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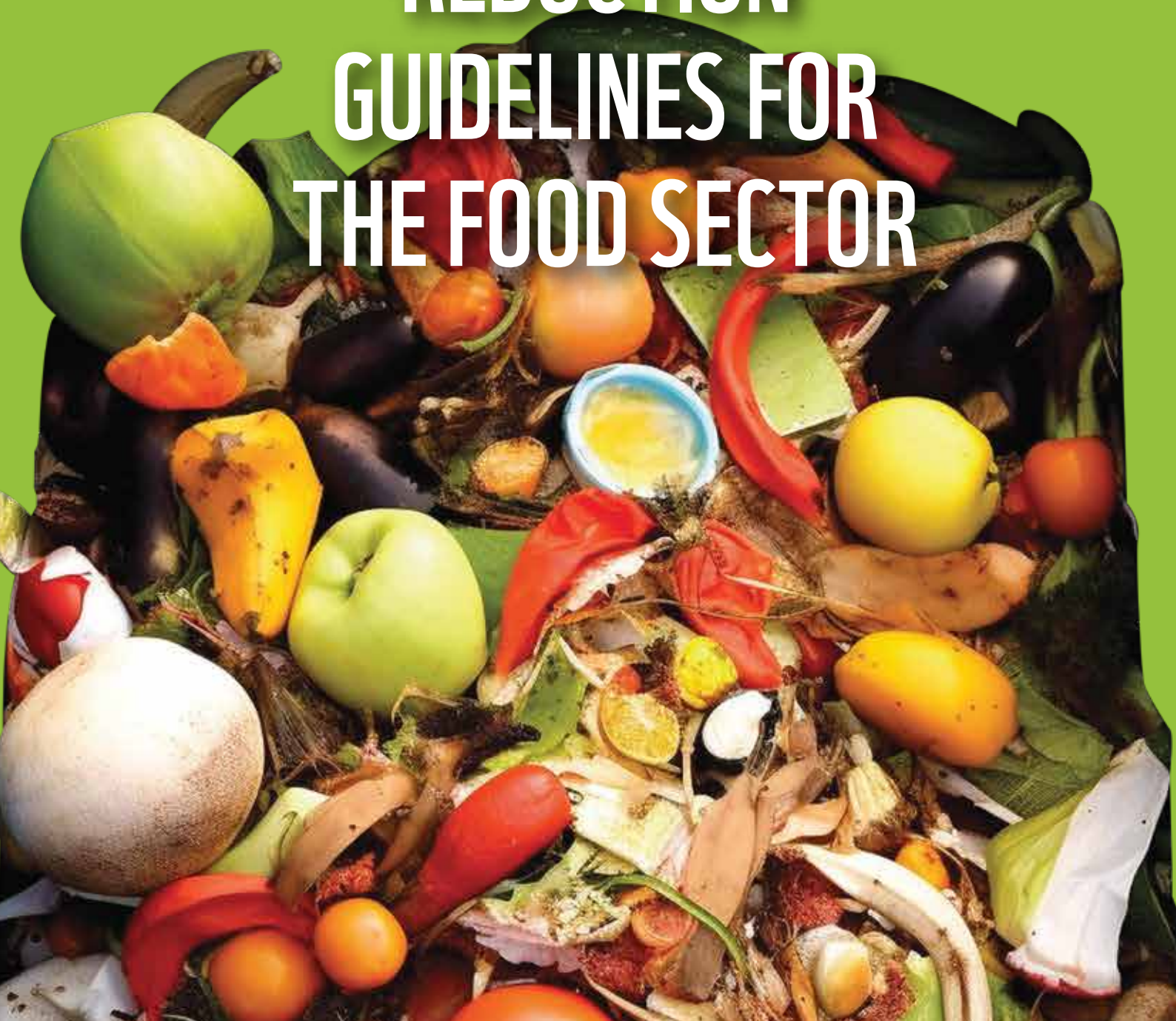
FOOD LOSS AND FOOD WASTE REDUCTION GUIDELINES FOR THE FOOD SECTOR



FOOD LOSS AND FOOD WASTE REDUCTION GUIDELINES FOR THE FOOD SECTOR

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Amid the triple planetary crises of climate change, resource depletion, and pollution, the necessity of sustainable practices becomes increasingly urgent. Recognizing that the food industry, as one of the largest sectors of the global economy, has a profound impact on the environment. It emerges as a crucial area for implementing practices to mitigate the impacts. Adopting sustainable practices within the food industry can significantly help decouple economic growth from negative environmental impacts. Furthermore, the private sector plays a pivotal role in addressing environmental issues. Thus, the food industry is an appropriate and strategic entry point to private sector interventions in our collective efforts towards a more sustainable future.

The Food Loss and Food Waste Reduction Guidelines for the Food Sector is a part of the Series of Tools for Integrating Sustainable Consumption and Production (SCP) into the Food Sector in Thailand, which consists of three guidelines:

1. Food Loss and Food Waste Reduction Guidelines for the Food Sector,
2. Single-Use Packaging and Tableware Reduction Guidelines for the Food Sector, and
3. Low Carbon Transportation Guidelines for the Food Sector.

This series of SCP Tools was developed under the IKI SCP Phase II Project on Establishing SCP—initiated by WWF Thailand, with support from the International Climate Initiative (IKI) and the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV). The project is dedicated to fostering SCP practices within the Thai food industry, focusing on chain restaurants, food retailers, and food delivery services.

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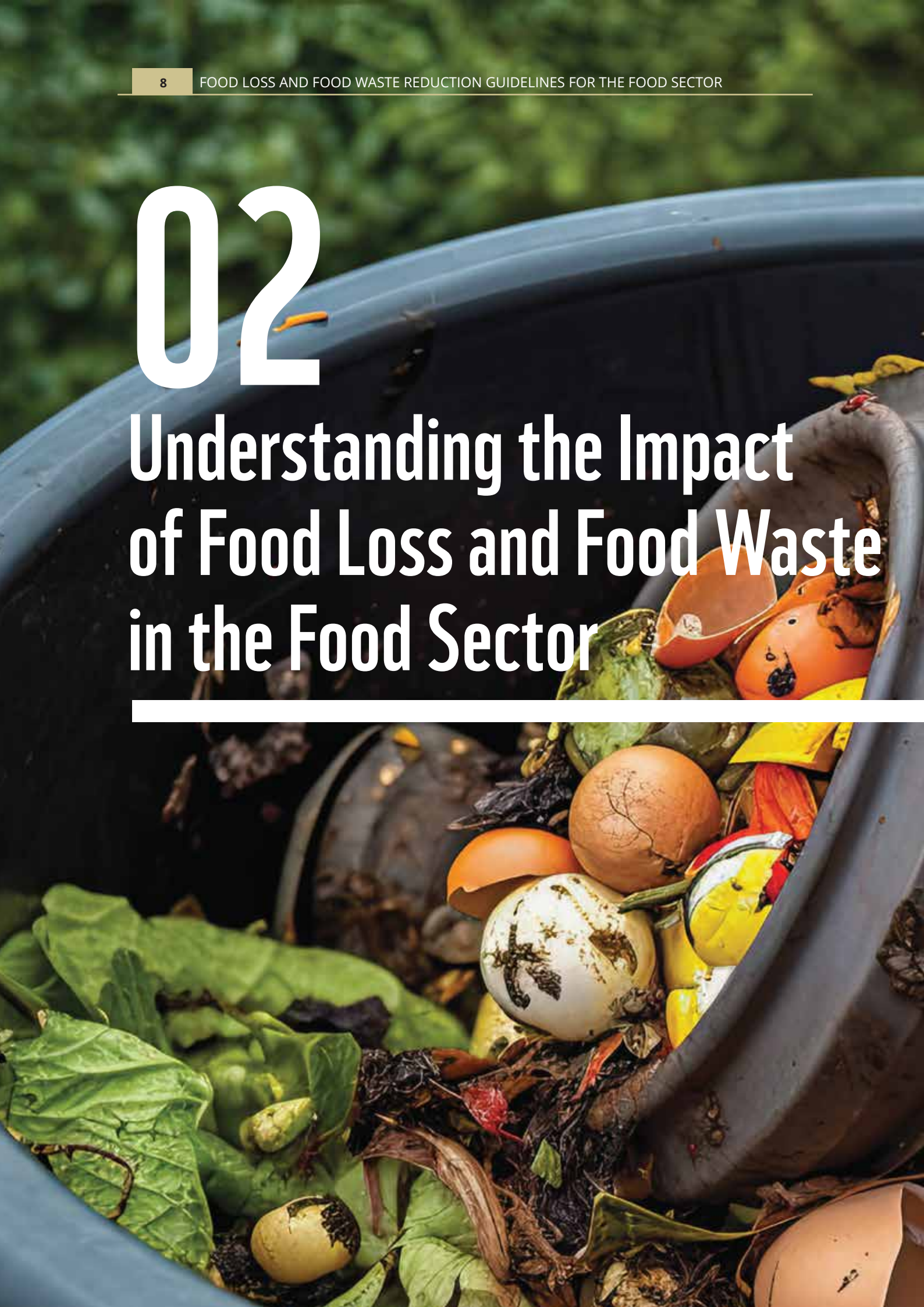
01 Executive Summary

The food industry in Thailand faces significant challenges related to food loss and food waste, particularly in restaurants, food retailers, and food delivery services. These challenges of food loss and food waste result in huge financial and environmental loss and also represent a significant waste management issue for businesses in the food sector to deal with. To address these challenges, we have developed a comprehensive and user-friendly guideline aimed at reducing food loss and food waste across these key players in the food industry.

The purpose of this guideline is to clarify the problem of food loss and food waste by providing clear and concise information on the issue as well as to highlight the benefits of reducing food loss and food waste in terms of environmental impacts, economic savings, and social responsibility. These solutions are designed to be straightforward and practical, enabling easy implementation and quick results. Together and with collaboration towards common goals for food loss and food waste reduction, we can take meaningful, collective action to create a more sustainable and responsible food sector in Thailand.



02 Understanding the Impact of Food Loss and Food Waste in the Food Sector

Globally, the problem of food loss and food waste is a significant challenge that affects not just the environment, but also has far-reaching economic and social implications. Vast quantities of food are lost or wasted at every stage of the supply chain.

Worldwide about 1.05 billion tons of food waste are generated annually (including inedible parts) with an estimated economic cost of 1 trillion USD per year (including fish and seafood).[1,2]

Moreover, food production is highly resource-intensive, playing a significant role in deforestation, wildlife habitat destruction, and the depletion of freshwater resources.

The United Nations has recognized the urgent need to address this issue through the Sustainable Development Goals (SDGs), a set of 17 global goals adopted in 2015 to guide development efforts through 2030.

Among these, SDG 12 is dedicated to ensuring sustainable consumption and production patterns. Within this framework, target 12.3 specifically aims at the reduction of food loss and waste, setting an ambitious goal to halve per capita global food waste at the retail and consumer levels and to reduce food losses along production and supply chains, including post-harvest losses by 2030.

Addressing food loss and food waste is a key priority in building a more sustainable and equitable global food system, aligning economic practices with the urgent need for environmental stewardship and social responsibility.

[1] United Nations Environmental Programme. (2024). *Food Waste Index Report 2024.* https://wedocs.unep.org/handle/20.500.11822/45230

[2] Food and Agriculture Organization of the United Nations. (2015). *Global Initiative on Food Loss and Waste Reduction.* https://openknowledge.fao.org/server/api/core/bitstreams/57f76ed9-6f19-4872-98b4-6e1c3e796213/content

Definitions of Food, Food Loss and Food Waste

According to the Waste and Resources Action Programme (WRAP), ***food*** *is a product intended for human consumption and includes food that is suitable for consumption when it is disposed of as well as that which may no longer be suitable for consumption at the time of disposal.*

The term ***food loss*** *refers to the decrease in edible food mass at the production, post-harvest and processing stages and is used to denote a proportion of food that ends up being removed from the supply chain.*

Food loss is often differentiated from 'food waste' according to where in the supply chain the food is lost such as on the farm or the reasons the food is lost such as disease or weather **(see Figure 1).** However, it is important to note that the distinction between food loss and food waste is not consistent. These guidelines will primarily focus on food waste experienced after food production.

Figure 1: Food Loss vs. Food Waste

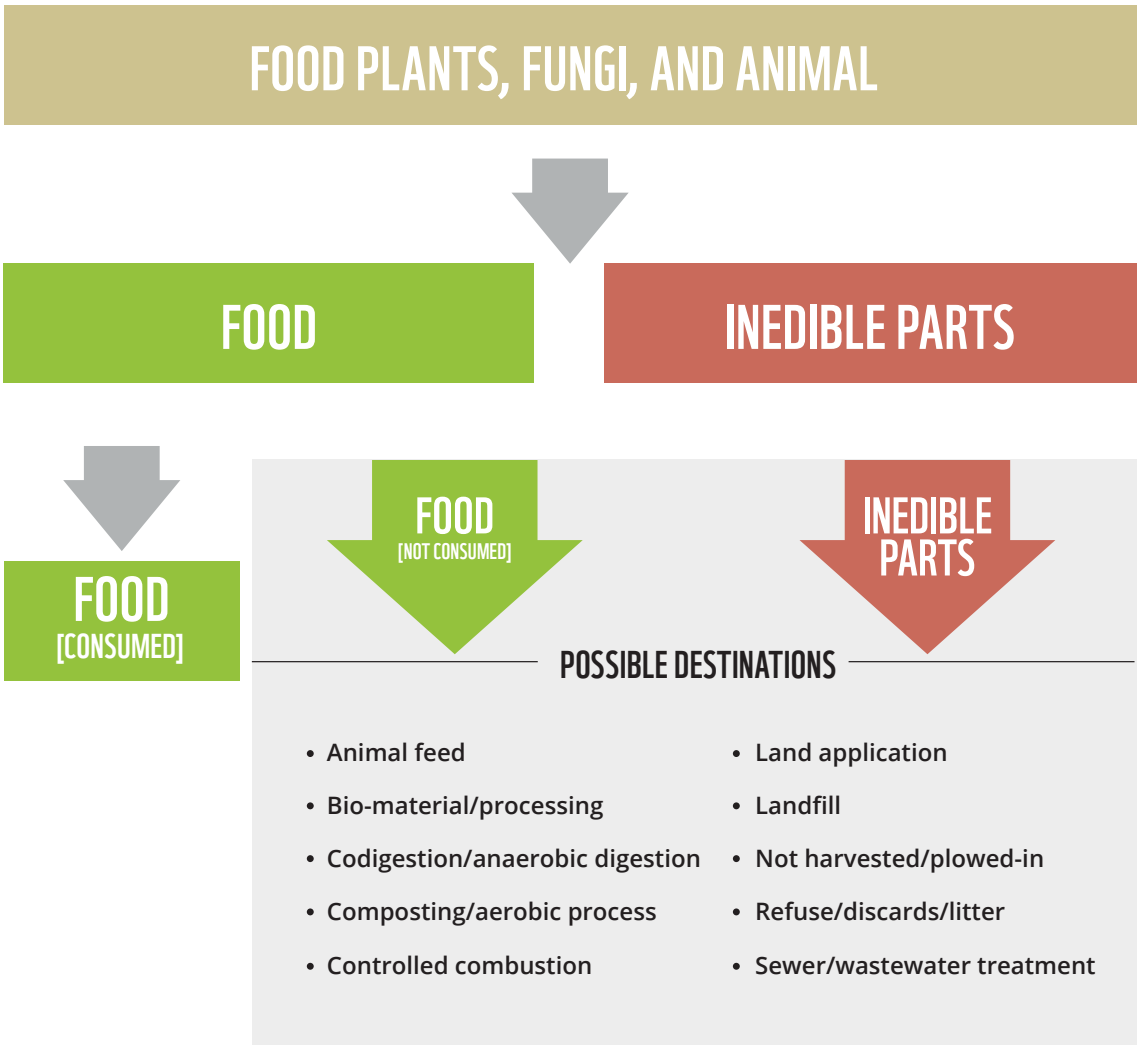
(Source: UNITAR and Swedish Environmental Protection Agency, n.d.)

Although there is no universally accepted definition of food waste, WRAP defines ***food waste*** *as "food and the inedible parts of food removed from the food supply chain to be recovered or disposed of".*[3]

This definition does not include waste prevention activities such as where surplus food is redistributed for human consumption, animal feed or industrial use. **Figure 2** illustrates WRAP's definition, highlighting both food waste and its potential destinations.

Figure 2: Material Types and Possible Destinations

(Source: WRAP, 2018)



[3] Waste and Resources Action Programme. (2018). *Food Waste Measurement Principles and Resources Guide.* https://food.ec.europa.eu/system/files/2018-04/fw_lib_fwp-guide_food-waste-measurement_wrap-2018.pdf

Food waste can be categorized in many ways. Aside from the WRAP definition which considers ***edible*** and ***inedible*** parts of food, food waste can also be classified as avoidable and unavoidable categories.

Avoidable Food Waste

Refers to food items that could have been eaten if they had been managed better. This includes food that spoils due to improper storage, excess food prepared and not sold, and edible parts of food that are often discarded due to preference or ignorance of their uses.

Unavoidable Food Waste

Includes waste that is inherently inedible, such as bones, eggshells, tea bags, and coffee grounds. These items can be repurposed in creative and environmentally friendly ways.

In the context of Thailand, the Thai Food Act B.E. 2522 (1979) addresses various matters related to food safety and hygiene, food production and trade in food as well as the administration of these matters. According to the Thai Food Act, ***food*** *refers to "edible items and those which sustain life:*

(1) any substances that human beings may eat, drink, suck or put into the body by any means, no matter in what form, but not including medicine, psychotropic substances, or narcotic under the law, as the case may be.

(2) any substances intended to be used or to be mixed as ingredients in the production of food including food additives, food coloring and food flavoring."

This definition of food should be taken into consideration as it is relevant to the food industry in Thailand.

Environmental, Economic and Societal Implications of Food Loss and Food Waste

Environmental Consequences

Food loss and food waste also represents a significant depletion of resources in terms of water, land and energy as these resources are used to produce, process and transport food from production-to-consumption.

For instance, large quantities of water are used in agriculture to grow fruit and vegetables, and when food is wasted, this water is also wasted. This compounds water scarcity issues that exist in many regions especially in Thailand, where it is expected that there will be cycles of flooding and drought due to climate change.

When food waste decomposes in landfills, it generates methane, a potent greenhouse gas that significantly contributes to *the rise of the average global temperature, known as* ***global warming,*** *as well as the resulting change in our climate.*

Global food waste alone is responsible for up to 11.8% of all global greenhouse gas emissions

and has a bigger greenhouse emissions footprint than the entire airline industry, global plastics production and global oil extraction combined.[2,4]

Reducing food waste lowers these greenhouse gas emissions. Additionally, reduction of food waste helps to conserve the resources that were involved in the production, processing and transportation of the food on the way to consumption, thereby helping to conserve these resources. Lastly, the reduction of food loss and food waste reduces the amount of food waste sent to landfills and thereby reduces the pressure on waste management systems and reduces the related environmental footprint.

[4] World Resources Institute. (2016) *World Greenhouse Gas Emissions: 2016.* https://www.wri.org/data/world-greenhouse-gas-emissions-2016

Economic Costs

Food loss and food waste represents a massive economic loss and huge waste management issue.

It is estimated that one third of all food produced is lost or wasted, which equals to around 1.3 billion tons of food and costs the global economy close to $940 billion each year.[3]

Thus, the economic losses can be direct financial losses experienced by businesses and consumers or increased operational costs due to the costs of having to manage food waste in terms of transportation, disposal and treatment.

Additionally, the labor, energy and materials invested in producing, processing and transporting food are lost when food is wasted resulting in inefficiency in production-to-consumption. All of these economic implications mean that food retailers, restaurants and consumers spend money on food that is never consumed.

This leads to substantial economic inefficiencies, higher overheads due to wastage, lower profit margins for businesses and higher prices for consumers.

The reduction of food loss and food waste results in significant cost savings for businesses due to the efficient use of resources which lowers expenses associated with purchasing, storage, and disposal of food.

These economic benefits can lead to increased profit margins by minimizing waste as more efficient operations. It means that a higher percentage of purchased food is sold which maximizes financial performance. The effective management of food resources leads to more efficient use of labor, energy, and materials related to production to consumption. This reduces overall operational costs and results in resource optimization.

[3] Waste and Resources Action Programme. (2018). *Food Waste Measurement Principles and Resources Guide.* https://food.ec.europa.eu/system/files/2018-04/fw_lib_fwp-guide_food-waste-measurement_wrap-2018.pdf

Social Implications

Food waste represents a challenge for food security and public health. Food waste exacerbates food insecurity by reducing the amount of food available for consumption. In a world where

37.2 million people suffer from emergency levels of hunger and 1.3 million people suffer from catastrophic hunger, reducing food loss and food waste could help to lessen the issue of global hunger and malnutrition.[5]

The reduction of food waste can improve food security by redirecting surplus food to those in need. This is particularly important in addressing hunger and malnutrition in vulnerable populations.

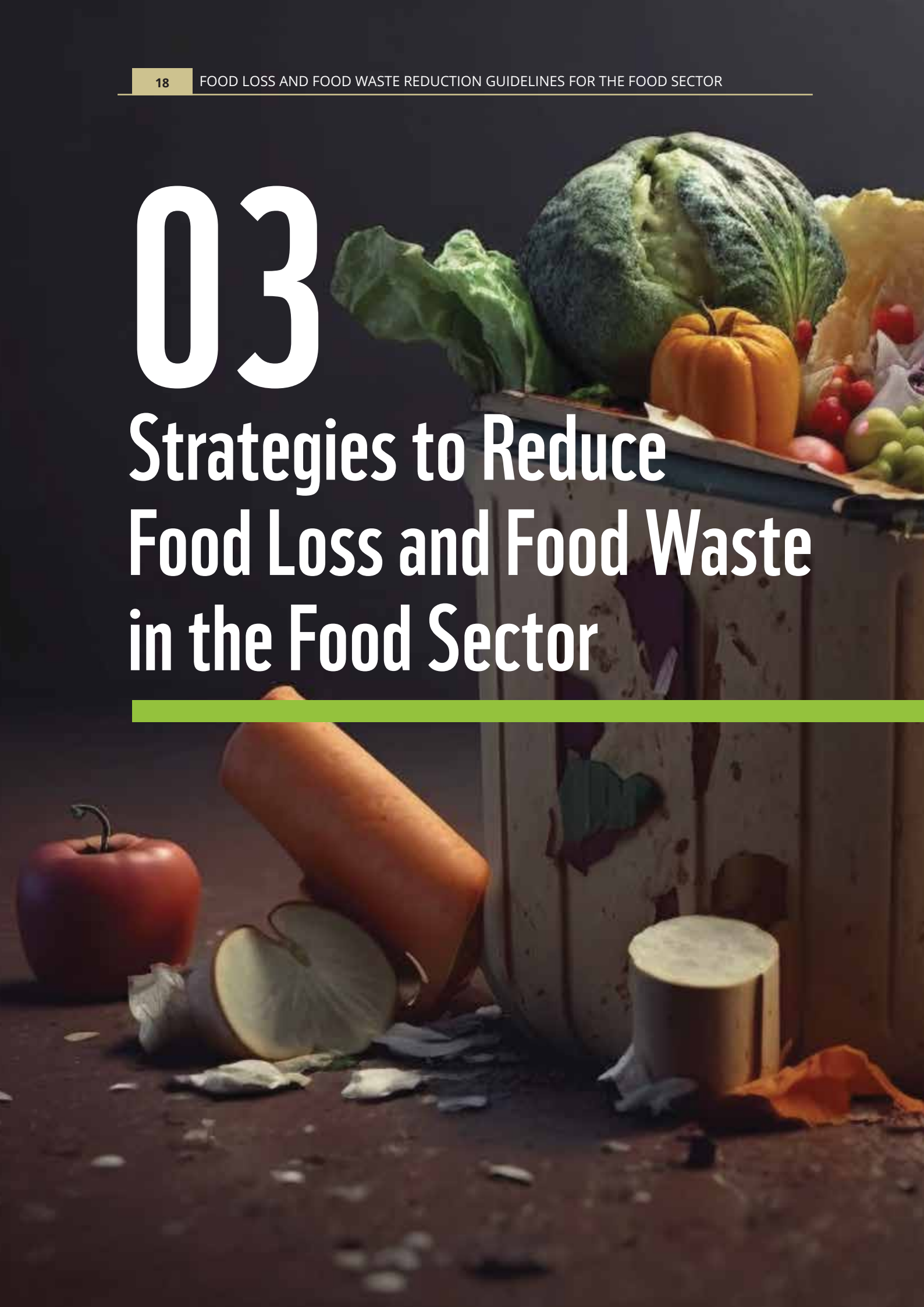
In terms of public health, **wasted food that is poorly managed can attract pests and contribute to the spread of diseases.** Additionally, the resources used to manage and dispose of food waste could be better allocated and utilized to enhance public health infrastructure.
There is also the aspect of community engagement in which initiatives to reduce food waste can help to foster stronger community relations as businesses collaborate with local organizations and charities to redistribute surplus food. All of these social benefits strongly benefit the business and its reputation as well as the surrounding community.

By implementing effective strategies for food waste reduction, the food sector can contribute to a more sustainable, equitable, and prosperous future for Thailand.

[5] United Nations Environmental Programme. (2021). *Food Waste Index Report 2021*. Nairobi.

Table 1: Issues Relate to Food Loss and Food Waste and Possible Solutions

Problem	Advantages	Disadvantages	Possible Solutions
Perception that organic waste is less harmful	• Organic waste is biodegradable and can enrich soil as compost.	• When decomposed anaerobically in landfills, it produces methane, a potent greenhouse gas.	• Promote and facilitate composting as an alternative to landfill disposal. • Educate about the impacts of methane from organic waste.
Taking home leftovers in single-use packaging	• Reduces food waste at the consumer level. • Provides convenience for customers.	• Increases use of single-use packaging, contributing to plastic waste.	• Offer smaller portions of dishes and encourage customers to finish their food. • Encourage the use of biodegradable or compostable containers. • Offer incentives for customers to bring their own containers.
Misunderstanding of best before dates vs. expiry dates	• "Best before" dates help ensure food quality.	• Leads to good food being discarded unnecessarily due to safety concerns.	• Educate consumers and staff on the difference between 'best before' and 'expiry' dates.
Over-preparation of food in restaurants	• Ensures that customer demand is met without delay.	• Leads to significant amounts of unsold food waste, financial loss.	• Implement demand forecasting techniques using historical data. • Offer special deals for excess food before closing.
Inefficient inventory management	• Often simpler for staff to manage without rigorous protocols.	• Can lead to overstocking and increased spoilage.	• Employ inventory management software to track stock levels and predict demand accurately.
Excessive portion sizes in restaurants	• Can create a perceived value for customers.	• Often results in increased plate waste.	• Offer a range of portion sizes and price points for more customization.



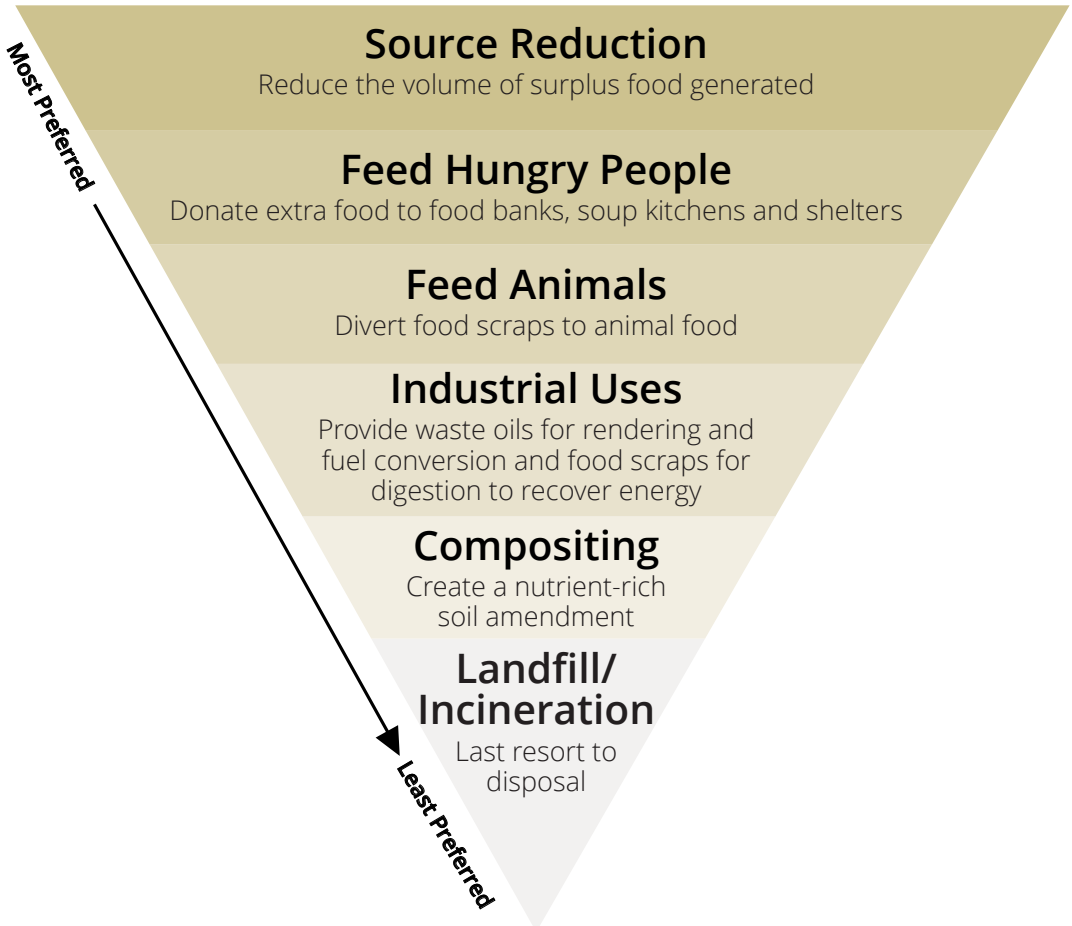
03 Strategies to Reduce Food Loss and Food Waste in the Food Sector

In response to these challenges related to food loss and food waste, the Environmental Protection Agency (EPA) has proposed the ***Food Recovery Hierarchy,*** *a framework that outlines prioritized actions to prevent and divert food waste from disposal* **(see Figure 3).**

This framework suggests that **the most desirable action is source reduction, aiming to minimize surplus food generated at the outset. Following source reduction, the hierarchy recommends feeding hungry people, feeding animals, industrial use, composting, and, as less desirable options, incineration or landfill.**

Figure 3: Food Recovery Hierarchy

(Source: EPA)



The Food Recovery Hierarchy prioritizes source reduction as the most effective means of tackling waste. By **preventing surplus food generation,** resources are conserved right from the production phase. If surplus occurs, the next preferable step is to **redirect food for human consumption,** often through donations to food banks, pantries, and shelters. Such efforts not only conserve the resources used in food production and transportation but also provide essential nutrition to those in need thus supporting vulnerable members of society. Ensuring that food donations are safe and efficiently managed requires adherence to food safety procedures and local regulations, which dictate handling, storage, and transportation. The Food Act B.E. 2522 (1979) and relevant Thai laws regarding proper food safety should be considered to ensure compliance with food safety laws when donating surplus food.

Food that is no longer suitable for human consumption, it can be used as **animal feed,** recycling nutrients into the animal production cycle and reducing the need for additional agricultural output. This approach saves on the costs of food waste disposal and reduces methane emissions from decomposing organic matter.

Anaerobic digestion in a well-managed system complements these strategies by breaking down organic materials in an oxygen-free environment to produce and collect biogas, primarily methane. This renewable energy source can then be used to generate electricity, reducing reliance on fossil fuels and supporting energy sustainability.

Composting represents another layer of food waste management by recycling organic waste, including spoiled produce and food preparation scraps, into nutrient-rich compost through **aerobic digestion.** This method supports soil health, enhances water retention, and decreases the dependence on chemical fertilizers. Some compostable items are shown in **Table 2.**

Lastly, the disposal of food waste by sending it to be **incinerated, with or without energy capture, or to landfill** is considered the least desirable action within the Food Recovery Hierarchy. This approach is seen as a last resort due to several significant environmental impacts:

Table 2: Compostable Items

Vegetable and fruit materials	Flowers, plants, and soil
Spoiled food products	Coffee grounds and filters
Wet and waxed cardboard	Bakery items
Paper towels and paper	Food preparation scraps
Wood pieces	Grocery and frozen foods
	Cooked food

Incineration

While incineration can reduce the volume of food waste and potentially capture energy through the burning process, it also has notable drawbacks. The incineration of organic materials releases carbon dioxide, a greenhouse gas as well as other harmful pollutants such as dioxins, which pose health risks. The energy capture from incineration often does not offset the environmental costs associated with these emissions.

Landfill Disposal

When organic waste breaks down in landfills, it does so anaerobically (without oxygen), leading to the production of methane, contributing to global climate change. Furthermore, landfills take up valuable land space, can lead to soil and groundwater pollution through leachate production, and the decomposition process can generate odors and attract pests.

Additionally, converting fats, oils, and greases from **food preparation into biofuel** opens up additional options for waste reduction. This process not only effectively manages waste but also facilitates the shift towards renewable energy sources, as biofuel derived from fats, oils and greases can power vehicles or generate heat and electricity, lessening the use of conventional fuels. Leveraging this approach helps mitigate environmental impacts and fosters a culture of sustainability that benefits both the economy and society.

04

Step-by-Step Framework to Implementing Food Loss and Food Waste Reduction in Restaurants, Food Retailers and Food Delivery Services

01 Setup and Planning

It is crucial to get management buy-in and form a dedicated project team of key personnel from various departments within the organization to effectively tackle food loss and food waste.

02 Plan and Conduct Food Waste Assessment

Plan and conduct the food waste assessment to develop the baseline for identifying the sources and how much waste is being created.

03 Implementation for Food Waste Reduction Measures

Once the food waste assessment has been performed, reduction targets need to be set as well as the development and implementation of improvement measures to reach these targets.

04 Employee Engagement and Training

Since employees interface with customers, it is vital that they have proper information and training on the protocols regarding the program as well has how to communicate these initiatives to customers.

05 Customer Engagement

In addition to employees' awareness and training the aspect of customer engagement cannot be underemphasized. Raising awareness campaigns as well as various initiatives and incentives can be very effective in communicating the importance of food loss and food waste measures as well as its benefits and progress in the short and long term.

06 Continuous Monitoring and Feedback

Essential to the attainment of food waste reduction goals is continuous monitoring of data of food waste reduction and responsive feedback mechanisms.

07 Summary and Outreach

Summarize the results of the food loss and food waste reduction efforts as well as to share success stories and support best practices. These steps help to communicate progress on program reduction goals as well as to spread knowledge and skills in the food sector around food loss and food waste reduction.

08 Food Waste Recovery and Processing

The last step of the framework is food waste recovery for human consumption and/or animal feed as well as food waste processing, although the emphasis of this framework is source reduction. Any food waste not recovered for human or animal consumption can then be composted or anaerobically digestated.

The following step-by-step framework outlines a comprehensive approach to preventing food loss and waste, emphasizing the importance of planning, assessment, and implementation within the food sector. These strategies are designed to be actionable and measurable, helping businesses reduce waste and improve sustainability.

In order to facilitate the use of this framework by the different types of businesses in the food sector, all of the strategies in this step-by-step framework will be marked with a different icon to identify the types of businesses to which the strategy would be the most relevant.

The types of businesses in the food sector and their icons are associated as follows:

Obtain Management Buy-In

The first task is to secure buy-in from upper management. To do this, the business case for reducing food waste should be presented. Data on the financial benefits of waste reduction, such as cost savings as well as the potential for enhancing the company's reputation as a sustainable business should be emphasized.

The sustainability director can act as a change agent by reviewing and analyzing global emerging trends and standards. The materiality issue can then be embedded into the business plan and strategy.

Assemble a Dedicated Team

Once buy-in is obtained, assemble the food waste reduction team and clearly define the roles and responsibilities of each team members, including middle management, to ensure accountability and efficiency. The team should be key personnel from various departments of the organization relevant to food loss reduction.

Appoint a project leader or coordinator to oversee the team's activities to be responsible for setting meeting agendas, tracking progress, and ensuring that the team remains focused on its goals. This person will serve as the primary point of contact for upper management and other stakeholders.

Involve all Departments for Maximum Implementation

Influence collaboration among all departments and engage each team to develop their own plan to maximize the effectiveness of the food waste reduction strategy. Establish regular meetings to discuss progress, share insights, identify challenges, and brainstorm solutions.

Ensure that each department has the resources it needs to contribute effectively to the project. This might include access to data, training programs, or budget allocations for specific waste reduction initiatives.

Perform Initial Assessments

Identify major points of food loss and food waste within the supply chain that can be addressed strategically.

Conduct a materiality assessment to help identify and understand the relative importance of food loss and food waste reduction to your organization.

Plan the Assessment

Determine the scope of the assessment, including sample size, number, and duration. Set clear goals to guide the assessment process, such as identifying key sources of waste or evaluating the effectiveness of current waste management practices.

Materials Preparation

Data record form: Use a standardized form to log food waste data (weight) according to different food waste categories for businesses in the food sector such as restaurants **(Appendix 1),** food retailers **(Appendix 2),** and food delivery services **(Appendix 3).**

Scale: Ensure accurate measurement of food waste.

Food waste collection bins with labels: Choose bins based on the area generating the waste, available space, and volume of waste. Label bins with photos and descriptions to ensure correct waste segregation. Use transparent or semi-transparent bags for visual inspection.

Collect Benchmark Data

Conduct daily measurements and record food waste data over a specified period, with at least two weeks recommended to capture accurate trends. This data will help identify patterns, set targets, and develop improvement measures as well as serve as a benchmark for evaluating the effectiveness of food waste reduction strategies.

Analyze and Report Results

Analyze the collected data to identify the main categories and sources of food waste and help in setting realistic reduction targets. Report to management and appropriate departments.

Set Reduction Targets

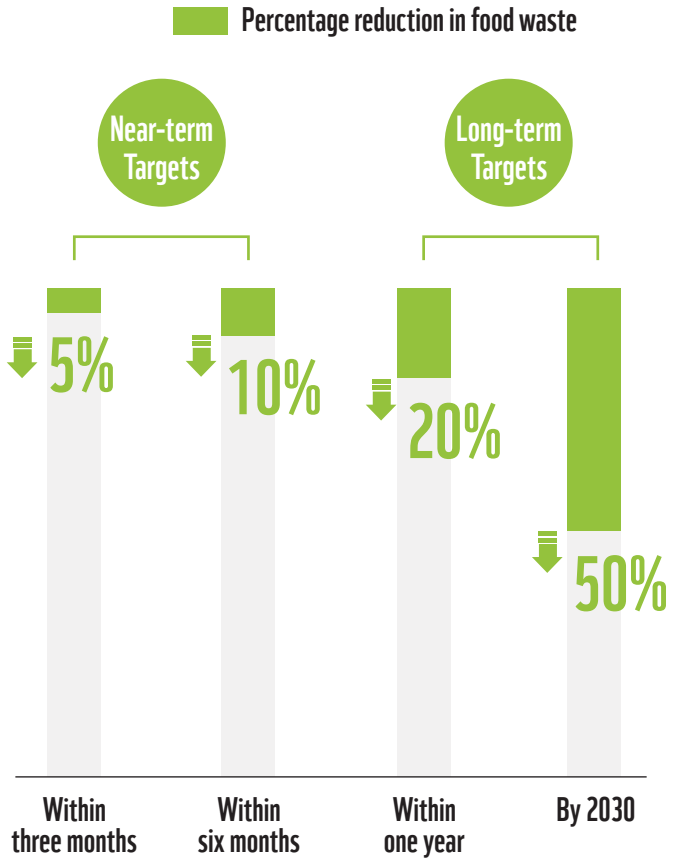
Based on the assessment, set achievable reduction targets:

Near-term Targets (3-6 months): Focus on quick wins, such as reducing over-preparation or optimizing portion sizes.

Long-term Targets (1 year or more): Aim for broader changes, such as improving procurement processes or enhancing food storage practices.

Figure 4: Near-term and Long-term Food Waste Reduction Targets

(Source: Shenzhen One Planet Foundation, 2017)



Code of Conduct

Develop a code of conduct focused on environmental responsibility, cost savings and hygiene standards when handling and dealing with food.

Develop and Implement Improvement Measures

Once the benchmark has been set, the main task is to develop and implement the selected food waste reduction measures. A pilot phase should be implemented prior to going full scale. Additionally, regular review and adjustment of food waste reduction strategies is then needed to ensure continuous improvement.

Food Procurement

• Reliable and Collaborative Suppliers

Choose suppliers who can provide on-time, on-demand delivery with optimized storage and transportation, ensuring that the freshest ingredients when they are needed to reduce excess inventory.

Favor local suppliers where possible, as shorter transportation distances reduce the risk of spoilage during long-haul deliveries. Local suppliers are often better equipped to deliver fresh produce more frequently, allowing for smaller, more frequent orders that align with actual demand.

Negotiate flexible contracts with suppliers that allow for adjustments in order size and frequency based on changing demand especially due to seasonal fluctuations or unexpected changes in customer behavior.

Prioritize suppliers who demonstrate a strong commitment to minimizing food loss and promoting sustainable practices. Transparency and willingness to collaborate on waste reduction initiatives is crucial.

Establish partnerships with suppliers to develop strategies that reduce food waste, such as adjusting order sizes based or establishing proper quality control mechanisms. Conduct regular audits of suppliers to ensure they adhere to food waste reduction practices.

• Data-Driven Decisions

Use historical sales and waste data to inform purchasing decisions to better match actual usage and demand to help maintain optimal inventory levels. Use commercial food waste solution technology to forecast if possible.

Consider adopting a just-in-time (JIT) purchasing strategy, where ingredients are ordered and delivered as close as possible to the time they will be used.

Implement bulk purchasing for non-perishable items or ingredients that have a high turnover rate, and monitor inventory levels closely to avoid overstocking perishable goods.

Embrace "Ugly" Produce

Incorporate "ugly" produce—fruits and vegetables that don't meet aesthetic standards but are perfectly edible—into purchasing practices. Promote a dedicated discounted section or integrate "ugly" produce into products where appearance is less important, such as soups, sauces, and smoothies.

Storage Management of Ingredients and Inventory

• Optimized Storage and Conditions

Organize storage areas by food category and by preservation requirements (e.g., refrigeration, freezing, dry storage). Having a systematic approach makes it easier for staff to find and use ingredients efficiently and extends shelf life.

Store items with strong odors, such as onions or fish, separately from other foods to prevent cross-contamination of flavors.

Keep ethylene-producing fruits like apples and bananas away from ethylene-sensitive produce to prevent premature ripening and spoilage.

Regularly monitor and maintain optimal temperature and humidity levels for each storage area. Accurate measurement tools such as thermometers and hygrometers should be used and staff need to check and adjust settings as needed.

Ensure that storage areas have adequate ventilation to prevent the buildup of moisture, which can lead to mold growth and spoilage. Proper airflow is particularly important in refrigerated and dry storage areas.

Implement specific storage protocols for different types of food, such as wrapping or covering items to prevent dehydration, using airtight containers for dry goods, and keeping produce in perforated bags to maintain freshness.

First-In, First-Out (FIFO) and Labeling

Train staff to use the FIFO system, where the oldest stock is used first, to minimize waste from expired or spoiled items. Organize storage areas so that older items are at the front and newer items are placed behind them.

Conduct regular inventory checks to ensure that FIFO practices are being followed and that items are being rotated properly. Regular checks also help identify slow-moving items that may need to be used more quickly or ordered in smaller quantities in the future.

Educate staff on the differences between various date labels, such as “best by,” “expiration,” “manufacture,” and “sell by” dates. Implement a policy for evaluating food that is near or past its labeled date to determine if it can still be used safely.

Menu Design

Portion Sizes

Design the menu to offer multiple portion sizes for dishes, allowing customers to choose the amount of food that best suits their appetite. This reduces plate waste and caters to different customer needs, from those with smaller appetites to those looking for a full meal.

Regularly gather customer feedback on portion sizes to ensure that they align with expectations. Adjust portions based on this feedback to reduce waste while maintaining customer satisfaction.

Adjust portion sizes for delivery orders based on customer preferences and the type of food being delivered. Offer smaller portions for dishes that may not reheat well or for customers who prefer lighter meals.

Smaller Plates

Use smaller plates or packaging for certain menu items to help manage portion sizes effectively and make servings appear more generous.

Ensure consistency in portion sizes across different plate sizes to maintain customer expectations. Standardizing serving sizes and train staff to plate food uniformly, regardless of the size of the dish or packaging.

Customization Options

Offer flexible menu options that allow customers to customize their meal by choosing the number of courses they prefer such as à la carte options, fixed-price menus, smaller portions, or customizable meal combos.

Create customizable meal combos that give customers the freedom to mix and match smaller portions of different dishes as well as choose side dishes.

Portion-Controlled Condiments

Provide condiments and sauces in portion-controlled sachets to minimize waste as it ensures that customers receive just the right amount. Allow the option to opt-out.

Ingredient Utilization

Design the menu to maximize the use of all parts of ingredients. For example, use vegetable trimmings to make stocks, repurpose leftover bread into croutons, or use fruit peels in sauces or garnishes.

Reduce the use of decorative features on menu items. Choose to make garnishes edible.

Plan the menu so that ingredients used in one dish can be easily incorporated into other dishes to minimize the risk of ingredients being wasted.

Creative Repurposing

Develop daily or weekly specials that creatively repurpose leftover ingredients or items nearing their expiration date. For example, use surplus vegetables in a soup of the day or turn over ripe fruits into desserts. Plan the menu to include seasonal ingredients that are readily available and likely to be fresher and less expensive.

• Discounts for Food Close to Expiry

Provide discounts for food that is still good to eat, such as food that is discounted at the end of the day, with proper information for consumer.

Food Packaging and Handling

• Proper Packaging and Storage During Delivery

Implement measures to maintain the proper temperature of food during transport to reduce spoilage by using insulated containers, heat packs, or cooling elements to keep hot foods hot and cold foods cold.

Use packaging that protects food from moisture, contamination, and physical damage during transit. For example, use moisture-resistant packaging for fried foods to keep them crispy, and choose containers with secure lids to prevent spills and leaks.

Consider using sustainable, eco-friendly packaging materials that are biodegradable or recyclable. While often pricier, this aligns with customer preferences for environmentally conscious choices.

Proper Storage Before Delivery

Ensure that food is stored properly before delivery to maintain its quality. This includes keeping hot and cold items separated, using appropriate storage containers, and avoiding delays that could lead to spoilage or reduction in quality.

Careful Handling During Transport

Train delivery staff on the importance of careful handling to prevent food from being damaged during transit including mindful driving, proper stacking of containers, securing items to prevent spills, and protecting food from environmental factors such as rain or extreme temperatures.

Logistics and Routing

Strategically locate distribution center for route optimization to reduce spoilage due to transportation.

Engage in route optimization for transportation between branches and delivery services.

Educate Staff on the Importance of Reducing Food Waste

Educate staff on the importance of reducing food loss and food waste to ensure effective implementation of food reduction measures. This includes the environmental consequences as well as the economic and social implications for the business.

Clarify the impact how the food waste reduction program will affect and benefit them as well as how their performance is linked to key performance indicators (KPIs) or incentives. Provide certification and participate in external trainings if possible.

Train Staff in Best Practices for Minimizing Waste in Daily Tasks

Conduct practical and hands-on training sessions where employees can learn and practice best practices in food waste reduction. Use scenario-based training where employees can work through common situations that lead to food waste.

Develop and Provide Educational Materials

Develop and provide easy-to-digest educational materials with instructions, descriptions, visual aids, process flow diagrams, etc. These guides should be clear, concise, and accessible, with step-by-step instructions for various tasks related to food waste reduction. Incorporate visual aids such as infographics, posters, and process flow diagrams to illustrate key points.

Checklists and quick-reference cards can be helpful for employees to use in their daily routines. These might include reminders about FIFO (First In, First Out) practices, tips for reducing spoilage, or key points for engaging customers about food waste.

Develop protocol details for food waste reduction program in employee orientation to facilitate continuity in the case of resignation or rotation.

Service Expressions and Customer Engagement Scripts

Develop scripts and talking points for staff to use when interacting with customers about food waste reduction. Train staff to weave reduction messages into their everyday interactions with customers.

Feedback and Follow-Up

Encourage staff to seek feedback from customers on their experience related to food waste reduction efforts to help refine practices and strengthen customer relationships.

Employee Incentives and Recognition

Establish a reward program or scoring system that offers incentives to employees who demonstrate exceptional commitment to reducing food waste and consistently meeting waste reduction goals.

Hold regular recognition events where employees who have contributed significantly to food waste reduction are acknowledged.

Link waste reduction efforts to performance reviews, where employees who excel in minimizing waste can receive higher performance ratings, which may lead to promotions or raises.

Awareness Raising Campaigns

Customer Role in Food Waste Reduction

Launch educational campaigns that inform customers about their role in reducing food waste, such as using "ugly produce", how to store leftovers properly, how to compost food scraps at home, or how to make mindful choices when ordering food.

Use digital platforms like social media, websites, and apps to educate customers about food waste reduction. Share tips, infographics, and success stories that encourage customers to take part in the initiative.

Signage and Displays

Use clear and visually appealing signage in prominent areas or digitally to educate customers about the importance of reducing food waste.

Signs can include statistics on food waste, tips on how customers can contribute to waste reduction, and information on what the business is doing to minimize waste.

Display posters and signage that guide customers on how to order responsibly, such as choosing the right portion sizes, taking leftovers home, or selecting customizable options to reduce waste.

Food Waste Separation Infrastructure

Set up infrastructure that facilitates food waste separation by having appropriate waste bins to encourage desirable behaviors for proper disposal.

Allocate staff to be stationed at waste separation bins along with signs to educate consumers about the impact of food waste and proper disposal.

Delivery services can educate consumers online for better food waste segregation at home.

Highlight the Benefits of Food Waste Reduction

Communicate the environmental benefits of reducing food waste, such as lowering carbon emissions and conserving resources. This can be done through messages on menus, receipts, and digital platforms.

Share how food waste reduction efforts contribute to supporting local communities, such as through food donations or partnerships with local charities. Customers are more likely to engage when they see the positive impact of their actions.

Initiatives and Incentives

Discounts

Promotion and discounts for "ugly" produce or near expired-food can help build customer awareness and change customer preferences.

Offer discounts or promotions to customers who participate in food waste reduction programs. For example, provide a discount for customers who bring their own containers for takeout or offer a loyalty reward for those who consistently finish their meals.

Activities and Contests

Organize challenges where customers are encouraged to reduce their food waste over a certain period. Participants could track their waste and share their experiences on social media, with the chance to win prizes or discounts.

Host contests that encourage customers to submit recipes that creatively use leftovers or food scraps. Winning recipes could be featured on the menu or shared through social media channels.

Customer Feedback

Implement customer surveys or comment cards that specifically ask about their experience with the business's food waste reduction practices. This could include questions about portion sizes, packaging choices, and their willingness to participate in waste reduction efforts.

Solicit feedback specifically on packaging used for takeout and delivery, focusing on its effectiveness in preserving food quality and minimizing waste.

Utilize digital channels, such as email surveys, social media polls, or feedback sections on your website, to gather input from customers.

Regularly Monitor Food Waste Data

Establish a system for collecting and tracking food waste data on an ongoing basis. Set up specific metrics to measure different aspects of food waste, such as the amount of food discarded, the reasons for waste, and the stages where waste occurs.

Schedule regular reviews of the collected data-monthly, quarterly, or annually-depending on the size and nature of your operations. These reviews should involve key stakeholders and strive to identify patterns, successes, and areas that require further attention.

Maintain detailed records of all food waste data and the outcomes of your monitoring activities to enhance understanding the impact of waste reduction efforts over time and provide a basis for future decision-making.

Regular reports summarizing progress should be shared with relevant stakeholders.

Adjust Strategies Based on Feedback and Data

Use the insights gained from monitoring activities to inform strategic decisions such as implementing new practices, refining existing ones, allocating resources differently, or scaling up successful strategies.

Maintain a flexible approach that allows for rapid adjustments based on new data. Regularly update waste reduction goals and targets based on the latest data, feedback, and industry best practices, ensuring that your efforts evolve in line with changing environmental and business conditions.

Compile the Results of Waste Reduction Efforts

Compile and analyze the data collected throughout the process. This involves gathering quantitative metrics such as the amount of waste diverted from landfills, the volume of food donated, or the savings achieved through reduced purchasing and waste disposal costs.

Compare the results against the benchmark data collected before the implementation of food waste reduction strategies. This comparison helps to measure progress, identify areas of success, and highlight any gaps that need further attention.

Develop a regular reporting schedule to keep track of the ongoing progress of the food waste reduction program. Reports could be generated monthly, quarterly, or annually such as Annual Reports or ESG and Sustainability Reports.

Promote Success Stories and Best Practices

Utilize internal communication channels to share the successes and best practices of the food waste reduction program with employees.

Organize workshops or seminars where successful teams or departments can share their strategies and experiences with others in the organization.

Share successes and best practices with other businesses, NGOs, and the public sector as well as customers and the local communities to increase knowledge sharing and demonstrate commitment to food waste reduction.

Develop partnerships and collaborate with other businesses, NGOs, and the public sector to work cooperatively towards shared food waste reduction goals.

Food Donation for Human Consumption

The first step in food donation is identifying surplus food that is safe and nutritious for human consumption. This includes excess inventory, food that is nearing its sell-by date, and prepared but unsold food that remains uncontaminated. Proper training for staff is important in recognizing and sorting out edible food that can be donated rather than discarded.

Establish strong partnerships with local food banks, shelters, and community organizations that can distribute donated food to those in need. These partnerships should be built on clear communication and regular coordination to ensure that donations are aligned with the needs of these organizations and reach beneficiaries in a timely manner and hygienic manner.

Ensure that all food donations comply with local food safety regulations and laws, such as the Food Act B.E. 2522 (1979). Implement strict food safety procedures to handle, store, and transport donated food, including maintaining proper temperature controls and hygiene practices to prevent contamination.

Develop a logistics plan for the collection and delivery of donated food. This may involve working with food recovery organizations that specialize in the transportation and redistribution of surplus food. Efficient logistics are key to ensuring that donated food remains fresh and safe for consumption.

Highlight the social impact of food donations to customers and within the community. Donating food not only helps reduce waste but also plays a significant role in combating food insecurity.

Food Recovery for Animal Feed

Determine which types of food waste can be safely and effectively used as animal feed. Avoiding cross-contamination is essential to ensuring the safety of the feed.

Adhere to local and national regulations regarding the use of food waste as animal feed. These regulations may specify the types of waste that can be used, processing requirements, and safety protocols to protect animal health and prevent the spread of disease.

Depending on the type of food waste, some processing may be required before it can be used as animal feed. Proper storage is also essential to prevent spoilage and ensure the feed remains safe for animal consumption.

On-Site Processing

Implementing on-site processing facilities requires an initial investment in infrastructure and equipment. Businesses need to assess their waste generation volumes, space availability, and the potential return on investment to determine the feasibility of on-site processing.

Integration ensures that food waste is consistently diverted from landfills and processed efficiently. Train employees to manage and operate the composting or anaerobic digestion systems is also essential to ensure efficiency and safety.

On-site processing should be seamlessly integrated into daily operations. This involves establishing clear procedures for separating organic waste from other types of waste, monitoring the composting or digestion process, and regularly maintaining the equipment.

Composting

For businesses with the appropriate facilities, on-site composting is a practical way to manage food waste.

Composting involves the aerobic decomposition of organic matter to produce nutrient-rich compost. On-site composting reduces the volume of waste sent to landfills and creates a valuable by-product that supports sustainable practices.

Anaerobic Digestion

If significant quantities of food waste are available, anaerobic digestion is another on-site processing option.

Anaerobic digestion breaks down organic material in the absence of oxygen, producing biogas (primarily methane) and digestate. The biogas can be used to generate electricity, heat, or fuel, providing a renewable energy source.

The digestate, a nutrient-rich slurry, can be used as a fertilizer or soil conditioner. On-site anaerobic digestion helps businesses convert waste into energy, reducing waste disposal costs and environmental impact.

Black Solider Fly Larvae

Black soldier fly larvae offer an innovative solution for managing food waste beyond traditional composting. These fly larvae can consume and rapidly break down organic waste converting it into valuable by-products like protein and fat, which can be used for animal feed or biofuels.

Off-Site Processing

For businesses that lack the facilities for on-site processing, partnering with professional waste management services or the government is a viable alternative.

Selecting the right waste management partner requires research and the evaluation of capabilities, environmental practices, and costs.

Off-site processing requires efficient logistics to transport food waste from the business to the processing facility as this is key to minimizing the environmental impact of transportation and ensuring that waste is processed promptly.

Work with waste management partner to receive regular reports on the amount of waste processed and the environmental benefits achieved to ensure that food waste is being handled responsibly.

Industrial Composting

Industrial composting facilities can process a wide variety of organic materials, including those that are more challenging to compost on-site, such as meat, dairy, and certain food packaging. These facilities operate at higher temperatures and with greater control for increased efficiency and safety.

Biogas Production

Partnering with facilities that specialize in anaerobic digestion can turn food waste into biogas, which is then used to produce electricity, heat, or vehicle fuel. The digestate produced during the process can also be used as a fertilizer.

Disclaimer

While not exhaustive, the various strategies presented in this step-by-step framework provides a comprehensive entry point for businesses in the food sector to implement food loss and food waste reduction measures. Keep in mind that there is no one way to approach the implementation of food waste reduction and that this framework can be adapted to suit a particular business.

In addition, taking action towards sustainable consumption and production based on the suggestion in the guidelines in this series may prove difficult to implement as some initiatives may conflict with each other and it is difficult to balance all of the goals presented. It is recommended that businesses set their top priorities and targets and work towards those in a strategic manner.

05 A Call to Action

The challenge of food loss and food waste in Thailand presents not only a significant barrier to sustainability but also an opportunity for transformation within the food sector. Business and consumers alike play pivotal roles in shaping the future of our food systems as we strive to live within planetary boundaries and make efficient use of our natural resources.

For businesses, the call to action is clear: adopt and implement measures to drastically reduce food loss and food waste as it has profound environmental, economic and societal and enhance their reputations as leaders in sustainability. Moreover, adopting these practices helps ensure compliance with emerging regulations aimed at reducing food waste in accordance with local and global policies.

The journey towards a more sustainable food sector is a collective responsibility that necessitates urgent action by both the public and private sector alike. Each measure implemented to reduce food loss and food waste contributes significantly towards the formation of a more sustainable and equitable world. The opportunity to enact meaningful change is present; embracing it is not only beneficial, but essential for future sustainability.

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Appendices

Appendix 1 Food Waste Monitoring Log for Restaurants

Restaurants

14-day Food Waste Weighing log

Please enter the quantity in the field
*Unit: KG

Start date:

	Spoilage		Trimming		Surplus		Plate Waste
	During preparation	During distribution	Avoidable food waste	Unavoidable food waste	Near expired overstock or ingredients	Unsold prepared food	Leftovers on customers' plates
Day 1							
Day 2							
Day 3							
Day 4							
Day 5							
Day 6							
Day 7							
Day 8							
Day 9							
Day 10							
Day 11							
Day 12							
Day 13							
Day 14							
Total							

Instructions for use

1. Weigh the amount of food waste in kilograms (KG) according to the classifications.
2. Record only solid leftovers, excluding packaging, liquid, etc.
3. Fill in 0 for zero waste options.
4. Keep one digit after the decimal point, e.g. 7.8 KG.
5. If possible, record the number of diners to help understand and optimize the cost of ingredients.

** This tool was adapted from a tool developed by the Rare Center for Behavior with the support of the EU SWITCH-Asia Program, and is intended for corporate reference only and not as research, commercial or legal advice.

Food Waste Categories for Restaurants

Spoilage

During preparation: Ingredients that have become unusable before they even reach the cooking stage.

During distribution: Occurs when food items spoil during distribution between branches.

Surplus

Near expired overstock or ingredients: Food and ingredients that are nearing their expiration date.

Unsold prepared food: Food that has been prepared but remains unsold.

Trimming

The removal of undesirable parts of food items during preparation for sale.

Avoidable food waste: Food waste that could have been consumed but was discarded instead.

Unavoidable food waste: Food waste includes items that are generally not consumed or are inedible.

Plate Waste

Consists of leftovers on customers' plates after dining.

Appendix 2 Food Waste Monitoring Log for Food Retailers

Retailers

14-day Food Waste Weighing Log

Please enter the quantity in the field
*Unit: KG

Start date:

	Food Loss	Food Waste						
		Trimming		Surplus		Spoilage		
	Does not pass inspection	Avoidable food waste	Unavoidable food waste	Near expired overstock or ingredients	Unsold prepared food	Handling accidents	During distribution
Day 1							
Day 2							
Day 3							
Day 4							
Day 5							
Day 6							
Day 7							
Day 8							
Day 9							
Day 10							
Day 11							
Day 12							
Day 13							
Day 14							
Total							

Instructions for use

1. Weigh the amount of food waste in kilograms (KG) according to the classifications.
2. Record only solid leftovers, excluding packaging, liquid, etc.
3. Fill in 0 for zero waste options.
4. Keep one digit after the decimal point, e.g. 7.8 KG.
5. If possible, record the number of diners to help understand and optimize the cost of ingredients.

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Food Waste Categories for Food Retailers

1. From Supermarkets

Food Loss

Does not pass inspection or quality control:
Food items that fail to meet specific quality or safety standards during inspection processes.

Food Waste

Trimming

The removal of undesirable parts of food items during preparation for sale.

Avoidable food waste: Food waste that could have been consumed but was discarded instead.

Unavoidable food waste: Food waste includes items that are generally not consumed or are inedible, such as banana peels, eggshells, or meat bones.

Surplus

Near Expired Overstock/Ingredients: Food and ingredients that are nearing their expiration date.

Unsold Prepared Food: Food that has been prepared but remains unsold.

Spoilage

Handling accidents: Occurs when food items spoil during stocking or shelving accidents.

During distribution: Occurs when food items spoil during distribution between branches.

2. From Food Courts

(see Restaurants in Appendix 1)

3. From Logistics and Deliveries

(see Food Delivery Services in Appendix 3)

Appendix 3 Food Waste Monitoring Log for Food Delivery Services

Deliveries

14-day Food Waste Weighing Log

Please enter the quantity in the field
*Unit: KG

Start date:

	Returned Food	
	Spoilage during delivery due to improper packaging or storage	Incorrect order or not matching customer expectations
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		
Day 8		
Day 9		
Day 10		
Day 11		
Day 12		
Day 13		
Day 14		
Total		

Instructions for use

1. Weigh the amount of food waste in kilograms (KG) according to the classifications.
2. Record only solid leftovers, excluding packaging, liquid, etc.
3. Fill in 0 for zero waste options.
4. Keep one digit after the decimal point, e.g. 7.8 KG.
5. If possible, record the number of diners to help understand and optimize the cost of ingredients.

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Food Waste Categories for Food Delivery Services

Returned Food

Spoilage during delivery due to improper packaging, storage or accidents: This form of waste occurs when food items spoil or degrade in quality during the transit process. Factors contributing to spoilage include improper driving, inadequate temperature control, ineffective packaging that fails to protect food from contamination or physical damage, and extended delivery times that exceed the safe threshold for food to remain unrefrigerated or unheated.

Incorrect order and not matching customer specifications: Results when there is a discrepancy between what the customer ordered and what is delivered. This can happen due to human error during order taking, miscommunication, or incorrect order processing. Food that does not meet customer specifications might be due to incorrect portion sizes, missing items, failure to adhere to specific dietary requests, or not meeting customer expectations in terms of taste and quality.

Note: While food waste may go back to restaurant or food retailers, proper monitoring and cooperation supports collaborative goals for food waste reduction.

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