



BAPPENAS

Kementerian Perencanaan Pembangunan Nasional/
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ROADMAP FOR FOOD LOSS AND WASTE MANAGEMENT IN SUPPORTING THE ACHIEVEMENT OF FOOD SECURITY TOWARDS GOLDEN INDONESIA 2045



Jejaring Pasca Panen untuk Gizi Indonesia



Life Cycle Indonesia
Towards Sustainable Indonesia





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Preface



Indonesia is committed to contributing to the achievement of sustainable development targets. One form of commitment of the Indonesian government is managing food loss and waste. Managing food waste is directly related to Goal 12, "Responsible Production and Consumption," and Goal 2, "Zero Hunger". The management of food waste and waste has made a significant contribution to reduce

Greenhouse Gas emissions. Food conservation efforts carried out by various parties also contribute to improving national food security. However, efforts to manage food loss and waste need to be encouraged in line with the increase in Indonesia's population.

Indonesia has a population of 270 million people, according to the 2020 Population Census. The sizable population is directly proportional to the potential for food loss and waste. Food loss and waste generation are expected to reach 344 kg per capita per year in 2045 with BAU (*Business as Usual*) conditions. The high rate of food loss and waste certainly has a negative impact both economically and environmentally. By considering economic growth, changes in people's behavior, increasing food utilization and agricultural and fishery production, controlling and measuring the efficiency of agricultural and fishery resources, as well as the development of data collection that can be monitored and evaluated periodically, it is expected that the management of food loss and waste can reach 75% by 2045.

Managing food loss and waste requires strong stakeholder collaboration regarding their interests and joint commitment to implementing the activities. Food loss and waste management needs to be carried out

along the value chain from production, processing, distribution, to the household level.. Therefore, joint guidance is required to emphasize productive collaboration and mutual understanding between stakeholders. The roadmap for food loss and waste management was prepared as a joint guide in improving the efficiency of the food supply chain and reducing food waste. This document is expected to be a guide in the development of national action plans and regional action plans.

Jakarta, June 2024

A handwritten signature in black ink, likely of Suharso Monoarfa, written in a cursive style.

Suharso Monoarfa

Minister of National Development Planning/
Head of the National Development Planning Agency

Foreword



Indonesia has a long-term vision of Golden Indonesia 2045 to become an Advanced and Sustainable Sovereign Archipelagic State. To achieve this big vision, transformative policies and steps are needed in all development fields. The transformation of the food system and the development of the circular economy are a series of transformative efforts that we need. Managing food loss and waste is one of the crucial parts of the circular economy and the transformation of the food system. The management of food loss and waste is

also a tangible form of Indonesia's commitment to implement and achieve Sustainable Development Goals (SDGs), especially Goal 12: Responsible Production and Consumption and Goal 2: Zero Hunger.

Golden Indonesia 2045, which conveys 5 (five) major strategies for food loss and waste management, namely: (i) Development of policies and regulations; (ii) Capacity building and education; (iii) Improvement of coordination and cooperation; (iv) Technology and infrastructure development and (v) Implementation of incentives and disincentives system.

This document is a cross-actor and cross-sectoral joint result involving the government, private sectors, academia and researchers, development partners, and communities. Multi-stakeholder involvement represents the food supply chain, including producers, retailers, distributors, consumers, and policymakers. Through this multi-stakeholder collaboration, this document presents a comprehensive roadmap to manage food loss and waste in Indonesia. Multi-stakeholder collaboration is

key to implementing strategic strategies for managing food loss and waste in Indonesia.

We would like to thank all parties who have contributed to the preparation of this document. This roadmap is expected to be a joint guide for managing food loss and waste, supporting food security and a circular economy towards a Golden Indonesia 2045.

Thank you.

Jakarta, June 2024

A handwritten signature in blue ink, consisting of a stylized 'V' followed by a horizontal line and a small flourish.

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Glossary

BAU	Business as Usual	TPB	<i>Tujuan Pembangunan Berkelanjutan</i> Sustainable Development Goals (SDGs)
FAO	Food and Agricultural Organization	TPA	<i>Tempat Pemrosesan Akhir</i> Final Processing Site
FL	Food loss	TPS	<i>Tempat Penampungan Sementara</i> Temporary Shelter
FW	Food waste	SDGs	Sustainable Development Goals
FLW	Food loss and waste	SIPSN	<i>Sistem Informasi Pengelolaan Sampah Nasional</i> National Waste Management Information System
HOREKA	<i>Hotel, Restoran, Katering</i> Hotels, Restaurants, Catering	SRT	<i>Sampah Rumah Tangga</i> Household Waste
Jaktranas	<i>Kebijakan dan Strategi Nasional</i> National Policies and Strategies	SSSRT	<i>Sampah Sejenis Sampah Rumah Tangga</i> Waste Similar to Household Waste
Jakstrada	<i>Kebijakan dan Strategi Daerah</i> Regional Policies and Strategies	TPS3R	<i>Tempat Pengelolaan Sampah Reduce, Reuse, Recycle</i> Reduce, Reuse, Recycle (3R) Waste Management Site
LCA	Life Cycle Assessment		
NBM	<i>Neraca Bahan Makanan</i> Food Balance Sheet		
NGO	Non-Governmental Organization		

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CHAPTER 1

INTRODUCTION

A. Food Management Hierarchy

Sustainable food management is the key to facing global food security, climate change, and economic development challenges. In the context of Indonesia, with a growing population and increasing urbanization, the need to ensure the availability of safe, nutritious, and affordable food is even more urgent.

According to the FAO report *"The State of Food and Agriculture 2019: Moving Forward on Food Loss and Waste Reduction"*, about 14% of global food production is lost between harvest and retail stages. In Indonesia, this figure reflects major challenges in the food supply chain, the origin of production, post-harvest handling, distribution, and consumption. This food loss and waste not only results in economic losses but also has a negative impact on the environment, including significant greenhouse gas emissions.

Sustainable food management involves strategies to reduce food waste, improve supply chain efficiency, and ensure equitable access to food resources.

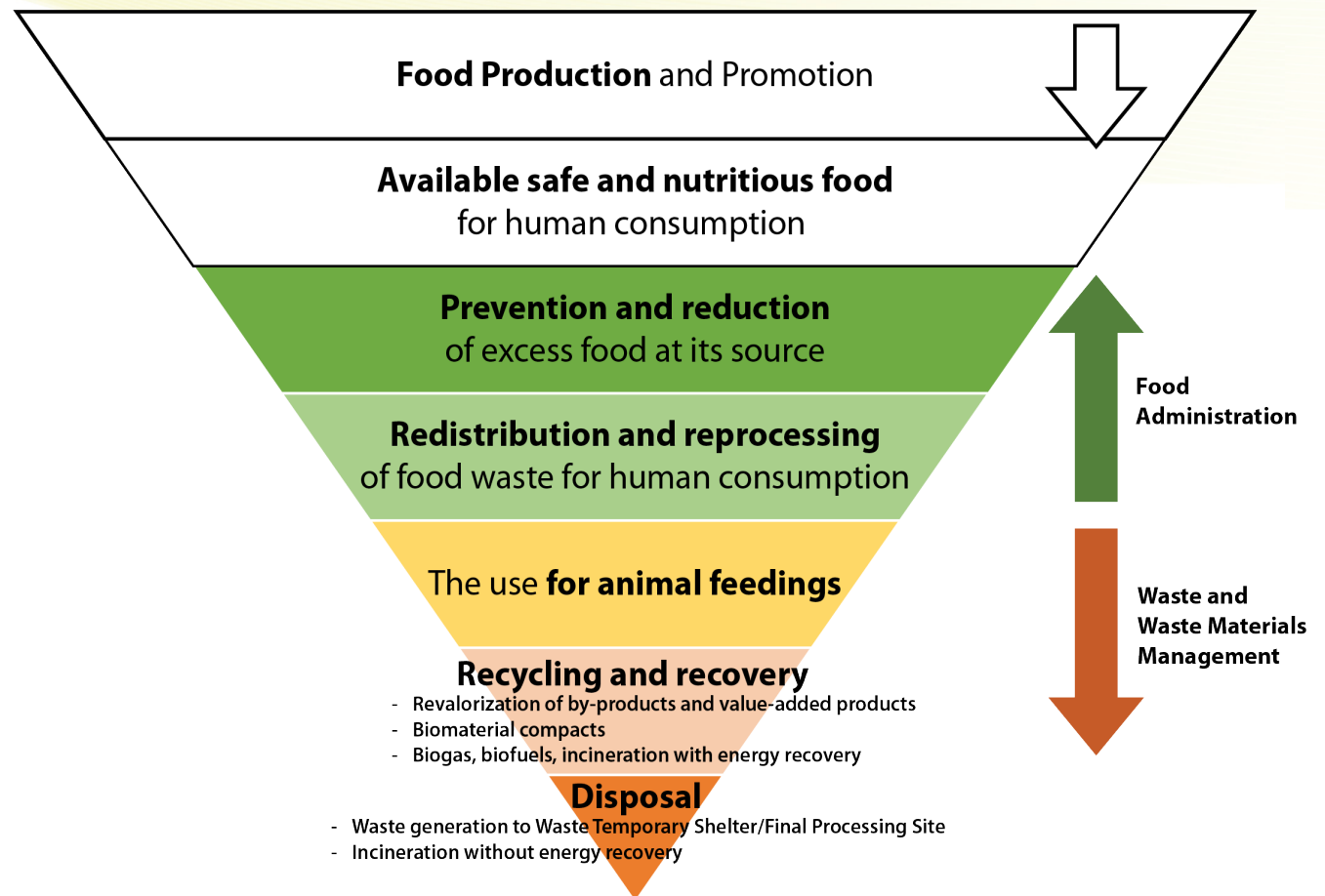


Figure 1. The Ideal Food Management Hierarchy for Sustainability

Source: Data from FAO, 2019

This approach includes modern technology, environmentally friendly agricultural practices, and policies supporting responsible food production and consumption.

The food management hierarchy is not just a plan, but a strategic framework meticulously designed to reduce food loss and waste along the food supply chain. It prioritizes preventive measures and reduction at the source, redistribution for human consumption, use as feed, and recycling before final disposal, ensuring maximum food value, reduced hunger, and minimal environmental impact.

The current hierarchy of Food Management in Indonesia cannot be said to be ideal. Despite the efforts and policies that have been implemented, many challenges remain. Based on the Bappenas study report (2021), the number of food losses and food waste (FLW) in Indonesia during the period 2000-2019 is estimated at 20.5 million tons of food loss and 20 million tons of food waste. Data from the Ministry of Environment and Forestry (MoEF) shows that food waste ranges from 22-23 million tons per year during the 2019-2023 period, covering a cycle of 48%-49% of the total estimated national food loss and waste.

Prevention and reduction at the source, redistribution of food, and utilization for animal food and recycling have not been optimally implemented in Indonesia. Disposal of non-recyclable food waste should be the last option with a focus on reducing environmental impact, but this practice is not yet fully effective. Bappenas's (2021) projections estimate that the generation of FLW in 2045 will produce 109.5 million tons or 336.72 kg of food/capita/year if no intervention is carried out.

Food Loss is defined as a decrease in the quantity of food that occurs in the process of producing, preparing, processing, making, preserving, packaging, repacking, and/or changing the shape of food. **Food Waste** is defined as food that is suitable and safe for human consumption that has the potency to be wasted into food waste at the distribution and consumption stages.

B. Food Loss and Food Waste

Sustainable food availability is a major challenge faced by countries worldwide, including Indonesia. The increase in food demand due to the growth of the population and the potential for a decline in food production due to the impact of climate change (such as drought and rising temperatures) are the driving factors to maintain food availability at the global level.

Indonesia's current population of 277.5 million is projected to reach 319 million by 2045. This development is accompanied by rapid urbanization, an increasing middle class, and climate change, all of which profoundly affect food management in Indonesia.

Arifin et al. (2018) stated that Indonesia's future food demand can be estimated by current demand, income, price, composition, and other factors that affect consumption behavior and trends.

Increasing production does not necessarily anticipate increasing food demand; therefore, it should also be accompanied by an efficient food system that reduces food loss from production to consumption as much as possible.



Using modeling data from Arifin et al., SUSENAS (2020) data corrected with data on food import-export and other national uses, as well as the percentage of food loss and waste using the percentage of food loss and waste based on the 2021 Bappenas study, an overview of the increase in loss and waste of several strategic food commodities in 2045 is obtained as presented in Figure 2.

In general, the increase in consumption of several types of strategic foods and their FLW in Indonesia between 2022 and the projection in 2045 ranges from 20% to 107%. The product with the largest increase in consumption and CNS was beef/poultry, with an increase of more than 100%. In addition, rice/corn also showed a significant increase in consumption and FLW, around 61%. In absolute terms, rice/corn is projected to contribute the most to the FLW in 2045, about 5.6 million tons.

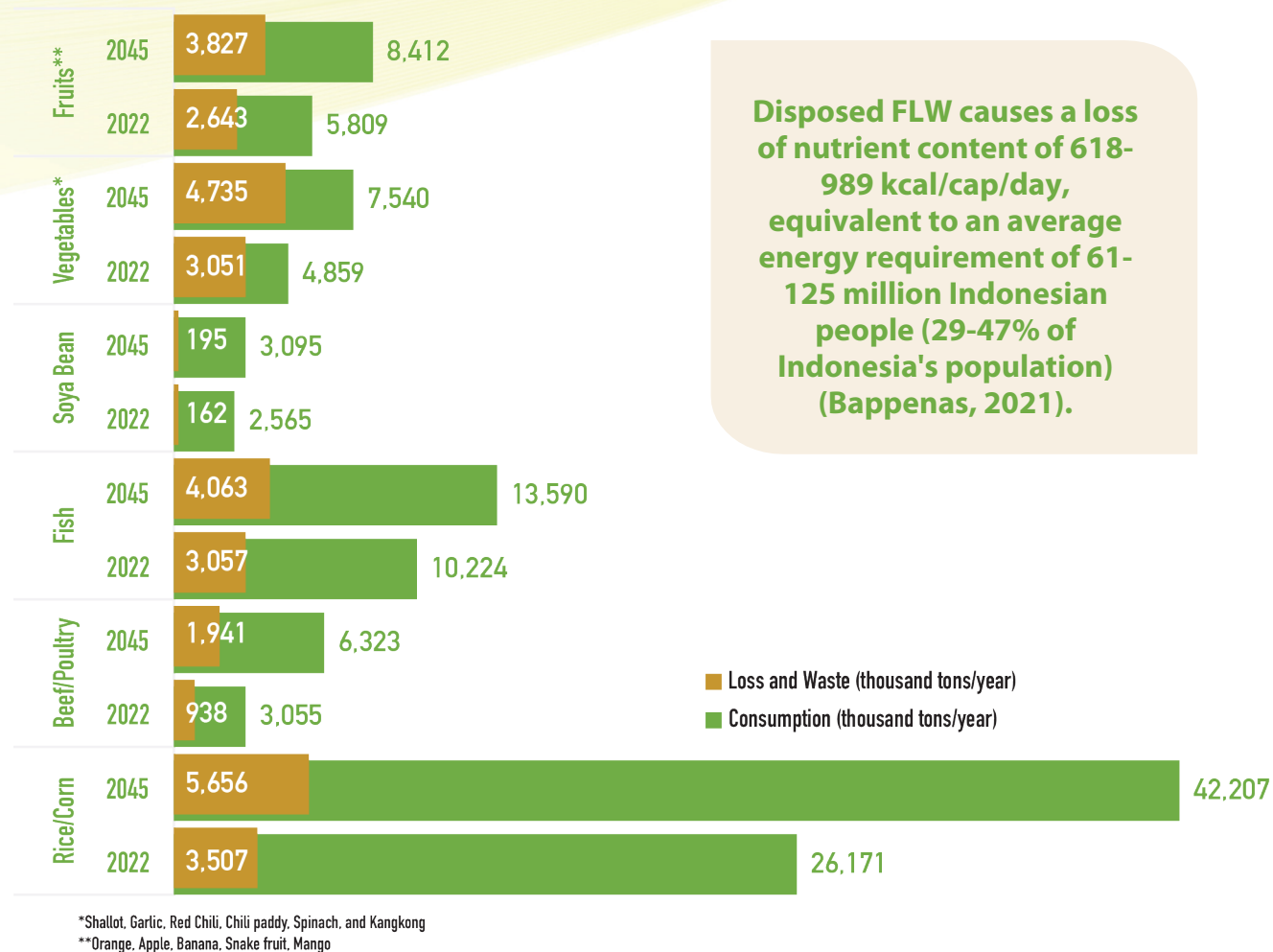


Figure 2. Comparison of Estimated Consumption with FLW of Several Food Commodities in 2022 and 2045 in Indonesia

Source: Data processed from Arifin et al. (2018) and the 2021 Bappenas FLW Study

Amount of FLW by Types and Sources of Food

In 2011, the FAO (Food and Agriculture Organization) estimated that about one-third of the world's food is wasted every year. There needs to be a change in perspective on how humans manage *the food* supply chain.

Globally, about 14% of food produced is lost at the point of agriculture and sales points (Food Loss), and about 17% becomes Food Waste (11% in households, 5% in food services, and 2% in retail) due to consumption behavior.

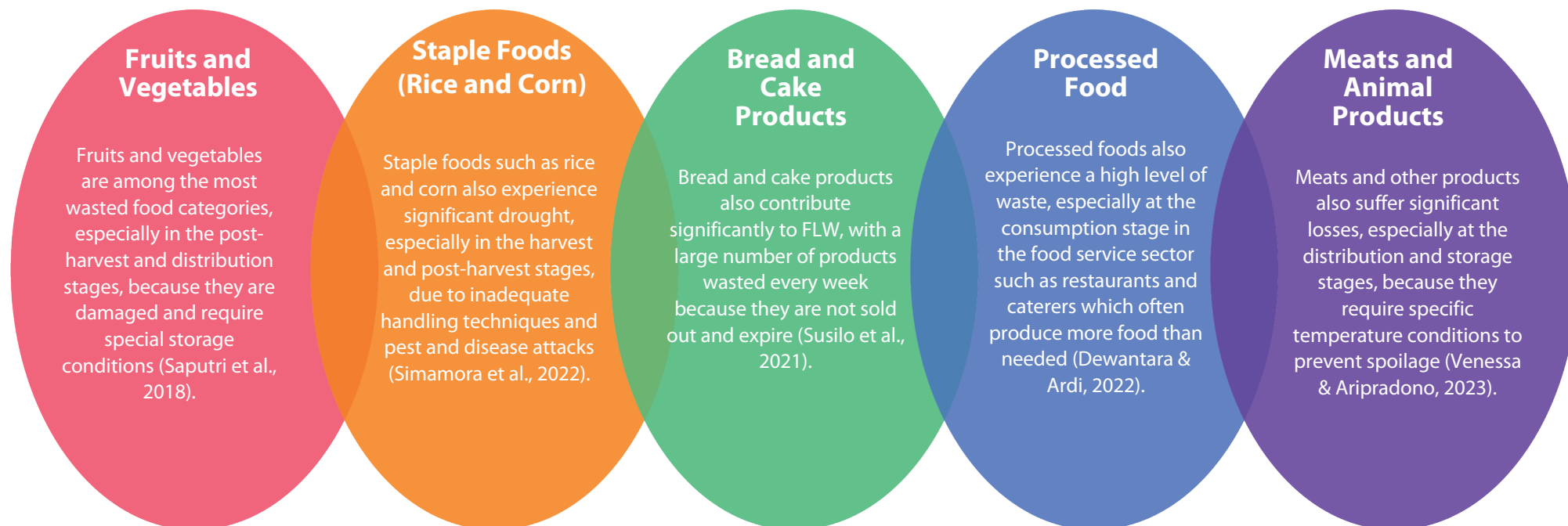
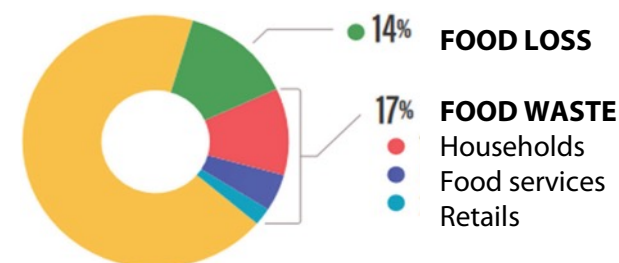


Figure 3. Sources of Food Loss and Waste
Source: Processed from various sources.

This increase is not only due to increased consumption but also to a lack of education about food storage, imperfections in the supply chain, and policies and infrastructure that do not support food waste management.

Food Loss and Waste Conditions in Indonesia



As one of the countries with the largest population and one of the largest food producers in the world, Indonesia's efforts to reduce FLW and improve the efficiency of its supply chain will have a broad and positive impact on global FLW management efforts. What needs to be noted is that the availability of data related to the number of food commodities published regularly in Indonesia is limited. Currently, information about FLW in Indonesia is available and can be referred to (this Bappenas book)

Research conducted by BAPPENAS (2021) reported that the amount of FLW that occurred in Indonesia from 2000-2019 reached around 23-48 million tons/year, equivalent to only 115-184 kg/per capita/year. The FLW occurs throughout the food commodity value chain from production, post-harvest and storage, processing and packaging, distribution, and marketing to the consumer level. **Food loss occurs in the first three stages, while food waste occurs in the last two stages.** The average food loss from 2000 to 2019 was 56%, and the rest was food waste. However, during this period of time, there was an increase in the proportion of food waste along with the management of food loss.

The largest FLW in Indonesia occurs in the food crop subsector, especially rice, followed by the horticulture subsector (vegetables and fruits). It is estimated that the food loss and waste (FLW) in the two subsectors can be used to feed 61-125 million people (29-47% of Indonesia's population), with economic losses reaching Rp 213-551 trillion/year, sub-sector, especially rice, followed by the horticulture sub-sector (vegetables and fruits). It is estimated that the food loss and waste (FLW) in the two subsectors can be used to feed 61-125 million people (29-47% of Indonesia's population) with economic losses reaching Rp 213-551 trillion/year or equivalent to 4-5% of Indonesia's GDP.

Reports by various international institutions, such as FAO, IFAD, UNICEF, WFP, and WHO (2017), further strengthen the importance of food loss and waste management. They report that food loss and waste occur along the food value chain, and it is estimated that this total food waste reaches 33% of the total global food production (FAO, 2019).

The magnitude of this food loss has prompted the United Nations to include the issue of food loss and waste in one of the Sustainable Development Goals (SDGs) Target 12.3.1, which is to "halve at least half of food loss at the retail and consumer levels, and reduce food loss along the production chain, post-harvest, distribution, and processing" by 2030 (FAO, 2019).

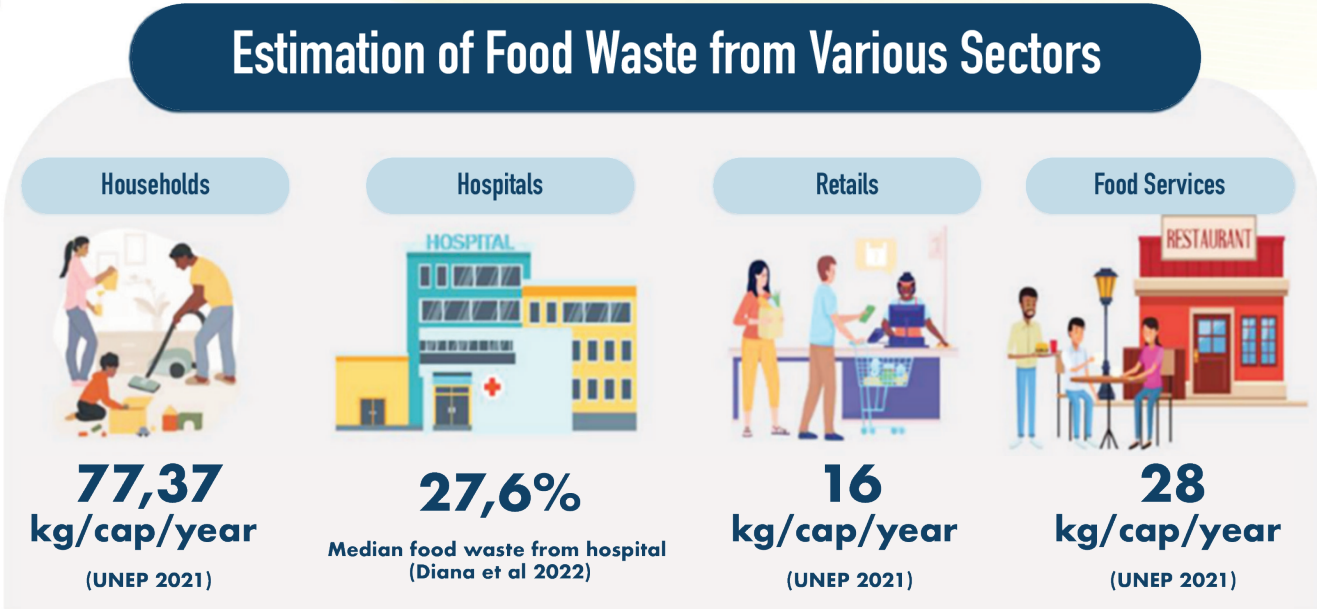
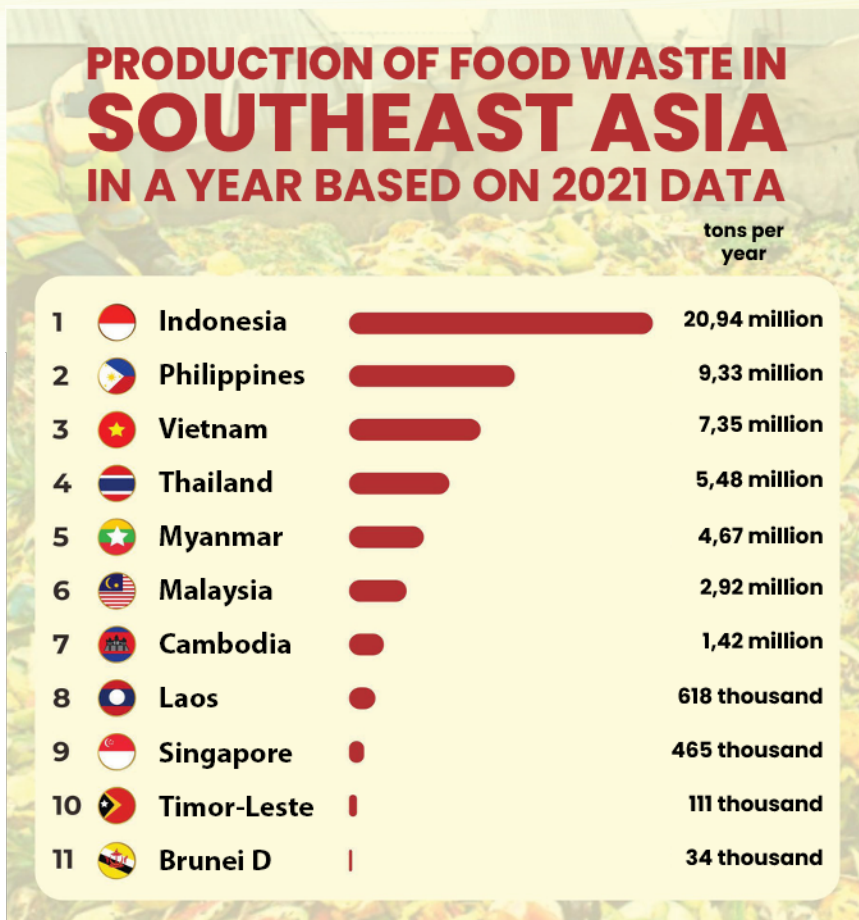


Figure 4. Average Estimated Food Waste from Various Sectors Globally

Source: Processed from data of FLW UNEP 2021 and Diana et al. 2022



According to UNEP in the Food Waste Index Report 2021, the achievement of SDG target 12.3, which focuses on reducing food loss and food waste, significantly impacts various other SDG targets. Reducing food loss improves food availability and quality (SDG 2) and maintains nutritional quality through good post-harvest practices (SDG 3). It also saves water use (SDG 6), increases farmers' income (SDG 8), and reduces treatment costs at the Final Disposal Site (SDG 11). In addition, reducing greenhouse gas emissions helps with climate change action (SDG 13), conserves marine resources (SDG 14), and saves natural ecosystems (SDG 15). The management of food loss and waste not only supports food security and community health but also contributes to environmental sustainability and improved economic welfare. Therefore, this effort is very important to achieve various SDGs and create a more sustainable future for Indonesia.

Figure 5. Production of Food Waste in Southeast Asia in A Year Based on 2021 Data
Source: Processed from FLW UNEP 2021 data

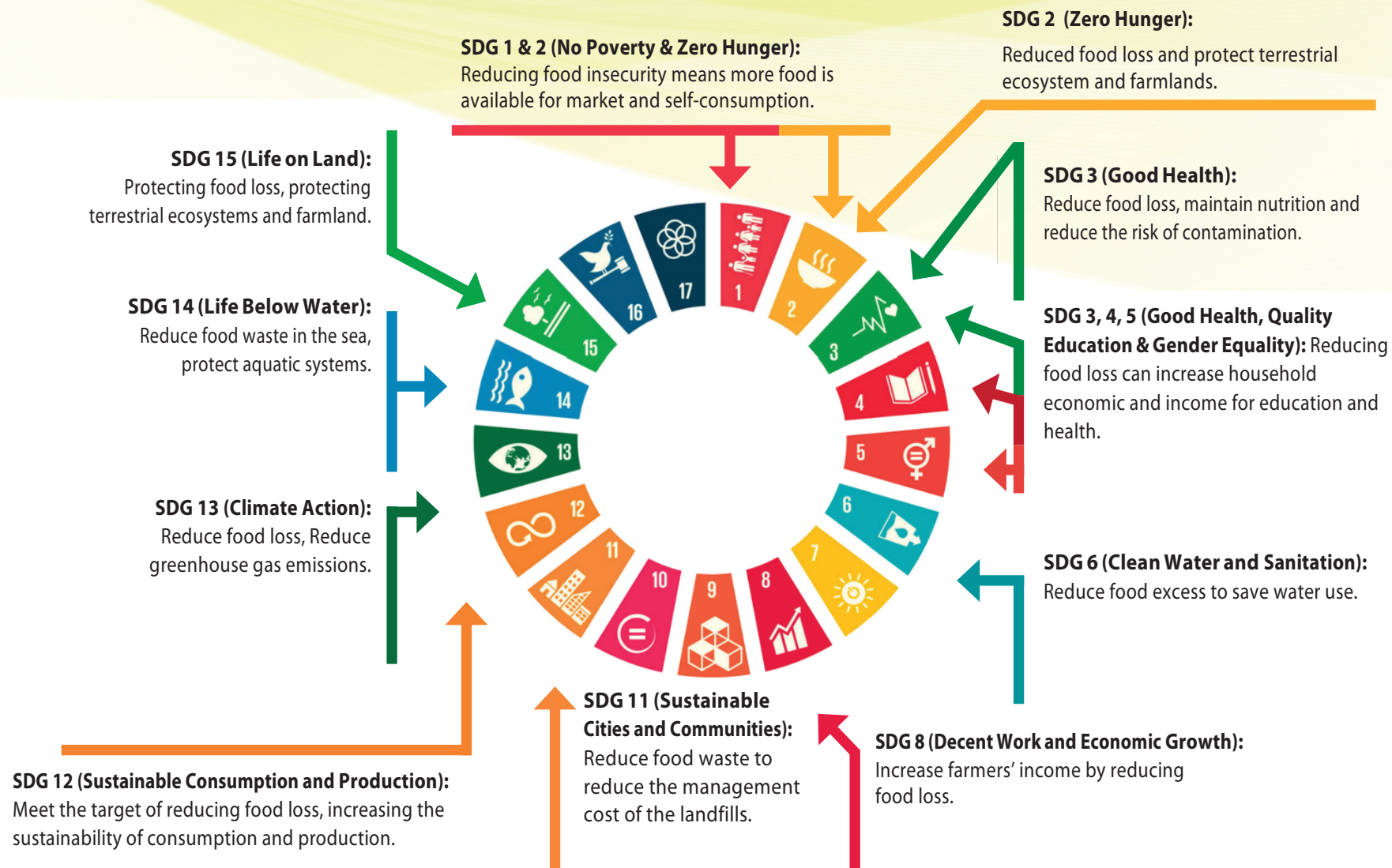


Figure 6. Relation of FLW management with Various SDGs
Source: FLW UNEP 2021

C. Food Waste and Food Production Waste Materials

The terminology of Food Loss and Waste has various definitions, and there are no laws and regulations in Indonesia that define it. This condition differs from the definition of waste and waste materials, stated explicitly in Law number 18/2008 on Waste Management and Law number 32/2009 on Protection and Management of the Living Environment. Therefore, technical regulations and waste and waste materials management programs, including food waste and food industry waste materials, are relatively better than efforts to reduce food loss.

The method of measuring waste generation and composition in Indonesia has been standardized through SNI 19-3964-1994, published in 2009. Since 2018, the Ministry of Environment, Hi-dup and Forestry (MoEF) has published data on waste generation, including food waste, per regency/city. From 2019 to 2023, the number of regencies/cities reporting food waste generation ranged from 139 to 250 annually.

To estimate the amount of food waste in regencies/cities that have not been reported, the management factor method is used based on population, the ratio of urban areas, and the average generation of food waste per capita from districts/cities that have reported in the same province.

This calculation results in an estimated amount of food waste in Indonesia of 22-23 million tons per year during the 2019-2023 period or around 48%- 49% of the estimated national food loss and waste.

Food waste is defined as food waste that is generated from daily activities in households, commercial areas, public facilities, and/or other facilities. Meanwhile, **food waste material** is the residue from food businesses and/or food production activities.

This data shows how much food waste contributes to Indonesia's total waste generation. These figures are not just statistics but a clear indicator of the big problems we face in food waste management.

The huge contribution of food waste to total waste generation highlights the urgency to address this problem seriously. If no significant steps are taken, the target of reducing waste by 30% by 2025, which is the goal of Presidential Regulation number 97/2017 on National Policies and Strategies for the Management of Household Waste and Waste Similar to Household Waste, will be very difficult to achieve.

Distribution (Min, Quintile 1, Average, Quintile 3, Max) of Estimation of Food Waste Generation (Tons) in 2023 in Regencies/Cities based on Provinces

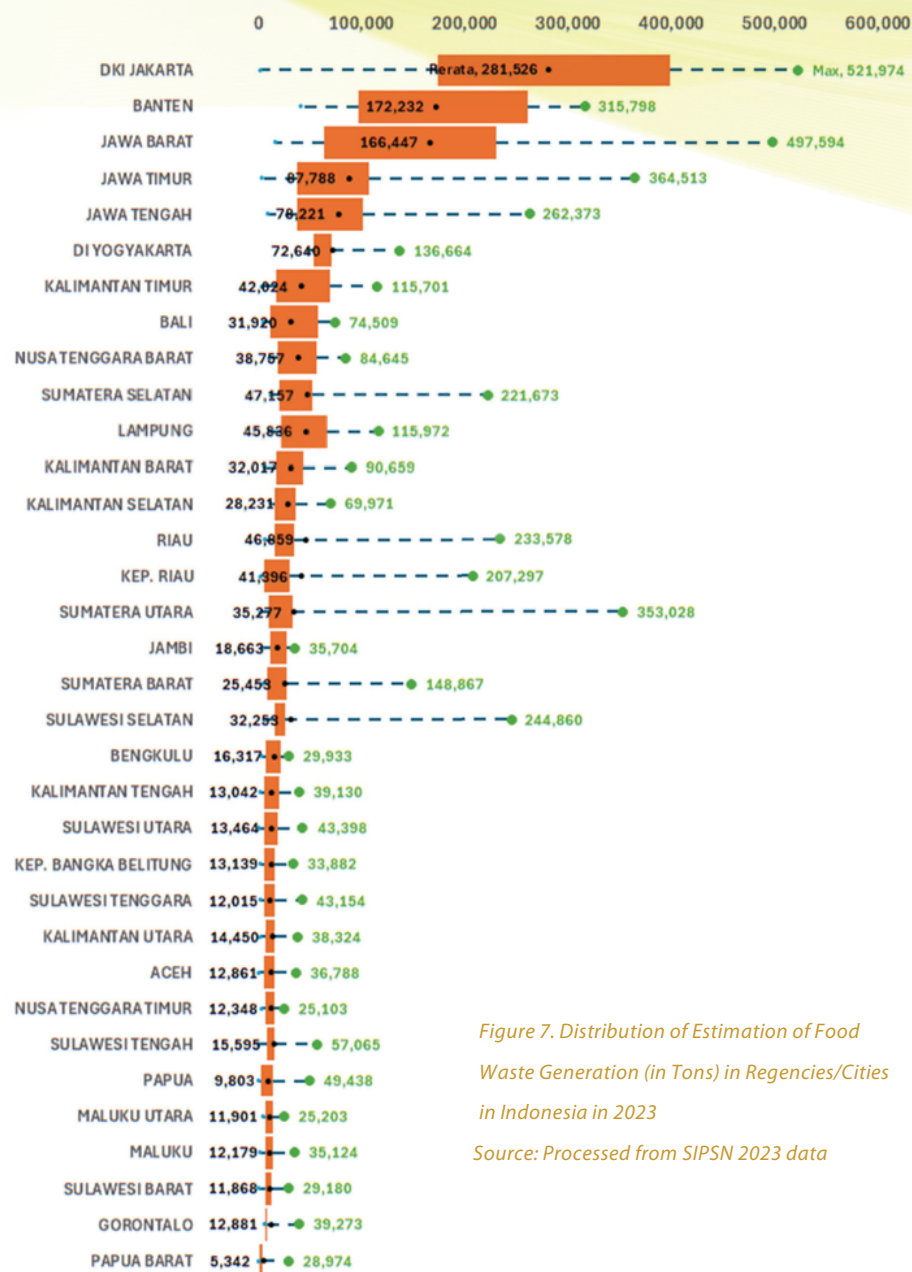


Figure 7. Distribution of Estimation of Food Waste Generation (in Tons) in Regencies/Cities in Indonesia in 2023

Source: Processed from SIPSN 2023 data

A report from Bappenas (2021) and data from the Ministry of Environment and Forestry show that this problem does not only affect the environment, but also has far-reaching economic implications. Every ton of food waste that is not managed properly is a significant waste of resources and contributes to greenhouse gas emissions, exacerbating climate change.

To Achieve the waste reduction target, more thorough commitment from all parties, including the government, the private sector, and the community is needed. This includes the application of more sophisticated waste management technology, infrastructure improvements, and changes in people's behavior. Public education and awareness campaigns about the importance of reducing food waste must also be improved. In addition, better coordination between government agencies and between the public and private sectors is needed to ensure that the strategies implemented are effective and sustainable. Investing in research and development of new technologies for food waste management will also be helpful.

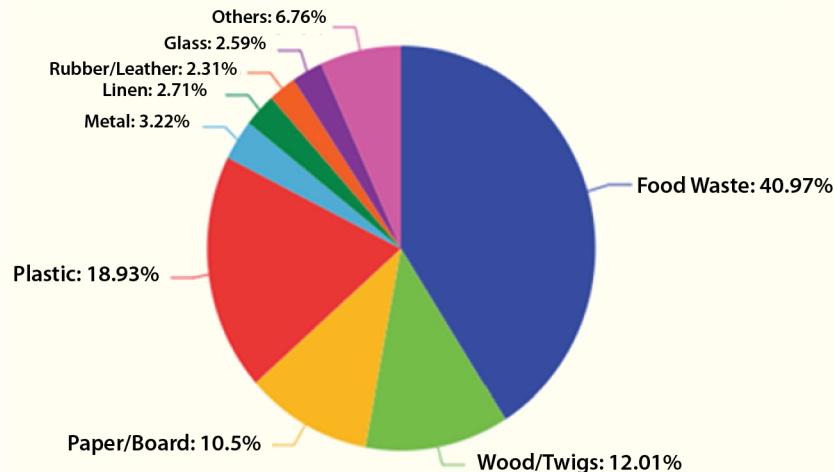
Fact Findings



Waste Management in Indonesia.....

Based on the **National Waste Management Information System (Sistem Informasi Pengelolaan Sampah Nasional – SIPSN)** data of the Ministry of Environment and Forestry as of June 4, 2024, the achievements of waste management performance are the achievements in reducing and handling household waste and waste similar to household waste. Data in 2024 from 193 regencies/cities throughout Indonesia shows that the volume of Household Waste and Waste Similar to Household Waste generation in Indonesia in 2024 reach **22,720,299.95** tons, with the volume of waste managed being only **15,191,576.68** tons or 66.86% of the volume of waste generated, while the remaining **7,528,723.26** tons or 33.14% is not managed.

WASTE COMPOSITION BASED ON ITS TYPES



WASTE COMPOSITION BASED ON ITS SOURCES

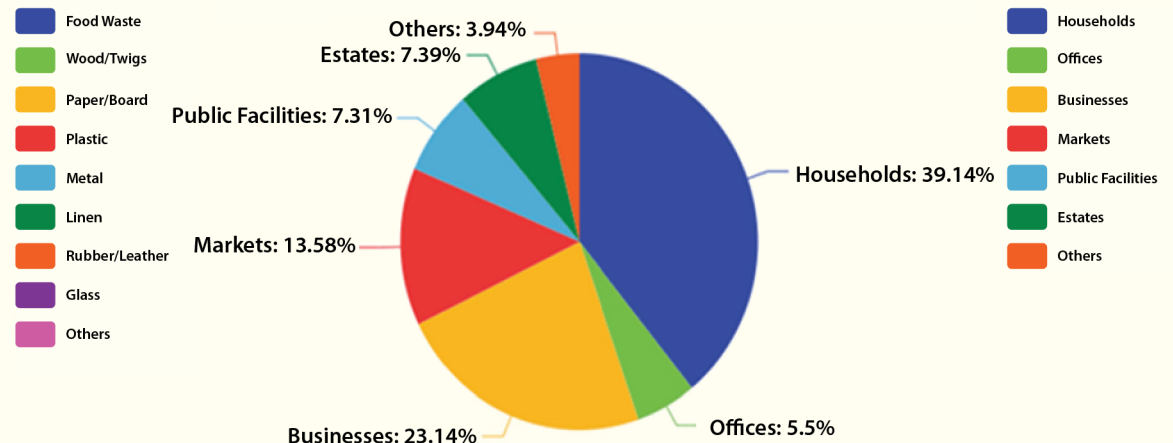


Figure 8. Waste Composition by Types and Sources of Waste

Source: Processed from SIPSN 2024 data



CHAPTER II KEY POLICY DIRECTIONS AND STRATEGIES

A. Policy Direction

The management of food loss and waste (FLW) is a significant challenge facing Indonesia, given its impact on the economy, the environment, and food security. The management policy of the FLW has evolved from the past, the present, to future plans, with various initiatives and strategies that seek to address this issue in a comprehensive, broad, and sustainable manner.



Past Policies

Focuses on waste management in general, with an emphasis on safe disposal and reducing environmental impact. Food loss and waste management programs are more oriented towards waste management after it is produced, with little attention to prevention at the source, while food management has not regulated the management of food loss and waste.



Current Policies

Adopting a more holistic approach in managing waste, including food waste, as seen from Presidential Regulation number 97 of 2017 concerning National Policies and Strategies for the Management of Household Waste and Waste Similar to Household Waste. This regulation sets a waste reduction target of 30% by 2025. According to the Ministry of Environment and Forestry data, food waste in Indonesia is estimated to reach 22-23 million tons per year, or around 44%-46% of the total waste generation. This data shows how much food waste contributes to total waste generation in Indonesia and the need for more effective policies to achieve it.



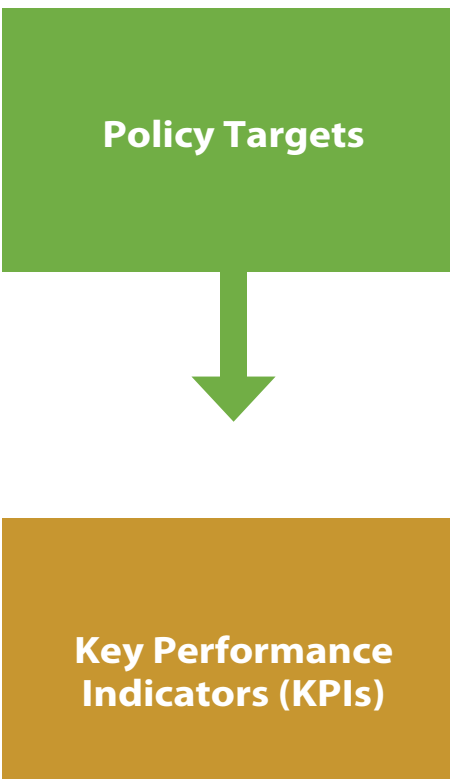
Future Policies

More focus must be placed on preventing FLW at the source, redistributing food that is still fit for consumption, and increasing the recycling and utilization of food waste. The vision is to achieve a more efficient and sustainable food system, with targets that are aligned with the SDGs, especially SDG 12.3 which targets a 50% reduction in food loss by 2030. In addition, the 2025-2045 RPJPN carries a development agenda that includes reducing food shrinkage and food waste. One of its missions is to achieve energy, water, and food independence. The main focus related to the reduction of FLW includes linking the national food logistics system, integrating national food production data with export-import data of strategic food products, developing data-based food and agriculture platforms, developing warehouse receipts, managing sustainable food systems, urban food systems, and managing food waste. With this roadmap, Indonesia also targets a 75% reduction in FLW by 2045 which is also part of the roadmap and national action plan for the circular economy 2025-2045.

B. Policy Targets and Key Performance Indicators

To achieve 75% food loss and food waste management (FLW) by 2045, Indonesia has set a number of policy targets and key performance indicators as follows.

Policy Targets



- FLW management at every stage of the food supply chain, from production, post-harvest, land processing, distribution, and marketing, to consumption.
- Strengthening infrastructure and technology is very important to improve the efficiency of storage facilities and food processing technology.
- Increasing awareness and changing consumer behavior through public education.
- Development of policies and regulations that support FLW management.
- Collaboration between sectors, including governments, the private sector, communities, and international organizations.

Key Performance Indicators (KPIs)

- Number of implemented policies, regulations, incentives, and disincentives.
- The awareness level of public that implementing FLW management practices.
- Storage facility capacity and adoption of new processing technologies.
- Number of collaboration programs focused on FLW management.
- Presence of FLW management at every stage of the supply chain.
- Volume of recycled or reprocessed food waste.
- The level of food waste reduction in the Waste Final Processing Sites.

C. Key Policy Principles

The food waste and food waste management policy in Indonesia is based on a number of key principles designed to achieve 75% FLW management by 2045. These principles cover a range of important aspects that ensure a comprehensive, inclusive, and sustainable approach to addressing the FLW issues.

Innovation and Technology

Applying new technologies to improve efficiency in food management, optimize production, storage, and processing, and monitor and reduce FLW in real-time.

Capacity Building and Education

Increasing capacity and education through training, counseling, and public awareness campaigns on the importance of reducing FLW included in the Education curriculum.

Participation and Multi-sectoral Collaboration

Reducing FLW requires the active participation of various stakeholders including governments, the private sector, civil society, academia, and international organizations, to achieve common goals.

Systemic and Integrated Approach

FLW policies must cover the entire food supply chain, from production to consumption, with policy integration across different sectors and levels of government for effectiveness.

Supporting Policies and Regulation

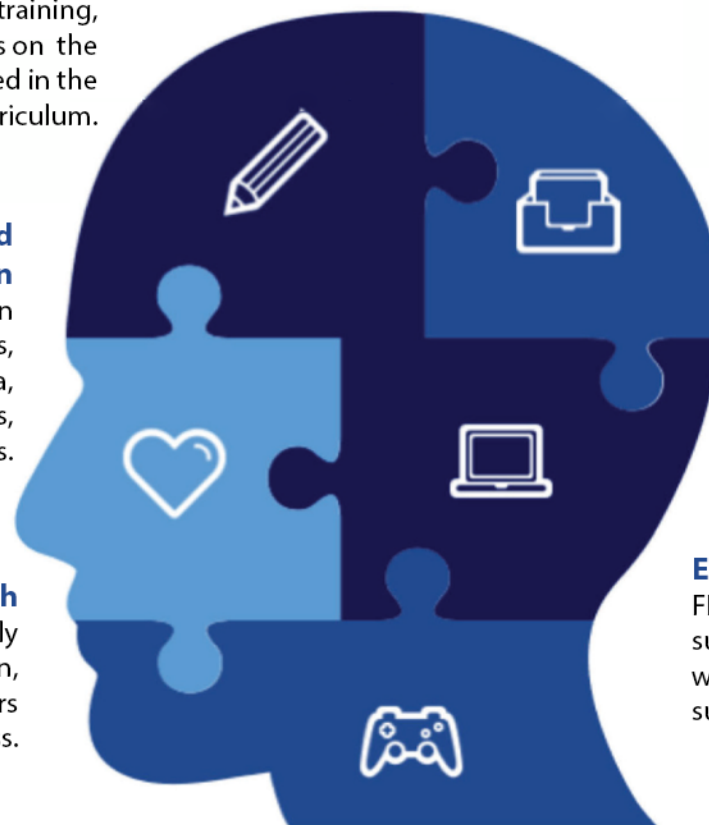
Implementation of policies and regulations that support efficient and sustainable food management, including incentives for good practices, penalties for waste, and food donation regulations.

Data-Driven Approach and Monitoring

Decision-making based on data and continuous monitoring to assess the effectiveness of FLW policies and strategies with accurate, up-to-date, data on the causes, locations and number of FLW.

Environmental Sustainability and Circular Economy

FLW policies must support environmental and economic sustainability by reducing the environmental impact of food waste and improving efficiency and reducing costs in the food supply chain.



*Figure 9. Key Principles of FLW Management Policy
Source: Processed from the 2021 Bappenas FLW Study.*

D. Stakeholder Engagement and Multisectoral Collaboration

Managing food loss and waste (FLW) by 75% by 2045 requires the active participation of various stakeholders. Each stakeholder group has an important role to play in creating an efficient and sustainable food system. Stakeholder engagement includes governments, the private sector, civil society, academia, international organizations, and local communities.



Government

Acting as a policymaker, regulator, and key facilitator by developing and implementing policies that support FLW payments, provide incentives, and oversee regulatory compliance.



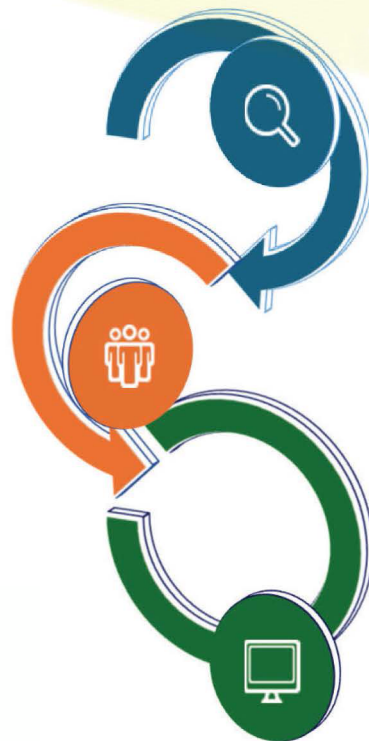
Private Sector

As food producer, distributor, and retailer, adopting best practices in supply chain management, investing in FLW reduction technologies, and collaborating with governments and Civil Society.



Civil Societies and NGOs

Play a role in advocacy, education, and program implementation at the community level by increasing public awareness of the importance of reducing FLW, running food donation programs, and supporting local initiatives.



Researcher and Academia

Play a role in research and development by providing data and innovative solutions, as well as data and analysis to support FLW reduction policies and develop new technologies.



International Organizations

Provide technical assistance, funding, and global experience by supporting program implementation and sharing best practices from other countries.



Local Communities

Acting as an implementer in the field and a direct recipient of the mandate by adopting FLW management practices in households and communities and participating in education and awareness programs.



Multisectoral collaboration is essential to supporting stakeholder engagement. Establishing forums and communication networks facilitates the exchange of information and practices.

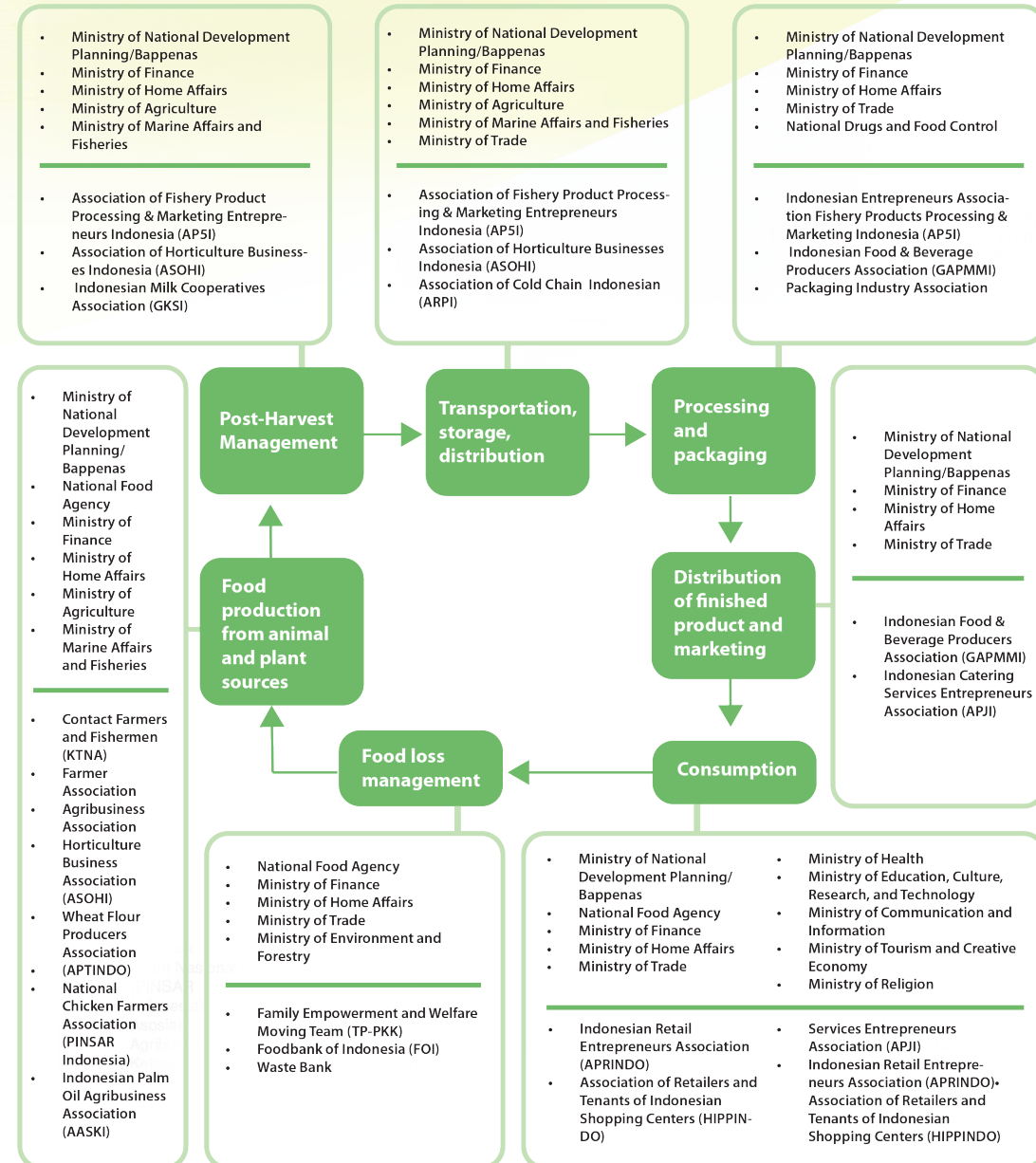
Public-private partnerships combine resources to achieve common goals. Collaborative projects and pilots test innovative solutions before they are expanded.

Joint education and training increase the capacity of all stakeholders. Strengthening policies and regulations creates a framework that supports collaboration and the implementation of best practices.

FLW Management Ecosystem

FLW Management Ecosystem Mapping

In the effort to optimize the FLW management ecosystem, which includes food rescue and non-food utilization in Indonesia, it is important to understand the role and coordination of various government institutions involved. The following map displays a complex network of entities involved in various stages in the food cycle, ranging from production, post-production processing, transportation, storage, and distribution to consumption and processing of food resources. The involvement across ministries and agencies emphasizes the importance of collaboration between sectors to ensure efficiency and sustainability in managing food resources. This synergy is essential to build a resilient food reserve system that can overcome national food security challenges while minimizing FLW and strengthening the circular economy.



FLW Mitigation by stakeholders

Mitigation of food loss and waste in Indonesia has many important benefits that affect various aspects of people's lives. Reducing food waste and waste is not only important to improve the efficiency of food

waste and security, but also, for economic, social, and environmental sustainability in Indonesia. Through a comprehensive and collaborative approach, Indonesia can achieve great benefits that support the

welfare of the entire community. Some of the concrete steps that can be taken by the main actors in carrying out this mitigation are described as follows.

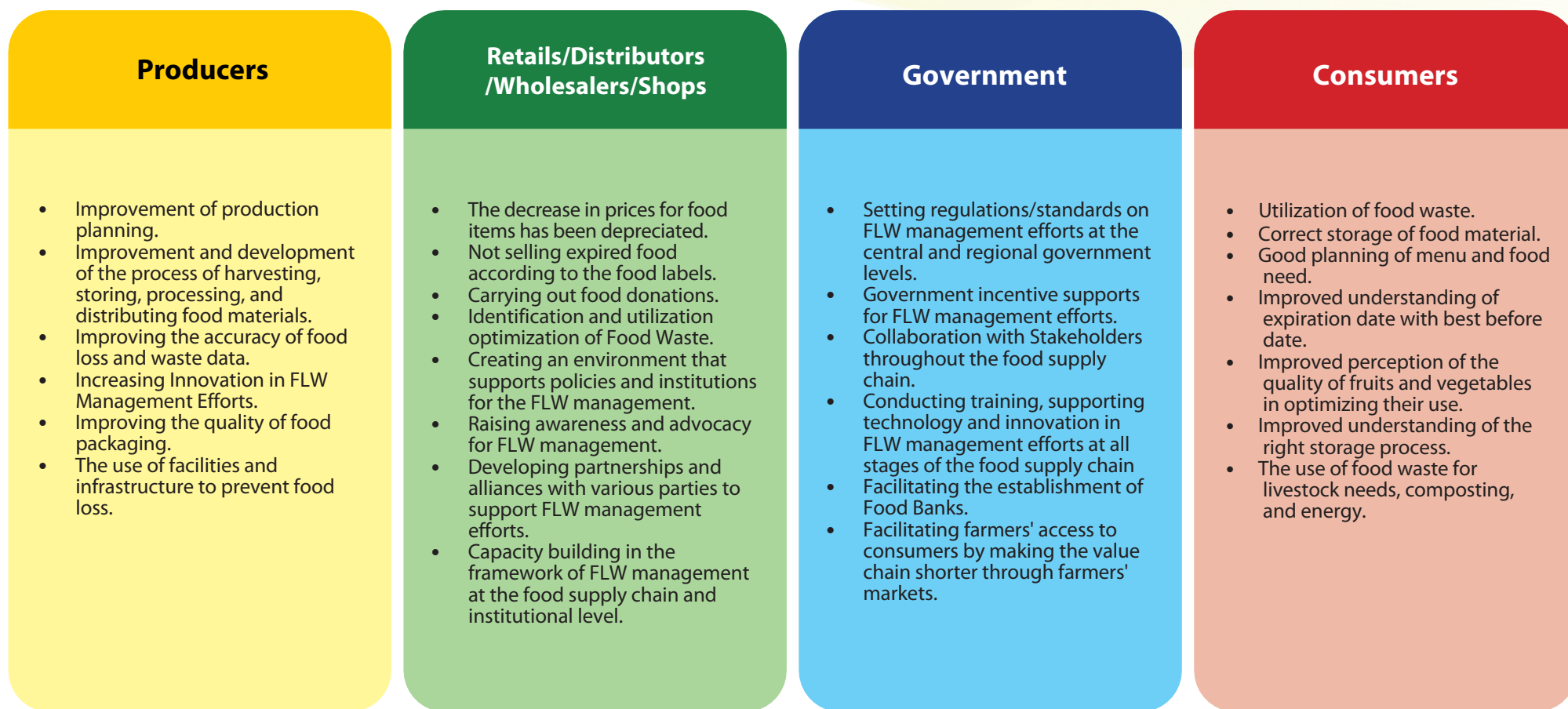


Figure 10. Actors' Activities in the Context of Mitigating Food Loss and Waste

E. Strategic Framework

The framework includes five main components: policy transformation, capacity building and education, improved coordination and cooperation, technology and infrastructure development, and implementing incentives and disincentives. Policy transformation involves preparing the NSPC, as well as strengthening budget commitments.

Capacity building includes training, counseling, and public awareness campaigns. Coordination is improved by forming coordination teams and collaborating with various stakeholders, including the business world and academia. Technology development includes innovation and modernization of infrastructure, as well as the adoption of information systems.

The application of incentives and disincentives includes tax incentives, subsidies, awards, penalties, and certification programs. The key to success is cooperation between the government, producers, households, the food service industry, distributors, NGOs, and communities.

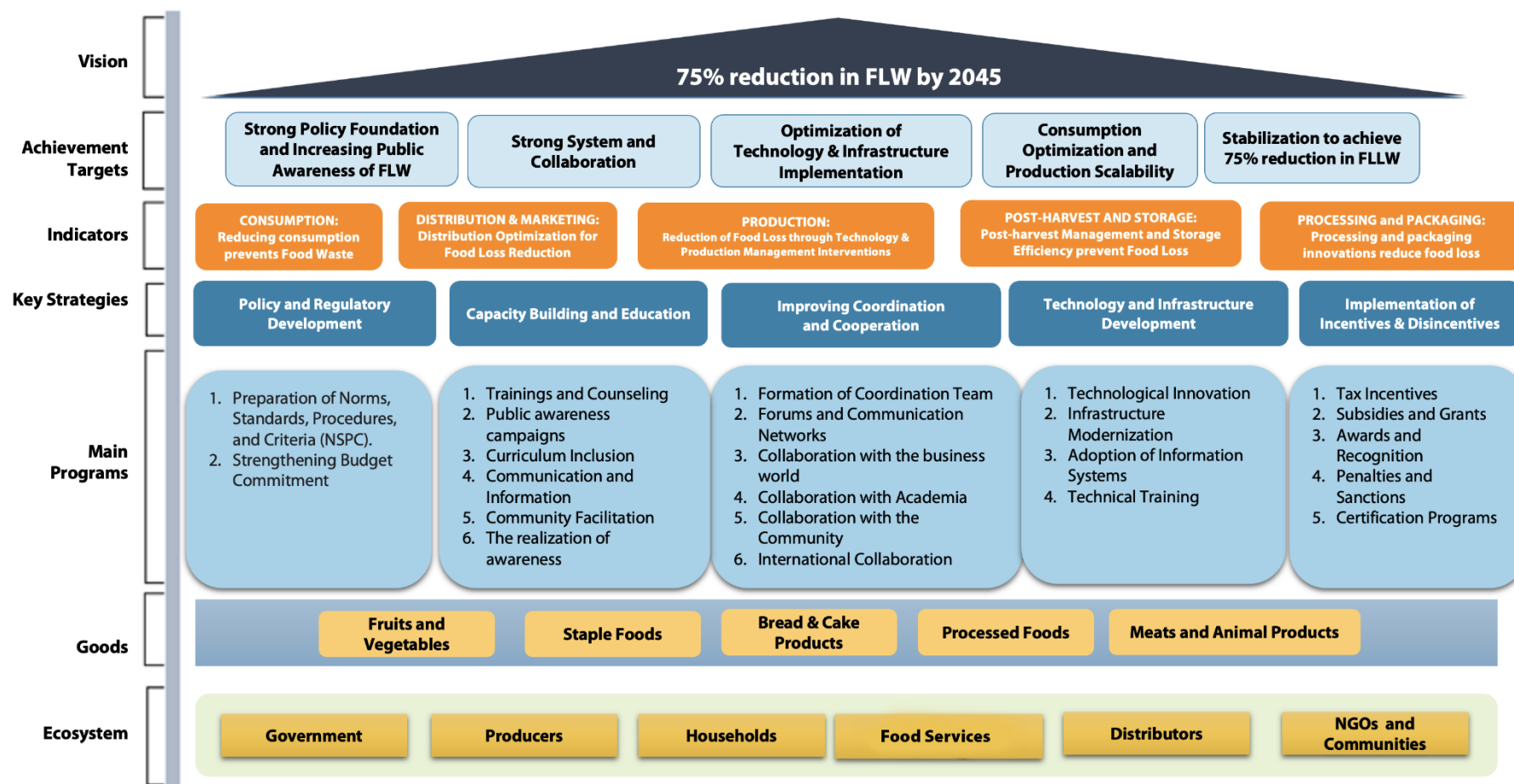


Figure 11. Food Loss and Waste Management Masterplan

F. Linkages to the Circular Economy Roadmap 2025-2045



The policy direction of FLW 2045 management is a derivative of the 2025-2045 food sector circular economy roadmap, both of which support each other in creating a sustainable food system.

- **Adoption of Conventional Agriculture:** The circular economy roadmap encourages the transition from conventional agriculture to organic and environmentally friendly agriculture. The FLW management roadmap supports this with policies and programs to reduce food loss in this new agricultural system.
- **Funding and Technology Support:** Both emphasize the importance of specialized, technology, and infrastructure funding. The FLW management roadmap details concrete steps to implement the technologies and infrastructure suggested in the circular economy roadmap.
- **FLW management:** the direction of the FLW management policy focuses on the FLW management as part of the broader circular

economy goals. It includes strategies to improve food security, reduce greenhouse gas emissions, and improve resource efficiency.

- **Integrated Data Collection:** The circular economy roadmap focuses on cross-ministerial collaboration and accurate data collection. The FLW management roadmap provides a mechanism to integrate data from multiple sources to support effective policy implementation.

Therefore, the FLW 2045 management roadmap provides operational details and specific strategies to achieve the broader goals of the food sector's circular economy roadmap 2025-2045, helping Indonesia achieve sustainability targets, improve food security, and drive inclusive and globally competitive economic growth.



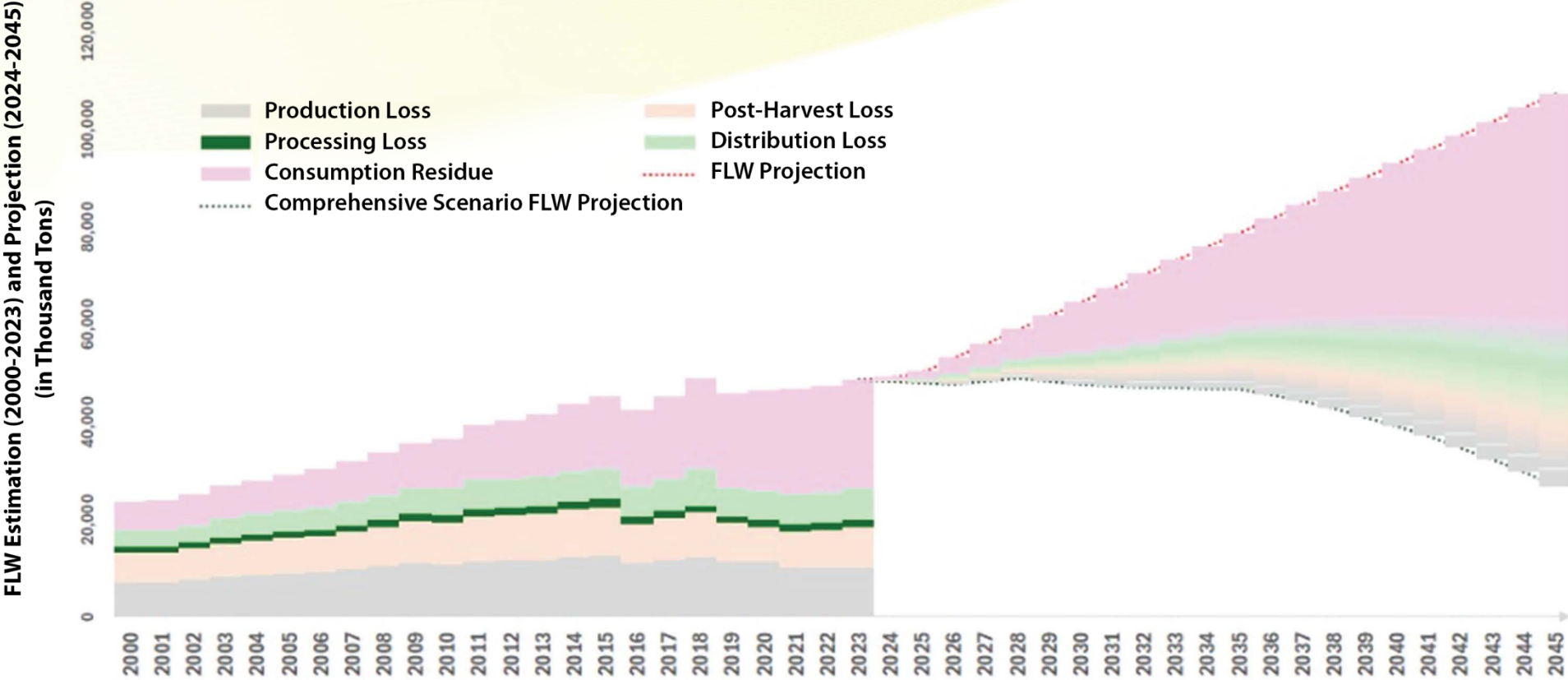
CHAPTER III

SCENARIO MODELING

The scenario modeling to reduce food loss and waste is based on data from the Food Balance Sheet published by the National Food Agency. To update the 2020-2023 FLW estimation model, the proportion of differences in the 2021-2023 Food Balance Sheet data trend was compared to the 2018-2020 one. In addition, the proportion of food waste trends from the 2019-2023 Ministry of Environment and Forestry's National Waste Management Information System data were used. The baseline projection of the FLW for the 2024-2045 period uses the 2021 Bappenas report. This methodology allows for better calculations with an input-output system, where losses at the production stage to distribution and marketing are calculated based on loss factors per commodity from FAO and Food Balance Sheet data. In contrast, losses at the consumption stage are calculated by combining Food Balance Sheet data and food waste generation 2019-2023 in 139-250 regencies/cities from the National Waste Management Information System data.



Projections of Food loss and waste require in-depth analysis based on historical data and current trends, as well as taking into account some factors such as population growth, changing consumption trends, and technological developments. With projections based on in-depth data analysis and structured strategies, Indonesia can achieve the target of 75% reduction in food loss and waste by 2045, supporting national food security, and contributing to environmental sustainability



Assumption: In the BAU scenario, no significant interventions were made to reduce Food Loss and Waste (FLW). These projections show pessimistic results where the increase in food production and consumption continues without changes in policies or technologies used to manage food waste. There are 3 strategic scenarios that include pessimistic, moderate, and optimistic which are highly determined from the success of the implementation of the program that will be launched to challenge the FLW.



This increase demonstrates the ongoing challenges in managing food loss and food waste materials in line with population growth and increased food consumption. Despite efforts to reduce FLW, increased production and consumption led to an ever-increasing quantities of FLW.

BAU Data (2020-2045)

The BAU projection shows a significant increase in Food Loss and Waste (FLW) if no intervention is carried out. The total FLW is projected to reach more than 100,000 tons by 2045, with food loss reaching more than 40,000 tons and food waste reaching more than 70,000 tons. This trend indicates that in the absence of significant changes in food waste materials management practices and food loss, increased production and consumption will continue to contribute to an exponential increase in FLW. This reflects significant inefficiencies in the food supply chain that must be addressed urgently to avoid greater environmental and economic impacts.

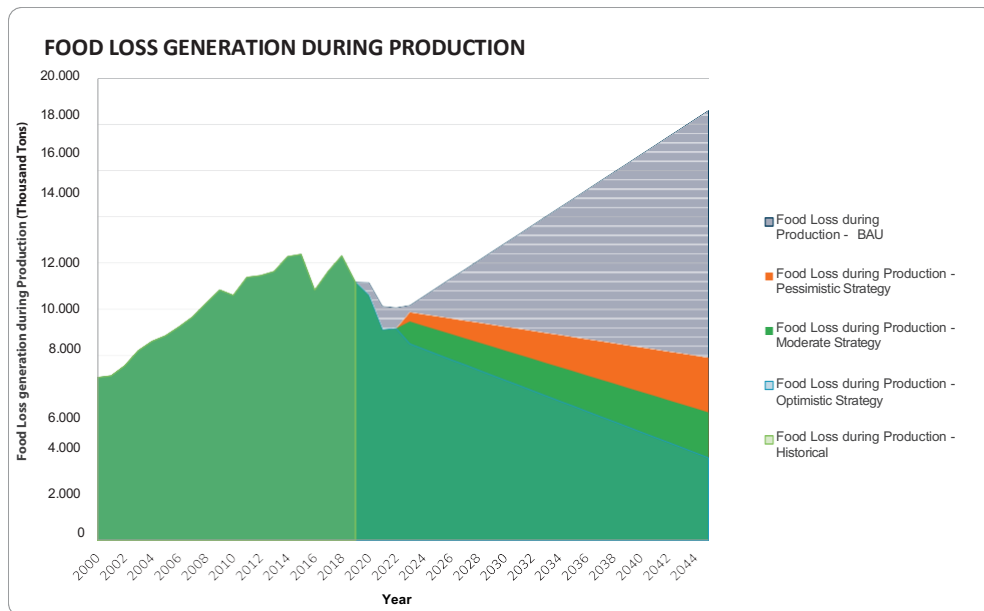
Historical Data (2000-2020)

Historical data from all three graphs shows a consistent trend of increasing Food Loss and Waste (FLW). The total FLW increased from about 20,000 tons in 2000 to more than 40,000 tons in 2020. Total food loss also showed a similar trend, increasing from about 15,000 tons to more than 25,000 tons, while total food waste increased from 10,000 tons to more than 20,000 tons.

Strategy Data (2020-2045)

The implementation of an optimistic strategy can show more positive results in controlling the increase in FLW to reach 25% by the end of 2045. With the right strategy, the total FLW can be reduced to around 60,000 tons by 2045. The total food loss is projected to decrease to around 20,000 tons, and the total food waste is up to around 40,000 tons. With the implementation of an effective strategy, the FLW management target of 50% by 2030 and 75% by 2045 becomes realistic and achievable. In the moderate strategy, the implementation of FLW management will only be at 35% and 50% for the pessimistic strategy. This analysis emphasizes the importance of implementing food loss and waste management strategies to control the increase in food waste materials and food loss in the future. The BAU scenario shows the potential for significant increase in the absence of intervention.

Projection of Food Loss Generation during Production



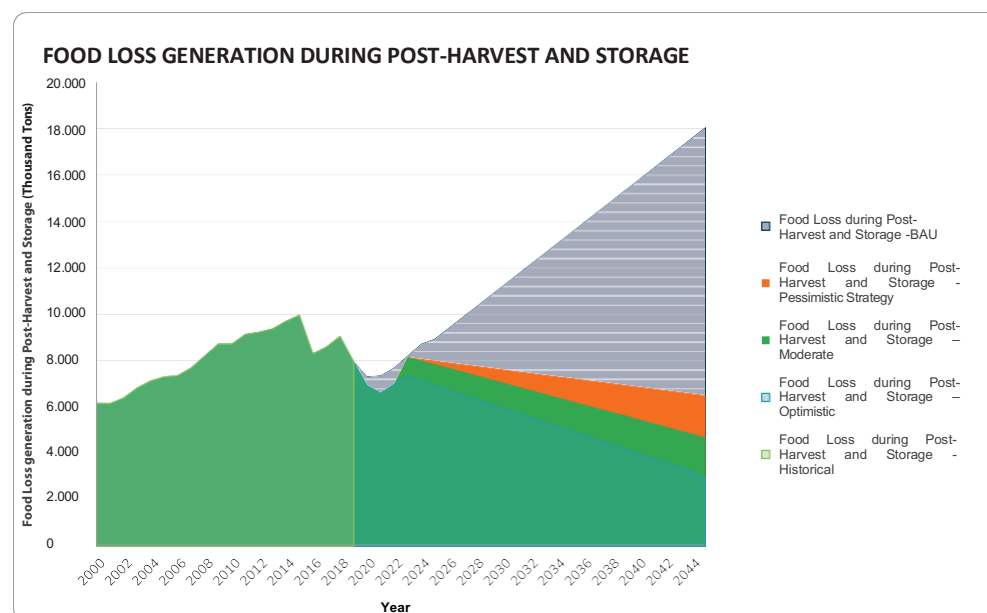
Business as Usual (BAU) Scenario

In the BAU scenario, food loss is projected to increase drastically from around 12,000 tons in 2020 to more than 18,000 tons in 2045. This scenario assumes no significant interventions to reduce food loss, so this increase reflects continued inefficiencies in the food supply chain.

Pessimistic, Moderate and Optimistic Strategy Scenario

This pessimistic strategy assumes that few interventions or mitigation programs have been implemented. Food loss is projected to decrease slightly from about 12,000 tons in 2020 to about 14,000 tons in 2045. Despite mitigation efforts, the impact is still limited, indicating the need for improvements in mitigation programs. **The Moderate Strategy scenario** assumes a more significant intervention than the pessimistic scenario. Food loss is projected to decline sharply, from around 12,000 tons in 2020 to around 10,000 tons in 2045. This suggests that with an increase in mitigation programs, more significant food loss management can be achieved. On the other hand, **the Optimistic Strategy scenario** assumes the implementation of maximum and effective mitigation programs. In this scenario, food loss is projected to decline drastically from around 12,000 tons in 2020 to less than 8,000 tons in 2045. This reflects the great potential to reduce food loss through the application of advanced technology, innovations in production management, and comprehensive consumer education and awareness programs.

Projected Food Loss Generation during Post-Harvest and Storage



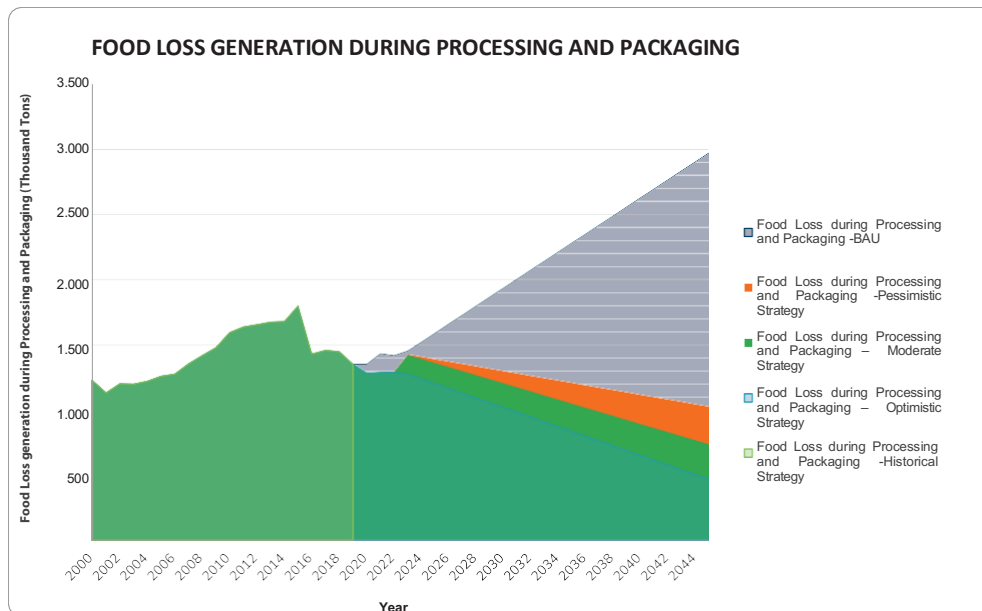
Business as Usual (BAU) Scenario

In the BAU scenario, food loss is projected to increase sharply from around 8,000 tons in 2020 to more than 16,000 tons in 2045. This scenario assumes no significant interventions to reduce food loss, so this increase reflects continued inefficiencies in the food supply chain at the post-harvest and storage stages.

Pessimistic, Moderate and Optimistic Strategy Scenario

This scenario assumes that there are only a few interventions or mitigation programs implemented. Food loss is projected to decrease slightly from around 8,000 tons in 2020 to around 14,000 tons in 2045. Mitigation efforts in this scenario are still limited, indicating the need for improvements in mitigation programs. The moderate scenario assumes a more significant intervention than the pessimistic scenario. Food loss is projected to decline more sharply, from around 8,000 tons in 2020 to around 10,000 tons in 2045. This shows that with an increase in mitigation programs, more significant food loss management can be achieved. In the Optimistic Strategy, implementing mitigation programs is maximum and effective. In this scenario, food loss is projected to decline drastically from around 8,000 tons in 2020 to less than 6,000 tons in 2045. This reflects the great potential to reduce food loss through the application of advanced technology, innovations in post-harvest management and storage, as well as comprehensive consumer education and awareness programs.

Projection of Food Loss Generation during Processing and Packaging



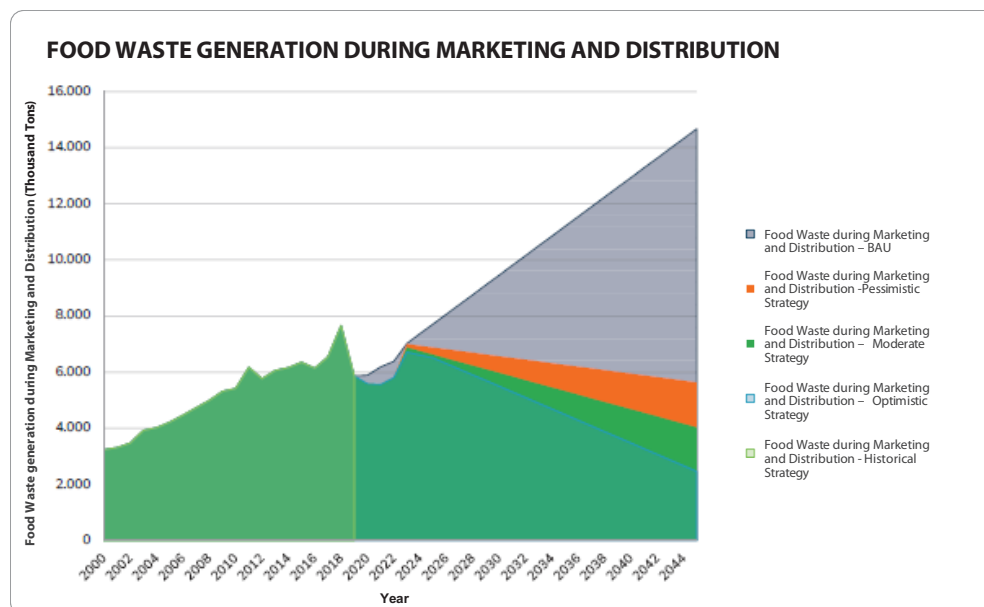
Business As Usual (BAU) Scenario

In the BAU scenario, food loss is projected to increase sharply from around 1,500 tons in 2020 to more than 3,000 tons in 2045. This scenario assumes no significant interventions to reduce food loss, so this increase reflects continued inefficiencies in the food supply chain at the processing and packaging stages.

Pessimistic, Moderate and Optimistic Strategy Scenario

This pessimistic scenario assumes that few interventions or mitigation programs are implemented. Food loss is projected to decrease slightly from around 1,500 tons in 2020 to around 2,500 tons in 2045. Despite mitigation efforts, the impact is still limited, indicating the need for improvements in mitigation programs. Meanwhile, the moderate scenario assumes a more significant intervention than the pessimistic scenario. Food loss is projected to decline more sharply, from around 1,500 tons in 2020 to around 2,000 tons in 2045. This shows that with an increase in mitigation programs, more significant food loss management can be achieved. In the optimistic scenario, it assumes the implementation of maximum and effective mitigation programs. In this scenario, food loss is projected to decline drastically from around 1,500 tons in 2020 to less than 1,000 tons in 2045. This reflects the great potential to reduce food loss through the application of advanced technologies, innovations in processing and packaging, and comprehensive consumer education and awareness programs.

Projection of Food Waste Generation during Marketing and Distribution



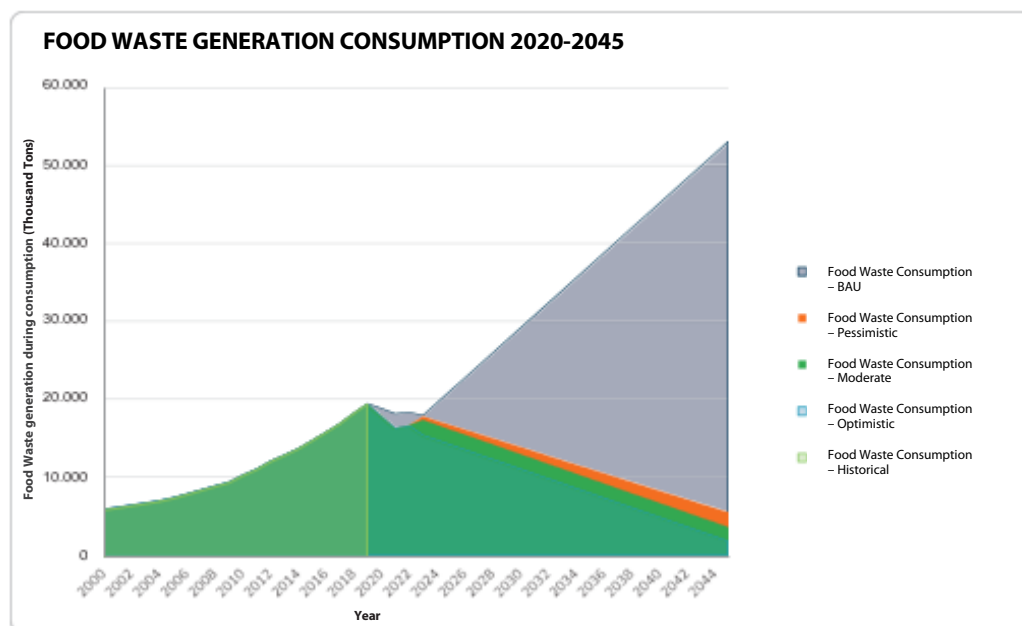
Business As Usual (BAU) Scenario

In the BAU scenario, food waste is projected to increase sharply from around 6,000 tons in 2020 to more than 14,000 tons in 2045. This scenario assumes no significant intervention to reduce food waste, so this increase reflects continued inefficiencies in the food supply chain at the distribution and marketing stages.

Pessimistic, Moderate and Optimistic Strategy Scenario

This pessimistic scenario assumes that few interventions or mitigation programs are implemented. Food waste is projected to decrease slightly from about 6,000 tons in 2020 to about 12,000 tons in 2045. Mitigation efforts in this scenario are still limited, indicating the need for improvements in mitigation programs. Meanwhile, the moderate scenario assumes a more significant intervention than the pessimistic scenario. Food waste is projected to decline more sharply, from around 6,000 tons in 2020 to around 8,000 tons in 2045. This shows that with an increase in mitigation programs, more significant food waste management can be achieved. In an optimistic scenario, it assumes the implementation of a maximum and effective mitigation program. In this scenario, food waste is projected to decrease drastically from around 6,000 tons in 2020 to less than 6,000 tons in 2045. This reflects the great potential to reduce food waste through the application of advanced technology, innovations in distribution and marketing management, and comprehensive consumer education and awareness programs.

Projection of Food Waste Generation during Consumption



Business As Usual (BAU) Scenario

In the BAU scenario, food waste is projected to increase sharply from around 20,000 tons in 2020 to more than 60,000 tons in 2045. This scenario assumes no significant interventions to reduce food waste, so this increase reflects continued inefficiencies in the food supply chain at the consumption stage.

Pessimistic, Moderate and Optimistic Strategy Scenario

This pessimistic scenario assumes that few interventions or mitigation programs are implemented. Food waste is projected to decrease slightly from about 20,000 tons in 2020 to about 50,000 tons in 2045. Mitigation efforts in this scenario are still limited, indicating the need for improvements in mitigation programs. Meanwhile, in the moderate scenario, a more significant intervention is assumed than the pessimistic scenario. Food waste is projected to decline more sharply, from around 20,000 tons in 2020 to around 40,000 tons in 2045. This shows that with an increase in mitigation programs, more significant food waste management can be achieved. In the optimistic scenario, it assumes the implementation of maximum and effective mitigation programs. In this scenario, food waste is projected to decline drastically from around 20,000 tons in 2020 to less than 30,000 tons by 2045. This reflects the great potential to reduce food waste through the application of advanced technology, innovations in consumption management, and comprehensive consumer education and awareness programs.

Estimation of food waste generation in Indonesia in 2019-2023 is carried out through several data interpolation techniques. For regencies/cities that do not have complete data or report more than one data, the average multiplier factor for food waste generation at the provincial level is used. For regencies /cities that only have one data, the ratio of population to the average generation of food waste at the provincial level is used. If the regency/city has no data at all, the average generation of food waste from the nearest province or with similar population characteristics and urban area ratios is used.

SIPSN Data

The number of regencies/cities reporting data on food waste generation varies every year, from 172 in 2019 to 250 in 2022, then down to 139 in 2023. The average generation of food waste per capita also shows fluctuations, with 82.8 kg in 2019, rising to 83.6 kg in 2020, then dropped to 80.3 kg in 2023. The total generation of food waste also fluctuated, with 9,065

thousand tons in 2019, increasing to 11,688 thousand tons in 2022, then dropping to 7,053 thousand tons in 2023. The average incidence per regency/city showed significant variation, with a decrease in 2022 and a slight increase in 2023.

SIPSN Data + Estimation

The number of regencies/cities analyzed is consistently 514 every year. The average per capita generation of food waste shows a slight increase from 81.2 kg in 2019 to 84.0 kg in 2023. The total generation of food waste increased from 22,354 thousand tons in 2019 to 23,318 thousand tons in 2023. The average generation per regency/city also showed an increase from 43 thousand tons in 2019 to 45 thousand tons in 2023.

The main difference between these two data is the number of regencies/cities analyzed and how the estimated data closes the data shortfall from the districts/cities that do not report. SIPSN + Estimation data provides a more comprehensive and consistent

picture, covering all regencies/cities, resulting in a higher and more stable total food waste generation compared to only reported data. The consequence of using data that is only reported (without estimation) is the potential underestimation of total food waste generation, which can have an impact on the planning and implementation of food waste management policies at the national level. Thus, the use of estimation methods that combine reported and in-polluted data provides a stronger and more reliable basis for effective food waste management policies and strategies.

Table 1. Food Waste Data and Estimation in Indonesia 2019 - 2023

	SIPSN Data+ Estimation					Only SIPSN Data				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
n Regency/City	514	514	514	514	514	172	169	169	250	139
Food waste generation (kg/capita)	81.2	81.7	81.7	82.9	84.0	82.8	83.6	81.2	79.0	80.3
Total food waste generation (thousand tons)	22,354	22,642	22,666	23,001	23,318	9,065	8,701	8,540	11,688	7,053
Average per regency/city (Min - Max) (thousand tons)	43 [0.08 - 610]	44 [0.13 - 587]	44 [0.14 - 565]	45 [0.13 - 515]	45 [0.13 - 522]	53 [0.31 - 441]	51 [0.13 - 502]	51 [0.20 - 565]	47 [0.13 - 436]	51 [0.48 - 365]
IQR per regency/city (Q1 - Q3) (thousand tons)	34 [8 - 41]	36 [8 - 44]	35 [9 - 43]	34 [9 - 43]	37 [9 - 46]	49 [11 - 60]	45 [11 - 56]	51 [11 - 63]	46 [10 - 56]	60 [12 - 72]

Source: Processed from various sources



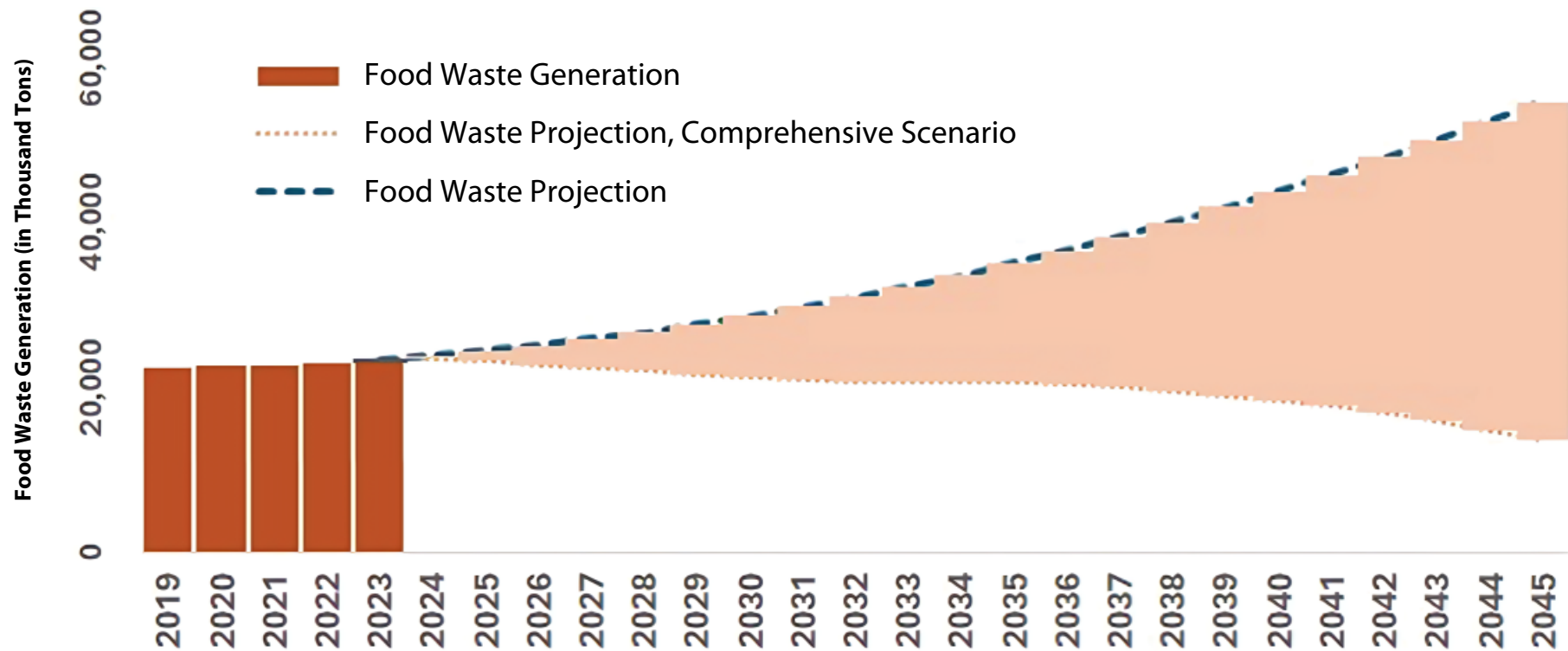
The model projects food waste generation at landfills from 2019 to 2045, with a scenario of managing food loss and waste (FLW) of 75%.

- **Food Waste Generation Data 2019-2023:** This data is a combination of reported SIPSN data and estimates for regencies/cities that do not have complete data.
- **Food Waste Projections 2024-2045:** The dotted line shows the projected generation of food waste if there are no interventions for FLW management, which shows a significant increase to reach around 60,000 tons by 2045. This projection is generated from the polynomial regression equation: $y = 45.284x^2 - 26.181x +$ with a value of $R^2 = 1$. This shows the perfect fit of this model with the 2024-2045 FLW projection.

This projection emphasizes the need for immediate and comprehensive action to achieve the FLW management target and realize a sustainable circular economy.

- **Food Waste Projection, Comprehensive Scenario:** The dotted lines show the projected generation of food waste if a comprehensive intervention to reduce FLW by 75% is successfully implemented. In this scenario, the generation of food waste decreases gradually and remains below 20,000 tons in 2045. The comprehensive scenario food waste projection for the period 2024-2045 is generated from the polynomial regression equation $y = -15.779x^2 + 130.09x + 22613$ with a value of $R^2 = 0.96$ which shows an excellent model fit.

Food waste generation model at the Final Processing Site if FLW can be reduced by up to 75%





CHAPTER IV

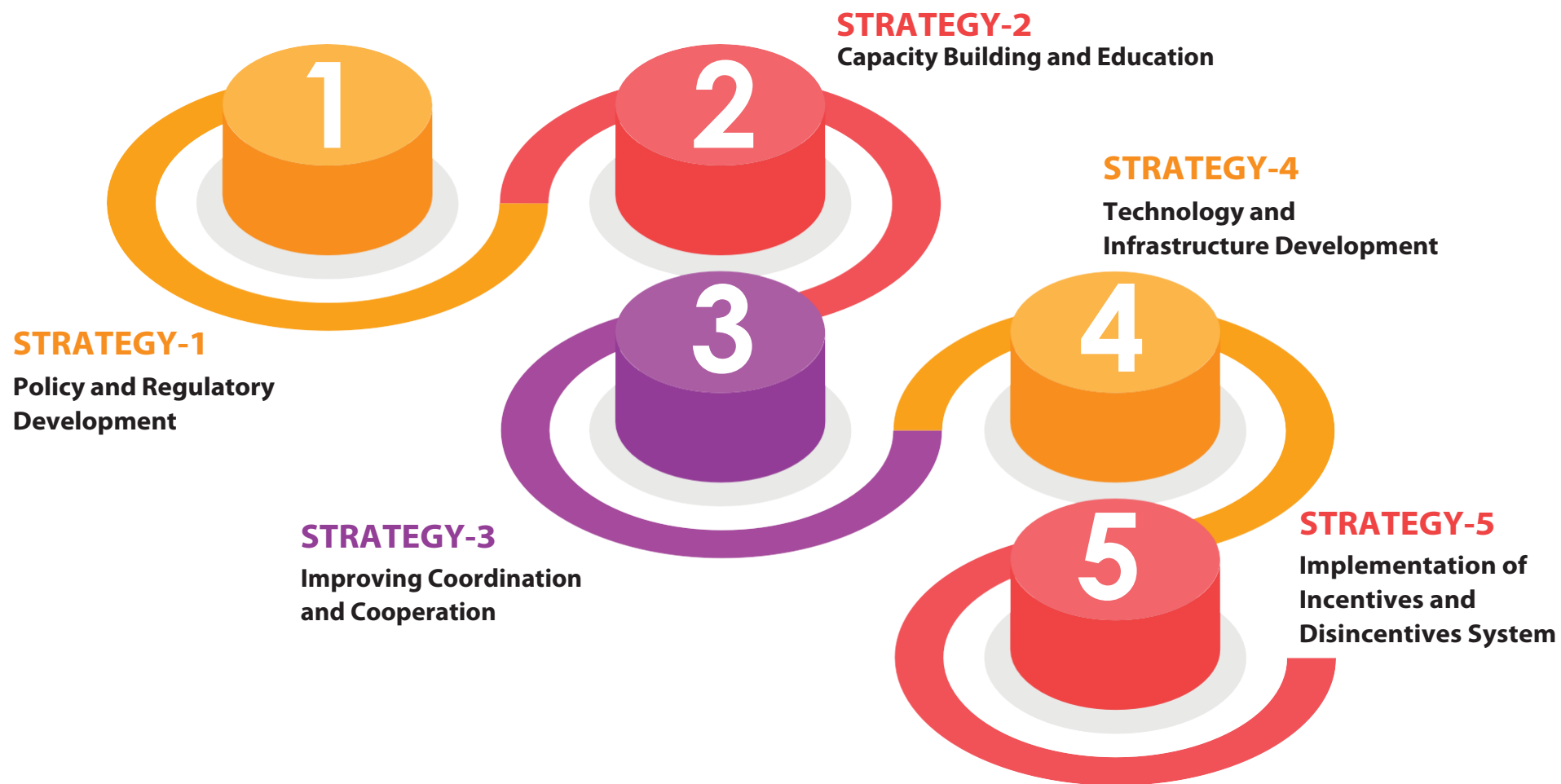
STRATEGIES, MILESTONES, AND KEY INDICATORS

The Indonesia Food Loss and Waste Management Masterplan Framework is a comprehensive strategic plan designed to identify, address, and reduce the amount of food lost (loss) or wasted (waste) throughout the food supply chain. The framework includes a coordinated set of actions, policies, and initiatives to improve food system efficiency, support food security, and reduce negative impacts on the environment and the economy.



Strategy to Achieve a 75% Reduction in Food and Waste in 2045

Contribute to food security, economic growth, and environmental sustainability



Develop and implement policies and regulations that support efforts to reduce food loss and food waste as a whole.



Strategy-1 Policy and Regulatory Development

1. Preparation of Norms, Standards, Procedures, and Criteria (NSPC): Develop and adopt clear and measurable national standards for reducing food waste and waste (FLW). This includes guidelines for production, post-harvest and storage, processing, and packaging processes to reduce Food Loss, while distribution, marketing, and consumption processes to significantly reduce Food Waste processes.
2. Strengthening Budget Commitments: Encouraging commitments from executive and legislative institutions at the central and regional levels as well as community financing contribution commitments in the form of levies for business actors, households, and equivalent home industries. This commitment is needed to collect and allocate an adequate budget for efforts to prevent and reduce food loss and waste in the form of fund allocation for infrastructure, education, and food loss and waste reduction programs.

Justification for the Importance of the Strategy:

Strong Legal Framework	1. Policies and regulations provide a strong and clear legal framework for all stakeholders, from businesses (food producers and business players) to consumers. It creates standards that must be adhered to, reduces uncertainty, and increases accountability.
Incentives, Enforcement, and Inclusivity	2. Incentives, Enforcement and inclusivity: Regulations allow the government to offer incentives for rule-abiding actors and impose sanctions on violators as well as assume shared responsibility between the central government, local governments and communities. This encourages positive behavior throughout the food supply chain.
National Harmonization	3. National Harmonization: With the Norm, Standard, Procedure, and Criteria (NSPC), all parties involved in the food supply chain work with the same guidelines, ensuring that efforts to reduce food loss and waste are coordinated and effective.
Long-Term Sustainability	4. Long-Term Sustainability: Good policies ensure the sustainability of food loss and waste program in the long term, including budget allocation and burden distribution between the government, businesses, and consumers in a sustainable manner.

Lessons Learned from Other Countries



France

In 2016, France adopted a law that prohibits supermarkets from throwing away unsold but still edible foodstuffs. Supermarkets are required to donate the food to charitable institutions or food banks. As a result, France managed to significantly reduce food waste and received international praise for its progressive policies.



South Korea

South Korea implements strict regulations that require the separation of food waste from other leftovers and charges households and businesses based on the amount of food waste produced. This policy has succeeded in reducing food waste by 95% since its implementation in 2005.



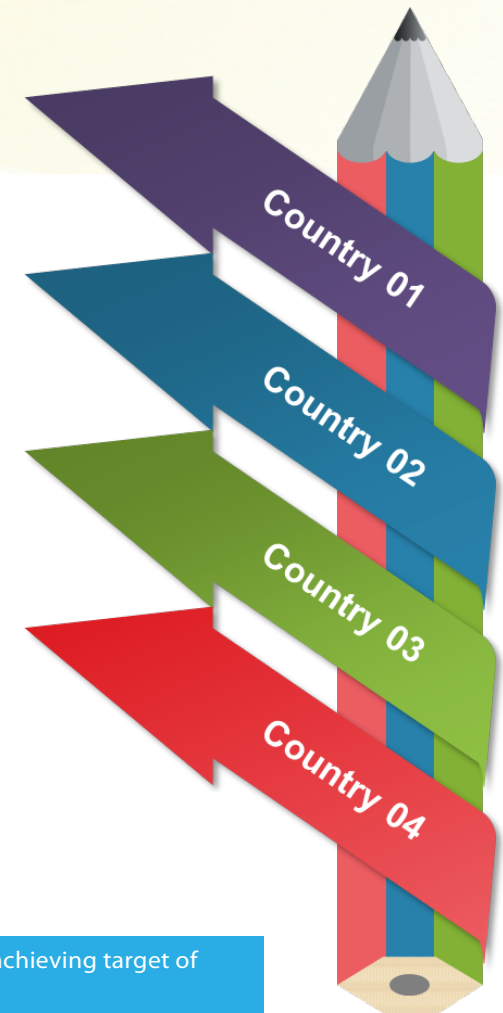
Italy

Italy passed a law in 2016 that provides tax incentives for companies that donate their foodstuffs. This policy not only reduces food waste, but also helps overcome the hunger problem by distributing decent food waste to those in need.



Japan

Japan has a law for food management that encourages companies and society to reduce food waste. The government also supports research and development of technology to process and utilize food waste. As result, Japan was able to significantly reduce food waste and increase public awareness of the importance of food waste management.



The development of good policies and regulations, based on those successful international examples, can help Indonesia in achieving target of reducing food loss and waste, support the national food security, and protect the environmental sustainability.

Milestones-Strategy 1

Policy and Regulatory Development



**Policy Basis
Preparation**



**Initial Implementation
and Evaluation**



**Capacity Enhancement
Optimization**



**Policy Consolidation
and Expansion**



**Consolidation and
Achievement of Final Targets**

2021-2025

1. Preparation of NSPC:
 - a. Formation of a drafting team and data collection.
 - b. Public consultation and stakeholder engagement to get inputs.
 - c. Preparation and trial of NSPC in various sectors.
 - d. Finalization and ratification of the NSPC as well as the preparation of monitoring and evaluation mechanisms.
 - e. Socialization of NSPC and training for all stakeholders.
2. Strengthening Budget Commitments: Initial budget allocation for the implementation of the NSPC and FLW programs.

2026-2030

1. Implementation of NSPC:
 - a. Full implementation of NSPC in all related sectors.
 - b. Increased budget allocation for the FLW programs.
 - c. Annual monitoring and evaluation as well as policy adjustments based on the results of the evaluation.
 - d. Audit and inspection of the implementation of NSPC.
 - e. Increase incentives and disincentives for stakeholders who comply with or deviate from the NSPC.
2. Target Setting: The setting of a target of reducing FLW by 50% in 2030 and a follow-up plan to reach 75% by 2045.

2031-2035

1. Training and Counseling:
 - a. Intensive training on NSPC to new stakeholders.
 - b. The use of new technologies in the implementation of NSPC.
 - c. Strengthening monitoring and evaluation capacity.
2. Coordination and Collaboration:
 - a. Strengthening coordination between institutions and sectors in the implementation of the NSPC.
 - b. Additional resources for regulatory monitoring and enforcement.
 - c. Mid-term evaluation of the achievement of the FLW reduction targets.
3. Policy Adjustments:
 - a. Adjustment of policies and strategies to address identified barriers.
 - b. Strengthening international collaboration in FLW management.

2036-2040

1. Policy Consolidation:
 - a. Consolidation of NSPC policies and best practices
 - b. Scaling up the FLW programs to new regions.
 - c. Policy adjustments based on recent developments.
2. Retraining and Innovation:
 - a. Retraining and capacity building for all stakeholders.
 - b. Implementation of the latest technology and innovations in FLW management.
 - c. Strengthening incentive and disincentive mechanisms.
3. Comprehensive Audit:
 - a. Comprehensive audit of the implementation of NSPC in all sectors.
 - b. A thorough review of the achievement of the target of 50% reduction in FLW.
 - c. Setting a follow-up strategy to achieve the 75% target by 2045.

2041-2045

1. Final Strategy Determination:
 - a. Establishment of a final strategy to achieve the 75% target reduction of FLW.
 - b. Strengthening coordination and synergy between institutions and sectors.
2. Thorough Evaluation:
 - a. Thorough evaluation of all FLW programs and policies.
 - b. Adjustments and refinements of the NSPC to ensure the achievement of the final target.
3. Resource Upgrades:
 - a. Strengthening the final monitoring and evaluation mechanism.
 - b. Additional resources and budgets for the consolidation phase.
4. Reporting and Publication:
 - a. Report and publication of FLW reduction achievements.
 - b. Increase public awareness of achievements and further steps.
5. 75% Target Achievement:
 - a. Achievement of the FLW reduction target of 75%.
 - b. Establishment of the next roadmaps

Increasing the capacity of human resources and educating the public about the importance of reducing food loss and waste.



Strategy-2 Educational Capacity Building

1. **Training and Counseling:** Provides training for farmers, distributors, retailers, and consumers on best practices to reduce food loss and waste. It includes techniques for storing, processing, and utilizing leftover food.
2. **Public Awareness Campaign:** Launched a public awareness campaign to educate the public about the impact of food loss and waste and ways to reduce it.
3. **Curriculum Inclusion:** Integrating materials on reducing food loss and waste into the educational curriculum from early childhood, elementary, to tertiary level.
4. **Communication and Information:** Using various media, including social media, to disseminate information and raise public awareness of the importance of reducing food loss and waste.
5. **Community Facilitation:** Encourage the formation of groups or communities that care about the reduction of food loss and waste, which can act as agents of change in their respective neighborhoods.
6. **Awareness and Commitment Strengthening:** Involvement of all stakeholders for efforts to reduce food loss and waste.

Justification for the Importance of the Strategy:

Behavior Change	1. Education and capacity building are key to changing people's behavior in handling foodstuffs. Without a good understanding, technical and policy efforts may not be fully effective.
Community Empowerment	3. Educated and trained communities have the capacity to take their own action in reducing food loss and waste, creating a broader and sustainable positive impact.
Active Participation	3. Education encourages active participation from all aspects in the community, including households, schools, and the business community, in efforts to reduce food loss and waste.
Policy Dissemination	4. Training and awareness campaigns can help communities understand and support government policies related to reducing food loss and waste.

Lessons Learned from Other Countries



Germany

The "Too Good to Go" campaign in Germany educates consumers and businesses on the importance of reducing food waste. They provide a digital platform that allows consumers to buy surplus food from restaurants and stores at discounted prices. This initiative has succeeded in reducing food waste and increasing public awareness.



Australia

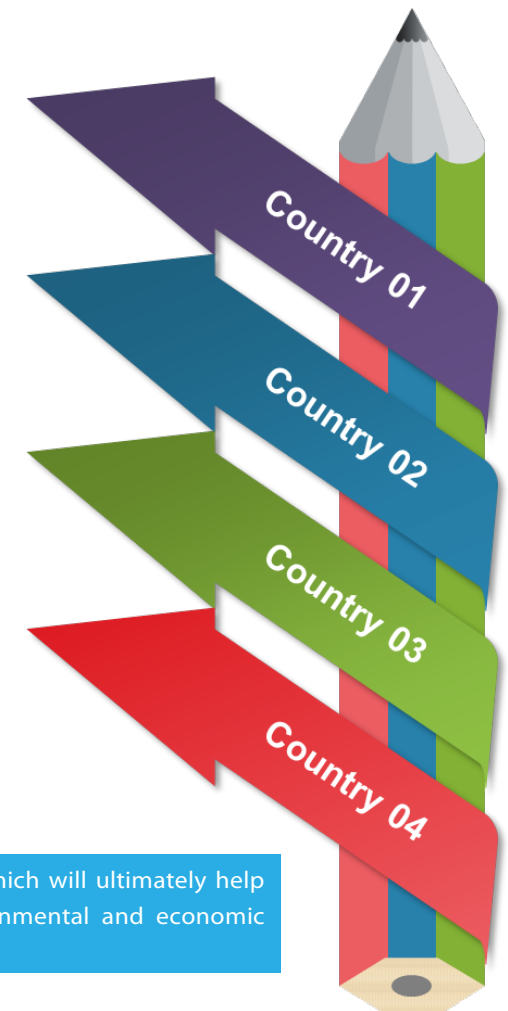
The "OzHarvest" program in Australia combines education with real action. In addition to collecting and distributing surplus food, they also run educational programs in schools and communities to teach children and the community about the importance of reducing food waste.



United Kingdom

The "Love Food Hate Waste" campaign in the United Kingdom has succeeded in reducing household food waste by 21% since its launch. The campaign uses a variety of educational tools, such as guides, videos, and workshops, to teach people how to reduce food waste at home.

By increasing capacity and education, Indonesia can create a more aware and responsible society in handling food, which will ultimately help significantly reduce food loss and food waste. This not only supports food security but also contributes to environmental and economic sustainability.



Milestones-Strategy 2

Educational Capacity Building



**Policy Basis
Preparation**



**Initial Implementation
and Evaluation**



**Capacity Enhancement
Optimization**



**Policy Consolidation
and Expansion**



**Consolidation and
Achievement of Final Targets**

2021-2025

1. Training and Counseling: Development of NSPC-based FLW training modules and implementation of basic training for farmers, producers, and distributors.
2. Public Awareness Campaign: Launch a national campaign on reducing FLW through social media, television, and radio.
3. Inclusive Curriculum: Integration of the FLW curriculum into primary to secondary education and teacher training.

2026-2030

1. Training and Counseling: Development of advanced training programs and increased coverage of training areas.
2. Public Awareness Campaign: Intensification of campaigns focusing on behavior change and evaluation of campaign strategies.
3. Inclusive Curriculum: Improvement and expansion of the FLW curriculum to schools in remote areas.

2031-2035

1. Training & Counseling: Optimization of training programs with the latest technologies and increased collaboration with higher education institutions.
2. Public Awareness Campaign: Development of specific campaigns for specific segments of society and increased community participation.
3. Inclusive Curriculum: Integration of FLW in higher education curriculum and development of FLW certification programs.

2036-2040

1. Training and Counseling: Consolidating and expanding training programs throughout Indonesia with regional training centers.
2. Public Awareness Campaigns: Development of international campaigns related to FLW and increased collaboration with international organizations.
3. Inclusive Curriculum: Consolidate the FLW curriculum at all levels of education and develop vocational education programs related to FLW.

2041-2045

1. Training and Counseling: Strengthen continuous training programs and improve the quality of training with the latest technology.
2. Public Awareness Campaign: Strengthen public awareness campaigns focusing on behavior change and develop global campaigns related to FLW.
3. Inclusive Curriculum: Strengthen the FLW curriculum at all levels of education and develop FLW education programs based on research results.

Strengthen coordination and cooperation between and between the central government, local governments, and other stakeholders to achieve common goals in reducing and handling food loss and waste.



Strategy-3 Improving Coordination and Cooperation

1. **Establishment of Coordination Teams:** Establish cross-sectoral coordination teams involving relevant ministries/agencies, local governments, non-governmental organizations, academics, the private sectors, and non-governmental organizations to ensure that policies and actions run in an inclusive, harmonious, and effective manner.
2. **Forums and Communication Networks:** Hold regular forums and build effective communication networks between all stakeholders to share information, best practices, and innovative solutions.
3. **Collaboration with the Business World:** Encourage strategic partnerships with the business world to reduce food waste through technological innovation, production efficiency, and better food distribution.
4. **Collaboration with academics:** Encourage developing, disseminating, and adopting knowledge and technologies to reduce food loss and waste.
5. **Collaboration with Community Elements/Community Institutions (NGOs):** Encouraging the agreement of joint obligations and responsibilities between the Central Government and Regional Government, with community elements assuming shared responsibility to prevent and reduce food loss and waste.
6. **International Collaboration:** Establish cooperation with international organizations and other countries to learn from their experiences and adopt the best food loss and waste management practices.

Justification for the Importance of the Strategy:

Effort Synchronization	1. Effort Synchronization: Good coordination ensures that all parties involved have an understanding of common issues, duties and responsibilities and are working towards the same goals, avoiding duplication of efforts, and maximizing synergy and efficiency.
Policy Effectiveness	2. Policies made and implemented through the cooperation of various parties will be more comprehensive and effective because they take into account the perspectives and needs of all stakeholders.
Capacity Building	3. Capacity Building: Cooperation allows for the transfer of knowledge and skills between various organizations and institutions, increasing collective capacity in addressing the issue of food loss and waste.
Innovative Solutions	4. Innovative Solutions: Collaboration with businesses and academia can encourage innovation in food management technology and practices to avoid and reduce food loss and waste into useful products such as compost, feed, and energy sources.

Lessons Learned from Other Countries



European Union

The European Union has a Coalition for Food Waste Reduction platform that brings together member states, businesses, and civil society organizations to work together on reducing food waste. These initiatives have resulted in various projects and policies that help reduce food waste across the continent.



United State

The "U.S. Food Waste Challenge" program launched by the USDA and EPA invites the public and private sectors to work together to reduce food waste. The program connects farmers, food producers, retailers, and consumers in a joint effort to achieve the goal of reducing food waste.



Australia

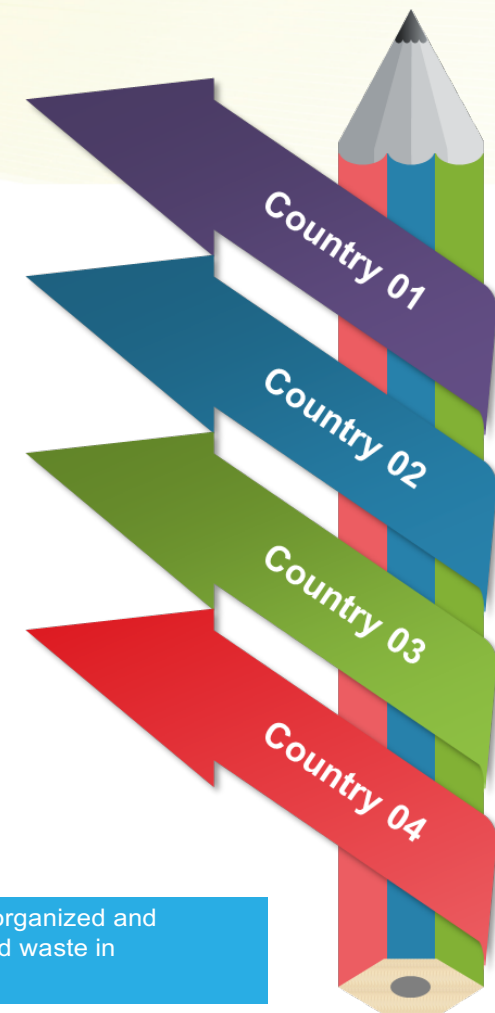
The Australian government through its "National Food Waste Strategy" initiative works closely with various sectors including the food and beverage industry, academia, and non-governmental organizations. They set up a national forum to share information and develop joint strategies in reducing food waste.



Canada

The "Love Food Hate Waste" program in Canada is the result of a collaboration between the government, private sectors, and non-profit organizations. The program has succeeded in raising awareness and reducing food waste in households through extensive education and collaboration campaigns.

Increased coordination and cooperation between various stakeholders is a key strategy that not only ensures more organized and focused efforts but also paves the way for more effective innovation and collective solutions in reducing food loss and waste in Indonesia.



Milestones-Strategy 3

Improved Coordination and Cooperation



**Policy Basis
Preparation**



**Initial Implementation
and Evaluation**



**Capacity Enhancement
Optimization**



**Policy Consolidation
and Expansion**



**Consolidation and
Achievement of Final Targets**

2021-2025

1. Formation of the Coordination Team: Establish a national coordination team of FLW involving representatives from the government, private sectors, academia, and NGOs.
2. Forums and Communication Networks: Holding annual FLW forums and building stakeholder communication networks.
3. Collaboration with the Business World: Launched a collaboration program with large companies to reduce FLW in their supply chains.

2026-2030

1. Formation of the Coordination Team: Strengthening coordination teams with the addition of regional sub-teams to expand reach and effectiveness.
2. Forums and Communication Networks: Expand the annual forum into an international platform and increase the frequency of communication network meetings.
3. Collaboration with the Business World: Develop cooperation with universities and research institutes to create innovative solutions for the reduction of FLW.

2031-2035

1. Collaboration with the Business World: Optimize collaboration with small and medium-sized companies to disseminate FLW best practices across business sectors.
2. Collaboration with the Community: Initiating participatory programs with the community to raise awareness and action to reduce FLW at the local level.
3. Collaboration with Academics: Increase the number of applied research and FLW-related publications through partnerships with academic institutions.

2036-2040

1. International Collaboration: Develop international cooperation with other countries and global organizations to share knowledge and technology in the reduction of FLW.
2. Collaboration with the Business World: Introducing incentives and rewards for companies that successfully reduce their FLW significantly.
3. Collaboration with the Community: Strengthen community-based programs and increase public engagement through national campaigns.

2041-2045

1. Collaboration with the Business World: Integrate FLW solutions in enterprise operational standards and supply chains.
2. Collaboration with the Academics: Increasing the academics' contribution in developing new technologies and efficient solutions for FLW reduction.
3. International Collaboration: Strengthen Indonesia's role as a global leader in reducing FLW through international cooperation and sharing best practices.

Increase the use of technology and facilities to support the reduction of food loss and waste.



Strategy-4 Technology and Infrastructure Development

1. **Technology innovation:** Encourage research and development of new technologies to reduce food loss and waste at every stage of the food supply chain, from production to consumption, and optimize appropriate technologies.
2. **Infrastructure Modernization:** Investing in infrastructure that supports efficient food storage, transportation, and distribution, such as refrigerated warehouses and advanced logistics systems, to food waste processing infrastructure.
3. **Adoption of Information Systems:** Implement an integrated information system that can monitor and manage food loss and waste data in real time and make it part of the Decision Support System (DSS) to facilitate better decision-making.
4. **Technical Training:** Provide training and technical support to farmers, distributors, and retailers to adopt technologies and best practices in reducing food waste, as well as technical training for related stakeholders in efforts to prevent and reduce food waste

Justification for the Importance of the Strategy

Operational Efficiency	1. Technology can help identify and address critical points in the food supply chain that cause food loss, thereby improving operational efficiency and reducing losses.
Improving Food Quality	2. Modern infrastructure such as refrigerated warehouses and efficient transportation can maintain food quality for longer, reducing spoilage and waste.
Data-Driven Decision	3. Integrated information systems enable accurate and real-time data collection and making them part of the Decision Support System (DSS) helps stakeholders make more informed decisions based on valid data.
Adaptability and Scalability	4. New technologies can be quickly adapted and scaled as needed, providing flexible solutions that can be applied across a wide range of contexts and scales.
Food security, environmental quality and circular economy	5. Strengthening food security, improving environmental quality, and implementing circular economy practices: the development of modern and appropriate technology and infrastructure is not only able to reduce and save food loss and waste which is useful for strengthening food security and improving the environment, but the management of food waste used as fertilizer, feed, and energy sources is also able to encourage economic growth.

Lessons Learned from Other Countries



Netherlands

The Netherlands uses advanced technologies in its food supply chain, such as IoT sensors for temperature and humidity monitoring in food transportation and storage. This technology helps reduce food waste by maintaining product quality from producers to consumers.



Japan

Japan has developed precision agriculture technology that uses drones and soil sensors to optimize water and nutrient use, thereby reducing food loss from the production stage. In addition, Japan has a very efficient storage and transportation infrastructure.



Sweden

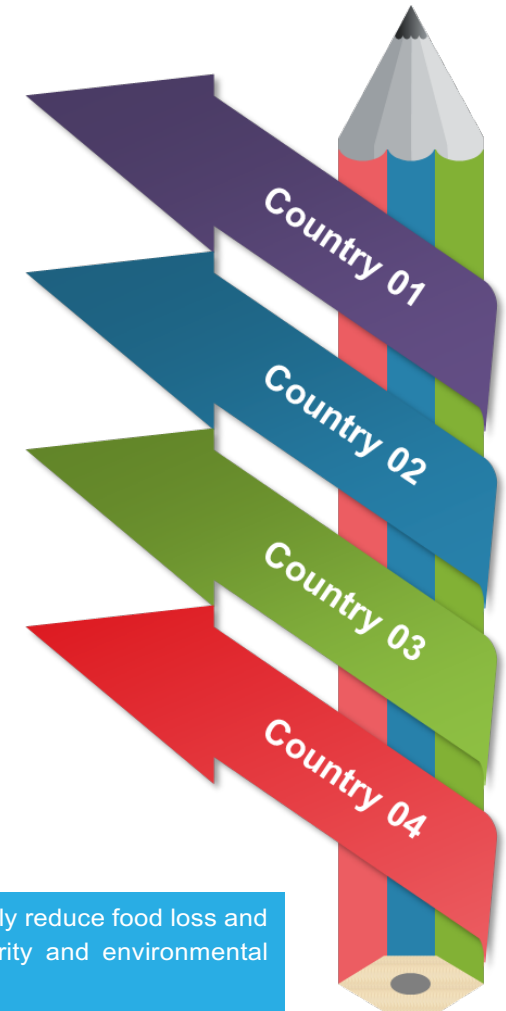
Sweden implements an integrated information system to manage food waste. For example, the "Karma" app allows restaurants and food stores to sell surplus food at discounted prices to consumers, reducing food waste while offering cheap food to the public.



United State

The "Spoiler Alert" initiative in the United States uses digital platforms to connect producers and retailers with charities and businesses in need of food surpluses. This technology helps reduce food waste by distributing food that is still fit for consumption to those in need.

By developing and adopting modern and efficient technology and infrastructure, Indonesia is expected to significantly reduce food loss and waste nationally. This not only improves the efficiency of the food supply chain but also supports food security and environmental sustainability.



Milestones-Strategy 4

Technology and Infrastructure Development



**Policy Basis
Preparation**



**Initial Implementation
and Evaluation**



**Capacity Enhancement
Optimization**



**Policy Consolidation
and Expansion**



**Consolidation and
Achievement of Final Targets**

2021-2025

1. Technological Innovation: Research and development of new technologies for food loss and waste (FLW) reduction. Implementation of innovative technology pilot projects in food supply chains.
2. Infrastructure Modernization: Review and improvement of existing food storage and distribution infrastructure. Construction of high-standard storage facilities in strategic areas.
3. Technical Training: Conducting technical training for business actors and farmers on the use of new technologies and efficient storage methods.

2026-2030

1. Technological Innovation:
 - a. Further development of technologies that have been successfully tested.
 - b. Encouraging collaboration with startups and tech companies to create new solutions.
2. Infrastructure Modernization:
 - a. Extending infrastructure modernization to rural areas and remote areas.
 - b. Application of smart storage technology to optimize food stock management.
3. Adoption of Information Systems:
 - a. Implementation of an integrated information system to monitor FLW throughout the supply chain.
 - b. Application of blockchain technology for transparency and accountability in food distribution.

2031-2035

1. Infrastructure Modernization:
 - a. Increasing the capacity of existing storage and distribution infrastructure.
 - b. Development of environmentally friendly and efficient food processing facilities.
2. Adoption of Information Systems:
 - a. Use data analytics to predict and prevent FLW in real-time.
 - b. Integration of information systems with e-commerce and logistics platforms
3. Technical Training:
 - a. Advanced training for farmers, producers and distributors on the latest technologies.
 - b. Training program to improve digital skills for food industry players.

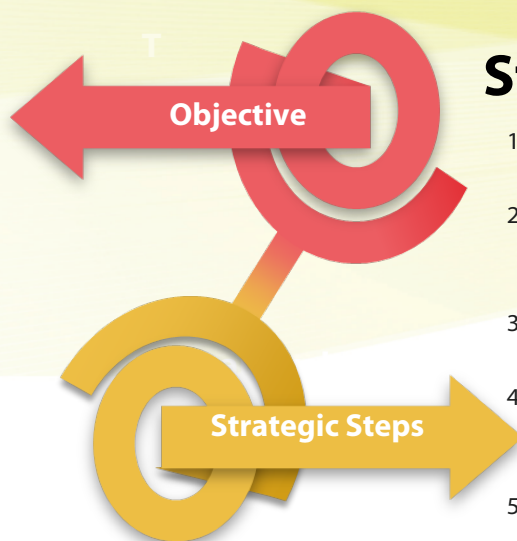
2036-2040

1. Formation of the Coordination Team: Establish a national coordination team of FLW involving representatives from the government, private sectors, academia, and NGOs.
2. Forums and Communication Networks: Holding annual FLW forums and building stakeholder communication networks.
3. Collaboration with the Business World: Launched a collaboration program with large companies to reduce FLW in their supply chains.

2041-2045

1. Formation of the Coordination Team: Establish a national coordination team of FLW involving representatives from the government, private sectors, academia, and NGOs.
2. Forums and Communication Networks: Holding annual FLW forums and building stakeholder communication networks.
3. Collaboration with the Business World: Launched a collaboration program with large companies to reduce FLW in their supply chains.

Encourage active participation from various parties in reducing food loss and waste through incentive and disincentive mechanisms.



Strategy-5 Implementation of Incentives and Disincentives System

1. **Tax Incentives:** Provides tax incentives to businesses that are successful in reducing food loss and waste or that donate their food surplus to charitable organizations.
2. **Sub successfully reduce food loss and waste or subsidies and Grants:** Provide subsidies or grants for projects that focus on reducing food waste, such as efficient food processing technology and storage infrastructure, and food waste management by all stakeholders.
3. **Awards and Recognition:** Hold annual awards for companies, organizations, and elements of society/individuals who are successful in their efforts to reduce food loss and waste.
4. **Penalties and Sanctions:** Applying penalties for companies and households/individuals/home industries that do not comply with regulations related to the management of food loss and waste, such as fines for the disposal of food that is still fit for consumption.
5. **Certification Program:** Develop a certification program to build a competitive advantage in the market for businesses, food rescue activists, and circular economy actors (recyclers) of food waste who apply best practices in reducing food loss and waste.

Justification for the Importance of the Strategy

Economic Motivation	1. Incentives and disincentives provide economic motivation for companies and individuals to adopt the practice of reducing food loss and waste. Incentives can make these efforts more financially appealing, while disincentives encourage compliance through financial consequences.
Driving Innovation	2. Subsidies and grants can encourage innovation by supporting the development of new technologies and effective practices to reduce food loss and waste.
Public Recognition and Support	3. Awards and certification programs can increase the visibility and reputation of businesses participating in food loss and waste reduction efforts, encouraging more companies to follow in their footsteps.
Stronger Regulation	4. Penalties and sanctions ensure that regulations related to the management of food waste and waste are followed seriously, creating a more conducive environment for food waste reduction.

Lessons Learned from Other Countries



Denmark

Denmark has an award program that recognizes businesses and organizations that have successfully reduced food waste. In addition, Denmark also provides financial support for innovative projects in food loss reduction, which drives many local and national initiatives.



Canada

The "Green Bin" program in Toronto, Canada, applies penalties for organic waste, including food. Households that do not properly sort organic waste are subject to fines. This encourages residents to be more aware of minimizing food waste.



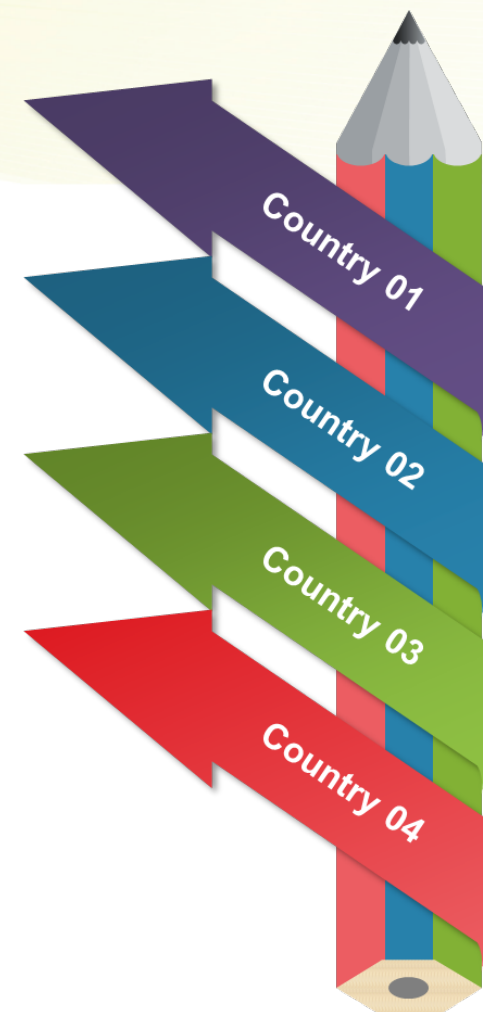
Switzerland

The Switzerland government provides tax incentives for companies that donate their food. In addition, they have a "Too Good to Waste" certification program that rewards restaurants and stores that successfully reduce food waste. This step has increased food donations and reduced waste.



Austria

Austria has an incentive policy that provides subsidies to farmers and companies that use technology to reduce food loss, such as cold storage and vacuum packaging. This has driven more comprehensive adoption of the technology and reduced waste at the production and distribution stages.





Singapore

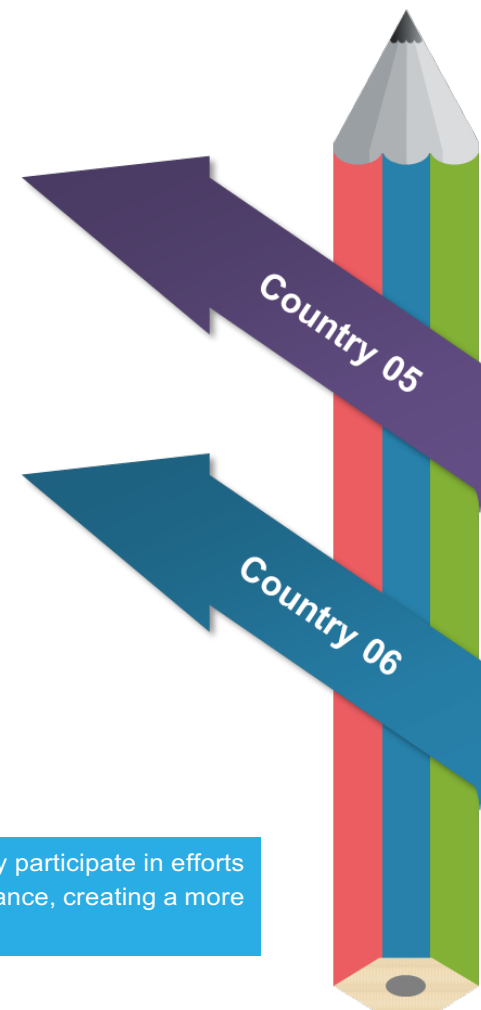
Singapore has implemented heavy fines for food disposal that does not comply with environmental regulations. In addition, the government provides subsidies for projects that use technology to process food waste into compost or energy. This has significantly reduced the amount of food waste and increased environmental awareness among businesses and the public.



Norway

Norway offers tax incentives and fee reductions for supermarkets that donate unsold but still consumable food. They also run a "Best for, men ikke dårlig etter" campaign (Good before, but not bad after) which encourages consumers not to throw away food that is still fit for consumption even after the "best before" date.

With the implementation of an incentive and disincentive system, Indonesia can encourage various parties to actively participate in efforts to reduce food loss and waste. This strategy not only provides an economic boost but also ensures regulatory compliance, creating a more conducive environment for sustainable reduction of food waste.



Milestones-Strategy 5

Implementation of Incentives and Disincentives System



**Policy Basis
Preparation**



**Initial Implementation
and Evaluation**



**Capacity Enhancement
Optimization**



**Policy Consolidation
and Expansion**



**Consolidation and
Achievement of Final Targets**

2021-2025

1. Tax Incentives:
Development of tax incentives policy for companies that implement the practice of reducing FLW. Launch of tax incentive programs for industry players who adopt environmentally friendly and efficient technologies.
2. Subsidies and Grants:
Provision of subsidies and grants to support technological innovation in FLW reduction. Launch of a grant program for research and development of FLW technology in the food sector.
3. Awards and Recognitions:
Launch of a national award program for companies and individuals who contribute significantly to the reduction of FLW. Public campaigns to raise awareness about the importance of reducing FLW through awards and recognition.

2026-2030

1. Tax Incentives:
 - a. Evaluation of the impact of tax incentive policies that have been implemented.
 - b. Adjustment of tax incentive policies based on evaluation results to increase effectiveness.
2. Subsidies and Grants:
 - a. Implementation of broader subsidy and grant programs to accelerate the adoption of FLW reduction technologies.
 - b. Monitoring and evaluation of the use of subsidies and grants to ensure their effectiveness.
3. Penalties and Sanctions:
 - a. The application of penalties and sanctions for companies that do not comply with the regulations on the reduction of FLW.
 - b. Development of an audit system to ensure compliance with FLW regulations.

2031-2035

1. Awards and Recognitions:
 - a. Strengthening the award program by adding award categories and increasing rewards.
 - b. Collaboration with the media to increase the visibility of the awards and recognition program.
2. Certification Program:
 - a. Launch of a certification program for companies that have significantly reduced their FLW.
 - b. Development of rigorous and accountable certification standards.
3. Penalties and Sanctions:
 - a. Stricter enforcement of sanctions for violations related to FLW.
 - b. Collaboration with law enforcement agencies to ensure compliance with FLW regulations.

2036-2040

1. Tax Incentives:
 - a. Optimization of tax incentive policies based on international best practices.
 - b. Private sector involvement in the formulation of more effective tax incentive policies.
2. Subsidies and Grants:
 - a. Increased budget allocation for subsidies and grants to support sustainable innovations.
 - b. Collaboration with research institutions to identify the latest technologies in FLW reduction.
3. Certification Program:
 - a. Development of international certification programs to expand reach and recognition.
 - b. Increased capacity of certification bodies to handle increased demand.

2041-2045

1. Tax Incentives:
 - a. Consolidation of tax incentive policies to ensure a significant contribution to the reduction of the FLW.
 - b. Public recognition of companies that make effective use of tax incentives.
2. Subsidies and Grants:
 - a. Final evaluation of subsidy and grant programs to measure long-term impacts.
 - b. Preparation of new policy recommendations based on the results of the evaluation.
3. Awards and Recognitions:
 - a. The establishment of the national award as a prestigious annual event.
 - b. Collaboration with international organizations to strengthen awards and recognition programs.

Food Loss and Waste (FLW) Indicators

Table 2. Indicators of Food Loss and Waste Governance

GROUP	NO	QUANTITATIVE INDICATORS	DESCRIPTION OF QUANTITATIVE INDICATOR ACTIVITIES	NO	IMPACT INDICATORS	DESCRIPTION OF IMPACT INDICATOR ACTIVITIES
Governance	1	Food Supply Availability Level	Monitor and evaluate the level of availability of domestic food supply based on: Availability = production + import-export - non-consumption use of food (feed, energy)	1	Policy Impact on FLW Management Reduction	Evaluation of FLW management as a result of policies for all stages of the food supply chain
	2	Capacity Utilization of Food Storage and Donation Systems	Measuring the level of food loss management through storage technology and the frequency of activation of the donation system to prevent oversupply of food	2	Effectiveness of Food Storage and Donation Programs	Assessment of the impact of food loss management programs through food storage technology and donation systems
	3	Food Security System	Analysis of the frequency of events that disrupt food security, such as natural disasters or distribution disruptions, as well as the magnitude of the impact on the stability of the food system	3	Food Security System	Food security test in the face of crises and its ability to maintain stable food distribution in emergency situations
	4	Improvement in Food Security Index Score	Quantification of improvements in the food security index as a result of implemented policies	4	Qualitative Changes in the Food Security Index	Monitor and analyze qualitative changes in food security index indicators, including accessibility, availability, utilization, and stability of food supply

Source: Processed from various sources

Food Loss and Waste (FLW) Indicators

Table 3. Food Loss Indicators

GROUP	NO	QUANTITATIVE INDICATORS	DESCRIPTION OF QUANTITATIVE INDICATOR ACTIVITIES	NO	IMPACT INDICATORS	DESCRIPTION OF IMPACT INDICATOR ACTIVITIES
Food Loss	1	Percentage of total Production	It measures the percentage of total food production that is lost or wasted at every stage of the food supply chain, from agricultural production to final consumption.	1	Percentage of vulnerable households that are helped	Analysis of the impact of food waste management on the amount of nutrients (calories, protein, etc.) wasted
	2	Total Volume	Calculating the total volume of food lost or wasted in a given unit (e.g., tons or kilograms) at each stage of the supply chain	2	Lost Monetary Value	Calculate the economic value of lost food in units of currency.
	3	Percentage to consumption	Calculating the percentage of total food consumption that is lost or wasted, gives an idea of how much food should be consumed but not utilized.	3	Wasted production costs	Measure production costs that do not yield benefits, including labor, raw materials, and energy costs.
	4	Percentage to supply	Calculating the percentage of total food supply lost or wasted, calculating the amount of food available for consumption but not used	4	Food Security	Measure how food loss affects food availability and food security locally and globally.
	5	Changes from year to year	Observing changes in the amount or percentage of food loss from year to year provides insight into the effectiveness of food loss management programs and policies.	5	Investment in Technology	Evaluate investments in technologies and processes designed to reduce food waste.

Source: Processed from various sources

Food Loss and Waste (FLW) Indicators

Table 4. Food Waste Indicator

GROUP	NO	QUANTITATIVE INDICATORS	DESCRIPTION OF QUANTITATIVE INDICATOR ACTIVITIES	NO	IMPACT INDICATORS	DESCRIPTION OF IMPACT INDICATOR ACTIVITIES
Food Waste	1	Total Volume	Calculate the total volume of food wasted in a given unit (e.g., tons or kilograms) at each stage of the food supply chain.	1	Total Economic Value	Calculate the economic value of wasted food in units of currency.
	2	Percentage of production	Measure the percentage of total food production that ends up as food waste at each stage of the supply chain.	2	Wasted Production Costs	Measure production costs that do not yield benefits, including labor, raw materials, and energy costs.
	3	Percentage to consumption	The percentage of total food consumption that ends up as food waste, gives an idea of how much food should be consumed but not utilized.	3	Losses of Producers and Farmers	Impact on farmers' and producers' incomes reduced due to unsold or wasted food
	4	Comparison between Wasted and Produced Food	Measure the comparison between the amount of food initially produced and the amount that ends up being leftover food at each stage of the supply chain.	4	Losses in the Retail and Consumer Sectors	Calculate financial losses in the retail sector and consumption due to food surpluses.
	5	Difference between the Start and End of the Supply Chain	Measuring the difference between the amount of food initially produced and the amount that reaches the final consumer, highlighting the amount of food wasted at each stage of the supply chain.	5	Investment in Technology	Evaluate investments in technologies and processes designed to reduce food waste.



CHAPTER V

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APPENDIXES

Appendix 1: Comparison of International Policies in the FLW Management

The following is a comparison of policies related to the FLW management between developed countries that are members of the OECD (Organization for Economic Co-operation and Development) and non-OECD developing countries. This comparison will be categorized into heavy, moderate, strong, and no policy at all in the effort to manage the FLW.

Table 5. Comparison of International Policies in the FLW Management

Country	OECD Member	Food Waste Materials Quantity (kg/ capita/year)	Food quality and security			Economy		Food Saving			Waste reporting obligations	Awareness of food waste management strategies
			Food Security for Donation	Date Labelling	Liability Protection for Food Donations	Tax Incentives	Taxation Barriers	Donation or Penalty Requirements for Food Waste	Grants and Incentives Government	National laws or policies on residual food		
USA	OECD	139	None	None	Strong	Strong	None	Weak	Strong	None	n/a	n/a
Australia	OECD	133	None	Moderate	Moderate	Moderate	None	None	Limited	Exist	n/a	Exist
Canada	OECD	118	None	Weak	Weak	Weak	None	Weak	Weak	None	n/a	n/a
UK	OECD	98	Strong	Strong	None	None	None	Weak	Strong	None	n/a	n/a
China	Non-OECD	126	None	Limited	None	Strong	Exist	Moderate	None	Exist	n/a	n/a
Indonesia	Non-OECD	121	None	Limited	None	None	Exist	None	Weak	None	n/a	n/a
India	Non-OECD	94	Weak	Weak	None	None	None	None	None	None	n/a	n/a
Singapore	Non-OECD	90	Strong	Weak	None	None	None	Strong	Strong	Strong	Strong	Strong

Source: Food and Agriculture Organization of the United Nations (FAO)

Comparison of the FLW Management Program in 34 Other Countries

To map the strategies and programs carried out by other countries and identify the countries that have implemented these measures the most, benchmarking has been carried out.

There is a list of 34 countries that have been mapped in general, which can be divided into two groups, namely OECD member countries and non-OECD countries. The list of countries includes Austria, Bangladesh, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovenia, Spain, Sweden, United Kingdom, and USA. In the implementation of the FLW management policy, there are several programs that are most carried out, including facility support, regulations/regulations, and education campaigns.

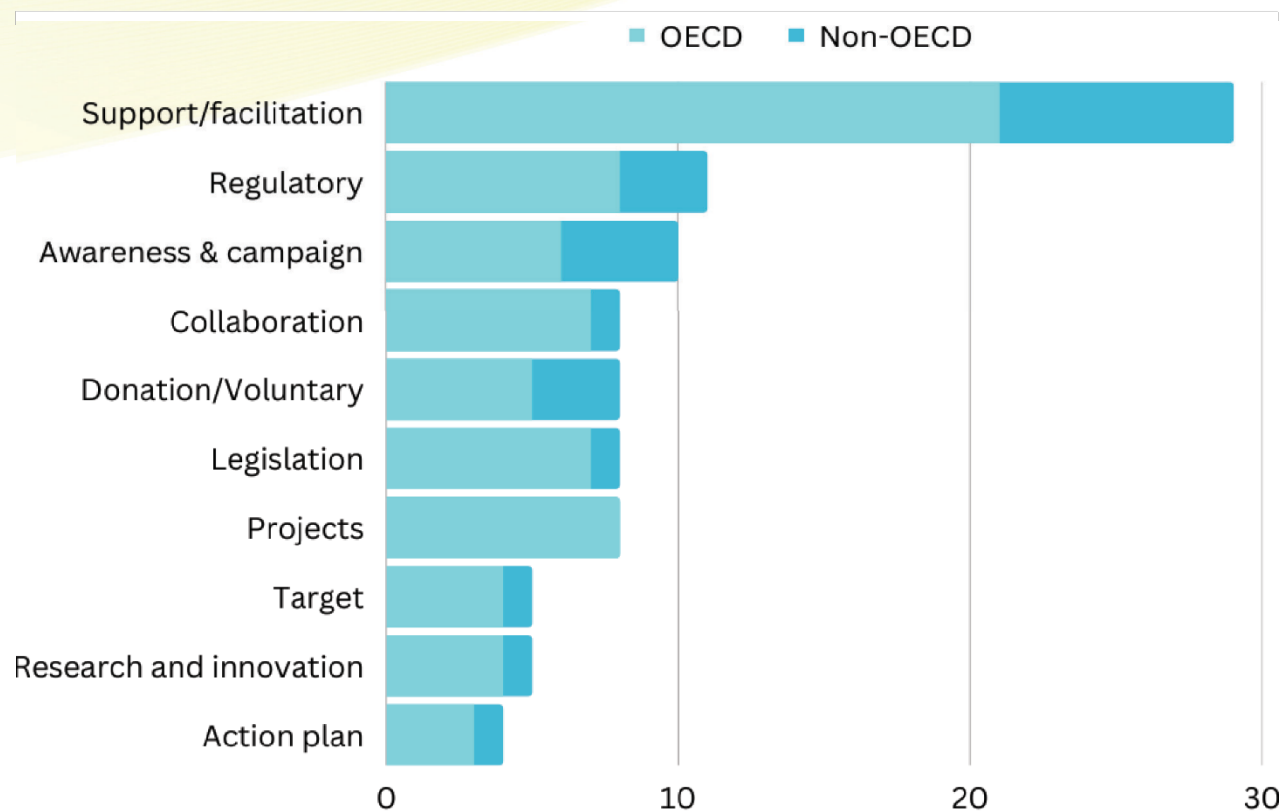


Figure 12. The type of approach taken by the governments of various countries to overcome the FLW.

Source: FAO, 2021.

Comparison of Policy Tools to Reduce Food Waste

There are nine policy tools that are needed to reduce food waste, among others (Leket, 2021): 1. Food safety for donations 2. Protection from legal liability for food donations	3. Expiration date 4. Tax incentives 5. Obligation to donate excess food 6. Ban/tax on sending organic waste to landfills	7. Grants and incentives from the government 8. The national goal is to reduce the amount of waste 9. National strategy to reduce food insecurity
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Food Safety for Donations

Policy Description: Creating a legal framework with clear guidance on food safety standards from donated or rescued food

Table 6. Examples of Policy Tools in Other Countries Related to Food Safety for Donations

Country	Title	Main Ideas	Sources
 India	<i>Food Safety and Standards (Recover and Distribution of Surplus Food) Regulation</i>	1. Establish the responsibilities of food donors and organizations distributing excess food, including appointing the Food Safety and Standards Authority as the guiding authority. 2. Establishing requirements for labeling the food to be donated. 3. Creating an obligation to record and monitor food surplus.	Gazette Notification, FSSAI (Food Safety And Standards Authority Of India), 2019.

Source: Processed from various sources



Protection from Legal Liability for Food Donations

Policy Description: Legislation that exempts organizations that donate, serve, transport, and deliver donated food from criminal or civil liability for damages caused, if they act in accordance with the law and are not negligent.

Table 7. Examples of Policy Tools in Other Countries Regarding Protection from Legal Responsibility for Food Donations

Country	Title	Main Ideas	Sources
 U.S.A	<i>The Bill Emerson Good Samaritan Food Donation Act (1996)</i>	Protect food donors and entities distributing surplus food from criminal and civil prosecution, as long as the process is done in good faith, and without willful negligence.	42 U.S. Code § 1791 – Bill Emerson Good Samaritan Food Donation Act, Legal Information Institute

Source: Processed from various sources



Expiration date

Policy Description: To reduce confusion about date labels on food products and encourage donations of safe, edible foods after their expiration dates, the best practices policy suggests three policy tools:

1. Regulations that offer two options for date labels: one for food safety ("use by") and one for food quality ("best by"). Safety-based labels are only used if consuming the food poses a hazard; Otherwise, quality-based labels are used.
2. Regulations that allow food donations after the quality-based date has passed (excluding safety-based dates).
3. Consumer education campaigns to clarify the meaning of date labels, prevent confusion about expiration dates and reduce unnecessary food waste.

Table 8. Examples of Policy Tools in Other Countries Regarding Expiration Date

Negara	Judul	Gagasan Utama	Sumber
 Inggris	<i>"Label better, less waste" Labelling guidance – Best practice on food date labelling and storage advice ,</i>	1. Sesuai dengan rekomendasi dari Codex Alimentarius PBB, Inggris Raya mengadopsi kebijakan yang membagi pangan menjadi dua kelompok dan menentukan label berbasis keamanan ("use by") atau berbasis kualitas ("best before") untuk setiap produk. 2. Kebijakan ini secara eksplisit melarang penjualan atau donasi pangan setelah tanggal keamanan ("use by") tetapi secara eksplisit mengizinkan penjualan atau donasi pangan setelah tanggal kualitas ("best before"). 3. Pemerintah Inggris, bekerja sama dengan organisasi WRAP, telah meluncurkan beberapa kampanye untuk mengedukasi masyarakat mengenai strategi untuk mengurangi sisa pangan termasuk pentingnya tanggal produk.	WRAP (Water and Resources Action Programme), Food Standard Agency, Department for Environment Food & Rural Affairs, 2019

Source: Processed from various sources



Tax Incentives

Policy Description:

1. Tax incentives create an economically competitive alternative to throwing away edible foods.
2. Value Added Tax exemption for food donated to food banks as a way to remove potential barriers.

Table 9. Examples of Policy Tools in Other Countries Related to Tax Incentives

Country	Title	Main Ideas	Sources
 U.S.A	Internal Revenue Code	1. Tax incentives for businesses in order to encourage donations of excess food. 2. The law allows double tax credits for food donations: 1. A reduction in general taxes equivalent to the cost of obtaining food (1). • The increase in tax deductions as an additional incentive, allows food donors to reduce (a) twice the cost of purchasing donated food or (b) the cost of donated food plus half of the expected profit from the sale of food if the food is sold at a fair market price. This deduction can be up to double the general deduction, with companies entitled to deduct up to 15% of taxable income for food donations (2).	26 U.S. Code § 170 – Charitable, etc., contributions and gifts, Legal Information Institute

(1) 26 CFR § 1.170A-1 – Charitable, etc., contributions and gifts; allowance of deduction, Legal Information Institute

(2) 26 CFR § 1.170A-4A – Special rule for the deduction of certain charitable contributions of inventory and other property, U.S. Government Information

Source: Processed from various sources



Obligation to donate excess food

Policy Description: Requires food suppliers to engage with NPOs to distribute unsold food that is fit for human consumption.

Table 10. Examples of Policy Tools in Other Countries Related to the Obligation to Contribute Excess Food

Country	Title	Main Ideas	Sources
 France	Relative Ala Lutte Contre Le Gaspillage Alimentaire (2019)	1. Obligation to donate unsold food 2. The ban on destroying food that is not sold but is still fit for consumption	

Source: Processed from various sources



Prohibition/tax on sending organic waste to Waste Final Processing Site

Policy Description: Prohibiting/taxing the disposal of organic waste in landfills as a tool to influence business behavior.

Table 11. Examples of Policy Tools in Other Countries Related to the Obligation to Prohibitions/Taxes for Sending Organic Waste to Landfills (Final Processing Site)

Country	Title	Main Ideas	Sources
 U.S.A.	Legislation to prohibit large waste producers from sending organic waste to landfill	1. In California, Connecticut, Massachusetts, Rhode Island, and Vermont, there are laws that prohibit dumping food waste into landfills. 2. In 2012, Vermont enacted the Universal Recycling Act (3) which prohibits the disposal of food waste in landfills. The law calls for a phased implementation, ending with full implementation by 2020, for both businesses and residents. According to the Vermont Food Bank, the legislation has increased food donations by about \$40 million. 3. In Massachusetts, businesses that produce more than one ton of food waste per week are prohibited from dumping food waste into landfills (4). Research conducted in 2016 found that the ban generated \$175 million worth of economic activity and created more than 900 jobs with food carriers, rehabilitation organizations, and other entrepreneurs.	
 U.K.	Landfill Tax	Taxes to encourage the reduction of landfill waste: Taxes are paid according to the weight of the garbage disposed of. 2011 (£24/ton); 2014 (£80/ton)	

(3) VERMONT'S UNIVERSAL RECYCLING LAW

(4) Commercial Food Material Disposal Ban, Massachusetts Department of Environmental Protection

(5) According to the Maintenance of Cleanliness Law, amendment 9.

(6) NIS 111.34/ton as of January 2022

(7) Based on the principle that the polluter pays, according to uniform criteria for "excess waste" as defined by the Ministry of the Interior.



Grants and Incentives from the Government

Policy Description: Funded grant and incentive programs at the national or local level offer resources that are essential for food donation initiatives.

Table 12. Examples of Policy Tools in Other Countries Related to Grants and Incentives from the Government

Country	Title	Main Ideas	Sources
 U.S.A.		- The Federal Emergency Food Assistance Program (TEFAP) allocates \$100 million and \$500 million dollars annually for administrative support and food rescue by local organizations. - This Federal grant program also supports food banks and food rescue efforts. - Some states also allocate funds to buy food for emergencies	
 Netherlands	<i>SBIR= Small Business Innovation Research Specific to reduce FW (Verminderen uondselerspilling)</i>	Subsidy programs for entrepreneurs to stimulate innovation to reduce and prevent FW	

Source: Processed from various sources



National Goals to Reduce Food Waste

Policy Description: Setting national goals to reduce food loss by 50% by 2030 in accordance with the UN SDGs.

Table 13. Examples of Policy Tools in Other Countries Related to National Goals to Reduce Food Waste

Country	Title	Main Ideas	Sources
 U.S.A.  Canada  Australia and a large part of Europe		The United States, Canada, most European countries, and Australia have declared goals to reduce food loss by 50% by 2030	

Source: Processed from various sources



National Strategy to Reduce Food Loss

Policy Description: Adopt a comprehensive national framework to reduce food loss and waste along the supply chain. This strategy will define clear and comprehensive national policies to reduce food waste and promote and encourage food rescue. This can include many of the policy tools discussed above.

Table 14. Examples of Policy Tools in Other Countries Related to National Strategies to Reduce Food Loss

Country	Title	Main Ideas	Sources
 Australia	<i>National Food Loss Strategy 2017</i>	- Set a goal to reduce food loss by 50% by 2030 - A comprehensive feasibility study on halving food loss by 2030 was conducted to do this. The study found that the goal can be achieved within seven years, if the following conditions are met: - Significant investment in innovation - Incentives offered - Implementing strict regulations - Promoting voluntary commitments to reduce food loss - Food industry and civil society involvement - Therefore, the Australia Department of Agriculture, Water, and Energy (DAWE) wrote and published the National Food Loss Strategy that focuses on four areas: promoting supportive policies, improving performance in the private sector, market development, and behavior change. - Supportive policies focus on four areas: - Creating basic national data for food loss and methodologies for measuring its reduction. - Identify relevant areas for focused investing. - Encourage voluntary commitments to reduce food loss. - Encourage legislation that supports food loss and food rescue. - Until now, progress toward these goals has not been measurable.	National Food Waste Strategy Halving Australia's Food Waste By 2030, Australian Government, 2017

Source: Processed from various sources

International Lessons Learned on Food Loss and Waste (FLW)

Table 15. International Lessons Learned on Food Loss and Waste (FLW)

Country/ Organization	Title	Main Ideas	Sources
UN	SDG's dan Champions 12.3 Paris Accord (Cop 21) FLW Goal	Target to halve food loss and waste by 2030	UN (2015)
European Union	Platform on FLW	A collaborative platform to reduce FLW across the EU	EU (2016)
European Union	Guidelines on Food Donation	Guidelines for safe and effective food donations	EU (2017)
International	First International Day of Awareness of FLW	The first International Day of Awareness on FLW	International (2020)
UN	Food System Summit Food is Never Waste Coalition	Coalition to ensure food is not wasted in the global food system	UN (2021)
COP 27	First Conversation on Food & Climate	First conversation about the link between food and climate change	COP 27 (2023)
Argentina	Food Donation Law	Law on food donations	Argentina (2004)
Australia	National Food Waste Strategy	National strategy for food waste materials reduction	Australia (2017)
Peru	Food Donation Law	Law on food donations	Peru (2016)
Argentina	National Plan	National plan to reduce FLW	Argentina (2018)
Colombia	National Policy Against Food Loss and Waste	National policy against FLW	Colombia (2019)
China	Anti-Food Waste Law	Laws against food waste	China (2020)

Country/ Organization	Title	Main Ideas	Sources
USA	Federal Interagency Strategy on Food Loss and Waste	Federal Interagency Strategy on FLW	USA (2019)
Brazil	Food Donation Law	Law on Food Donation	Brazil (2020)
Paraguay	Special Program for Redistribution of Food	Special program on food redistribution	Paraguay (2022)
Ecuador	Law to Prevent FLW and Reduce Hunger	Law to prevent FLW and reduce hunger	Ecuador (2022)
France	Best Practice: France	Supermarkets are compulsory to donate unsold food to food bank	France (2016)
South Korea	Best Practice: South Korea	"Pay as You Throw" policy to pay the fee according to the amount of food waste	South Korea (N/A)
Harvard Law School & GFN	The Global Food Donation Policy Atlas	Identification and analysis of laws related to food donations, recommendations for policy changes, global engagement platforms, and specialized technical assistance. Related Legal Issues • Food Safety: Policy on food safety standards. • Date labeling: Policies on labeling and expiration dates • Responsibility and Liability: Rules on legal responsibility in food donations. • Taxes and Incentives: Tax policies and incentives for food donations. • Funding and Grants: Financial support and grants for food donation initiatives. • Food Waste Laws and Policies: Regulations on waste and food waste materials management.	Cooperation between the Food Law and Policy Clinic (FLPC) of Harvard Law School and The Global Food Banking Network (GFN)

Source: Processed from various sources

Appendix 2: Community Initiatives

The following are some examples of community initiatives that currently exist related to FLW:

Table 16. Some Examples of Community Initiatives That Exist Today

	Yayasan Surplus Peduli Pangan The company has a vision to create an environment without food waste as a step to support SDGs 2, 12, and 13. Through the Surplus application platform, business actors can sell excess food and sell it for 50% of the original price. Buyers can buy excess food products at a cheaper price. Other activities carried out include food awareness education, community empowerment, and business actors in line with the foundation's values, research consultations in the field of environmental conservation, especially specifically on the problem of food waste, and distributing donations from the rescue of excess food suitable for consumption.
	Foodbank of Bandung This Food Bank is located in Bandung, West Java. One of its initial missions is to increase food security for the underprivileged community and reduce food waste from excess food. In addition to food rescue activities, it also provides education to the community to prevent and save food. The Food Assistance Programs that have been implemented by the Foodbank of Bandung are Asupan Sehat Anak (ASA), Dapur Ngebul, and BOTRAM. Foodbank of Bandung also has entrepreneurship programs, namely Black Soldier Flyer (BSF), Aquaponic, and Budikdamber.



Foodbank of Indonesia (FOI)

FOI is a non-profit social organization and the first food bank in Indonesia legally known as Yayasan Lumbung Pangan Indonesia (YLPI). FOI focuses on helping vulnerable groups who lack access to food and assisting sustainable agricultural systems. FOI also has a network of food banks as regional FOI and FOI Network. Until now, FOI is spread across 47 regencies/cities with a majority of 8,412 female volunteers. FOI programs include the Mentari Bangsaku, Sayap dari Ibu Program, and Dapur Pangan FOI (FOI Food Kitchen) Program. FOI's main activity is donating excess food to FOI's fostered partners such as PAUD and Posyandu for underprivileged community groups. Donor partners who have collaborated with FOI include supermarkets, bakeries, and food industry. The donors have the same goal, namely, to achieve the 2030 SDGs 2 (End hunger), 12 (Responsible consumption and production), 13 (Climate change), and 17 (Partnership for the goals).



FoodCycle Indonesia

This Jakarta-based Non-Profit Organizations (NGO) is engaged in food rescue from various sources such as weddings, bakeries, corporate lunches, supermarkets, and Fast-Moving Consumer Goods (FMCG). The food obtained is distributed to the underprivileged people. In addition, FoodCycle has skills development and community empowerment programs such as FoodCycle Farm. Other programs from FoodCycle Indonesia include Semangat Pagi Indonesia, Bread Rescue, A Blessing to Share, Lunch Sharing, etc.



Aksata Pangan

Aksata Pangan is an NGO in Medan City, North Sumatra. It is a member of the Global Food Banking Network. Aksata Pangan has programs to support SDG 2, Zero Hunger, SDG 12, Responsible Consumption and Production, and SDG 13, Climate Action. It has four main programs: Food Stamps, Food heroes, Food Pantry, and Food Drive. Aksata Pangan has established food donation collaborations with hotels, retailers, and fruit and vegetable farmers.



Ruang Pangan

Social communities in Lampung focus on handling and distributing excess still-fit-for-consumption food waste that has the potential to be wasted on beneficiaries. Ruang Pangan has volunteers from cross-university student groups who focus on activities to support the SDGs with the commitment of Lampung without food waste (Zero Food Waste) and Lampung without hunger (Zero Hunger). Initiation of the establishment of the Food Room during the COVID-19 pandemic by distributing excess food to people in need and reuse food waste into useful products. The Food Room program includes Food Rescue, Food Drive, Gleaning, Food Creative Campaign, and Food Back to Nature. Partners who have collaborated with Ruang Pangan include hotels, restaurants, caterings, supermarkets, and traditional markets. Ruang Pangan also has activities to disseminate this activity by educating the community, especially students, therefore, it is in line with the Independent curriculum program.



Scholars of Sustenance (SOS)

SOS Indonesia or Yayasan Derma Atas Pangan is a non-profit organization that was originally located in Bali and in December 2023 has opened a branch in Jakarta. SOS itself is an international global non-profit environmental organization committed to the prevention and reduction of food waste and food security and nutrition. SOS has 7 branches in ASEAN countries (Thailand, Philippines, and Indonesia). SOS's main vision is to rescue excess food and distribute it to people in need. The main SOS Indonesia programs include Food Rescue, Rescue Kitchen, and Healthy School. So far, it has collaborated with various hotels, supermarkets, bakeries, manufacturers, and farmers.

	Garda Pangan The Food Bank based in Surabaya, East Java has a vision to realize the management of potentially wasted excess food for various social, environmental, and economic purposes in accordance with the food recovery hierarchy. Food donation collection comes from hotels, processed food distributors, supermarkets, weddings, and gleaning from farmers. Currently, the Food Guard is assisted by volunteers from students and employees. Since its establishment in 2017, the Food Guard has distributed excess food donations to orphanages, villages/villages, street children's shelters, and patient shelters. The Food Guard is also a Sustainable Food Systems Coalition member in developing Indonesia's food loss and waste calculation methods.
	Gita Pertiwi Gita Pertiwi is a Non-Profit Organization (NGO) that focuses on environmental conservation issues and fights for justice and gender equality. It was established in 1991 in the City of Surakarta. The initial goal of Gita Pertiwi was to reduce the exploitation of marginalized groups - especially women, children, and other vulnerable groups, and environmental destruction. Over time, Gita Pertiwi also has food rescue activities. One of the major programs is the Food Smart City which has synergized with the Authority Organization of the Surakarta City.
	Svarna Loka A community of food activists in Semarang City that focuses on food rescue and community empowerment. Svarna Loka contributes to circular economy activities, ranging from excess and wasted food. Socialization activities have often been carried out in schools. In addition, education on the consumption of nutritious food based on local food to posyandu (integrated health service posts) and schools in Semarang City.

Source: National Food Agency



This book is expected to be able to act as a “*trigger*” for the central and regional governments in efforts to manage Food Loss and Waste (FLW) through operational details in the form of action plan.

Therefore, it is hoped that there will be alignment between the Roadmap and the Action Plan which is the operational derivative in the policy and implementation of Food Loss and Waste Management (FLW) in Indonesia.