the value chain. Members include Sodexo, which is working to prevent and reduce food waste in schools, hospitals, and workplace restaurants.
57. Lipinski, B., C. O'Connor, and C. Hanson. *SDG Target 12.3 on Food Loss and Waste: 2016 Progress Report*. Washington, DC: Champions 12.3.

APPENDIX

GLOBAL				
Sector	Number of businesses	Average cost of equity	Average cost of debt	Average cost of capital
Beverage (alcoholic)	212	8.6%	4.6%	7.8%
Beverage (soft)	104	10.2%	4.6%	9.1%
Food processing	1,228	8.4%	4.6%	7.6%
Food wholesalers	119	7.5%	4.6%	6.9%
Retail (grocery and food)	172	8.2%	4.6%	7.5%
Hotel/gaming	651	9.2%	4.6%	8.3%

USA				
Sector	Number of businesses	Average cost of equity	Average cost of debt	Average cost of capital
Beverage (alcoholic)	22	7.9%	4.0%	7.1%
Beverage (soft)	43	9.2%	4.0%	8.2%
Food processing	89	7.6%	3.5%	6.8%
Food wholesalers	14	6.6%	4.0%	6.1%
Retail (grocery and food)	17	8.5%	4.0%	7.6%
Hotel/gaming	73	8.1%	3.5%	7.2%

EUROPE				
Sector	Number of businesses	Average cost of equity	Average cost of debt	Average cost of capital
Beverage (alcoholic)	51	7.2%	4.4%	6.6%
Beverage (soft)	18	7.3%	4.4%	6.7%
Food processing	156	8.2%	4.4%	7.4%
Food wholesalers	13	6.4%	4.4%	6.0%
Retail (grocery and food)	31	10.8%	4.4%	9.6%
Hotel/gaming	122	9.3%	4.9%	8.4%

EMERGING				
Sector	Number of businesses	Average cost of equity	Average cost of debt	Average cost of capital
Beverage (alcoholic)	117	10.3%	5.3%	9.3%
Beverage (soft)	33	12.7%	5.3%	11.2%
Food processing	815	9.6%	5.3%	8.7%
Food wholesalers	53	8.7%	5.3%	8.0%
Retail (grocery and food)	61	9.6%	5.3%	8.8%
Hotel/gaming	399	10.0%	5.3%	9.1%

Source:

Authors' calculations for listed private sector companies to January 2016 based on five-year financial performance data from NYU Stern Business School's international data, accessible at: http://people.stern.nyu.edu/adamodar/New_Home_Page/data.html.

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ABOUT CHAMPIONS 12.3

Champions 12.3 is a unique coalition of more than three dozen leaders from around the world dedicated to inspiring ambition, mobilizing action, and accelerating progress toward achieving SDG Target 12.3.

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