

2025 Progress Review on Food Loss and Waste Reduction in the Asia- Pacific Economic Cooperation Region

APEC Agricultural Technical Cooperation Working Group

October 2026



**Asia-Pacific
Economic Cooperation**



**Asia-Pacific
Economic Cooperation**

2025 Progress Review on Food Loss and Waste Reduction in the Asia-Pacific Economic Cooperation Region

APEC Agricultural Technical Cooperation Working Group

October 2026

APEC Project: ATCWG 202 2024A

Prepared by

Dr Kenneth Dy

Assistant Professor, Department of Economics, Tunghai University

Tel: +886-4-2359-0121 ext. 36113

E-mail: kendy04@thu.edu.tw

Mr Jun-Song Yew

Secretary General, Taiwan Association of Input-Output Studies

Tel: +886-2-2363-7372

Email: song.900306@gmail.com

Dr Ching-Cheng Chang

Adjunct Research Fellow, Institute of Economics, Academia Sinica

Tel: +886-2-2782-2791 ext. 201

E-mail: emily@econ.sinica.edu.tw

Dr Shih-Hsun Hsu

Honorary Chairman, Taiwan Association of Input-Output Studies

Tel: +886-2-2363-7372

E-mail: m577tony@gmail.com

For

Asia Pacific Economic Cooperation Secretariat

35 Heng Mui Keng Terrace

Singapore 119616

Tel: (65) 68919 600

Fax: (65) 68919 690

Email: info@apec.org

Website: www.apec.org

© 2026 APEC Secretariat

APEC#226-AT-01.3

Table of Contents

1. Introduction	1
1.1 The APEC Food Security Roadmap Towards 2030	1
1.2 Target-Measure-Act Framework	1
1.3 Member Economy Abbreviations	2
2. Overall Observations	2
2.1 Target.....	2
2.2 Measure	5
2.3 Act.....	9
3. Progress Report per Member Economy	11
3.1 Australia	11
3.2 Brunei Darussalam	17
3.3 Canada.....	18
3.4 Chile.....	20
3.5 People's Republic of China.....	24
3.6 Hong Kong, China.....	27
3.7 Indonesia.....	29
3.8 Japan	32
3.9 Republic of Korea	32
3.10 Malaysia.....	37
3.11 Mexico	39
3.12 New Zealand.....	42
3.13 Papua New Guinea.....	46
3.14 Peru	47
3.15 The Republic of the Philippines.....	50
3.16 The Russian Federation.....	52
3.17 Singapore	55
3.18 Chinese Taipei	57
3.19 Thailand.....	61
3.20 United States.....	65
3.21 Viet Nam	70
References.....	73

1. Introduction

1.1 The APEC Food Security Roadmap Towards 2030

In 2021, the APEC member economies agreed to the Food Security Roadmap Towards 2030 which aims to establish an

... open, fair, transparent, productive, sustainable, and resilient APEC food systems that ensure access to sufficient, safe, affordable, and nutritious food to meet dietary needs and food preferences for active and healthy lives.

It has five key action areas: digitalization and innovation, productivity, inclusivity, sustainability, and public private partnership. Under sustainability, there is the action area 17(e), which states that economies are committed to

Provide capacity building and best practice sharing workshops to support member economies' individual and collective efforts to align with the UN Sustainable Development Goals 12.3 "by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses," with specific indicators based on each economy's respective situation such as measured by the UN/FAO Food Waste Index (FWI) or other appropriate index. And promote public-private investment in infrastructure and cold chain to reduce the current levels of food loss and waste and review progress in this area by 2025.

In 2022, Thailand also hosted an online meeting among member economies to concretize the Implementation Plan for each action area of the APEC Food Security Roadmap Towards 2030, which includes the objectives, individual actions, collective actions, evaluation of progress, target, and lead economy (APEC, 2022). The Implementation Plan was endorsed by the Seventh Food Security Ministerial Meeting held in 2022.

In view of the progress review in 2025, Chinese Taipei, as the lead economy for 17(e), coordinated with the different APEC member economies to summarize their achievements with respect to food loss and waste prevention and reduction. The progress review for each economy is structured based on the Target-Measure-Act framework.

1.2 Target-Measure-Act Framework

This framework has been promoted by the Champions 12.3 coalition of executives from governments, businesses, international organizations, research institutions, farmer groups, and civil society since 2016 toward achieving Sustainable Development Goal (SDG) Target 12.3 by 2030. In their Champions 12.3 (2025) report (p.4), they summarized their findings that,

"[Economies] and regional blocs representing roughly 55% of the global population had set specific targets in line with Target 12.3, although all UN Member States have collectively adopted Target 12.3.

[Economies] representing 12% of the global population have quantified base-year FLW and started reporting on FLW.

[Economies] representing 52% of the global population are actively working at scale to reduce FLW. Japan has halved its rate of FLW.”

Overall target

APEC as a region has agreed on certain targets, such as those below:

1. APEC Food Security Roadmap Towards 2020
“APEC economies will strive to reduce food loss and waste by 10% compared with the 2011–2012 levels by 2020.” (The Vision and Goal, par. 7)
2. UN Sustainable Development Goals 12.3 (towards 2030)
As stipulated in the APEC Food Security Roadmap Towards 2030, 17(e), the region will “support member economies’ individual and collective efforts to align with the UN Sustainable Development Goals 12.3 ...”, that is, “by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”

Note that SDG 12.3 does not specify an exact goal for food loss reduction.

1.3 Member Economy Abbreviations

This report uses the official APEC abbreviations for its member economies:

Australia (AUS)	Japan (JPN)	The Republic of the
Brunei Darussalam	Republic of Korea	Philippines (PHL)
(BD)	(ROK)	The Russian
Canada (CDA)	Malaysia (MAS)	Federation (RUS)
Chile (CHL)	Mexico (MEX)	Singapore (SGP)
People’s Republic of	New Zealand (NZ)	Chinese Taipei (CT)
China (PRC)	Papua New Guinea	Thailand (THA)
Hong Kong, China	(PNG)	United States (USA)
(HKC)	Peru (PE)	Viet Nam (VN)
Indonesia (INA)		

2. Overall Observations

This section explains a few overall observations and explains some of the details about how the report summarized information from various sources.

2.1 Target

Most of the economies do have food loss and waste (FLW) reduction goals or targets, or some other objective related to FLW such as zero or reduce organic waste to landfill [e.g., Ontario-Canada; Hong Kong, China; Singapore], municipal waste reduction, or organic waste recovery and composting [e.g., Chile, Japan].

Fourteen APEC member economies have FLW reduction goals that are aligned with SDG 12.3, meaning some of them are not exactly identical to SDG 12.3. For example, the United States and Australia aim to reduce both food loss and waste by 50% by 2030, whereas SDG 12.3 only requires food waste to be halved. A recent report from the Organization for Economic Co-operation and Development (OECD, 2025) also cites Canada and Japan as having goals that

are more ambitious than SDG 12.3.¹ And while Mexico does not explicitly state SDG 12.3, their goals are quite aligned with it (ibid.). Then, Peru is about to make SDG 12.3 an explicit goal in their official policy. Some economies have goals that cite SDG 12.3 but have a lower target. For instance, Chinese Taipei states that it will reduce FLW by 2030, without specifying the 50% goal. Other economies that have FLW targets lower than SDG 12.3 include People's Republic of China and Indonesia (OECD, 2025). It's important to highlight that not being aligned with SDG 12.3—which includes Brunei Darussalam, People's Republic of China; Hong Kong, China; Papua New Guinea; The Republic of the Philippines; The Russian Federation; Singapore; Viet Nam—is not inherently a negative indication because some of them have very exact FLW reduction targets and many of them have put great efforts into reducing and preventing FLW in their economy.

Food loss targets are usually less clear or exact. Examples of economies with more precise food loss reduction targets include People's Republic of China, Mexico (postharvest losses down to 5%), The Republic of the Philippines (reduce post-harvest losses by 10% in 5 years), Chinese Taipei (fruits and vegetable food loss to 8.8% by 2030). On the other hand, “food waste tended to be addressed as part of overarching waste strategies (Bagherzadeh, Inamura and Jeong, 2014).” (as cited in OECD 2025 report, p.19)

Economies with specific targets include:

- a. Chile: (a) 500,000 families to use compost bins and recover 30% of organic waste generated at municipal level by 2030; (b) 5,000 education centers with compost bins and recover 66% of organic waste by 2040.
- b. Hong Kong, China: reducing per capita MSW disposal by 40–45% and achieve zero landfill by 2035.
- c. Singapore: reducing daily waste sent to their landfill by 30% by 2030.
- d. Chinese Taipei: reducing per capita food waste to 10.02mt, and fruits & vegetable food loss to 8.8% by 2030.
- e. THA: lowering the percentage of food waste in solid waste to < 28% by 2027; 5% reduction in food loss of target items.

Most of the baseline year used for these goals is 2015, that being the initial year of SDG. But some have a different baseline such as Japan (2000) and Australia (2019). As for target year, most economies set 2030—again, that being the goal of SDG. The People's Republic of China has a target by 2027 based on its Action Plan for Food Conservation and Anti-Food Waste. Moreover, their target to reduce food loss rate is compared to international average, instead of a baseline in their own economy.

The targets are stated in different policy documents; some as part of a food loss and waste roadmap/plan [People's Republic of China], some as part of their development plan [Indonesia], and some even inscribed in their laws [Japan, Thailand].

¹ The OECD report covered 42 economies, eleven of which are APEC member economies: Australia, Canada, Chile, People's Republic of China, Indonesia, Japan, Republic of Korea, Mexico, New Zealand, Peru, and the United States.

2.2 Measure

Where an economy did not provide any other information, this report relied mostly on the Food and Agriculture Organization (FAO) Food Loss and Waste Database (<https://www.fao.org/platform-food-loss-waste/flw-data/en/>), UN SDG data portal (<https://unstats.un.org/sdgs/dataportal/database>; and <https://www.fao.org/sustainable-development-goals-data-portal/data/indicators/1231-global-food-losses/en>) and U.N. Environment Programme (UNEP) 2021 and 2024 reports. We also included estimates from other sources when readily available from government websites and news reports.

The UN uses the following definition:

- a. **Food Loss** – “the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retail, food service providers and consumers.”
- b. **Food Waste** – “decrease in the quantity or quality of food resulting from decisions and actions by retailers, food services and consumers.”

However, since quality loss is difficult to quantify, the data mostly refers only to loss in quantity (i.e., discarded or thrown away). Nevertheless, food quality loss in, say, the distribution stage may be counted as food quantity waste in the retail or consumption stage.

For food loss, we used the UN FAO FLW database and filtered data after 2005. When there are multiple estimates for a particular stage of the supply chain, we input a range. Some sources that the FAO Database cites cannot be found anymore. If the source can be found, we include them in the references.

Food waste is supposed to be more difficult to measure yet for most of the economies, it was easier to obtain data for food waste than for food loss. Most of these come from UNEP (2021, 2024) reports, whose “Estimates of individual [economies] ... are datapoints from existing studies or extrapolations from other [economies]’ data.” (UNEP 2024, p.7) In 2024, they included more information about their sources and how the sources compiled their data.

One advantage of measuring food waste over estimating food loss is that all food waste is lumped together, unlike food loss which is measured separately by commodity and stage of the supply chain. Only Mexico has food waste estimates for different commodities. The UNEP 2021 and 2024 publications report figures gathered until 2019 and 2022, respectively. The food waste per capita measured in kilograms (kg) across different APEC economies, except for Chinese Taipei that is excluded from the UN is presented in Table 1.² Moreover, bear in mind that the years presented may not necessarily be the time when data were actually measured. These dates are more like compilation dates when the UNEP gathered/estimated the information from various sources, which did the data measurement prior to 2019 and 2022. Table 1 follows UNEP classification of food waste based on source: Household (HHS), Out-of-home consumption (OOHC, i.e., restaurants, hotels and the like), and Retail (RTL).

² UNEP (2021, 2024) also has data on *total* food waste, which we do not present here anymore since SDG 12.3 speak of halving food waste per capita. Based on their data, total food waste increased by 11% from 2019 to 2022.

Table 1. UNEP estimates of food waste per capita in kg, 2019 and 2022

	2019				2022			
	ALL	HHS	OOHC	RTL	ALL	HHS	OOHC	RTL
Australia	132.0	101.1	21.5	9.4	176.9	97.8	58.2	20.9
Brunei								
Darussalam	117.3	79.3	25.3	12.7	157.2	76.0	35.1	46.1
Canada	116.6	78.3	25.5	12.8	188.1	78.5	79.7	29.8
Chile	111.8	73.6	25.5	12.8	145.5	88.0	42.5	15.1
People's Republic of China	126.2	64.5	46.0	15.8	141.6	76.2	45.6	19.8
Hong Kong, China	108.9	70.8	25.4	12.7	139.9	101.5	24.7	13.7
Indonesia	121.1	77.7	27.8	15.7	143.5	53.5	40.1	49.9
Japan	84.4	59.9	15.1	9.4	80.6	59.7	12.0	8.9
Republic of Korea	108.6	70.6	25.3	12.7	133.4	95.0	24.7	13.7
Malaysia	253.1	89.1	87.2	76.8	209.5	81.2	49.5	78.8
Mexico	211.9	95.8	28.2	87.9	214.7	104.8	64.4	45.5
New Zealand	86.5	58.8	24.7	3.0	103.6	61.1	39.4	3.1
Papua New Guinea	123.5	83.7	25.4	14.4	129.9	89.1	31.1	9.7
Peru	114.6	71.7	27.4	15.5	154.2	87.6	47.5	19.0
The Republic of the Philippines	127.0	84.6	27.1	15.3	110.1	25.6	40.3	44.2
The Russian Federation	74.8	33.4	27.7	13.7	55.5	33.4	8.4	13.7
Singapore	117.3	79.3	25.3	12.7	149.6	68.5	35.1	46.0
Thailand	119.1	76.8	27.0	15.3	176.3	86.2	40.1	49.9
United States	155.3	71.9	66.3	17.1	158.6	73.1	73.7	11.9
Viet Nam	120.3	76.7	27.8	15.8	156.7	72.1	40.3	44.2
Total	2,530.3	1,497.6	631.4	401.3	2,925.5	1,508.6	832.8	584.1
Average	127				146			

Per capita food waste increased by 16% from 2019 to 2022, and the average increased from 127 kg to 146 kg across APEC, excluding Chinese Taipei. Most of this increase is attributable to Canada (61%) and Thailand (48%). The biggest drops in per capita food waste were in The Russian Federation (–26%) and Malaysia (–17%). Figure 1 shows the per capita food waste estimates across economies and sources of food waste in both compilation years.

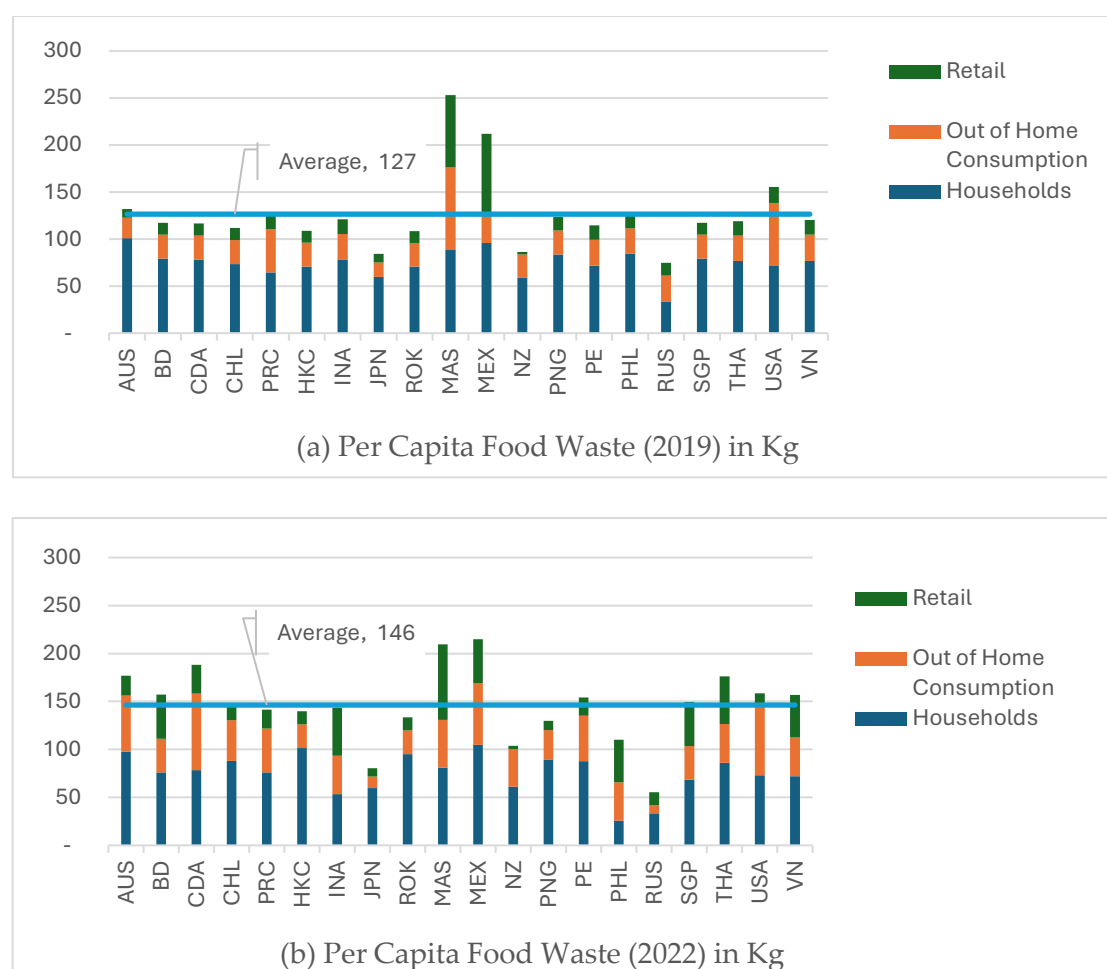


Figure 1. Per Capita Food Waste across economies and sources (in kg), 2019 and 2022

Although the bulk of food waste is due to households, its share in the food waste per capita has gone down from 59% to 52% as shown in Table 2.

Table 2. Food waste per capita distribution

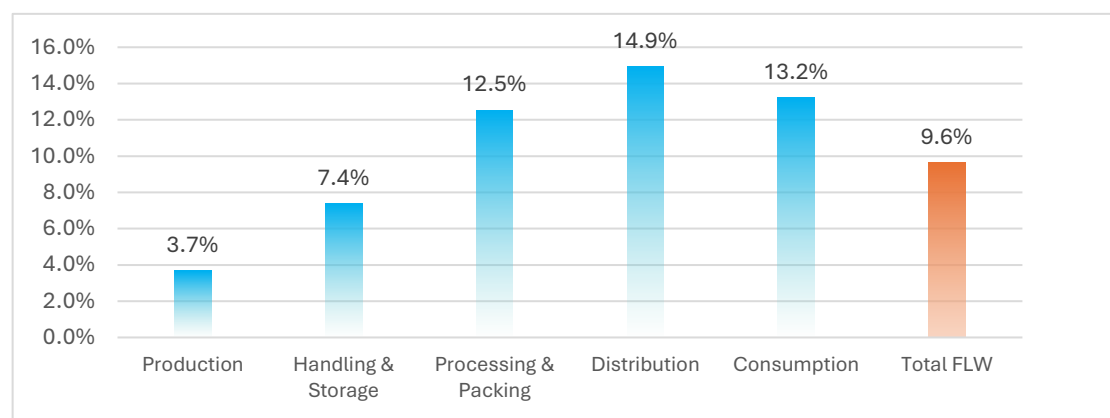
	2019	2022
Household	59%	52%
Out-of-home consumption	25%	28%
Retail	16%	20%

For some economies, we have included FLW figures across different stages of the food supply chain based on FAO Mass Flows Method and Food Balance Sheet estimated by the Chinese Taipei team.³ Aggregate estimates for 2015 and 2022 are shown in Figures 2 and 3.⁴ Note that Brunei Darussalam and Singapore do not have food balance sheets, so this also does not represent the whole of APEC. On average, FLW in the 19 member economies with food

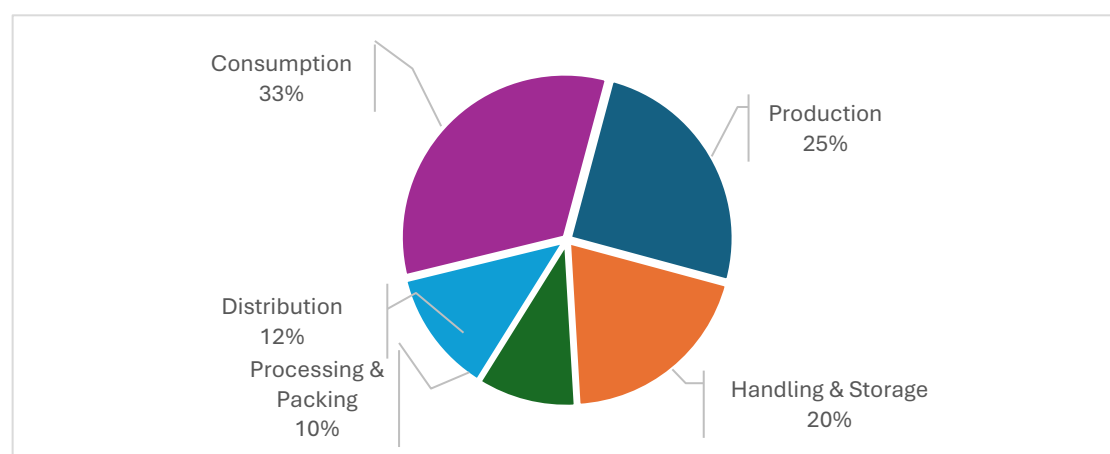
³ Estimates using the mass flow method is not shown for some economies since they have been excluded by them during the revision process.

⁴ Data for these are available on: <https://apec-flows.ntu.edu.tw/database.aspx>. (accessed March 18, 2025)

balance sheets grew by 9.6% between 2015 and 2022, or 1.32% annually. In terms of economy, this is mostly attributable to Indonesia; Mexico; and Peru. Only The Russian Federation and Chinese Taipei had lower FLW. For The Russian Federation, this is mainly due to the production stage, especially of Roots and Tubers. For Chinese Taipei, this is due to lower food waste in the consumption stage, especially milk products.



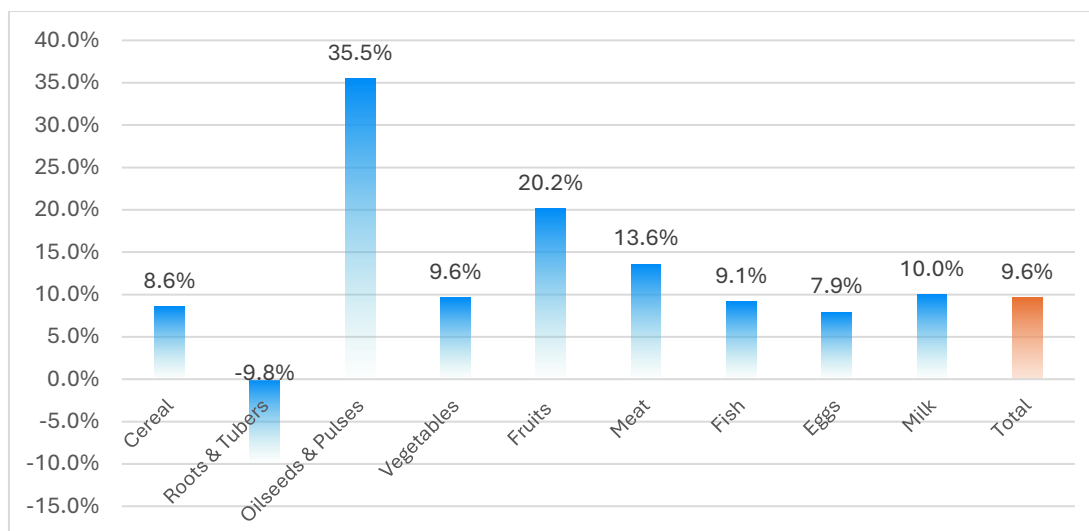
(a) FLW Growth by stage of food supply chain (2015–2022)



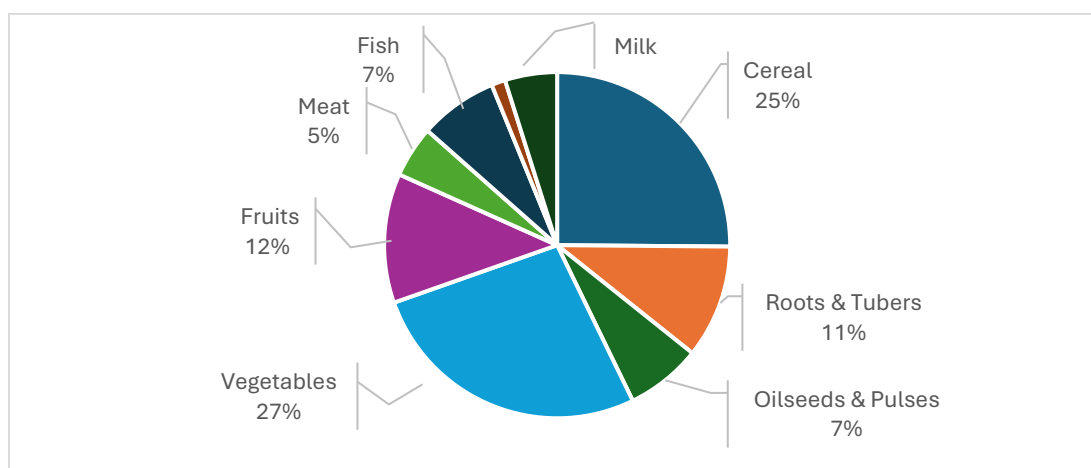
(b) Distribution of FLW by stage of food supply chain (2022)

Figure 2. FLW growth (2015–2022) and distribution by stage of food supply chain based on mass flow method (2022)

In terms of stage of supply chain (Figure 2a), the growth in FLW is mostly from the lower stream stages: processing/packaging, distribution and consumption. The 2022 distribution shown in Figure 2b is more or less the same as in 2019, not shown here. In terms of commodity group (Figure 3a), the growth in FLW is due to seeds & pulses [especially Australia; Indonesia; The Russian Federation; Thailand) and Fruits [especially Malaysia]. Nevertheless, comparisons across economies are not straightforward owing to differences in size, economic structure, economic capabilities and other factors.



(a) FLW Growth by Commodity Type (2015–2022)



(b) Distribution of FLW by commodity in APEC

Figure 3. FLW growth (2015–2022) and distribution by commodity type based on mass flow method (2022)

The distribution of FLW across stages of the supply chain (Figure 2b) and across commodity groups (Figure 3b) has not changed much between 2019 and 2022. In terms of stage of food supply chain, the highest is consumption (32–33%), then production (25–27%). In terms of commodity group, the highest is vegetables (27%), then cereals (25%).

2.3 Act

The OECD (2025, p.25) reports that private households and retail stage of the food supply chain are the two that are receiving the most policy attention. This is echoed by the findings of our report for APEC. It is worth noting that between food loss and food waste, it is the latter that has more data. Whether this reflects that things that get measured are acted upon, or that things we want acted upon get measured, it does show that measurement and action are heavily intertwined.

The most common policies related to reduction of FLW are those to do with food redistribution, including partnering with food banks, setting up online platforms for such purpose, granting tax or other fiscal incentives, legal protection, and food sharing phone apps. The Food Policy Atlas ⁵, a collaborative project of The Global FoodBanking Network and the Food Law and Policy Clinic of Harvard Law School, has a database of policies related to food donation, packaging and food waste policies all over the world, of ten out of 21 APEC members are included. The group used heuristic rubrics to classify whether each economy's policies are strong, moderate, limited or none.

The next most cited action is education and campaign drives for both consumers and businesses, including Love Food Hate Waste and Clean Plate Campaigns. Ten out of 21 economies also have dedicated webpages that provide information and other support to consumers and firms on FLW reduction and prevention. Most of these are by their ministry for environment; some by the consumer affairs agency, ministry for agriculture, food and drug authority, or a city government.

Other actions that are commonly found among APEC economies include promotion of circular economy (including recycling waste to feeds for poultry, cattle or aquaculture; composting like feeding waste to insects or worms; waste-to-energy/bioenergy; upcycling food waste; etc.), household waste management (smart bins, promoting organic and compost bins, waste segregation, charging for trash), and funding (including subsidy to manufacturers & recyclers; contests or award schemes).

Thirteen member economies have issued their own FLW report, guidelines, or roadmap. These include Australia; Canada; Chile; People's Republic of China; Hong Kong, China; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Singapore; Thailand; and United States. These are cited under each of the economy progress report. Apart from laws related to food donation, some economies have other legal provisions that are also directly or indirectly related to FLW such as **People's Republic of China Anti-Food Waste Law** of 2021, **Japan's Food Recycling Law** of 2001, **Peru's Law N 30988** of 2019 for the purpose of reducing and preventing FLW at all stages of the food supply chain, **Chinese Taipei's Food and Agricultural Education Act** of 2022, and **Thailand's National Food Committee Act B.E. 2551** of 2008.

For some economies, we also highlight some efforts by the private and non-government sectors, especially those in collaboration with the government.

⁵ The information is available on: <https://atlas.foodbanking.org/map/>. (accessed March 18, 2025)

3. Progress Report per Member Economy

The Chinese Taipei team prepared progress review drafts for all 21 economies and sent them out to be revised by each one. We received responses from nine including Australia; Chile; Indonesia; Malaysia; New Zealand; Peru; Thailand; United States; and Viet Nam.

3.1 Australia

Target

In 2017, Australia committed to UN SDG 12.3 through the National Food Waste Strategy: Halving Australia's food waste by 2030 (strategy). The strategy outlined Australia's target to halve food waste by 2030 and provided a framework to support collective action towards achieving this goal (Commonwealth of Australia, 2017).

Australia's Circular Economy Framework (framework) was published in 2024 and captures Australia's food waste target. The framework identifies food and agriculture as a priority sector for Australia's circular economy transition, and outlines opportunities to reduce food waste through innovation, standards and behavior change (DCCEEW, 2024).

Australia's definition of food waste, defined in the strategy (Commonwealth of Australia, 2017), covers:

- solid or liquid food intended for human consumption generated across the entire food supply and consumption chain (supply chain)
- food that does not reach the consumer, or reaches the consumer but is thrown away, including both edible and inedible parts of food
- food imported into and disposed of in Australia
- food produced or manufactured for export which does not leave the border.

Australia's target is more ambitious than SDG 12.3 because Australia's definition of 'food waste' encompasses the UN definitions of both 'food loss' and 'food waste'. This means that Australia is aiming to halve both 'food loss' and 'food waste', compared to the baseline set in 2021 (FIAL, 2021), whereas SDG 12.3 only requires a reduction in food loss.

Measurement

The most comprehensive statistics of food waste across the food supply chain in Australia come from the **National Food Waste Strategy Feasibility Study** (feasibility study) published in 2021 by **Food Innovation Australia Limited** (FIAL).

According to the feasibility study (FIAL, 2021), in 2018–19 around 7.6 million tonnes of food was wasted across the supply chain in Australia (baseline). This is equivalent to 312 kg per capita. Approximately 70% of this waste was considered 'edible'.

1. Food loss:

- (a) Using the UN empirical definition of 'food loss' (occurring from farm up to but excluding retail), according to the feasibility study (FIAL, 2021), in 2018–19 around 3.2 million tonnes of food waste was generated from Australia's primary production, manufacturing and distribution sectors.

Food Supply Chain Stage	2018–19 Food Waste (million tonnes)
Primary production	1.68
Manufacturing	1.28
Distribution	0.26

(b) From FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Chain Stage	Loss Percentage
Tomatoes	2017	Farm	28.7–47.0%
		Retailing	2.4–5.4%
		Packaging	10.8%
Cabbages	2013	Processing	20.0%
		Marketing	32.5%
Cauliflowers and broccoli	2013	Processing	3.0–65.0%
		Farm	10.0–11.0%
		Marketing	28.0%
Lettuce and chicory	2013	Farm	4.0–6.0%
		Processing	9.0–16.0%
Chillies and peppers	2013	Farm	8.0%
Carrots and turnips	2013	Farm	1.0%
		Processing	1.0–5.0%
Sweet corn	2013	Processing	38.5%
Other vegetables	2013	Farm	10.0%
		Processing	1.0–5.0%
Other fruits	2019	Packaging	24.0%

Note: The FAO FLW Database indicates that the data presented comes from Rogers et al. (2013), McKenzie et al. (2017) and Collins (2019). The Australian Government has not verified this data.

2. Food waste:

(a) Using the UN empirical definition of ‘food waste’ (occurring from retail to consumption), according to the feasibility study (FIAL, 2021), in 2018-19 around 4.5 million tonnes of food waste was generated from Australia’s wholesale/retail, hospitality, institution and household sectors.

Food Supply Chain Stage	2018–19 Food Waste (million tonnes)
Wholesale/retail	0.53
Households	2.50
Hospitality	1.20
Institutions	0.26

(b) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	2,563,110.27	2,559,065.08	101.08	97.76
Out of Home Consumption	546,339.63	1,524,668.80	21.55	58.24
Retail	238,247.67	547,033.32	9.40	20.90

Note: The Australian Government has not verified this data.

3. Food loss and waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production	Handling & Storage	Processing & Packing	Distribution	Consumption	Total FLW
-----------	------------	--------------------	----------------------	--------------	-------------	-----------

	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	380	418	372	67	234	40	40	208	530	537	1,556	1,269
Roots & Tubers	253	243	101	97	124	149	39	46	152	182	669	718
Oilseeds & Pulses	375	765	0	0	36	43	8	12	32	48	451	868
Vegetables	392	418	63	67	20	40	103	208	267	537	844	1,269
Fruits	623	566	100	91	38	48	104	130	321	401	1,186	1,236
Meat	96	86	25	22	199	178	133	132	365	363	817	782
Fish	11	11	1	1	12	14	80	86	293	316	396	428
Eggs	10	9	0	0	1	1	4	4	31	33	46	48
Milk	344	306	47	42	91	81	31	33	935	985	1,448	1,447

Note: The Australian Government has not verified this data

Actions

The following are key actions undertaken by the Australian Government to reduce food waste since publication of the strategy:

1. In 2018, the Australian Government awarded the End Food Waste Cooperative Research Centre (CRC) (formerly the Fight Food Waste CRC) an AUD 30 million grant from 2018 to 2028. The grant is supporting the delivery of industry-led research collaborations focusing on solutions to reduce food waste across the supply chain and to transform unavoidable waste into saleable products.⁶
2. From 2020-2024, the Australian Government supported the establishment of End Food Waste Australia (EFWA) (formerly Stop Food Waste Australia) with an AUD 4 million grant to help deliver the strategy. In addition to their research and development initiative (the End Food Waste CRC) outlined above, EFWA's key initiatives include:
 - (1) The Australian Food Pact (Pact), a voluntary agreement that brings together Australia's largest food businesses to commit to targeting food waste throughout their supply chains, with signatories receiving support from EFWA in the form of tools, resources, and technical assistance.⁷
 - (2) Sector Action Plans (SAPs) which identify food waste hot spots and develop priority actions for specific sectors.⁸ SAPs have been developed for the bread and bakery, dairy, food cold chain, food rescue, food service, and horticulture sectors.
3. In 2023, the Australian Government provided EFWA an additional AUD 10 million grant from 2023 to 2026 to develop and establish an economy-wide consumer behavior change campaign for food waste. EFWA's campaign, 'The Great Unwaste', is helping Australian households reduce the amount of food they waste.⁹
4. In December 2024, the Australian Government released **Australia's Circular Economy Framework**. The framework provides the blueprint for

⁶ More information about the CRC is available at: <https://endfoodwaste.com.au/research-and-development/>. (accessed March 18, 2025)

⁷ More information about the Pact is available at: <https://endfoodwaste.com.au/australian-food-pact/>. As of 3 June 2025, 46 organizations were signatories to the Pact, including Australia's leading food retailers.

⁸ More information on the SAPs is available at: <https://endfoodwaste.com.au/sector-action-plans/>. (accessed March 18, 2025)

⁹ More information about the campaign is available at: <https://thegreatunwaste.com.au/>. (accessed March 18, 2025)

Australia's circular economy transition and sets clear priorities and targets to keep materials in the Australian economy for as long as possible, while reducing waste. The framework identifies food and agriculture as one of four priority sectors. Reducing food waste to support decarbonisation is identified as a key opportunity for Australia.

The Australian Government has a dedicated webpage with more information about action for reducing Australia's food waste.¹⁰ There are many agencies and organizations in Australia who are responsible for, or who are actively engaged in, action contributing to reducing food waste, outlined in the table below. Much work has been completed since publication of the strategy, and more is underway, however, these actions have not been collated and listed here.

Agencies/Organizations	Roles	Main Activities
Government		
Australian Government (federal government)	Responsible for Australia's legislation, strategies and policy frameworks for waste management. Provides economy-wide leadership and coordination in waste matters. Ensures Australia's global obligations for waste are met.	- Delivering actions relevant to food waste under other domestic waste policies. - Collecting and reporting economy-wide food waste data.
State and territory governments	Responsible for the management and regulation of waste within their jurisdiction in accordance with their own legislation, policies and programs.	Food waste activities differ between each state and territory. Generally, within their jurisdiction, their main activities include: - developing and implementing food waste policies - trialing/piloting and delivering food waste programs - investing in food waste projects and programs, including through grants - investing in food waste research - supporting local governments in managing food waste.

¹⁰ More information available at: <https://www.dcceew.gov.au/environment/protection/waste/food-waste>. (accessed March 18, 2025)

Agencies/Organizations	Roles	Main Activities
Local government (councils)	Responsible for the on-ground management of waste within their jurisdictions.	Food waste activities differ between each local government. Generally, within their jurisdiction, their activities include: - developing and delivering food waste policies - delivering public education campaigns to reduce food waste.
Non-government organizations		
End Food Waste Australia (EFWA)	- Established to support industry action and collaboration towards meeting Australia's target to halve food waste by 2030. - Links government, businesses, industry bodies, retailers and consumers to help deliver mutually beneficial collaborations and food waste solutions.	EFWA's key initiatives include: - the End Food Waste Cooperative Research Centre which is leading food waste reduction research and delivering evidence-based solutions to all levels of government and the supply chain - the Australian Food Pact (Pact), a voluntary commitment program supporting food businesses to reduce food waste along the supply chain - Sector Action Plans (SAPs) which establish a framework for targeted food waste reduction interventions in specific sectors - 'The Great Unwaste', an economy-wide consumer behaviour change campaign helping Australian households reduce the amount of food they waste.
Major food rescue/food relief organizations	- Rescues surplus, edible food from food businesses for donation to Australians in food insecure situations.	The main activities differ between each organization. Generally, the main food waste activities include: - collecting surplus,

Agencies/Organizations	Roles	Main Activities
	- Advocates for action on FLW.	- edible food from food business and delivering it to food relief organisations and programs for donation to Australians in food insecure situations - partnering with major Australian food businesses, including Australia's largest retailers, to rescue their surplus, edible food - transforming rescued and donated food into cooked, nutritious meals for food relief - delivering education programs including for reducing food waste - delivering food waste avoidance education campaigns.
Food industry	- Implement solutions to reducing food in their supply chains.	Activities differ between each business/organization. Generally, food waste activities may include: - measuring and tracking their food waste to understand types and amount of food being disposed, and to identify reduction opportunities - adopting measures to reduce food waste and providing training to staff - partnering with food rescue/relief organisations to donate edible food that would otherwise be wasted.

3.2 Brunei Darussalam

Target

In 2020, Brunei Darussalam launched its climate change policy (BNCCP) and NDC, which includes the aim to “Reduce municipal waste to landfills to 1kg/person/day by 2035 ... through adoption of best practices and innovative technologies.” (Brunei Darussalam’s NDC 2020; BNCCP Strategy 7 on Waste Management)¹¹

Measurement

1. Food Loss: No data was found.
2. Food Waste
 - (a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	34,739.48	34,108.59	79.30	75.97
Out of Home Consumption	11,079.66	209,651.05	25.29	35.14
Retail	5,551.14	274,980.03	12.67	46.09

- (b) Shams et al. (2024) report that 35% of Municipal Solid Waste in the Brunei Darussalam is attributable to food waste. Authors did not provide other details as to how this was estimated, or when and where this was computed. A news report puts the amount of food waste at 297,218 tonnes in 2019 (Mahmud, 2023).

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production	Handling & Storage	Processing & Packing	Distribution	Consumption	Total FLW
Fish (2015)	0	0	0	3	0	3
Fish (2022)	1	1	1	0	0	3
Change	1	1	1	-3	0	0

Actions

1. Among the strategic objectives within BNCCP Strategy 7, the economy aims to “pursue and adopt waste-to-energy technologies” by 2025.¹² However, a piece of news last year reports that a new target date, 2029, has been set for commencement of the waste-to-energy plant.¹³
2. Non-government initiatives:
 - a. To minimize the food waste during Ramadan, “vendors joining the [Ramadhan Bazaar Batu Satu Event in Sahur Sengkarai] do not throw away leftovers; they are donated to mosques for the congregants after Sunnat Tarawih and Tedarus.” (Mahmud, 2023)
 - b. “Golden Corporation Sdn Bhd was the first company in Brunei to produce Fish Meal where the excess and unmarketable fish are reprocessed into

¹¹ “Solid waste” includes food waste, along with industrial and other types of waste.

¹² More information available at: <https://climatechange.gov.bn/SitePages/Pages/bnccp-goals.aspx> (Accessed Feb 25, 2025)

¹³ More information available at: <https://borneobulletin.com.bn/minister-plans-waste-to-energy-plant-as-alternative-to-landfill/> (Accessed Feb 25, 2025)

value products. At the same time, the company also makes its aquatic feed for consumption in its shrimp farms and acts as a feed to aqua farmers. This production has helped in reducing marine wastage and pollution.” (Sulaiman and Ab Talib, 2024)

- c. Kilang ReRoot, an NGO, was founded in November 2020 to raise awareness and tackle FLW in Brunei Darussalam, and to promote sustainable food production chain.¹⁴

3.3 Canada

Target

Apart from the committing to UN SDG 12.3 on halving per capita food waste and reducing food loss by 2030 for the whole of Canada, the government of Ontario, in addition, aims to phase out food and organic waste to landfills by 2030 (NDC, 2022).

Measurement

1. Food Loss

(a) From the FAO Food Loss and Waste Database (Retail stage):

Commodity	Year	Loss %-age	Source
Cattle meat	2014	3.0–4.0%	Gooch and Felfel (2014)
Seafood	2014	2.0–3.5%	

2. Food Waste

From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	2,938,320.60	3,019,925.34	78.31 [†]	78.53
Out of Home				
Consumption	956,614.91	3,064,632.08	25.49	79.70
Retail	479,283.90	1,146,937.19	12.77	29.83

[†] Environment and Climate Change Canada. 2019. National Waste Characterization Report: The Composition of Canadian Residual Municipal Solid Waste.

http://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf

3. Food loss *and* waste

(a) “Canada estimates its total food waste at 35.5 million tonnes annually, with approximately 71% categorized as food loss and 29% as food waste. This is equivalent to more than half of Canada’s total annual food supply. Over 200kg of food waste is thrown out by single-family Canadian households annually. ... (Warner, 2022)” (Attavanich *et al.*, 2022, p.5)

(b) Another estimate cited by the **National Zero Waste Council** (NZWC), a federation of 21 municipalities across Canada, puts total food loss and waste at half of all food produced in Canada.¹⁵

(c) FAO Food Loss and Waste Database (Whole Supply Chain):

Commodity	Year	Loss %-age	Source
-----------	------	------------	--------

¹⁴More information available at: <https://kilangreroot.com/>. (accessed 11-May-2025).

¹⁵More information available at: <https://nzwc.ca/focus-areas/food/issue/Pages/default.aspx>. (accessed March 18, 2025)

Mixed grain	2014	38% (not clear)
Snails, except sea snails	2014	50% (not clear)

(d) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	649	665	636	652	551	589	96	102	1,264	1,343	3,195	3,350
Roots & Tubers	976	1,286	390	515	243	278	76	87	298	341	1,983	2,507
Oilseeds & Pulses	1,443	1,471	0	0	78	89	19	24	73	96	1,613	1,680
Vegetables	464	469	74	75	34	44	176	228	455	590	1,204	1,405
Fruits	163	183	26	29	32	48	161	242	420	632	803	1,135
Meat	87	100	23	26	180	208	148	157	406	432	843	923
Fish	59	48	3	2	50	41	108	105	395	386	613	582
Eggs	21	26	0	0	2	2	12	14	86	107	121	149
Milk	295	353	41	49	78	93	35	37	1,053	1,120	1,501	1,653

Actions

1. Canada has a dedicated webpage for food loss and waste that serves as a platform to educate their people and to explain their strategies to curb FLW. Among other things, their webpage includes advice for the food sector businesses, consumers, and educators.¹⁶
2. They have joint projects with Mexico and United States to combat FLW in the North American region.¹⁷
3. Initiatives by NZWC can be found here: <https://nzwc.ca/focus-areas/food/what-we-are-doing/Pages/default.aspx>. They include promoting circular food systems and providing information about FLW measurement and other resources.
4. In the 2022 NDC of Canada, the governments of Manitoba and Ontario undertook to support the diversion of food and other organic waste away from landfills. Manitoba plans to redirect them to composting programs. Also, British Columbia is pushing for circular economy, which will theoretically reduce food loss.
5. “The Canadian government launched a Food Waste Reduction Challenge to stimulate and accelerate innovative solutions to food loss and waste. The Challenge has attracted over 500 applicants, many of which are MSMEs developing new business models and technological solutions that prevent and divert food loss and waste across the supply chain.” (Attavanich *et al.*, 2022, p.11)
6. Agriculture and Agri-Food Canada launched a USD 20 million food waste reduction challenge to spur innovative solutions in 2021. The winners were awarded in 2024.¹⁸
7. “In June 2020, the Canadian government launched a USD 50 million Surplus Food Rescue Program to address an urgent surplus of perishable

¹⁶ More information available at: <https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/food-loss-waste.html>. (accessed March 18, 2025)

¹⁷ More information available at: <https://www.cec.org/flwy>. (accessed March 18, 2025)

¹⁸ More information available at: <https://www.canada.ca/en/agriculture-agri-food/news/2020/08/surplus-food-rescue-program.html>; impact.canada.ca/en/challenges/food-waste-reduction-challenge-novel-tech. (accessed March 18, 2025)

commodities [during] COVID-19. ... Organizations that [were] funded...: Second Harvest; Food Banks Canada; Les Fermes Dani; Canadian Produce Marketing Association; Fisher River Cree Nation; Clearwater Seafood, in partnership with Membertou to Mi'kmaq communities; and La Table des Chefs.” (Attavanich *et al.*, 2022, p.11)

8. In 2019, Canada released a report on the state of food loss and waste in their economy.¹⁹
9. “[Canada] requires standard labels to distinguish certain foods that are likely to decline in quality past the date versus those that will decline in safety. However, the government also allows food businesses to choose to include date labels on other products, meaning that a wide range of products carry differing date labels in Canada ... which may limit donation.”²⁰

3.4 Chile

Target

Apart from promoting compliance with SDG 12.3 target, Chile’s organic waste strategy also aims to recover 30% of organic waste generated at municipal level by 2030, and 66% by 2040. In order to achieve this, they also aim, by 2030, to get 500,000 families to use compost bins and/or worm composting bins in their homes, 5,000 education centers with compost bins, and 50% of public institutions separating at source and recovering organic waste.

Measurement

1. Food Loss:

From the FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Stage	Loss Percentage
Potatoes	2015	Storage	5.7%
		Marketing	1.3%
Pears	2013	Farm	13.0%

During 2024, exercises to estimate the loss index have begun. However, these are not yet sufficient to be reported. Currently, work is being done on collecting field data (harvest) to be surveyed by the **National Statistics Institute** (INE) in 2026. In addition, data from literature will be used to complete the missing links in the supply chain.

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	1,400,946.43	1,725,226.29	73.58	88.00
Out of Home Consumption	484,610.56	832,815.16	25.45	42.48
Retail	242,799.94	295,143.98	12.75	15.06

(b) In 2024, the Study on the **Characterization of Municipal Solid**

¹⁹ More information available at: <https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/food-loss-waste/taking-stock.html>. (accessed March 18, 2025)

²⁰ More information available at: <https://atlas.foodbanking.org/map/>. (accessed March 18, 2025)

Household and Assimilable Waste in Chile indicated that approximately 26% of household waste in Chile—varying slightly by region—is composed of fruits and vegetables, meat and fish, and other wasted edible food. Furthermore, the study reports a 26% waste figure for hotels, cafes, and restaurants, and a 34% waste figure for street markets or **ferias libres** (PUCV and SUBDERE, 2024). It is important to note that the study includes 15 of Chile's 16 regions.

3. Food loss *and* waste

(a) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	97	66	61	41	205	227	81	91	195	218	639	643
Roots & Tubers	130	139	112	119	86	97	23	26	18	20	369	402
Oilseeds & Pulses	5	4	2	2	18	25	6	9	6	9	37	49
Vegetables	410	413	164	165	88	115	64	83	45	59	770	835
Fruits	1,233	1,295	493	518	386	422	80	95	51	61	2,244	2,391
Meat	44	47	8	9	37	39	78	96	94	115	262	306
Fish	125	158	155	204	132	174	21	29	9	12	442	578
Eggs	14	14	0	0	1	1	8	8	8	8	31	31
Milk	74	83	122	138	19	22	134	150	67	75	416	467

(b) Lettuce: 99,300,000 unit/year (20% harvest), Potatoes: 58,320 tonnes/year, Imported rice: 280 tonnes/year (losses in storage), Bread: 300,000 tonnes/year, Hake (Fish): 851 tonnes/year (53%), Cuttlefish (Seafood): 24,255 tonnes/year (44%) (Eguillor, 2017).

(c) In 2021, Chile generated 5.18 million tonnes of FLW, with fruit being the largest contributor at 2.50 million tonnes (48% of total FLW). Vegetables accounted for 0.80 million tonnes (16%). Other food groups each contributed 1% to 10% of the total FLW. Per capita FLW was 295 kg (Durán-Sandoval, 2024).

Actions

1. According to Survey Report on Feasible Solutions for Food Loss and Waste Reduction (Hsu *et al.*, 2018)

Solution	Program/ activity
1. Consumer Education Campaigns	The stakeholders involved with Chile's Committee to Prevent and Avoid Food Losses and Waste, together with the organization "5 a Day" developed a booklet with information about FLW to promote education campaign on FLW at schools and to the public.

2. Pre-harvest technical support 3. Harvesting technical aid 4. Postharvest facility support	Public institutions provided technical advice on selecting the best high yielding varieties, use the best culture practices relating to crop management, irrigation, and fertilizer use and pest control; and support farmers with cultivating equipment. Public institutions developed post-harvest research to prevent FLW especially in fruits and vegetables for export and provided training for farmers to improve the handling of produce; adhere to the best time for harvesting of crops and handle produce with care; train farmers/operators on mechanized harvesting; training on postharvest processing of fruits, vegetables and grains.
5. Cold Chain Management	Provision of cold storage and refrigeration equipment for fruits and vegetables
6. Food donation support	Special tax benefits for food banks

2. Public-Private Actions

Chile's **National Commission for the Prevention and Reduction of Food Loss and Waste** (CNPDA) was formed on September 20, 2020, via **Ministerial Decree N°17**, as a result of collaborative work dating back to 2015. It acts as a public-private articulation space, involving the public sector, academia, civil society, private sector, and international organizations. Its work is organized into five axes which correspond to the Commission's functions: (1) initiatives and programs; (2) policies and regulations; (3) research and teaching, innovation and technology transfer; (4) dissemination and communication; and (5) information for decision-making. To achieve its objectives, the commission's representatives are organizing their work into four subcommittees: prevention and reduction of food loss; prevention and reduction of food waste; research and teaching, innovation and technology transfer in food loss and waste; and enabling conditions for the prevention and reduction of food loss and waste.

Progress and Initiatives (2023–2024): The implementation of the CNPDA's roadmap has been ongoing since 2023. Key advancements include:

In the “initiatives and programs” axis, developed strategies to reduce food losses at farm level in smallholder producers, through the components of diagnostic of food value chain, rural extension and technology transfer. They also published the handbook on food loss and waste, *Valora los Alimentos*, and *Mejora tu Nutrición*. During the COVID-19 pandemic, the Commission supported the development of “Micro Food Banks” installed in street markets (Quezada, 2019; Eguillor, 2021; Espinoza, 2023). The network of micro food banks is being strengthened and expanded, with the continuity of 84 existing microbanks and the creation of 48 new ones across Chile. Simultaneously, the public food bank network is expanded through the **25 municipal 'EcoMercados Solidarios'** led by FOSIS economy-wide.

In “policies and regulations”, efforts are being made to propose and support laws regulating the distribution of food fit for human consumption, and the governance of the CNPDA has been strengthened by including the fishing and aquaculture sector.

In “research and teaching”, a Network of Academics in FLW has been formed to generate scientific evidence and train professionals.

For “information for decision-making”, work is underway to monitor SDG 12.3.1a, specifically measuring the food loss index.

In “dissemination and communication”, the International Day of Awareness on FLW is commemorated annually, and public awareness campaigns are supported. The CNPDA actively participated in various FLW-related events during 2024 in Chile and outside, including a workshop within APEC 2024.

3. Actions for 2025:

For 2025, the CNPDA plans the implementation of a work plan developed by the subcommittees, which specifies activities that respond to actions across the 5 axes of the roadmap. The CNPDA also supported the review of the “Manual of Good Practices in Food Safety for Fresh Agricultural Products in Food Banks” to strengthen the work of food banks and micro food banks. Progress is being made in measuring the Food Loss Index (12.3.1.a). To disseminate research on FLW in Chile, the first cycle of webinars on the subject is being launched

National Strategy for the Prevention and Reduction of Food Loss and Waste (ENPDA): The construction of the ENPDA began during the fourth quarter of 2024. This strategy aims for a horizon of 2040 for Chile. It is a joint effort involving the Ministry of the Environment, Ministry of Agriculture (ODEPA), Inter-American Development Bank (IDB), FAO, UNEP, and the Agency for Sustainability and Climate Change, with participation from the CNPDA. The goal is to revitalize public and private efforts in FLW prevention and reduction through a long-term economy-wide strategy. The final ENPDA proposal will be submitted for public consultation in February 2026.

Agreement for Clean Production: The Food and Beverages Association of Chile (AB Chile A.G.), in collaboration with the Agency for Sustainability and Climate Change and ODEPA, has initiated a process to obtain a Clean Production Agreement. This agreement, currently in the signature and accession stage, aims to optimize and improve the management of FLW for food and beverage producers associated with AB Chile, considering their entire value chain.

To commemorate the International Day of Awareness of Food Loss and Waste on September 29, 2025, MINAGRI, Odepa, and CNPDA collaborated on several strategic initiatives. These included organizing a community fair at the Cerro Navia Food Bank and launching the **ACHIPIA-UBO Food Safety Manual** during a specialized seminar. Additionally, Odepa actively engaged in regional cooperation through the **FAO Food Loss Measurement Workshop**. The activities concluded with the inauguration of a FOSIS **EcoMercado Solidario** in San Esteban, highlighting a comprehensive commitment to food waste prevention and community support.

4. In 2021, the Ministry of Environment launched Chile's strategy on organic waste.
5. The Ministry of Environment and Ministry of Agriculture each has dedicated web pages for food loss and waste: <https://economiacircular.mma.gob.cl/desperdicio-de-alimentos/> and

<https://www.odepa.gob.cl/sustentabilidad/agricultura-sustentable/perdida-y-desperdicio-de-alimentos>, respectively.

6. In the private sector, the Red de Alimentos is the first food bank in Chile, which was established in 2010. Through an efficient and traceable process, it unites companies and people in vulnerable situations by rescuing food, diapers, and personal hygiene products fit for consumption and distributing them to those most in need (Quezada, 2019).

3.5 People's Republic of China

Target

"By the end of 2027, the long-term mechanism of food and food conservation will be more perfect, the statistical investigation system, standard norms and index systems for food loss and food waste will continue to improve, the rate of loss of food production, storage, transportation and processing will be controlled below the international average, and the per capita food waste in the catering industry, the cafeteria, the school canteen, and the per capita food waste will be significantly reduced, and the food waste will be effectively curbed."²¹

Measurement

1. Food Loss

From the FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Stage	Loss %-age	Source
Maize	2016 to 2020	Harvesting	2.30–2.74%	Li et al. (2022) gathered data from different prior studies.
		Transport	0.90%	
		Drying	1.40%	
		Storage	2.41–4.50%	
Rice	2016 to 2020	Harvesting	2.70–3.92%	
		Transport	0.90%	
		Drying	1.40–1.85%	
		Storage	1.21–2.00%	
		Processing	1.73%	
Wheat	2016 to 2020	Distribution	0.79%	
		Harvesting	2.30–4.72%	
		Transport	0.90%	
		Drying	1.40%	
Mixed Grain	2014	Storage	1.87–3.20%	FAO database simply indicates it's from a survey published in 2016 in China.
		Handling	4.0–6.0%	
		Processing	2.20–3.3%	
		Storage	5.7–8.6%	
Chicken meat	2014	Distribution	1.0–1.5%	
		Farm	8.0–9.9%	

²¹ More information available at: http://www.npc.gov.cn/npc/c2/c30834/202501/t20250123_442612.html. (accessed 1-April-2025)

Cattle meat with bone	2013	Handling	1.4–2.1%	FAO database indicates it's from a literature review by Gang Liu.
		Processing	1.1%	
		Storage	2.5–3.7%	
		Distribution	3.0%	
Potatoes	2012	Storage	15.00–25.00%	Reardon et al. (2012)
	2009	Farm	2.23%	
		Trader	3.00%	
		Wholesale	1.00%	
Apples	2001	Storage	4.00%	Zheng et al. (2001), Wang and Bagshaw (2001)
Cabbages	2001	Harvest	5.0–8.3%	
		Drying	2.0–3.0%	
		Trimming	1.0–5.0%	
		Trimming (export)	45.0–50.0%	
		Storage	32.7–45.0%	
		Transport	3.0–4.0%	
		Wholesale	3.2–17.2%	
Cauliflowers and broccoli	2001	Processing	5.0–15.0%	Zheng et al. (2001)
		Pre-cooling	1.0%	
		Transport	2.0%	
		Wholesale	0.5%	
Green Garlic	2001	Storage	5.0%	Zheng et al. (2001)
Onions and shallots, green	2001	Storage	45.0–55.0%	
		Transport	0.5–5.0%	
		Wholesale	0.5–5.0%	

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	91,646,212.71	108,667,368.95	64.45	76.21
Out of Home				
Consumption	65,377,740.84	65,071,245.83	45.98	45.64
Retail	22,424,704.82	28,227,821.71	15.77	19.80

(b) UNEP (2021, p.41) also gathered food waste per capita estimates of different areas in People's Republic of China. Please see the report for details on sources and accompanying explanations in UNEP (2021, p.42) and UNEP (2024, p.119, 147).

Area	Source/year	Kg/capita
Beijing	Gao <i>et al.</i> (2013)	26
Beijing	Qu <i>et al.</i> (2009)	59
Suzhou	Gu <i>et al.</i> (2015)	67
Shandong	Li <i>et al.</i> (2021)	21
Hong Kong, China	Lo and Woon (2016)	101
Economy-wide	Song <i>et al.</i> (2015)	23
Economy-wide	Xue <i>et al.</i> (2021)	29 [†]
Urban Areas	Zhang <i>et al.</i> (2020)	150

[†] Taken from UNEP (2024, p.30). The rest are from UNEP (2021).

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	7,612	7,769	37,297	38,069	27,572	31,344	4,713	5,360	46,186	52,523	123,379	135,065
Roots & Tubers	35,416	30,600	9,917	8,568	2,851	3,188	5,858	6,145	7,313	7,768	61,355	56,268
Oilseeds & Pulses	1,211	1,406	569	661	570	634	253	331	1,003	1,310	3,606	4,342
Vegetables	53,504	59,100	38,523	42,552	315	349	32,539	36,071	56,807	62,973	181,687	201,046
Fruits	13,579	16,017	9,777	11,532	224	253	8,415	10,082	14,997	17,935	46,991	55,818
Meat	1,666	1,786	434	465	3,452	3,699	3,799	4,484	10,447	12,332	19,797	22,766
Fish	2,202	1,743	369	430	3,603	4,198	7,066	7,965	25,909	29,203	39,149	43,539
Eggs	1,457	1,411	0	0	140	135	736	732	5,522	5,487	7,855	7,765
Milk	1,312	1,448	181	200	346	381	203	266	6,079	7,981	8,121	10,275

Actions

- Reducing FLW is an integral part of People's Republic of China food security strategy. During the Central Rural Work Conference (中央农村工作会议) in 2022, Chairman Xi Jinping gave a speech where he stressed that achieving food security requires simultaneously increasing productivity and reducing loss.²²
- In 2024, the government issued the Action Plan for Food Conservation and Anti-Food Waste 《粮食节约和反食品浪费行动方案》, requiring all departments in various regions to conscientiously implement it.²³ The action plans include:
 - Accelerating the development of the agricultural machinery and equipment;
 - Improving food storage through innovations, green storage, high-standard granaries, improving management practices, and smart food warehouses;
 - Constructing and promoting special railway lines, special docks, bulk grain transit and supporting facilities, special loading and unloading machinery and other grain transportation equipment;
 - Improving food manufacturing processes;
 - Promoting various anti-food waste lifestyle behaviors;
 - Fortifying the anti-food waste campaigns with guidelines and appropriate punishments; and
 - Strengthening statistical surveys of loss and waste.
- People's Republic of China promoted Clean Plate Campaign in 2013 and 2020 to curb wastefulness in banquets and other meal gatherings, catering services, and canteens. This campaign was included in their 2022 NDC as part of their strategy to combat climate change.

²² More information available at : <http://cpc.people.com.cn/n1/2023/0325/c164113-32651066.html>. (Accessed 1-April-2025)

²³ More information available at: http://www.npc.gov.cn/npc/c2/c30834/202501/t20250123_442612.html. (Accessed 1-April-2025)

3.6 Hong Kong, China

Target

The **Food Wise Hong Kong Campaign** was launched in 2013 to instill behavioral changes in the community to avoid and reduce food waste at source. Their first objective is to “Promote awareness of the community on the food waste management problems in [Hong Kong, China] in support of government policies to achieve the visions in the **Waste Blueprint for Hong Kong 2035** and the target of attaining carbon neutrality before 2050.”²⁴ Based on the **Waste Blueprint for Hong Kong 2035**, the economy aims to reduce the per capita municipal solid waste (MSW) disposal by 40–45% and achieve zero landfill by 2035.²⁵

Measurement

1. Food Loss: No data was found.

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	530,984.96	759,922.92	70.83	101.47 ²⁶
Out of Home Consumption	190,146.74	185,068.93	25.37	24.71
Retail	95,267.46	102,908.86	12.71	13.74

(b) Based on statistics gathered by **Feeding Hong Kong** (FHK), the economy sends about 3,437 tonnes of food waste to their landfills, of which 68% are from household and the rest from commercial and industrial sources. Supermarkets and wet markets discard 29 tonnes and 14 tonnes of edible food per day, respectively.²⁷

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	6	0	30	0	90	81	15	14	150	135	292	230
Roots & Tubers	0	0	0	0	2	5	5	13	6	15	12	33
Oilseeds & Pulses	0	0	0	0	4	6	1	1	5	6	10	13
Vegetables	3	3	2	2	1	1	55	83	96	145	157	235
Fruits	0	0	0	0	0	0	35	38	60	66	95	105

²⁴ More information available at: <https://www.wastereduction.gov.hk/en-hk/waste-reduction-programme/food-wise-hong-kong-campaign>. (Accessed 1-April-2025)

²⁵ More information available at: https://www.eeb.gov.hk/sites/default/files/pdf/waste_blueprint_2035_eng.pdf (Accessed 1-April-2025)

²⁶ This was taken from Lo and Woon (2016), which the UNEP (2024) report explains, “cites the Hong Kong Environment Bureau’s official statistics. It is assumed to be from Waste Compositional Analysis but is not made explicit, nor were other details of the method provided (such as sample).”

²⁷ More information available at: <https://feedinghk.org/food-waste-hunger>. (Accessed 1-April-2025)

Meat	3	3	1	1	6	5	39	42	108	114	157	164
Fish	19	10	1	0	7	4	71	66	261	243	359	324
Eggs	0	0	0	0	0	0	3	4	22	32	25	36
Milk	0	0	0	0	0	0	2	3	46	87	48	90

Actions

Unless otherwise indicated, the information below is taken or quoted from the **Waste Blueprint for Hong Kong 2035** (Feb 2021).

3. Hong Kong, China is “charging for disposal of MSW, to gradually reduce the per capita MSW disposal by 40–45% and increase the recovery rate to about 55% by developing adequate waste-to-energy facilities, to move away from the reliance on landfills in the long run.” The co-digestion of sludge with food waste which can triple biogas yield.²⁸ Some examples include:
 - a. Tai Po Sewage Treatment Work which began in 2019 and can process 50 tonnes of food waste per day. This avoids 650 tonnes of greenhouse gas (GHG) emissions a year.²⁹
 - b. The O-Park 1 which began in 2018, and “adopts anaerobic digestion technology that can convert 200 tonnes of food waste into electricity each day. Apart from self-sustaining the operation of the facility, surplus electricity is exported to the power grid, supporting the electricity need of about 3,000 households annually [14m kWh annually]. Around 85,000 tonnes of food waste have been recovered for transforming into energy [as of February 2021]. ... If half of the food waste in [Hong Kong, China] is transformed into electricity, it can support the need of about 27,000 households.”
4. As part of the **Food Wise Hong Kong Campaign** launched in 2013, a Big Waster Mascot was also “created to encourage the public to reduce food waste at source. The domestic food waste disposal has been reduced by 17% from 0.37 kg per person per day in 2013 to 0.30 kg in 2019... More than 950 organisations from both public and private sectors have signed the Food Wise Charter and are committed to reducing food waste at source, while over 1000 eateries have enrolled in the Food Wise Eateries Scheme.”
5. “The first phase of the pilot scheme on food waste collection commenced in July 2018, covering 70 public venues, some schools and about 120 private institutions. An average of about 100 tonnes of food waste are collected under the scheme daily for transforming into energy, and compost as a by-product.”
6. As part of a multi-pronged approach, the economy also aims to enhance waste segregation, support the industry through a recycling fund, bolster innovation through a green tech fund, expand educational and promotional campaigns.
7. Through the **Environment and Conservation Fund (ECF)**, the government “has been supporting non-governmental organisations in running food recovery projects, under which surplus food is collected from the

²⁸ More information available at:

https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/codigestion_trial_%20scheme.html (Accessed 1-April-2025)

²⁹ More information available at:

https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html (Accessed 1-April-2025)

- commercial sector and donated to the needy.”³⁰
8. “In 2011, the Hong Kong, China Productivity Council launched the Food Waste Recycling Project in Housing Estates, which provided a budget of HKD 60 million to housing estates to install on-site composting machines. ... , with residents benefiting from food waste education, food waste collection and recycling activities.” (Attavanich *et al.* 2022, p.12)
 9. Hong Kong, China has a dedicated webpage for FLW:
https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html
 10. Private and not-for-profit initiatives: **Feeding Hong Kong** (FHK) rescues about 65 tonnes of food products every month. In 2024, they gathered more than 1,250 tonnes of quality surplus food donations from more than a hundred companies and redistributed them to more than 150 charities. They also “offer safe, professional solutions to food companies with quality surplus.” They also “collaborate with schools to educate students about food as a resource and how individual actions can positively change the community.” They also provide citizens with the opportunity to volunteer.³¹

3.7 Indonesia

Target

Indonesia is committed to UN SDG 12.3 on halving per capita food waste and reducing food loss by 2030 and included this in their medium-term development plan (RPJMN) for 2020–2024 (Ministry of National Development Planning, 2021).

Measurement

1. Food Loss

(a) From the FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Stage	Loss Percentage
Rice	2012	Farm	4.69–10.79%
	2007	Harvest	1.20%
	2013	Processing	5.00–15.00%
	2005–2007	Storage	0.31–1.08%
	2005–2007	Transport	0.62–0.91%
Maize (corn)	2011	Farm	3.27%
Strawberries	2010	Post-harvest	30.00%

(b) The percentage of food loss declined from 61% in 2000 to 45% in 2019 (Ministry of National Development Planning 2021, p.22).

(c) The postharvest losses for tomato and chili are 26% and 23% (Widiriani, 2019).

(d) According to the Ministry of Agriculture (2018), postharvest losses of red curly chili along the supply chain are about 24%, with the critical point during the stage of trader/retailer and large-scale collectors and caused by sorting and grading activities (e.g., not uniform in color and size).

³⁰ More information available at:

https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html (Accessed 1-April-2025)

³¹ More information available at: <https://feedinghk.org/food-waste-hunger> (Accessed 1-April-2025)

- (e) Postharvest losses of shallots were around 27.5%, and the critical point is in the curing process (i.e., not hygienic, conventional sun drying) (Iriani *et al.*, 2018).
- (f) Rice postharvest losses decreased from 20.30% in 1987 to 10.43% in 2012, of which, harvesting (0.53%), threshing (0.83%), drying (6.09%), milling (2.98%) (Adiandri, 2017).
- (g) Fishery losses decreased from 12.48% in 2008 to 5.64% in 2012 (Natsir, 2015).

2. Food Waste

- (a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	20,938,251.73	14,728,363.62	77.67	53.46
Out of Home Consumption	7,482,276.77	11,051,710.30	27.76	40.11
Retail	238,247.67	547,033.32	9.40	20.90

- (b) The percentage of food waste generation in 20 years increased from 39% in 2000 to 55% in 2019. Food waste generation of 5–19 million tonnes/year, and also 300 kg per capita per year. “In terms of food type, the largest FLW generation is contributed by the crop sector, precisely cereals, totaling 12–21 million tonnes/year. Meanwhile, the most inefficient type of food is the horticulture sector, especially vegetables – in which the loss reaches 62.8% of the total domestic supply of vegetables in Indonesia.” (Ministry of National Development Planning 2021, p.9)
- (c) Martianto *et al.* (2013) surveyed 32 restaurants and 279 respondents, and found that those below 20 yrs. old waste about 0.7kg/capita/year; 20–39 yrs. old about 1.4kg/capita/year, 40–59 yrs old about 1.5kg/capita/year; and those >60 yrs old about 1.2kg/capita/year.
- (d) Based on APEC 2019 Expert Consultation on Reducing Food Loss and Waste for Addressing Interlinked Challenges of Food Security and Climate Change, estimates of consumer’s rice waste at various restaurants in Bogor city by type of restaurant: Sundanese restaurant (4.7 g/capita/day), Javanese restaurant (3.6 g/capita/day) and *warung tenda* (4.2 g/capita/day), *padang* restaurant (2.5 g/capita/day).
- (e) Mandasari (2018) found that Indonesian undergraduate students produced 47.05 g of avoidable food waste per person each month (564.62 g/year). And Nafiroh and Fuad (2019) found that rice waste per household could reach 108 g/month (1.296 kg/year).

3. Food loss and waste

- (a) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	4,392	3,765	4,817	4,129	4,767	3,948	1,261	1,055	1,854	1,550	17,090	14,447
Roots & Tubers	1,347	855	4,009	2,545	137	270	1,211	1,327	327	387	7,029	5,383
Oilseeds & Pulses	7,947	12,957	12,670	20,656	331	1,102	194	395	95	194	21,237	35,305
Vegetables	1,487	1,911	758	975	99	134	831	1,127	508	688	3,683	4,836
Fruits	2,716	3,325	1,385	1,696	325	325	1,390	1,843	823	1,108	6,641	8,297

Meat	91	148	5	7	76	124	199	385	114	220	484	885
Fish	584	641	1,303	1,282	927	912	1,514	1,740	202	232	4,530	4,807
Eggs	148	550	0	0	1	3	41	165	28	110	218	827
Milk	53	57	88	95	14	15	152	494	15	49	322	711

(b) The accumulation of FLW in Indonesia in the period of 2000–2019 reached 23-48 million tonnes each year or equivalent with 115–184 kg/capita/year or equivalent to 4–5% of Indonesian GDP (Ministry of National Development Planning 2023).

Actions

1. Regulations and policies related to FLW:
 - a. Law 18/ 2008 on Municipal Solid Waste Management: This law emphasizes waste reduction, reuse, and recycling, as well as proper disposal, to minimize environmental impact and promote resource efficiency. For example, under its Article 20(3), stakeholders shall use as little material as possible which produces waste.
 - b. Regulation of Ministry of Agriculture No 44/ 2009 on Good Handling Practices: This regulation aims to maintain the quality and competitiveness of agricultural products of plant origin.
 - c. For food safety and FLW reduction efforts, such as food donation
 - Government Regulation 69/1999 on Food Labeling and Advertisement
 - Government Regulation 28/2004 on Safe, Quality, and Nutritious Food
 - Government Regulation 86/2019 on Food Safety
 - Regulation of the Indonesian FDA 20/ 2019 on Food Packaging (under revision): includes regulations for recycled packaging
 - Regulation of the Indonesian Food and Drugs Administration (BPOM) 20/2021 on Food Labelling
 - d. Government Regulation 17/2015 on Food Security and Nutrition
 - e. Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP) for FLW reduction efforts in the handling, processing, and distribution stages. According to Natsir (2015), for example, the programs of reducing fishery losses in Indonesia include socialization and campaign, building a system for best practices from farm to table, promoting technologies such as drying machine, rice thresher to reduce losses, price incentive based on product quality, reducing portion size to minimize waste during consumption and processing. Also, according to Regulation of Ministry of Agriculture No 44/ 2009, the objectives of GHP includes reducing postharvest losses, extending shelf-life, maintaining freshness, increasing usefulness, enhancing value-added, increasing efficiency in the use of resources and facilities, strengthening competitiveness, and developing sustainable agricultural business.
2. Indonesia implemented a program called UPSUS (*Upaya Khusus*, meaning Special Effort), which aimed at increasing productivity and production while at the same time reducing yield losses through the use of facilities/machinery such as mini combine harvester, thresher/corn sheller, dryer, revitalization of rice milling unit, silo/storage system.
3. Indonesia, in collaboration with FAO, launched an E-agriculture Strategy

Roadmap with its main target to integrate database for farmlands and farmers, as well as providing a digital early warning system for disasters that could threaten agricultural production, and run a system for agricultural data collection, extraction, and analysis by 2027.

3.8 Japan

Target

1. Japan had set its domestic food loss and waste (edible parts) reduction target by 50 % each from business and household compared to 2000 baseline.
2. The latest data shows that domestic food loss and waste has been reduced by 53% compared to 2000, merging 58% from businesses reduction and 46% from household reduction (2023), making it to have achieved SDG Target 12.3 (halving food waste)
3. In March 2025, Japan raised its ambition to a 60% reduction target in businesses while keeping the target in household by 50%, aiming for 56% in total by 2030.

Measurement

1. Food Loss (in 10³ tonnes, edible parts, 2023):
 - Post-harvest: no data available
 - Processing and manufacturing: 1,080
2. Food Waste (in 10³ tonnes, edible parts, 2023):
 - Wholesale trade: 90
 - Retail: 480
 - Restaurants and food services: 660

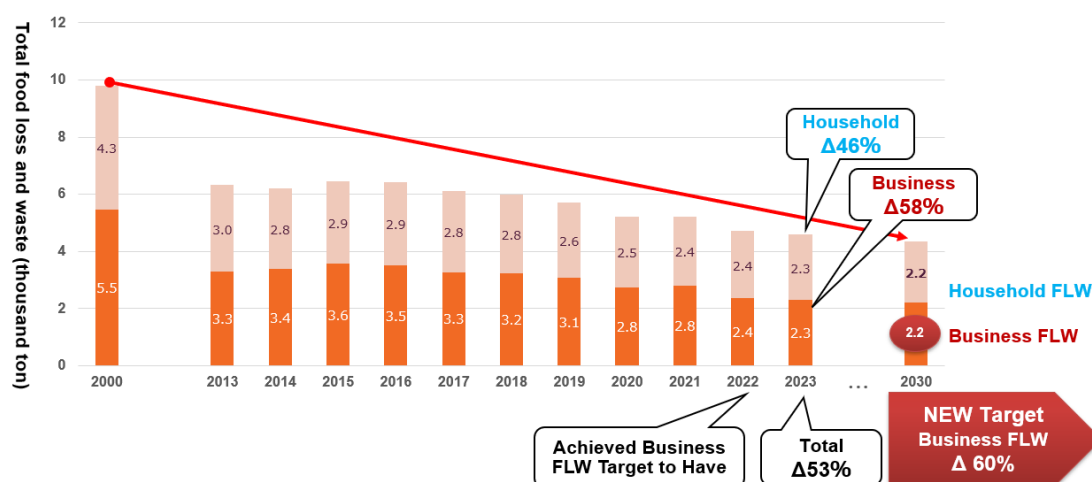


Fig. Trend in food loss and waste. New reduction target for business was set in March 2025.

Actions

1. Strengthening Prevention Measures Across the Food Supply Chain

Food-related business operators are encouraged to intensify efforts to prevent the generation of food waste through a set of upstream and downstream measures. These include facilitating the redistribution of surplus food to individuals facing food access constraints.

Operators are further encouraged to improve best-before date labelling practices, including the adoption of year-and-month formats where appropriate, in order to reduce premature disposal driven by consumer or commercial misinterpretation. In line with food safety requirements, businesses are also encouraged to review product specifications and technologies with a view to extending shelf life, taking into account the characteristics of each food product.

In addition, food-related business operators engaged in food retail and distribution are encouraged to review commercial practices that may contribute to food waste along the supply chain. This includes relaxing delivery deadlines, placing orders earlier, and adopting other practices that facilitate smoother implementation of food waste prevention measures by business partners.

2. Improving Transparency and Public Disclosure of Business Initiatives

To enhance accountability and support informed decision-making by stakeholders, food-related business operators are encouraged to strengthen the disclosure of information related to food waste prevention efforts. This includes, where relevant, the disclosure of data on surplus food redistribution through securities reports, integrated reports, corporate websites, or other appropriate channels.

To ensure that disclosed information is accessible and meaningful to the public, the development of mechanisms to appropriately assess and communicate business efforts on food waste prevention and resource efficiency is being envisaged by the Government.

3. Mandatory Annual Reporting by Food-related Business Operators

Annual reporting is mandatory under the Food Recycling Act for food-related businesses that produced 100 tonnes of food loss and waste or more in a previous year. Reporting includes amount of food waste (both “kg” and “kg/sales”), amount of food waste reduction (prevention of wasted food, food donation, etc.), amount of recycled food waste (animal feed, compost, biogas, energy recovery, etc.) and activities conducted for reduction and/or recycling of food waste on the amount of food waste.

4. Promote recycling in the private sector

Under the Food Recycling Act, 148 Recycling Business Operators are registered and the Food Recycling Loop Certification has been granted to 59 groups of food business/recycler/farmer(s) (2025) that can enjoy exemption from obtaining a municipal license for collection/transportation of food waste under the Waste Management Act to foster recycling business operators.

5. No-Food Loss Project

Promoted by both the public and private sectors to raise public awareness and encourage action by supporting activities in each stage of the food supply chain. Japan shares the concept of Mottainai (a sense of regret over waste and respect for resources (MAFF, 2019).

1. “Japan is one of the few [economies] that carries out regular impact assessments of FLW policies. **A Survey on Attitude and Awareness in Consumer Life** is, for example, conducted on an annual basis to evaluate consumer awareness and behavioural change on FLW.” (OECD, 2025, p.33)
2. “The Act on Promotion of Food Loss and Waste Reduction” was introduced in 2019 to encourage all levels of government, businesses and consumers to work together to prevent still-edible food from being discarded October is set as the Food Loss and Waste Reduction Month. Some key initiatives include: (i) Extending the best before date on consumer products; (ii) Recycling food wastes into fertilizer and feed; (iii) Creating business incentives for those in the food supply chain; and (iv) Support food bank activities.” (Norton, 2023)
3. According to the information from the Ministry of Environment:

Model projects	MOE Japan conducts “Model Project for Promoting Creation of Zero Food Loss and Waste Areas,” which supports pioneering cases that aim to create Zero FLW Areas by reducing and recycling FLW and widely disseminating their achievements to other regions and organizations.
Manual on FLW Reduction Efforts for Local Governments	Japan has selected 25 initiatives by the local governments to reduce FLW, compiled the steps and key points to implement them, and published them as a manual in order to further promote FLW reduction in local governments. The manual is available on the FLW Portal.
mottECO initiative	Japan published promotional materials, such as images for posters and stickers, for the mottECO initiative, which is the practice of bringing home leftovers from restaurants.
Food Drive Guidance	Japan published the Food Drive Guidance to assist local governments and local community groups in conducting food drive activities.

Source: https://www.env.go.jp/en/press/press_02937.html

4. “Japan gives tax incentive (deductible treatment) for the food supply to food banks. Japan also [has] food labelling policies or enacted legislation, the main one being Food Labelling Act.” (Méndez-Lazarte, 2025, p.76)
5. Japan has several webpages dedicated to food loss and waste:
 - Consumer Affairs Agency (CAA): https://www.caa.go.jp/policies/policy/consumer_policy/information/food_loss
 - Ministry of Agriculture, Forestry and Fisheries: <https://www.maff.go.jp/e/policies/env/frecycle.html> and https://www.maff.go.jp/j/shokusan/recycle/syoku_loss/index.html
 - Ministry of the Environment: <http://www.env.go.jp/recycle/foodloss/index.html>

3.9 Republic of Korea

Target

Korea is committed to UN SDG 12.3 on halving per capita food waste and reducing food loss by 2030.

Measurement

1. Food Loss: No data was found.
2. Food Waste.

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	3,657,763.88	4,921,086.30	70.61	94.97
Out of Home Consumption	1,309,852.33	1,280,410.15	25.28	24.71
Retail	656,263.17	711,980.94	12.67	13.74

(b) According to the Ministry of Environment, food waste in 2020 approximately 13,671 tonnes/day, about 70% of which are generated by households and small restaurants (Kim, 2023).

(c) On average, households in Korea generate only 33 kg of food waste per person per year. This number drops to approx. 25 kg when a food waste drying machine is installed (Envac, 2024).

	Households	Inhabitants	Total food waste generated (kg)	Food waste generated (kg/capita/year)
Xi project in Seoul	1,772	5,316	202,260	38
Raemian Riocent	1,000	3	67,355	47
Bangbae project in Seoul	150	0.5	27,759	12.2

Source: <https://www.envacgroup.com/insights/tackling-food-waste-south-koreas-success-story/>

3. Food loss *and* waste

(a) From the FAO State of Food and Agriculture 2019, Table A6 (pp.141–142), FLW Estimates from Grey Literature, [Economy] and Sectoral Reports between 2000 and 2017 are aggregated:

Observation	Mean	Median	s.d.	Min.	Max.
29	13.8	14.0	3.9	8.0	24.0

(b) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	73	64	359	314	1,139	1,042	196	180	1,924	1,765	3,691	3,365
Roots & Tubers	171	168	48	47	65	114	53	78	85	134	422	541
Oilseeds & Pulses	4	4	2	2	50	63	14	18	57	72	127	159
Vegetables	859	843	619	607	6	7	618	729	1,079	1,273	3,181	3,459
Fruits	248	213	179	154	10	9	186	182	341	333	964	891
Meat	46	52	12	14	96	109	152	194	419	534	726	903
Fish	219	174	16	18	158	177	379	387	1,388	1,420	2,161	2,177
Eggs	31	33	0	0	3	3	12	15	89	115	136	166
Milk	79	72	11	10	21	19	5	10	164	287	280	397

(c) “[About] 34.1% of the total supply of fruits and vegetables, meat and cereals were lost and wasted in Korea in 2015. ... Furthermore, 47.6% of the total [FLW] occurred at the upstream stages in the FSC, ... and 52.4% occurred at the downstream stages.” (Kim and Park, 2023)

Actions

1. Policies and plans for reducing FLW in Korea:

Policy/Plan	Description
Comprehensive measure to reduce food waste (2010)	By the Ministry of Environment https://me.go.kr/home/web/policy_data/read.do?menuId=10265&seq=6568
Volume-based Waste Fee System (VBWF system)	Volume-based Waste Fee System was used in Korea since 1995 to solve the problem of municipal solid waste. Since 1997, food waste has been separated into a food waste bag. Separation/collection of food waste was required for all households since 2005.
‘Pay as You Throw’ principle	‘Pay as You Throw’ principle requires households and small-sized private sector business to purchase government-issued plastic bags of different sizes and pay as they throw. The government introduced the pilot volume-based food waste fee system to 144 local regions in 2012, and expanded it to the whole economy in 2015. Through the tool of plastic bag, payment chip or sticker, and RFID system, they reduced food waste by 15% in 2012 and by 30% in 2015.
Voluntary Agreement to reduce food waste Campaign	Campaign to reduce the number of side dishes at a restaurant. Such as Korean households prepare meals with a large number of small dishes, which is considered courteous. They also promoted “Take out food that is left”, “empty dish” movement, and food bank donation.
Master Plan of Food Waste Utilization as a Resource	The Ministry of Environment implemented the ‘Master Plan of Food Waste Utilization as a Resource’ (1998–2002). Prohibition of direct landfilling of food waste (from January 2005), which started food waste separation and food waste recycling activities. Under this plan, government also provides financial support to public recycling facilities that recycle food waste (feed, fertilizer, biomass, etc.).
Separate collection of Food Waste	Separate collection of Food Waste from 2005. The separate collection of food waste is necessary to conduct food waste recycling as well as solid waste recycling. Recycling rate of food waste is over 95% since 2012.
Energy anaerobic digestion	Livestock companies and big food waste generators are required to generate biogas from 2025.

2. Food waste related laws (1961–present)

Filth Cleaning Act (1961–1977)	In 1961, the Filth Cleaning Act was established. In this act, “garbage” included solid waste, ash, sludge, manure, and animal residue. The owners of land or buildings within the cleaning zone were obliged to clean up the garbage on their premises, and the garbage that was difficult for individuals to manage was collected and disposed of by the district, city, or county.
Environmental Conservation Act (1978–1986)	This Act initiated an environmental management system that emphasized the need to establish environmental standards, implement environmental impact assessments, and create environmental technology review committees
Waste Management Act (1986–1992)	The Waste Management Act was enacted in 1986, and integrated the Filth Cleaning and Environmental Conservation Acts to introduce and include the concept of recycling. The Filth Cleaning Act focused primarily on the regulations related to the disposal of waste and sewage, whereas the Environmental Conservation Act aimed to address air and water pollution resulting from industrialization.
The Basic Plan of Resource Circulation (2018–2027),	The Basic Plan of Resource Circulation (2018–2027) aims to reduce the daily generation of household waste per capita while increasing the adoption rate of RFID (Radio Frequency Identification) for food waste in multi-unit dwellings to 100% by 2027.
Biogas Using Organic Waste Resources (Act No. 19151)	The Act on the Promotion of the Production and Use of Biogas Using Organic Waste Resources (Act No. 19151) was enacted and promulgated on 30 December 2022. This law stipulates the scope of mandatory private biogas producers, biogas production target rate, and targets of financial support.

3.10 Malaysia

Target

In 2016, the MYSaveFood Network of the Malaysian Agricultural Research and Development Institute announced its aim to reduce per capita food waste by 50 percent by 2030, in line with SDG 12.3 (Champions 12.3, 2019).

Measurement

1. Food Loss:

(a) From the FAO Food Loss and Waste Database:

Commodity	Food Supply Stage	2007
Rice	Farm	Threshing: 5–13% Handling: 6% Drying: 2%
	Storage	On farm: 5% Central: 6%

(b) Shahar *et al.* (2017) reported the reduction of post-harvest losses (PHL) after the introduction of better post-harvest management practices and technology. The PHL rate

(c) stood at total of 28.5% in 2013. After the improvements, the results of their study showed that food loss in the following stages in 2016 were brought down: Harvesting (1.38%), Transportation (0.63%), Drying

(Kemubu Agricultural Development Area in Kelantan) (0.12%), Milling (3.05%), and Storage (2.71%).

2. Food Waste (by region and stage)

(a) Based on information gathered by the UNEP Food Waste Index Report 2024, Malaysia has the following food waste estimates by sub-region and some sectors:

Economy-wide = 112 kg/capita/year (2013)

Bandar Baru Bangi = 71 kg/capita/year (2012)

Sungai Asap, Belaga, Sarawak = 81 kg/capita/year (2023)

Sabah = 40 kg/capita/year (2014)

Seremban = 102 kg/capita/year (2021)

Food service sector = 9 kg/capita (2013)

(b) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	2,921,576.53	2,754,807.71	89.06	81.17
Out of Home Consumption	2,861,537.49	1,681,049.04	87.23	49.53
Retail	2,518,199.21	2,675,061.54	76.76	78.82

(c) "In 2016, the State determined that 15,000 tonnes of organic waste is produced daily, 3,000 tonnes of which was estimated to be food fit for human consumption. Annually, that food waste translates to almost 1.1 million tonnes, on par, for population size, with smaller European regions." (FAO, 2018)

3. Food loss *and* waste

(a) From the FAO State of Food and Agriculture 2019, Table A6 (pp.141–142), FLW Estimates from Grey Literature, [Economy] and Sectoral Reports between 2000 and 2017 are aggregated:

Observation	Mean	Median	s.d.	Min.	Max.
5	5.6	6.0	2.5	2.0	9.0

(b) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	104	105	114	115	375	418	99	111	146	163	838	912
Roots & Tubers	5	7	14	20	8	10	52	70	14	19	92	126
Oilseeds & Pulses	4,634	4430	7,38	7,06	410	473	103	121	50	60	12,585	12,147
Vegetables	177	194	91	99	20	24	164	204	100	125	552	646
Fruits	133	201	68	103	16	40	105	188	63	112	386	644
Meat	55	57	3	3	47	48	153	175	87	100	345	383
Fish	121	300	104	235	74	167	271	271	36	36	606	1,009
Eggs	71	64	0	0	0	0	18	17	12	11	101	92
Milk	1.85	2	3.06	3	0.48	0	18.18	146	1.82	14	25.39	165

Actions

1. Pilot Data Collection and Measure Fruit and Vegetable Losses under SDG

12.3.1.a in select regions of Malaysia (Dy et al., 2024)

2. Food Waste Management Development Plan for Industry, Commercial and Institution Sector (2016–2026):

- (1) Strategy 1&2: Establish baseline data and food waste regulation
- (2) Strategy 3: Minimize at source (Food bank, MYSavefood)
- (3) Strategy 4: Treatment at source (Compost, Zero Waste Community)
- (4) Strategy 5: Centralized food waste treatment facilities (Anaerobic Digester)
- (5) Strategy 6: Final disposal³²

3. Other actions to Reduce FLW in Malaysia:

Type	Program
Education Campaigns	MYSaveFood campaign to raise public awareness - Local network: 150 companies, public agencies, universities, NGO - International network: FAO, France, Denmark, OIC, APEC - Awareness: 100 programs (e.g. MYSaveFood@Ramadan)³³ - Education: 50 schools (e.g. urban farming, composting, etc.) - Media: Media Prima, TV Al-Hijrah, Hypp TV
Pre-harvest technical support	- Malaysian Good Farm Certification Scheme (SALM) - Malaysian Good Agricultural Practices (myGAP)
Harvesting technical aid	Economy-wide Agro-Food Policy (2011–2020): optimization and sustainable land; development and upgrading agriculture infrastructure; increase the quality and safety of food by expanding the compliance of standards; strengthening human capital in the agricultural sector, including use of modern technology.
Postharvest Facility Support	- Study on postharvest losses of paddy by MARDI - SOP for reducing paddy postharvest losses (MARDI, 2017) - Grading, Packaging and Labeling (GPL) guidelines (FAMA)
Capacity building for FLW	- Training supply chain actors (farmers, wholesaler, exporters, retailers) to maximize yield and minimize losses of fruits and vegetables - International Postharvest Symposium (2012) - Postharvest Losses and Food Waste Conference (2013) - Workshop on maintenance of postharvest quality of vegetables in ASEAN: PH-AARNET (2017) - Training Course and Workshop on Capacity Building on Warehousing and Storage Management by COMCEC (2019)
Food Donation	Food Bank Malaysia (Min. of Domestic Trade and Consumer Affairs)

3.11 Mexico

Target

“[Although the] SDG indicator 12.3 is not specifically in the economy’s SDG agenda, the goal is consistent with other mechanisms aimed at achieving this goal such as the 10th North American Leaders Summit, in which an ambitious plan was agreed to cut FLW by half by 2030.” (Méndez-Lazarte, 2025, p.79)

³² APEC 2019 Expert Consultation on Reducing FLW for Addressing Interlinked Challenges of Food Security and Climate Change. <https://apec-flows.ntu.edu.tw/report-detail.aspx?seq=25>

³³ In 2019, Malaysia launched the Ramadan without Waste campaign to help reduce food waste during Ramadan, a period when food waste can increase by 15-20% across Malaysia.

In the 2017 APEC Expert Consultation of Food Losses and Waste Reduction, Mr Fuentes-Rascón reported that Mexico aimed to minimize postharvest losses to 5% of agricultural production in Mexico equivalent to 79.5 thousand mdp.

Measurement

1. Food Loss:

From the FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Chain	Loss %-age
Beans	2016	Harvest	8.00%
		Processing	13.30%
		Stacking	2.10%
		Storage	0.80%
Maize (corn)	2016	Storage	7.70%
		Processing	3.50%
Mangoes	2015	Post-harvest	10.00%
Tomatoes	2016	Harvest	10.30%

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	11,979,364.27	13,368,447.20	95.77	104.85
Out of Home Consumption	3,527,216.94	8,210,203.68	28.20	64.39
Retail	11,000,000.00	5,798,640.99	87.94	45.48

(b) According to 2015 APEC Expert Consultation on Assessment Methodology of Fishery and Livestock Losses report, the percentage of waste as below (SAGAPRA, 2015):

Description	%Waste	Description	%Waste
Tortilla	29.39	Wheat product	45.31
Rice	46.87	Beef	34.87
Pork	40.91	Chicken	39.36
Tuna	23.43	Fishes	54.07
Shrimp	37.77	milk	57.14
Egg	37.66	Potato	37.11
Avocado	53.97	Garlic	21.35
Onion	32.08	Chilli	34.14
Red tomato	28.86	Nopal	53.26
Cucumber	45.46	Green tomato	17.78
Carrot	19.01	Beans	24.96
Guava	57.73	Lemon	33.38
Mango	54.54	Apple	49.07
Melon	25.42	Orange	23.22
Papaya	32.80	Pineapple	32.78
Banana	53.76	Watermelon	29.44
Grape	45.53	Mean of waste	37.26

3. Food loss and waste

(a) A study concluded in 2020 “estimated 20 million tonnes of [FLW] occur each year from just 79 products from farm gate to retail, representing over 35% of total food produced in [Mexico].” (WRAP and World Bank,

2020)

(b) From the FAO Food Loss and Waste Database (whole value chain):

Commodity	Year	Loss Percentage	Commodity	Year	Loss Percentage
Avocados	2011	3.90%	Milk	2013	37.14%
Bananas	2011	0.45%	Onions	2013	32.08%
Barley	2011	15%	Oranges	2013	23.22%
Beans	2013	24.96%	Papayas	2013	22.80%
Cantaloupes	2013	41.24%	Pepper	2013	45.46%
Carrots	2013	19.01%	Pig	2013	40.91%
Cattle	2013	34.87%	Pineapples	2013	32.78%
Chillies	2013	44.14%	Potatoes	2013	37.11%
Cucumbers	2015	45.46%	Pumpkins	2013	14.65%
Eggplants	2013	49.07%	Rice	2015	46.87%
Eggs	2013	37.66%	Sorghum	2011	1.50%
Grapes	2013	45.53%	Soya beans	2011	1.70%
Green garlic	2013	21.35%	Tomatoes	2016	7.60%
Lemons	2013	33.38%	Watermelons	2011	0.42%
Maize (corn)	2011	1.10–4.20%	Wheat	2011	1.00%
Mangoes	2011	0.17%			

(c) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	886	930	555	583	1,662	1,992	663	830	1,591	1,991	5,358	6,326
Roots & Tubers	270	302	232	260	179	203	49	55	37	42	767	862
Oilseeds & Pulses	103	115	48	54	131	238	60	80	59	79	402	565
Vegetables	2,852	3337	1,141	1,335	576	581	415	404	293	285	5,276	5,941
Fruits	3,584	4458	1,434	1,783	1,039	1,309	736	907	519	640	7,311	9,096
Meat	188	234	35	43	158	196	405	526	486	631	1,272	1,630
Fish	87	99	82	96	70	82	189	183	76	73	503	532
Eggs	169	198	0	0	7	8	97	114	97	114	369	434
Milk	421	498	697	824	109	129	1,211	1,332	606	666	3,044	3,449

Actions

1. The Crusade Against Hunger (2013–2018), included efforts to reduce FLW after harvesting, in storage, transportation, distribution, and commercialization (Valencia-Ugalde, 2019, Hsu *et al.*, 2018).
2. According to 2017 APEC Expert Consultation of Food Losses and Waste Reduction report by Mr Fuentes-Rascón, Mexico will take actions to improve agricultural work, devise contingency plans in the face of climate adversities, improve postharvest collection systems, place incentives and support systems for food distribution, improve food shelf life, optimize food outlets, and recover food throughout the food supply chain for distribution to target population.
3. “[The General Health Law] requires organizations supplying, receiving, or distributing food to comply with sanitary controls set forth in the law. However, it does not offer additional guidance or reference specific provisions with which food donors and food recovery organizations must comply. ... The said law protects food donors by shifting exclusive

responsibility to intermediary food recovery organizations. It also imposes penalties for those that knowingly or negligently authorize the distribution of food that is unsafe for human consumption. Some states have also adopted liability protections for food donation.”³⁴

4. “Mexico provides domestic tax deductions to corporate and individual taxpayers that offer food for donation, provided it is still suitable for human consumption. Donors agree that the general deduction, which allows donors to claim up to 7% of the donor’s taxable income or profit, and an additional monthly deduction do not always cover the full cost of donation.” (*ibid.*).
5. “Mexico has enacted domestic date labeling standards, which require manufacturers of prepackaged foods to select from either a safety-based label, referred to as the “expiration date,” or a quality-based label, referred to as the “preferred consumption date.” The law does not address whether food may be donated after the preferred consumption date has passed.” (*ibid.*)
6. The government has been working closely with the FAO since 2017 to design policies to reduce FLW across the supply chain.³⁵
7. The Mexican Association of Food Banks (BAMX) coordinates the work of more than 50 independent food banks across more than 27 Mexican states.³⁶
8. Mexico’s Institute of Statistics and Geography piloted the ERAMO Food Waste and Organic Matter Survey to measure FLW, in collaboration with several universities and higher education institutions throughout Mexico. The basic objective was to establish an official “baseline” for FLW in Mexico. The survey covers the whole food supply chain (Dy *et al.*, 2021).
9. The Cheaf App in Mexico allows restaurants to avoid food waste and recover cost by offering unsold food at lower price to consumers (Díaz, 2020; García, 2021).

3.12 New Zealand

Target

New Zealand (NZ) does not currently have an economy-wide food loss and waste reduction target.

Measurement

The Ministry for the Environment is establishing a baseline measure of food loss and waste across New Zealand. The initiative is in response to a recommendation by the Environment Committee in its March 2020 report (Webb, 2020). The research has been carried out by the University of Otago and has measured food loss and waste throughout the food supply chain and where it ends up (e.g., landfill, compost, animal feed). Findings are expected to be published by the end of 2025.

1. Food Waste

³⁴ More information available at: <https://atlas.foodbanking.org/map>. (Accessed 10-May-2025)

³⁵ More information available at: <https://www.fao.org/mexico/programas-y-proyectos/iniciativa-para-la-reduccion-de-perdidas-de-alimentos-en-mexico/en/>. (accessed April 26, 2025)

³⁶ More information available at: <https://bamx.org.mx/>. (accessed April 26, 2025)

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	291,769.10	316,590.00	58.84 [†]	61.06
Out of Home Consumption	122,305.87	204,551.67	24.66	39.45
Retail	14,923.27	16,192.80	3.01	3.12

[†] In UNEP (2021) report, this figure is 61 kg/capita.

(b) In 2025, New Zealand households threw out approximately NZD 3 billion of avoidable food waste (Rabobank, 2025).

2. Food Loss and Waste

(a) A report for Preventing Food Loss and Waste in Aotearoa New Zealand: Evidence for Action Across the Supply Chain (Office of the Prime Minister's Chief Science Advisor, 2024) presents domestic data for estimated losses of each meat species based on a 12-month time frame.

Type	Livestock quantity (millions)	Liveweight per animal (kg)	Casualties (% loss)	Estimated quantity of casualty animals (thousands)	Estimated liveweight of casualty animals (tonnes)
Calves	5.1	35.0	2.4	120	4,195
Cattle	9.6	467.0	1.9	182	85,181
Chicken (meat)	119.0	2.5	2.0	2,380	5,950
Farmed deer	0.8	85.0	3.4	28	2,400
Lambs	20.9	4.5	2.5	523	2,351
Sheep	25.5	60.0	3.6	918	55,080
Total	181.5	-	-	4,151	161,180

Note: Table 2 in the cited report.

The same report also estimated horticultural pre- and post-harvest losses for some fruits, as shown below.

Crop	Pre-harvest % losses	Post-harvest % losses	Context
Glasshouse tomatoes	14	3	From direct measurement of unharvested tomatoes and rejected tomatoes at a glasshouse.
Apples	10	16	Estimates from a report that surveyed 15 growers (65% of orchard land) in Central Otago (2021). Pre-harvest: farmer estimates of unharvested fruit. Post-harvest: harvest and process losses.
Apricots	6	12	
Cherries	8	14	
Nectarines and peaches	4	12	

Note: Table 3 in the cited report.

(b) A mixed-methods study undertaken in New Zealand in 2020 estimated that food not sold or utilised at the retail level in New Zealand amounted to approximately 13 kilograms per capita per year, with 3 kilograms per capita per year being sent to landfill. The retail study identified fresh vegetables (27%), bakery items (23%), meat and fish (19%), and fresh fruit (17%) as the major contributors to total discarded food. The research was informed by on-site food waste audits (16 stores), interviews and analysis of existing data from three major retailers (Woolworths, New World, and PAK'nSAVE) across four major urban

- centres. The study extrapolated this data across all stores to estimate that 60,500 tonnes of unsold or unused product are produced annually, some 14,000 tonnes of which go to landfill (Goodman-Smith et al., 2020).
- (c) Analysis of New Zealand's hospitality sector by WasteMINZ (2018) found that cafes and restaurants generate an estimated 24,400 tonnes of food waste each year, with an unknown proportion going to landfill. Of this, 61% is considered avoidable waste, including preparation waste (60%), plate waste (33%), and spoilage (7%). The primary types of food wasted are vegetables (28%), bakery items (26%), meat (13%), and fruit (9%). Data informing the study were collected through bin audits of businesses.

Actions

1. Food waste donation is supported by the Food Act 2014 which provides that: "A donor is protected from civil and criminal liability that results from the consumption of food donated by the donor if the food was safe and suitable when it left the possession or control of the donor; and as applicable, the donor provided the recipient with the information reasonably necessary to maintain the safety and suitability of the food." (Food Act, 2014, s352).
The Ministry for Primary Industries (MPI) which administers the Food Act 2014, has also developed advice on: reducing food waste at home and reducing food waste for businesses.
2. In 2020 the New Zealand Government agreed to adopt a domestic definition and undertake a baseline measure of food loss and waste.
3. In May 2022 New Zealand's first Emissions Reduction Plan (ERP1) was published and served as a roadmap for reducing emissions for the next three years. It included several food waste-related actions including diverting food waste from landfills, improving methane capture from landfills and encouraging behaviour change.
4. As a result of ERP1 a **National Food Waste Reduction Partnership Programme** was established to deliver domestic-level behaviour change programmes that reduced food waste and emissions. Six organisations received a collective NZD 6.8 million in government funding for projects that aimed to reduce food waste in three settings: households; Māori-led settings and businesses. Most of the projects were for three years and will be completed by mid-2025.³⁷
5. Between 2022-2024 food loss and waste was one of four major projects that was investigated by the Prime Minister's Chief Science Advisor. Five reports explored evidence-based solutions to address food lost or wasted throughout the food system.³⁸
6. In 2023 Ministry for the Environment developed and published definitions for food loss and food waste to enable a consistent approach to be taken with food reduction initiatives (Ministry for the Environment, 2023). These definitions were used as the basis for the domestic baseline measure for FLW undertaken by the University of Otago.
7. The second Emissions Reduction Plan (ERP2) was published in 2025 and

³⁷ More information available at: <https://environment.govt.nz/what-you-can-do/funding/resources-for-seekers-of-environmental-funding/national-food-waste-reduction-programmes/>. (Accessed 10-May-2025)

³⁸ More information available at: <https://www.pmcsa.ac.nz/topics/food-rescue-food-waste/>. (Accessed 10-May-2025)

serves as the roadmap for reducing domestic emissions from 2026-2030. The main FLW-related action in ERP2 is: “investigate ways of improving organic waste disposal and landfill gas capture.” ERP2 notes the opportunity to use organic waste streams to capture biogas and upgrade it to biomethane which is chemically identical to natural gas. The plan also notes that the Waste Minimisation Fund (WMF) will be used to support infrastructure projects and systems that reduce organic waste and emissions.³⁹

8. The (WMF) is administered by Ministry for the Environment and provides funding for projects which divert waste from landfill. Minimum grants are NZD 100,000. Ministry for the Environment typically provides 40% of funding, or 50% if the proposal has a strong public benefit, or 75% if there are highly compelling benefits to the public. A range of projects are funded, from feasibility studies, recycling infrastructure (optical sorters, wash plants, granulators) to curbside recycling collections. Following the direction in ERP2, as of 1 July 2025, the WMF is currently accepting applications for projects that improve:
 - sorting and separation of organic material
 - resource recovery systems
 - processing capabilities for organic waste.
9. The WMF is funded from a waste disposal levy. Ministry for the Environment has progressively increased the levy from NZD10/tonne as set in 2009, increasing to NZD 75/tonne in 2027. Half of the funds raised through the levy are allocated to territorial authorities for waste minimisation activities, approx. NZD 30 million per annum is allocated to the WMF and the remainder supports other government priorities.
10. The Ministry for Social Development provides support for the food rescue sector through its Food Secure Communities programme. In addition to funding local community food providers, the programme also helped to establish three government partner organisations:
 - (a) New Zealand Food Network – distributes bulk surplus and donated food from food producers, growers and wholesalers to food hubs around New Zealand on an ‘as required’ basis. These food hubs then distribute the food onto foodbanks and other community food services.
 - (b) Aotearoa Food Rescue Alliance – provides central government support for local food rescue organisations to reduce food waste and increase food security through capacity building, promoting good practice, enhancing collaboration and advocacy.
 - (c) Kore Hiakai Zero Hunger Collective – supports frontline community food organisations to distribute food in many enhancing ways, while also undertaking work to address the root causes of food insecurity (Ministry for the Environment, 2023).
11. Additional funding opportunities are available through the Bioresource Processing Alliance. The Alliance is government funded and brings together industry knowledge and research expertise to support the research and development of projects that aim to create value from low-value biological by-products from primary industry processing. This includes raw materials

³⁹ More information available at: <https://environment.govt.nz/assets/publications/climate-change/ERP2/New-Zealands-second-emissions-reduction-plan-202630.pdf>. (Accessed 10-May-2025)

derived from forestry, marine, agricultural, horticultural, animal and microbiological streams. The aim is to increase productivity, generate export revenue, and create environmental and social benefits for New Zealanders.⁴⁰

3.13 Papua New Guinea

Target

“Papua New Guinea has determined additional adaptation priority areas as part of the 2019–2020 regional and sectoral consultations of the Green Climate Fund Readiness Support project... The additional adaptation priority areas include Forestry and Land-Use, Waste, Fisheries, Extractive industries, Biodiversity and Tourism/Cultural. These priority areas are linked to the agriculture, health, natural resources, and environment sector.” (PNG’s NDC, 2022, p.23)

Measurement

1. Food Loss: No data was found.
2. Food Waste
(c) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	798,767.09	903,212.89	83.71 [†]	89.05
Out of Home Consumption	242,642.27	315,733.62	25.43	31.13
Retail	137,260.21	98,133.68	14.38	9.68

[†] In UNEP (2021) report, this value is 91.

(d) In the PacWastePlus 2023 report for Papua New Guinea, ‘organic waste’—of which food waste is a part—contributes 40.18% of the economy’s municipal solid waste (SPREP, 2023).

3. Food loss *and* waste
Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	0	4	0	3	46	99	8	17	105	223	159	345
Roots & Tubers	373	387	149	155	166	172	52	54	203	211	942	979
Oilseeds & Pulses	86	106	0	0	3	5	7	7	27	27	124	144
Vegetables	106	112	17	18	4	5	24	25	61	65	212	224
Fruits	471	476	75	76	21	21	101	104	265	272	933	949
Meat	9	10	2	3	20	21	25	27	67	74	124	134
Fish	16	16	1	1	11	11	18	10	65	36	111	74
Eggs	0	0	0	0	0	0	0	0	1	1	1	1
Milk	0	0	0	0	0	0	0.32	0.40	9.71	12.00	10.03	12.40

Actions

1. Under the priority area of “Other - Waste” of the Papua New Guinea’s 2022

⁴⁰ More information available at: <https://bioresourceprocessing.co.nz/what-we-do/>. (Accessed 10-May-2025)

NDC (p.26), one of the supported adaptation actions is municipal waste management planning and household waste management, both of which in principle, include food waste.

2. **“National Implementation Plan for Management of Persistent Organic Pollutants in Papua New Guinea”**, which was rolled out from 2006–2011, as part of PNG’s commitment to the Stockholm Convention, in principle covers waste streams that are considered FLW. Among their action plans (pp.70–75), there is review and amendment of relevant legislation, establishment of an enabling policy framework, capacity building and training, awareness and education programmes.
3. In the 2021 APEC Minimizing Food Loss and Waste Survey (Full Survey Report), one of the respondents from PNG mentioned the Market for Village Farmers (MVF) project – **Maket Bilong Vilis Fama**, “closely linking farmers with buyers of produce in a productive and mutual partnership arrangement. It aims to synchronize production with markets and brings markets closer to farmers, even to their farm gates. This hopes to lessen the length of the supply chain and ensures that the fresh produce is properly packaged and stored and handled along the food value chains, in as far as distant markets are concerned.” (p.34) This project covers six provinces within the economy, namely, Eastern Highlands, Western Highlands, East New Britain, Jowaka, Morobe and Simbu. At its inception, it was expected to directly benefit about 25,000 farming households or around 125,000 individuals.⁴¹
4. As part of the above project, the supervision report as of Aug 2024, mentions that “Waste management is practiced in the operation of the solar dryers where low quality bulb onions and other crops are used for fertilizer. Discarded pine cones in the solar dryer are also used for fertilizer.” (p.18) This reduces pre-harvest food loss.

3.14 Peru

Target

“Peru has reported not having yet set an explicit target for reducing FLW. However, it is working on setting a target to measure SDG 12.3.1.” (Méndez-Lazarte, 2025, p.82)

Measurement

1. Food Loss

The FAO Food Loss and Waste Database:

Commodity	Location	Year	Food Supply Stage	Loss Percentage
Potatoes	Lima	2016	Processing	2.27%
	Lima		Trader	1.22–3.72%
	Junín and Ayacucho		Farm	9.38–19.62%
Beans, dry	Selva and Coast Region	2013	Post-harvest	15.00–25.00%
Maize		2013	Post-harvest	25.00%

⁴¹ More information available at: <https://www.ifad.org/en/w/projects/2000000899>. (Accessed Mar 3, 2025)

Wheat	Assam	2013	Post-harvest	15.00–25.00%
-------	-------	------	--------------	--------------

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	2,354,805.83	2,983,734.78	71.74	87.63
Out of Home Consumption	898,852.73	1,618,974.18	27.38	47.55
Retail	508,471.65	647,123.86	15.49	19.01

(b) Solid waste in Peru reached approximately 19,000 tonnes, of which approximately 54% are organic waste, 20% are reusable inorganic solid waste, and only 52% of waste is disposed in landfills (Ministry of Environment, 2019).

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	140	144	87	91	423	449	172	183	412	439	1,234	1,307
Roots & Tubers	868	1,063	746	914	331	384	90	104	69	80	2,105	2,546
Oilseeds & Pulses	23	30	11	14	26	35	15	17	14	16	89	113
Vegetables	606	620	242	248	161	147	116	106	82	75	1,206	1,196
Fruits	1,159	1,553	464	621	310	375	206	248	145	175	2,284	2,972
Meat	52	67	10	12	44	56	38	98	46	118	189	352
Fish	284	315	239	267	204	228	80	93	32	37	839	940
Eggs	25	33	0	0	1	1	11	16	11	16	48	65
Milk	70	82	116	136	18	21	142	233	71	117	417	590

Actions

1. According to the report of Méndez-Lazarte (2025, pp. 82–83), As part of governance, Peru established the Multisectoral Commission on Food and Nutritional Security, which “brings together a variety of public and private stakeholders around a diversity of food security challenges, including FLW.” (Méndez-Lazarte, 2025, pp. 82–83) Various government and non-government agencies/organizations also undertake different activities to address the issue of FLW, including food recovery and utilization, education, efficiency improvement of the production chain, and transforming food waste into animal feed.

This Commission coordinates, articulates, formulates, and monitors public policies on food security and nutrition, such as regulations to prevent and reduce food loss and waste. Its work is very important for governance, since strengthening the food system and ensuring food security are very complex issues that require the approach and coordination of different actors.

2. Laws regarding FLW taken from the report of Méndez-Lazarte (2025, pp. 84–85) and <https://atlas.foodbanking.org/map> (accessed 4-May-2025):
 - a. Law No. 30988 (2019) to promote the reduction and prevention of food loss and waste at all stages of the food supply chain.
 - b. Law No. 31477 and Law No. 30498 promote actions that “allow the recovery of foods of agricultural, fishing and aquaculture origin suitable

- for direct human consumption to supply the population in vulnerable conditions, in accordance with the provisions of Law No. 30988”, and to “facilitate the transportation of donations in situations of natural disasters.” These laws have a direct impact on improving the population's food security and nutrition.
- c. Consumer Protection and Defense Code (Law No. 29571) has provisions for food labelling. Other laws and regulations in this space include the Peruvian Technical Standard NTP 209.03837, which requires perishable food items to indicate an “expiration date,” but this date is not defined as a safety-based label. There is neither an alternative quality-based label for manufacturers.
 - d. Regulation of Legislative Decree No. 1304 (DS 007-2024-PRODUCE) “approves the Regulations of the Law on Labeling and Verification of the Technical Regulations of Manufactured Industrial Products”.
 - e. The Food Donation Law imposes limited legal liability on food donors and food recovery organizations only if there is proof of gross negligence or fraud.
 - f. Under the Food Donation Law, corporate donors may claim up to 10% of their net income, with the deduction not to exceed 1.5% of the total value of net food sales made by the donor during the fiscal year. There are also extra benefits during emergency cases. Moreover, food is subject to the 16% general sales tax (IGV), which may be reclaimed by donors on food donations to tax-exempt organizations that are registered as donation-receiving entities pursuant to the Food Donation Law. However, many organizations still reckon that it is cheaper to discard food than to donate it.
 - g. Law of Integral Management of Solid Waste (Decreto Legislativo N 1278), and Regulation of Law of Integral Management of Solid Waste (Decreto Supremo N 014-2017-MINAM) for the prevention or minimization of the generation of solid waste at source, compared to any other alternative.
3. The Law Against Food Loss and Waste (Law No. 30988) extends financial support for FLW reduction and prevention activities, including grant competitions to fund relevant projects.
 4. Banco de Alimentos Peru was endorsed by the Global Food Banking Network since 2014. They recover food and redistribute them to communities with food insecurity. There are currently nine food banks promoted by the UN World Food Programme (WFP), and three more are expected to open in 2025. Between September 2023 and October 2024, these food banks are estimated to have benefited approximately 316,000 people.
 5. The Ministry of Agricultural Development and Irrigation, together with the FAO representative in Peru, implemented the “Good Practices Award for Preventing and Reducing Food Loss and Waste.” This initiative seeks to recognize good practices implemented by civil society organizations, academia, local governments, and the private sector, in order to raise awareness and involve all these stakeholders in solving this problem. This initiative recognized best practices in various categories, such as experiences in food production, marketing, and food recovery. Five successful experiences were recognized, such as a restaurant project that

maximizes the use of food by creating recipes that make use of fruit peels; as well as experiences from social organizations that recover food in markets and farms to benefit vulnerable populations.

6. During PPFS-APEC activities last year, Peru prioritized the development of the "Trujillo Principles for the Prevention and Reduction of Food Loss and Waste in the Asia-Pacific Region." This document was developed jointly with PPFS delegates and welcomed at the Food Security Ministerial Meeting on August 18, 2024, in Trujillo, Peru. These Principles aim to support economies in designing and implementing effective policies to prevent and reduce food loss and waste, with a circularity approach, in order to strengthen our agri-food systems and enhance their resilience and sustainability.

3.15 The Republic of the Philippines

Target

Under The Republic of the Philippines Climate Change Action Plan (NCCAP) 2011 – 2028, one of the three main outcomes under the Strategic Actions on Climate-Smart Industries and Services for 2011–2028 is to develop “green cities and municipalities.” And one of the strategies to achieve this is to “intensify waste segregation at source, discard recovery, composting, recycling.” (NCCAP, p.21) This should improve food waste reduction.

In the economy report of The Republic of the Philippines in the APEC 2023 Workshop on Food Loss and Waste, the representative of the Philippines reported that The Republic of the Philippines aims to reduce post-harvest losses by 10% in 5 years [presumably, by 2028] (Dy *et al.*, 2024, p.10).

Measurement

1. Food Loss:

From the FAO Food Loss and Waste Database:

Commodity	Area covered	Year	Loss percentage	Food supply stage
Lettuce and chicory	Mindanao	2011	11.50%	Wholesale
Mangoes, guavas and mangosteens	Bataan	2018	9.26%	Farm
		2018	2.14%	Transport
	Calabarzon	2018	6.70%	Wholesale
	Oriental	2018	4.89%	Farm, Sorting
	Mindoro	2018	3.33%	Transport
Papayas	Blumentritt	2018	2.50 – 5.50%	Wholesale
	Divisoria	2018	2.50 – 5.50%	Wholesale
	Mindanao	2011	40.10%	Transport
		2011	15.30%	Wholesale
Rice		2013	2.00 – 6.00%	Storage
		2013	3.00 – 10.00%	Farm - Handling
		2013	1.00 – 5.00%	Farm - Drying
		2013	2.00 – 6.00%	Farm - Threshing

Tomatoes	Laguna	2018	0.28%	Farm
		2018	0.60%	Packing
		2018	3.60%	Wholesale
		2018	1.48%	Distribution
	Mindanao	2011	10.80%	Wholesale

2. Food Waste

(a) In the UN SDG data portal, there are two food waste measures available for individual economies.⁴² The data for 2019 and 2022 are shown below. They closely match the values in the UNEP Food Waste Index Report 2021 and 2024, respectively, for household waste.

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	9,334,476.59	2,954,580.30	84.57	25.57
Out of Home Consumption	2,989,215.82	4,660,965.97	27.08	40.33
Retail	1,690,968.34	5,113,255.41	15.32	44.25

(b) The UNEP Food Waste Index Report 2024 cites an unpublished UN Habitat report that shows data for household food waste for some provinces.⁴³

- Cagayan de Oro: 26 kg/capita/year
- Legazpi: 33 kg/capita/year
- Ormoc: 18 kg/capita/year

3. Food loss and waste

(a) From the FAO State of Food and Agriculture 2019, Table A6 (p.141), FLW Estimates from Grey Literature, [Economy] and Sectoral Reports between 2000 and 2017 are aggregated:

Observation	Mean	Median	s.d.	Min.	Max.
17	6.9	8.4	4.4	1.0	15.5

(b) From the FAO Food Loss and Waste Database (whole supply chain), Pastolero and Sassi (2022).

Commodity	Loss percentage
Bananas	20.05%
Maize (corn)	14.69%
Rice	18.10%

(c) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

⁴² “Estimates of individual [economies] ... are datapoints from existing studies or extrapolations from other [economies]’ data.” (UNEP 2024, p.7)

⁴³ UNEP (2024, p.145) explains “Results were shared by UN-Habitat for the purposes of the Food Waste Index. The Waste Wise Cities Tool methodology guidance document explains the common approach: a sample size of 90 households (10 households from 3 survey areas, with 3 income groups each), increasing to 150 households (5 survey areas) in megacities. Bags were given to households to store all waste generated in the home for eight days, with the first day discarded as it may involve wastes generated before the start of the survey. The waste was sorted into 12 categories, including ‘kitchen/canteen’ as distinct from ‘garden/ park’ and ‘wood.’”

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	1,098	1,500	1,204	1,645	1,492	2,100	395	553	581	812	4,769	6,610
Roots & Tubers	184	176	546	524	30	20	262	175	71	47	1,092	942
Oilseeds & Pulses	726	717	1,157	1,143	48	78	28	39	14	19	1,973	1,996
Vegetables	886	939	452	479	60	63	508	528	310	323	2,217	2,333
Fruits	2,237	1,553	1,141	621	116	375	922	248	562	175	4,978	2,972
Meat	100	86	5	4	84	73	263	295	150	169	602	627
Fish	187	153	262	240	186	171	467	463	62	62	1,164	1,089
Eggs	42	66	0	0	0	0	11	20	7	13	61	99
Milk	1	1	1	2	0	0	11	343	1	34	14	380

Actions

1. In terms of food security, Output Area 1.2 of the NCCAP is to formulate “climate-sensitive agriculture and fisheries policies, plans and program,” under which the government intends to scale up best practices in “agricultural and fisheries waste recycling and composting.” (1.2.2.e; NCCAP, p.66) This should aid in reducing food loss.
2. Several bills for food waste reduction have been proposed in the legislature since 2016 (Santiano, 2024), the most recent one was the Zero Food Waste Act of 2022 (Senate Bill No. 240) (Austria, 2023), but none have passed into law.
3. “Although there are no laws in The Republic of the Philippines exactly like the ones implemented in France, there is one that merely encourages the donation of food for charitable purposes, which is Republic Act No. 9803, also known as the ‘Food Donation Act of 2009’” (Santiano, 2024), which states on Section 2 thereof that the purpose of encouraging food donations is to “alleviate [The Republic of the Philippines] poverty and reduce food wastage.”⁴⁴
4. Private initiatives: **Ajinomoto Philippines Corporation** reduce food loss by, for instance, “recovery of fermentation liquids left over from making [its] umami seasoning, which are then used as organic fertilizer and animal feed.” Then, to tackle food waste, the company launched a “TOO GOOD TO WASTE” campaign in the Republic of the Philippines “to raise awareness and offer food loss and food waste solutions..., providing recipes that use leftover ingredients, and helping consumers enjoy delicious food while doing something good for the planet.”⁴⁵

3.16 The Russian Federation

Target

No data was found.

⁴⁴ More information available at: <https://www.officialgazette.gov.ph/2009/11/20/republic-act-no-9803/>. (Accessed Feb 27, 2025)

⁴⁵ More information available at: <https://www.ajinomoto.com.ph/nutrition/too-good-to-waste-food-loss-and-food-waste-reduction-for-a-sustainable-future>. (Accessed Feb 27, 2025)

Measurement

1. Food Loss: No data was found.

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	4,868,563.96 [†]	4,829,771.59	33.41 [†]	33.37
Out of Home				
Consumption	4,033,088.23 [‡]	1,220,199.45	27.67 [‡]	8.43
Retail	2,001,062.31	1,985,117.99	13.73 [†]	13.72

[†] Tiarcenter (2019). Foodsharing in Russia. Moscow. https://tiarcenter.com/wp-content/uploads/2019/11/ENG_Foodsharing-in-Russia_2019.pdf.⁴⁶

[‡] Filimonau, V. and Ermolaev, V.A. (2021). A sleeping giant? Food waste in the foodservice sector of Russia. *Journal of Cleaner Production* 297, 126705. <https://doi.org/10.1016/j.jclepro.2021.126705>.⁴⁷

- (b) “In The Russian Federation around 70 million tonnes of solid waste are generated annually. Food waste accounts for about 25% of this volume (17.9 million tonnes per year). On average, The Russian Federation throws away about 88 kg of food a year. 94% of food waste in the Russian Federation is dumped in landfills and carbon footprint of this waste is estimated at 64 million tonnes of CO₂ eq. Food waste generated by households accounts for 71% of total food waste in the Russian Federation and food waste generated by food-related businesses – for 29%. When the types of food waste are separated, the top three consist of: 1) Cereal products (bread and pasta products), which ranked first in household waste (62%) and third in wholesale and retail food waste (12%); 2) Dairy products (milk, kefir, yoghurt, cheese, fermented milk) were the most prevalent in wholesale and retail waste (47%) and ranked fifth (5%) in consumer waste; and 3) Potatoes comprised 15% of consumer waste and 11% of wholesale and retail waste.” (Attavanich *et al.*, 2022, p.8)
- (c) The Russian Environmental Operator (REO) “estimated that nearly 16 million tonnes of food waste is generated in [The Russian Federation] on average per year. This makes up roughly 30% of municipal solid waste.” (Vorotnikov, 2022).

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

⁴⁶ UNEP (2024, p.122) explains, “The paper cites what is assumed to be a waste composition analysis by the Higher School of Economics (which was not found when searched for) and data from Rosstat. The shares of waste at each stage were calculations based on data from Russian Agriculture Ministry (2017). The estimate provides a total food waste estimate as well as the amount of waste at each stage of the chain; these were then combined to form sector-specific estimates.”

⁴⁷ UNEP (2024, p.154) explains that this was from a study in Kemerovo, then its results scaled to the whole of the Russian Federation. The report further indicates, “In the Russian Federation, food waste is collected and organizations pay for the weight of waste collected. For the study, 21 food service businesses (for-profit restaurants only, public sector excluded) provided their financial records for an estimate of food waste generated to be calculated. In-situ observations were also made.”

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	732	1,097	1,435	2,150	2,423	2,611	415	449	5,088	5,499	10,094	11,807
Roots & Tubers	6,897	3,872	2,483	1,394	1,630	1,247	505	388	1,591	1,219	13,107	8,120
Oilseeds & Pulses	569	1,167	51	105	130	169	30	39	117	154	898	1,634
Vegetables	3,424	2,862	685	572	149	140	668	631	1,964	1,852	6,889	6,057
Fruits	648	989	130	198	83	114	337	463	1,034	1,422	2,231	3,185
Meat	158	202	33	43	381	488	476	531	1,310	1,461	2,359	2,726
Fish	232	259	12	13	219	253	295	335	361	410	1,118	1,271
Eggs	100	108	0	0	10	10	49	53	194	211	352	382
Milk	1,117	1,196	154	165	294	315	126	119	1,768	1,661	3,459	3,455

Actions

1. "In The Russian Federation a draft law on food sharing – on the possibility of retail chains to donate to charity organizations products whose shelf life is coming to an end– is being developed. According to the bill, retailers will be exempt from paying VAT on products donated for charity projects. A number of food-sharing initiatives have developed in the Russian Federation recently. Among them is first food bank in the Russian Federation "Foodbank Rus". It realizes projects with producers and retailers, for example, with X5 Retail Group, to donate products to help people in need." (Attavanich *et al.*, 2022, p.18)
2. In 2022, "the Russian Environmental Operator (REO) and the biggest food retailer Magnit have jointly developed a comprehensive [economy-wide] programme of food waste management, under which food waste collected throughout the supply chain should be sold to "specialised organisations" through an electronic trading platform." (Vorotnikov, 2022)
3. "Using expired food in feed and fertiliser production was legally approved ... in 2020," although in 2022, their government "had to prohibit adding even heat-treated food waste in pig feeding, citing veterinary risks." (Vorotnikov, 2022)
4. In the unofficial translation by the UNFCC of the Russian Federation's "Strategy of socio-economic development of the Russian Federation with low greenhouse gas emissions until 2050," there are several measures to be implemented that can aid in reducing food loss and waste:
 - a. "stimulating the equipping of buildings with installations that use and produce renewable energy (solar collectors for hot water supply, photovoltaic panels for generating electricity, heat pumps, apartment and communal wastewater heat recovery units, food waste grinders for processing them into biogas at treatment facilities, etc.);
 - b. formation of a system for the separate collection and accumulation of waste, including the accumulation of organic waste
 - c. distribution of landfill gas collection technologies and its use as fuel, the maximum direction of organic waste to production facilities, including commercial compost, biogas or feed for animals and aquaculture;
 - d. production of biofuels in livestock and crop production, the introduction of biogas complexes for the disposal of organic waste."

3.17 Singapore

Target

In 2019, Singapore's Ministry of Environment and Water Resources (MEWR) released the Zero Waste Master Plan, which aims for a 30% reduction of waste sent to their landfill each day by 2030. Food waste is one of the "priority waste stream" envisaged in the plan.

Measurement

1. Food Loss: No data was found.
2. Food Waste
 - (a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	465,355.13	409,181.71	79.3	68.5
Out of Home Consumption	148,418.38	209,651.05	25.3	35.1
Retail	74,360.68	274,980.03	12.7	46.0

- (b) Based on statistics gathered by the Save Food Cut Waste organization, "Singapore threw away about 0.68 million tonnes of food waste in 2011 and only 10% was recycled. This means on average, each person in Singapore generated about 130 kg of food waste a year."⁴⁸
- (c) In the Zero Waste Masterplan of Singapore, it's reported that "According to an NEA study in 2016–2017, each household disposed of 2.5 kg of avoidable food waste each week. Rice, noodles and bread were among the most commonly wasted food items. ... In 2018, food waste made up one-fifth of the total amount of waste disposed of in Singapore [fifth highest], but only 17% of food waste was recycled."
- (d) Replying to parliamentary question on commercial and industrial food waste, Ms. Grace Fu, Minister for Sustainability and the Environment, reported that "The total amount of food waste generated in 2022 was 813,000 tonnes, close to the 817,000 tonnes in 2021. About 40% of Singapore's total food waste generated was from commercial and industrial sources."⁴⁹

Actions

1. Singapore launched a waste reduction publicity program in November 2015 to "encourage consumers to adopt smart food purchase, storage and preparation habits to help them minimise food wastage" through educational advertisements and videos distributed via social media and community events. They trained hundreds of Food Waste Reduction Ambassadors. In 2019, they adopted the slogan, "**Buy, Order or Cook Just Enough**". They partnered with "hawker centres and organisations such as Dairy Farm Singapore, NTUC FairPrice, Prime Supermarket and Sheng Siong Supermarket, [and educational institutes] to engage consumers at points-of-consumption." They advised consumers to "order only what you can finish,

⁴⁸ More information available at: <http://www.savefoodcutwaste.com/food-waste/food-wastage-in-singapore/>. (accessed May 20, 2025)

⁴⁹ More information available at: <https://www.mse.gov.sg/latest-news/written-reply-to-pq-on-commercial-and-industrial-food-waste>. (accessed May 20, 2025)

- ask for less rice or noodles if you cannot finish them and to say ‘no’ to side dishes you will not eat.” (MEWR, 2019, pp.25–26)
2. Publishing guidebooks for different stakeholders:
 - a. In 2016, Singapore published three food waste minimization guidebooks, one each for food manufacturing establishments, supermarkets, and retail food establishments.
 - b. In 2017, Singapore published “Love Your Food: A Handy Guide to Reducing Food Wastage and Saving Money” advising consumers on ways to reduce food waste in areas including cooking, grocery, office pantry, kitchen, parties, etc.
 - c. Food Waste Segregation and Treatment Guidebook (2020)
 - d. Love Your Food: Waste Less Save More @ Canteen (2020)
 - e. A dedicated government webpage for food waste management: <https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/food-waste-management/food-waste-management-strategies>
 3. Singapore is “exploring closing waste loops at the district level, such as by converting food waste into useful products like compost, which can be used for landscaping,” especially for newly (re)developed Jurong Lake District and Punggol Digital District. (MEWR, 2019, p.24)
 4. “Singapore’s date labeling regime requires manufacturers to choose between four date labels: “use by,” “sell by,” “expiry date,” or “best before.” [However,] The law does not clearly define these labels as quality-based or safety-based.”⁵⁰
 5. On food donation:
 - a. Singapore “produced a set of guidelines [in 2016] to promote food safety, which includes how to manage pre-packed or perishable food, and transport donated food to recipients.” (MEWR, 2019, p.24)
 - b. “Where there is unsold or excess food that is still suitable for consumption, consumers and food establishments can donate them to food distribution organisations such as The Food Bank Singapore, Food from the Heart, Willing Hearts and Fei Yue Community Services.” (MEWR, 2019, p.38)
 - c. “Singapore is one of the few [economies] to offer comprehensive [economy-wide] liability protections for food donors and food recovery organizations.”⁵¹
 6. On food segregation:
 - a. In May 2020, Singapore launched the Food Waste Fund (FWF), “a one-off new fund aimed to incentivise premises to adopt food waste segregation and treatment solutions in order to improve cleanliness and reduce disamenities from food waste. ... A total of 24 approved projects are supported under the FWF.”⁵²
 - b. Singapore has “passed regulations under the Resource Sustainability Act to progressively require, from 2024, large commercial and industrial

⁵⁰ More information available at: <https://atlas.foodbanking.org/map/>. (accessed May 20, 2025)

⁵¹ More information available at: <https://atlas.foodbanking.org/map/>. (accessed May 20, 2025)

⁵² More information available at: <https://www.nea.gov.sg/committee-of-supply-2022/integrated-sustainability-report-2020-2021/review-of-fy2020/ensuring-a-clean-and-sustainable-environment-for-singapore/sustainable-and-resource-efficient-singapore>. (accessed May 20, 2025)

food waste generators, including hotels, shopping malls, and food manufacturers, to segregate their food waste for treatment or conversion into useful products, and to submit annual food waste reports.”
<https://www.mse.gov.sg/latest-news/written-reply-to-pq-on-reducing-food-waste>

- c. “A Food Waste Treatment Facility (FWTF) is being constructed as part of the upcoming Integrated Waste Management Facility at Tuas Nexus and will serve as an off-site treatment option for owners and operators of premises who segregate their food waste. When the FWTF is operational, the additional biogas produced will boost electricity generation.” (ibid.)
7. Private and not-for-profit initiatives:
 - a. UglyFood hosts a recipe website that is committed “to reducing food waste through creative, resourceful use of ingredients. Each recipe highlights nutritious, budget-friendly meals that promote a healthy lifestyle while cutting down on waste.”⁵³
 - b. Save Food Cut Waste is non-profit organization that’s engaged in “educating individuals, businesses and organisations in Singapore about the environmental and social impacts of food waste, and encouraging everyone to take action in reducing food waste.”⁵⁴
 - c. KosmodeHealth Singapore offers valorisation services which is the extraction of valuable components from food waste like proteins and fiber, and converting them into reusable food ingredients.⁵⁵

3.18 Chinese Taipei

Target

In 2019, Chinese Taipei’s Council for Sustainable Development announced the SDG target 12.3 for the economy is to “Reduce food loss in the production and supply chain and reduce food waste in consumption.” (p.64) Among other things, Chinese Taipei aims to achieve the following specific targets:⁵⁶

Measure	2021 Baseline	2025	2030
Food loss (vegetables & fruits)		8.9%	8.8%
Food waste from hypermarkets (vegetables & fruits)	9.0%	1.5%	1.4%
Food processing loss (advise the number of manufacturers)	23	30	40
Food waste in supermarkets and retailers	10,357.46 tonnes	Statistics on the food waste from supermarkets	Statistics on the food waste from

⁵³ More information available at: <https://uglyfood.com.sg/about-me/>. (accessed May 20, 2025)

⁵⁴ More information available at: <http://www.savefoodcutwaste.com/about/>. (accessed May 20, 2025)

⁵⁵ More information available at: <https://kosmodehealth.com/agrifood/>. (accessed May 20, 2025)

⁵⁶ More information available at: <https://ncsd.ndc.gov.tw/Fore/nsdn/archives/meet3/detail?id=06aed260-a583-4dd6-92d7-9e6c63349fb0>. (accessed May 29, 2025)

Measurement

1. Food Loss

- (a) Based on the 2022 Annual Report on [Chinese Taipei's] Sustainable Development by the **National Council for Sustainable Development** (2023), twenty-one aquacultural waste temporary storage sites handled approximately 17,000 tonnes of waste and reused 6,000 tonnes. The total amount of waste processed was approximately 23,000 tonnes.
- (b) Based on the food balance sheets of 2020 and 2021, the Ministry of Agriculture estimates that the loss of vegetables dropped from 281,000 tonnes in 2020 to 278,000 tonnes in 2021; and the loss of fruits dropped from 313,000 tonnes in 2020 to 302,000 tonnes in 2021 (**National Council for Sustainable Development**, 2023).

2. Food Waste

According to statistics from the Ministry of Environment, the total of leftovers in 2023 is 478,000 tonnes, compared to 609,000 tonnes in 2015 (Ministry of Environment, 2024).

3. Food loss *and* waste

Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	22	22	109	107	306	311	52	53	514	522	1,003	1,015
Roots & Tubers	71	74	20	21	16	10	23	16	31	22	161	143
Oilseeds & Pulses	2	3	1	1	34	33	11	10	42	40	90	86
Vegetables	217	220	156	158	2	2	171	161	299	281	845	822
Fruits	212	209	153	151	5	4	161	150	288	268	819	782
Meat	30	28	8	7	63	58	95	82	262	227	458	403
Fish	81	131	4	6	41	62	95	101	349	369	570	669
Eggs	19	16	0	0	2	1	9	8	67	57	97	82
Milk	17	14	2	2	5	4	8	4	244	119	276	143

Actions

1. In 2022, Chinese Taipei announced Food and Agricultural Education (FAE) Act. Its Article 4.3 states as one of its guiding principles, "Inculcating the idea of treasuring food and reducing waste: Putting into practice consumption of local agricultural products, reducing food waste, reducing the amount of food used, and reducing leftovers; ensuring food safety and food crop safety; encouraging the rational and circular use of farmland, water for agricultural purposes, and other resources; and striving for stable access to food for citizens." In light of this, the government will support institutions, including, as Article 12.3 states, "Putting into practice consumption of locally produced agricultural products, reduction of food waste, reduction of the amount of food used, and reduction of leftovers."⁵⁷

⁵⁷ More information available at:

<https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=M0090039>. (accessed May 29, 2025)

2. In 2021, the Council of Agriculture (now, Ministry of Agriculture, MOA) launched a five-year project for cold chain logistics to enhance Chinese Taipei's competitiveness in exports of processed food and agricultural products. The new projects are mainly aimed at Chinese Taipei's farming products, including fruit and cereal grains, which supply chain management has shown are prone to disruptions, including price fixing by intermediary brokers.
3. The "Guidelines for the Safe and Hygienic Donation of Food" in 2023 indicates that donated food should be consumed within its expiry date and comply with the Act Governing Food Safety and Sanitation. Private organizations or enterprises donating soon-to-expire items to food banks will distribute them as quickly as possible to avoid waste.⁵⁸
4. The Agriculture and Food Agency under MOA has five strategies to reduce FLW: disaster losses, distribution losses, cold chain facilities, post-harvest processing, and circular economy facilities.
5. The amount of food waste recycled by households decreased from 595,000 tonnes in 2018 to 479,000 tonnes in 2023, and the proportion of food waste reused increased from 40% (2018) to 60% (2023). Out of the 479,000 tonnes of recycled food waste in 2023, "feed application accounted for about 41.3% (such as for pig feeding), compost to fertilizer (with high-performance and traditional compost plant) about 48.6%, bio-energy generation 8.7%, and other uses (such as keeping black soldier flies and poultry) 1.4%."⁵⁹
6. When the MOA promoted "Every Class Eats Grouper" in schools to absorb the overproduction of fish, it also promoted the use of fish head and fish bones to make soup, minimizing food waste.
7. Biomass energy centers and food waste compost facilities have been set up in different areas of Chinese Taipei:
 - Food waste compost facility in Hsinchu County, Yilan and Tainan.
 - WaiPu Green Energy Ecological Park
 - Taoyuan Biomass Energy Center
8. Private and not-for-profit initiatives:
 - The Homemaker United Foundation, McDonald's, 7-Eleven, and Family Mart use a pre-order system to manage stock and avoid food waste.
 - The PX Mart, Family Mart, 7-Eleven, and Carrefour offer discounts on products with short expiration dates and also collaborates with local foodbanks to donate unsold food.
 - Fu-Fruit Co., Ltd. invested NTD 2.5 billion to build a "smart cold chain fresh food logistics center" in Tucheng Industrial Zone, New Taipei City. The new factory has full-temperature storage, rapid freezing equipment, and aseptic automatic cutting and packaging production lines. The X-ray foreign object detection machine is used for food safety checks, and then for the automatic weighing scale, filling, vacuum and sealing packaging, etc., to make sure the highest standard of food cold chain operation specifications.

⁵⁸ More information available at:

<https://www.fda.gov.tw/tc/newsContent.aspx?cid=3&id=28512>. (accessed May 29, 2025)

⁵⁹ More information available at: <https://www.ema.gov.tw/en/affairs/general-waste/food-waste/301.html>. (accessed May 23, 2025)

9. Other actions to Reduce FLW in Chinese Taipei:

Type	Program
Education Campaigns	- Cherishing Food Festival, Recycle Leftover Award – from leftover to compost (Ministry of Environment) - Establish New Taipei City Surplus-Food Network - The Ministry of Environment has a dedicated webpage for food waste: https://www.ema.gov.tw/en/affairs/general-waste/food-waste/301.html
Pre-harvest technical support	- Support farmers to use the Agricultural Insect Net, LED insect trap for pest control (Ministry of Agriculture)
Postharvest Facility Support	- Support the farmer to improve postharvest processing of vegetables and grains (Agriculture and Food Agency) - Support food sector in deploying First-In, First-Out (FIFO) method for stock management (Ministry of Health and Welfare)
Improved Handling and Transportation System	- Implement “building an agricultural product cold-chain logistics and quality assurance system”, to ensure quality and reduce waste in transit, ensure stable supply and prices of domestic produce and further the value and safety of agricultural products for export (Agriculture and Food Agency)
Cold Chain Management	- Help public stock keeper to establish low-temperature system to store the public stock paddy (Agriculture and Food Agency)
Packaging	- Subsidize a project of post-harvest process of vegetables and grains, which includes investing in improving the packaging of fruit and grain products. (Agriculture and Food Agency)
Manufacturing Line Optimization	- Support the factory to extend the retention period by processing technologies (Agriculture and Food Agency)
Capacity building for FLW	- APEC Multi-Year Project Workshop on Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain - APEC 2019 Expert Consultation on Reducing Food Loss & Waste (FLW) for Addressing Interlinked Challenges of Food Security and Climate Change - 2021 Workshop on Reducing Food Loss and Waste along the Food Value Chain in APEC during and post COVID-19 Pandemic - 2022 Webinar on Drafting the Implementation Plan for Reducing Food Loss and Waste - APEC 2023 Workshop on Reducing Food Loss and Waste by Strengthening Resilience and Digitalization in APEC Food System. - New Taipei City Sustainable Food Forum - Foodbank experience conference (Ministry of Health and Welfare) - Restaurants effectively use food materials conference (Ministry of Health and Welfare)
Food Donation Support	- Donating food to food banks (Ministry of Health and Welfare) - The Taipei City Government established a leftover exchange counter in the market - The Chinese Christian Relief Association has been administering a 1919 Food Bank program. - The ATF, a foodbank alliance of Chinese Taipei, collects surplus food from wholesalers (Carrefour) and supermarkets for charitable organizations.
Food Waste Recycling	- Yuland Biological Agriculture Co. Ltd used black midges as organic fertilizers.

	- The Environmental Protection Bureau of Yunlin County used food waste as organic fertilizers. - For the Ministry of Environment, “[t]he aim of food waste reutilization is to convert food waste into valuable resources (e.g. animal feed, fertilizer, bio-energy generation etc.)...”
--	---

3.19 Thailand

Target

Thailand does have an explicit target for reducing FLW set for in the Food Management Action Plan Phase I (2023–2027), the Action Plan for Reducing Losses along the Production Chain 2023-2027, and Food Waste Management Roadmap 2023–2030 and Action Plan for Food Waste Management Phase 1 (2023-2027) (The Secretariat of **National Food Committee**, 2024, p.2, p.74, p.75).

In 2024, the Food Waste Management Action Plan, Phase 1 (2023–2027) states that Thailand aims to reduce food waste to less than 28% of total solid waste by 2027.⁶⁰ It also “aims for a 5% reduction of a food loss indicator in the target food group compared to the baseline from 2025 to 2027. Currently, it is in the stage of setting the baseline and developing a draft driving plan for reducing food loss throughout the supply chain.” (Méndez-Lazarte, 2025, p.99)

The targets for reducing food loss in the agricultural sector provided by the Thailand delegates to APEC are as follows:

1. 2023–2027: 3% annual reduction from the baseline
2. 2028–2032: 4% annual reduction from the baseline
3. 2033–2037: 5% annual reduction from the baseline

The indicators and targets of the Food Management Action Plan Phase I (2023–2027)

Indicators	Baseline Data	Annual Targets				
		2023	2024	2025	2026	2027
Reduction in the proportion of food waste to total municipal solid waste	38	35	34	32	30	28
Reduction in the amount of food waste generated from target sectors (kilograms per person per year)	146	130	122	114	105	97

Notes:

1. The proportion of food waste to total municipal solid waste refers to the amount of food waste found in the composition of municipal solid waste at disposal sites.
2. The amount of food waste from target sectors refers to food waste generated from three target sectors: 1) Food retailers 2) Food service providers and 3) Consumers

Measurement

1. Food Loss

⁶⁰ More information available at: <https://online.pubhtml5.com/lmon/urvm/>. (accessed August 23, 2025)

Thailand has established a domestic Food Loss Baseline for agricultural and food products.⁶¹ The baseline food loss rate for Thailand was determined to be 3.79%.

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	5,478,531.87	6,180,468.30	76.83	86.20
Out of Home Consumption	1,925,013.78	2,876,252.73	27.00	40.12
Retail	1,088,960.30	3,579,982.53	15.27	49.93

3. Food loss and waste (percentage of food production lost and wasted)

(a) Loss percentage throughout the agricultural food product supply chain provided by the Thai delegates to APEC:

Commodity	Food Supply Stage							
	Harvesting	Transportation from the plantation	Quality check station at farm	Transportation from Quality check station	Processing & packaging	Distribution to wholesale/retail	Food loss index	Global Food loss index
Cereals and Beans								
Rice	6.95	N/A	2.21	N/A	N/A	N/A	9.16	2.21
Mung beans and Transparent vermicelli	14.17	0.10	4.39	0.37	0.00	0.00	18.32	4.84
Fruits and Vegetables								
Cabbage	15.03	N/A	7.24	3.38	N/A	5.46	21.10	21.52
Tomato	8.82	N/A	2.68	N/A	3.59	0.49	44.91	10.21
Salad vegetable and Lettuce	8.10	N/A	4.90	0.80	33.40	11.80	49.13	44.64
Banana (Cavendish)	1.74	0.28	6.56	N/A	N/A	N/A	8.44	6.82
Fresh and dried longan (with peel)	5.87	N/A	6.15	0.00	0.26	0.71	12.51	7.06
Nam Dok Mai mango	5.33	N/A	4.85	N/A	8.83	0.30	18.12	13.51
Roots, Tubers, and Oil-Bearing Crops								
Oil palm and palm oil	2.46	N/A	1.35	N/A	2.69	0.02	6.36	3.99
Cassava	1.42	1.00	5.00	N/A	N/A	N/A	6.16	3.89
Animal Products								
fresh chicken and frozen fried chicken	0.02	0.23	0.00	0.00	0.00	0.00	0.25	0.23
UHT milk	0.16	0.00	1.60	N/A	N/A	0.85	3.32	2.67
Fish and Fish Products								
Nile tilapia	0.99	0.73	N/A	N/A	N/A	N/A	6.89	1.82

⁶¹ This was based on a study of food losses across five commodity groups, with at least two representative products selected per group, totaling 13 products as follows: Cereals and Beans: 2 products — mung beans and Transparent vermicelli, and rice; Fruits and Vegetables: 5 products — banana (Cavendish), Nam Dok Mai mango, fresh and dried longan (with peel), cabbage, and tomato; Roots, Tubers, and Oil-Bearing Crops: 2 products — oil palm and palm oil, and cassava; Animal Products: 2 products — fresh chicken and frozen fried chicken, and milk; Fish and Fish Products: 2 products — white shrimp and frozen fried breaded shrimp, and Nile tilapia. See Agricultural Research and Development Agency (2020), Attavanich *et al.* (2019), Jakrawatana *et al.* (2020), Mungkung (2023), and Mungkung (2025).

white shrimp and frozen fried breaded shrimp	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
--	------	------	------	------	------	------	------	------

Actions

1. The Action Plan for Food Waste Management Phase 1 (2023-2027) focuses on changing the behaviour of food vendors, food entrepreneurs and consumers. It has the following main principles:
 - a. Food waste prevention at the source through proper planning by producers and consumers to avoid food surplus. It prioritizes managing raw materials and excess food before they become food waste (such as preserving food from excess raw materials or modifying menus from excess food); and food donation to food banks, charity kitchens, and shelters.
 - b. Utilization of food waste, including feeding animals, industrial uses (such as waste-to-energy, and upcycling food waste).
 - c. Composting
 - d. Disposal by landfill/incineration as last resort.
2. Part of the Action Plan is the Food Waste Management Roadmap (2023 – 2030), which aims to be a guideline for food waste reduction action of Thailand. Their activities include:

2023:

 - a. Develop and implement best practices for food waste prevention, reduction, and management among street vendors and business operators
 - b. Raise awareness, instill values, and promote collaboration to change consumer behaviors and the practices of food sellers and preparers regarding food waste prevention, reduction, and management

2024:

 - a. Promote and support public participation in garbage sorting from general waste, and development of waste separation and collection systems
 - b. Establish a solid waste management system at disposal sites

2025:

 - a. Develop a food waste information system, a networking platform, and a Business-to-Business model.
 - b. Establish a Food Waste Knowledge Hub

2026-2027:

 - a. Develop innovative food waste management solutions for food vendors and communities
 - b. Establish networks for food waste management and utilization
 - c. Create financial or tax incentive mechanisms for sellers and business operators
3. Other government policies:

One of the key mandates of the **National Food Committee** is to promote food security throughout the entire production chain, establish robust linkages between food and nutrition, improve the quality of life of the population, and reduce food losses at all stages of the supply chain. Currently, each province

is in the process of developing its own strategic plan that is tailored to local contexts and needs.

The Committee has officially endorsed the Roadmap for Food Loss Reduction through the Production Chain (2023–2027), proposed by the Subcommittee on Food Loss Reduction. Under this initiative, 13 key agricultural commodities have been identified as representative products to determine the domestic baseline for food loss and to develop the Food Loss Index.

The Agricultural Research Development Agency (ARDA) has provided funding to support comprehensive research aimed at establishing baselines and delivering policy recommendations to reduce food loss in Thailand. This research initiative involves collaboration with academic institutions and researchers from universities across the economy.

In parallel, the Department of Agriculture has received government funding to implement the project titled: “Food Loss Reduction through the Agricultural Supply Chain for Sustainable Development Goals”. The project is divided into three phases, with the first phase focusing on reducing food loss in the supply chains of banana, mango, oil palm, and palm oil.

4. In the private sector (some initiatives):

- a. LightBlue is a food waste solutions provider since 2012. Their main goal is to reduce food waste (raising awareness, monitoring, wholistic certification). Their framework is basically to reach zero food waste to landfills. They work mostly with the hospitality industry, but they also partner with educational and other institutions. Their approach is to help establishments set up a food waste monitoring system. To encourage them, Lightblue Consulting makes them see how much they can save in terms of food costs (Dy *et al.*, 2024, p.8).
- b. Thai Beverage, a large beverage company, is committed to achieving SDG goals throughout its supply chain. With regard to SDG 12.3, they have monitored FLW in their operations (including restaurants), and they put effort to redirect them to other uses such as animal feed, fertilizer, biofuel, sold to employees, and food donation. Below is the result of their efforts in the past several years.

	2019	2020	2021	2022	2023
Total Weight of all Food Loss & Waste	4,043	2,548	2,552	2,366	2,542
Amount Used for Alternative Purposes	1,940	1,617	1,533	1,596	1,565
Amount Discarded to landfill	2,103	931	1,019	770	977

- c. Charoen Pokphand Group (CP, 2024) actively addresses FLW across its operations, aligning with FAO guidelines since 2020. The company monitors various aspects such as quantity, quality, and economics of food loss across different sectors, including pork, poultry, aquaculture, and processed foods. By analyzing data, CP identifies hotspots of loss and implements targeted projects—like enhancing pork processing efficiency—to reduce waste. Additionally, CP has set an ambitious goal to eliminate food waste by 2030, focusing on resource flow management, especially packaging materials, to minimize environmental impact and promote circular economy practices.
- d. Central Retail Corporation (2024) has adopted a Zero Waste Model to reduce food waste by repurposing edible waste into animal feed and converting non-edible waste into compost and cooking gas. The

company uses a data tracking system to monitor food nearing its 'best-before' date, enabling collaboration with partners to minimize waste, generate revenue, and provide healthy food to low-income communities. In 2023, this approach reduced 1,525.7 tonnes of food waste, with plans to expand economy-wide.

3.20 United States

Target

The United States has a stated goal of halving per capita food waste and reducing food loss by 2030.

Measurement

1. Food Loss

The United States Department of Agriculture's Economic Research Service estimates farm to retail food loss percentages for select fresh fruits and vegetables using data for 2019.

United States food loss percentages from the farm to retail sectors for select commodities, 2019¹

Commodity	Loss percentage	Commodity	Loss percentage
Fresh vegetables		Fresh fruit	
Asparagus	9	Tangerines ²	5
Cabbage	7	Grapefruit	3
Carrots	3	Lemons	4
Cucumbers	8	Limes	5
Eggplant	10	Apples	4
Lettuce, leaf	7	Apricots	9
Okra	12	Avocados	6
Onions	6	Cantaloupe	8
Potatoes	4	Cherries	8
Pumpkin	10	Grapes	9
Snap beans	6	Kiwi	9
Spinach	12	Mangoes	5
Sweet potatoes	10	Papaya	5
Tomatoes	15	Watermelon	10

¹ The loss percentages reflect changes in weight and other losses as foods start through the marketing system and include natural shrinkage, loss from mold or pests, inadequate climate control, and marketing standards that result in culling of non-marketable produce.

² Includes mandarins and clementines.

Source: U.S. Department of Agriculture, Economic Research Service, Loss-Adjusted Food Availability Data Series, <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system>.

2. Food Waste

(a) United States estimates the amount of food waste generated by sector, as well as the amounts being managed by several management pathways. In 2019, 66.2 million tons of wasted food was generated in the food retail, food service, and residential sectors. Tons means U.S. short tons.

Estimated Annual Wasted Food Generation for the Food Retail, Food Service and Residential Sectors (2019)

Sector	Estimated Annual Generation (Tons/ year/Sector)	Percent of Total
Residential	26,502,346	40.0%
Food Retail	12,971,959	19.6%
Food Service	26,741,937	40.4%
Total Generation	66,216,242	

(b) In 2018, 335 pounds of food waste per person left the human food supply chain (i.e., were sent to landfill, controlled combustion, sewer, co/anaerobic digestion, compost/aerobic digestion, and land application), and in 2019, 349 pounds (152.0 kg) of food waste per person left the human food supply chain. The 2030 goal aims to reduce this food waste by 50% to 164 pounds (74.4 kg) per person.

3. Food loss and waste

From the FAO State of Food and Agriculture 2019, Table A6 (pp.141–142), FLW Estimates from Grey Literature, [Economy] and Sectoral Reports between 2000 and 2017 are aggregated:

Observation	Mean	Median	s.d.	Min.	Max.
43	13.7	12.0	7.6	4.0	37.0

Actions

The United States Federal government has undertaken several initiatives to prevent and reduce food loss and waste. Select activities and accomplishments include:

1. Economy-wide Strategy: Released a **National Strategy for Reducing Loss and Waste and Recycling Organics** (USDA, 2024a).
2. Interagency Coordination: Created a **Federal Interagency Food Loss and Waste Collaboration** made up of the following key agencies: Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA). The three agencies re-signed a formal agreement to renew the Collaboration in May 2024.⁶²
3. Non-Government and Private Sector Collaborations
 - (a) Renewed the EPA, FDA, and USDA **2019 agreement** with the Food Waste Reduction Alliance's founding partners in June 2024, representing three major sectors of the supply chain—food manufacturing, retail, and restaurant and food service—and works collaboratively to reduce the amount of food waste generated; increase the amount of safe, nutritious food donated to those in need; and divert food waste from landfills (US FDA, 2024).
 - (b) Launched the **United States Food Loss and Waste 2030 Champions** group via USDA and EPA in 2016 which invites businesses and

⁶² Details are available here: <https://www.usda.gov/foodlossandwaste/interagency>. The agreement signed in May 2024 is available here: <https://www.usda.gov/sites/default/files/documents/2024USDA00131-Fully-Signed-Agreement.pdf>.

organizations to make a public commitment to halve the FLW in their own operations by 2030.⁶³

4. Data, Research and Analysis: Tracks food waste and published the following, selected reports and resources:
 - (a) Estimating the Cost of Food Waste to American Consumers and determined the cost of food waste to each U.S. consumer to be USD 728 per year (US EPA, 2025a)
 - (b) Environmental Value of Applying Compost: Improving Soil Health for Stormwater Management, Contaminated Site Remediation, Ecosystem Restoration, Landscaping and Agriculture (US EPA, 2025b)
 - (c) Food Availability (Per Capita) Data System – Loss-Adjusted Food Availability Documentation (Updated 2025) (USDA, 2025)
 - (d) Wasted Food Report: Estimates of Generation and Management of Wasted Food in the United States in 2019 (US EPA, 2023a)
 - (e) From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways (US EPA, 2023b)
 - (f) The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States (Buzby *et al.*, 2014)
5. Grant Administration: Launched several new or enhanced grant programs; selected examples include:
 - (a) EPA-led **Solid Waste Infrastructure for Recycling Grant Program** invested more than USD 83 million in 2022 in food-related projects
 - (b) EPA-led **Consumer Recycling Education and Outreach Grant Program** awarded 25 projects in 2023
 - (c) **USDA's National Institute of Food and Agriculture** (NIFA) invested USD 186.6 million through several **funding programs** between fiscal year 2018 to fiscal year 2025 that supports 356 projects designed to reduce food loss and waste economy-wide
 - (d) **USDA's Office of Urban Agriculture and Innovative Production Composting and Food Waste Reduction Program (CFWR)** has distributed more than USD 31 million across 145 projects in 42 states and 1 United States territory since its launch in fiscal year 2020 supporting local governments across the Economy conserve food and develop alternative waste streams that benefit American producers
 - o In its first year, CFWR projects diverted 1,150 tons of food waste from landfills, generated over 16,000 tons of compost, and provided thousands of Americans with specialized education, job training, employment, and material support for their farms and gardens.
6. Resources:
 - (a) Developed **Foodkeeper App** via the FDA and USDA Food Safety and Inspection Service, among other federal agencies, to help consumers understand how to store foods and beverages to maximize freshness and quality of items, with a view to reducing food waste.⁶⁴
 - (b) Maintains various FLW-relevant webpages, which highlight relevant activities, resources, and, as appropriate, funding opportunities:

⁶³ Details are available here: <https://www.usda.gov/about-food/food-safety/food-loss-and-waste/us-food-loss-and-waste-2030-champions>.

⁶⁴ More information available at: <https://www.foodsafety.gov/keep-food-safe/foodkeeper-app>.

- EPA Food Waste Research
 - EPA Sustainable Management of Food
 - USDA National Institute of Food and Agriculture FLW
 - USDA FLW
 - FDA FLW
- (c) Released the Wasted Food Scale in a simple and a more detailed version (2023)
- (d) Released **FDA fact sheet** encouraging retail food establishments to adopt safe food donation practices⁶⁵
- (e) Released **FDA infographic** highlighting back-to-school themed tips to help students and parents reduce food waste⁶⁶
7. Laws and Regulations
- (a) The **Internal Revenue Code 170(e)(3) of 2011** provides enhanced tax deductions to businesses to encourage donations of fit and wholesome food to qualified nonprofit organizations serving the poor and needy. Qualified business taxpayers can deduct the cost to produce the food and half the difference between the cost and full fair market value of the donated food.⁶⁷
- (b) The **Protecting Americans from Tax Hikes (PATH) Act in 2015** amended the Tax Reform Act making permanent and extending the enhanced tax deductions for food donations to all businesses, including C-corporations, S-corporations, limited liability corporations (LLCs), partnerships, and sole proprietorships.⁶⁸
- (c) The **United States Federal Food Donation Act of 2008** specifies procurement contract language that encourages the donation of excess wholesome food to eligible nonprofits to feed food-insecure people in the U.S.⁶⁹
- (d) The **Bill Emerson Good Samaritan Food Donation Act of 1996** provides limited liability protection for persons, companies or institutions who make good faith donations to nonprofits that feed the hungry. Visit **42 U.S. Code § 1791** and USDA's **Frequently Asked Questions** for more information.⁷⁰
- All fifty states have food donation statutes that limit food donors' liability – these vary widely, such as by who (i.e., donors, nonprofit organizations), and what foods and food products are covered.
 - Food donations by businesses must still comply with applicable state and local health, food handling, and food safety laws and regulations.
- (e) USDA-FDA issued a joint request for information in 2024 seeking information about food date labeling with the goal of providing further

⁶⁵ More information available at: <https://www.fda.gov/food/retail-food-industryregulatory-assistance-training/key-steps-donating-food-retail-food-establishments>.

⁶⁶ More information available at: <https://www.fda.gov/media/180753/download?attachment>

⁶⁷ <https://www.govinfo.gov/content/pkg/USCODE-2011-title26/pdf/USCODE-2011-title26-subtitleA-chap1-subchapB-partVI-sec170.pdf>.

⁶⁸ More information available at: <https://www.congress.gov/bill/114th-congress/senate-bill/185/text>

⁶⁹ More information available at: <https://www.congress.gov/110/plaws/publ247/PLAW-110publ247.pdf>.

⁷⁰ More information available at: <https://www.govinfo.gov/content/pkg/PLAW-104publ210/pdf/PLAW-104publ210.pdf>.

clarity, transparency, and cost savings for United States consumers (USDA, 2024b).

- (f) At the State level, **ReFED** and the **Harvard Law School Food Law and Policy Clinic** track and analyze food waste legislation and publish a biannual update to the Food Waste Policy Finder which provides a comprehensive view of state and federal-level policies and highlights the efforts to shape the future of food waste reduction.⁷¹

In 2024, 29 states introduced a total of 100 unique food waste-related bills. Of these, 75 remained pending at the end of the year, 18 passed, and seven failed. New Jersey led the way with 20 bills introduced, followed by California with 13. Only 18% of proposed state-level bills being passed, compared to 25% after the 2023 legislative session. Bills that included funding for food waste measures, often as part of broader funding packages, were the most likely to pass.

8. Corporate and Non-Government U.S. Selected Activities

- (a) **ReFED** conducted studies, forged partnerships with food service providers and retailers to monitor and reduce food loss and waste, issued roadmaps and guidelines for different sectors, and created **Insights Engine**, which is an “online hub for data and solutions featuring the most comprehensive examination of food loss and waste in the United States.”⁷²

- (b) Selected corporate examples from the **U.S. Food Loss and Waste Champions Milestone Reports** include:

- **Albertsons Companies:** Enabled more than 950 million meals since 2019 through its store food donations and its Foundation’s Nourishing Neighbors program and diverted more than 321 million pounds of food and trimmings through anaerobic digestion, compost, and animal feed operations.
- **ALDI:** Diverted 76% operational waste companywide in 2022 and recycled 1,645 tonnes of food between the ALDI Test Kitchen and select stores.
- **General Mills:** Enabled 393 million meals for hungry families worldwide since 2010 and seventeen or 41% fully of their production facilities met their zero waste to landfill criteria in fiscal year 2022.
- **Walmart:** Achieved approximately 12% reduction in operational food loss and waste versus their 2016 baseline and diverted more than 906 million pounds of food waste from landfill and incineration globally.⁷³

⁷¹ More information available at: <https://policyfinder.refed.org/>.

⁷² More information available at: <https://insights.refed.org/>.

⁷³ More information available at: <https://www.usda.gov/about-food/food-safety/food-loss-and-waste/us-food-loss-and-waste-2030-champions>.

3.21 Viet Nam

Target

Under the **National Green Growth Strategy** for 2021–2030 period with a Vision by 2050, there are goals that pertain to food waste:⁷⁴

- “By 2030, the rate of municipal solid waste that is collected and treated in accordance with relevant standards and regulations is expected to reach above 95%; the rate of municipal solid waste that is treated adopting direct burial method is expected to account for 10% of total amount of waste collected;” and
- “By 2050, the rate of municipal solid waste that is collected and treated in accordance with relevant [economy-wide] standards and regulations is expected to reach 100%, while the burial of organic solid waste and recyclable waste is expected to be minimized; ... ”

As for food loss, Viet Nam's delegate to APEC reported that their economy aims to reduce post-harvest losses of key agricultural, forestry and fishery products by 0.5% to 1.0% per year by 2030. Additionally, they aim to reduce greenhouse gas emissions from the food system by 10% compared to 2020.

Measurement

1. Food Loss

(a) From the FAO Food Loss and Waste Database:

Commodity	Year	Food Supply Stage	Loss %age	Source
Cassava Chips	2014	Harvest	0.5%	Naziri et al. (2014)
	2014	Processing	5.0%	
	2014	Transport	0.5%	
Cassava Dry Starch	2014	Processing	0.5%	
	2014	Transport	0.5%	
Cassava Wet Starch	2014	Harvest	0.5%	
	2014	Processing	1.0%	
	2014	Transport	2.0%	

(b) The waste generation data of 2018 shows that Viet Nam produced 62 million tonnes of agricultural waste, which includes food loss. (Lifted from <https://vietnam.opendevlopmentmekong.net/topics/vietnam-waste-management/>, accessed March 12, 2025)

2. Food Waste

(a) From the UN SDG data portal:

	Tonnes		Kg/capita	
	2019	2022	2019	2022
Households	7,346,716.81	7,079,810.95	76.71	72.11
Out of Home Consumption	2,666,991.33	3,960,369.06	27.85	40.34
Retail	1,508,689.29	4,344,674.18	15.75	44.25

⁷⁴ For the previous goals under the **2009 National Strategy on Solid Waste Synthesis Management**, see <https://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=92301>.

(b) The UNEP Food Waste Index Report 2021 and 2024 also cite the following studies for specific areas on household food waste estimate:

Area	Source	Kg/capita
Mekong Delta	Thanh et al. (2010)	85
Da Nang	Vetter-Gindele et al. (2019) [‡]	67
Hội An	UN-Habitat (2021a)	77 [†]
Tam Kỳ	UN-Habitat (2021b)	44 [†]
Hue	UN-Habitat unpublished	88

[†] These figures are computed by UNEP from UN-Habitat Waste Wise Cities reports by multiplying the daily per capita food waste by 365.

[‡] In UNEP (2024) this is cited as Zakarya *et al.* (2022), but that is an error.

The UNEP Food Waste Index Report 2024 explains more details about how the figures above were estimated by each cited study.

3. Food loss and waste

(a) From the FAO State of Food and Agriculture 2019, Table A6 (p.141), FLW estimates from grey literature, [economy] and sectoral reports (2000–2017).

Observation	Mean	Median	s.d.	Min.	Max.
1	2.0	2.0	..	2.0	2.0

(b) Estimated FLW using the FAO Mass Flow Model (thousand tonnes):

Commodity	Production		Handling & Storage		Processing & Packing		Distribution		Consumption		Total FLW	
	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022	2015	2022
Cereal	2,155	2,019	2,363	2,214	1,546	1,782	420	490	617	720	7,101	7,225
Roots & Tubers	649	625	1,931	1,860	12	16	108	140	29	38	2,729	2,678
Oilseeds & Pulses	122	137	195	218	23	46	34	43	17	21	391	466
Vegetables	2,135	2,587	1,089	1,320	135	168	1,137	1,415	695	864	5,192	6,355
Fruits	1,027	1,496	524	763	63	110	532	713	325	431	2,471	3,514
Meat	140	140	7	7	118	118	435	383	248	219	948	868
Fish	248	311	369	510	262	363	503	615	67	82	1,449	1,881
Eggs	39	38	0	0	0	0	11	11	7	8	57	57
Milk	27	43	45	71	7	11	66	369	6	37	152	531

Actions

1. In 2009, the government issued a resolution that (a) provided guidelines to farmers and aquaculture operators on how to reduce post-harvest losses, (b) gave financial incentives for businesses, farmer cooperatives, and farmers for investment in loss-reducing machinery and facilities, and (c) laid down the roles of different government ministries with respect to reducing post-harvest losses.⁷⁵
2. In 2010 and 2013, the government of Viet Nam enacted a credit support policy for purchasing machinery and equipment that can reduce post-harvest losses for agricultural and aquatic products.⁷⁶

⁷⁵ See <https://thuvienphapluat.vn/van-ban/Dau-tu/Nghi-quyet-48-NQ-CP-co-che-chinh-sach-giam-ton-that-sau-thu-hoach-nong-san-thuy-san-95190.aspx> (accessed March 3, 2025)

⁷⁶ See <https://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=97254>, and <https://thuvienphapluat.vn/van-ban/Tai-chinh-nha-nuoc/Quy-dinh-68-2013-QD-TTg-chinh-sach-ho-tro-giam-ton-that-nong-nghiep-213484.aspx> (accessed June 10, 2025)

3. The **National Action Plan on Sustainable Consumption and Production (2021–2030)** highlights the need for circular economy, which in principle should support waste-to-energy initiatives. This would lessen both food loss and waste.
4. In the 2022 NDC of Viet Nam, the government aims to construct new waste treatment facilities to produce compost, rather than having material go to landfills.
5. Investment in Smart Waste Management Technologies – Adoption of AI-driven waste sorting, IoT-based monitoring, and automated waste collection systems (Report Ocean, 2025).
6. Private initiatives:
 - a. In line with the concept of circular economy, food factories can reuse organic material that would otherwise have been discarded as food loss. For example, as Truong Hoang Phuong shared in the APEC 2021 workshop on food loss and waste (Dy *et al.*, 2021), Nestlé Viet Nam recycles 100% of waste coffee grounds to generate steam that contributes to 70% of their fuel source.
 - b. The Viet Nam Food Bank Network focuses on alleviating the situation of hungry people and promoting efforts to fight food waste.⁷⁷

⁷⁷ See <https://foodbankvietnam.com/ve-chung-toi/>. (accessed Mar 11, 2025)

References

- Adiandri, R.S. 2017 (July). 2017 APEC Expert Consultation of Food Losses and Waste Reduction. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2017_C_S3-03_Indonesia-Revised2.pdf.
- Agricultural Research and Development Agency (Thailand). 2020. Food loss study to boost up food security. Bangkok. p.32-43. <https://www.arda.or.th/api/component-file/image/6800/o>.
- Asia-Pacific Economic Cooperation (APEC). 2022. *Implementation Plan of the Food Security Roadmap Towards 2030*. [https://www.apec.org/docs/default-source/groups/ppfs/2022/endorsed-implementation-plan-of-food-security-roadmap-2030---2-sep-2022-\(clean\).pdf](https://www.apec.org/docs/default-source/groups/ppfs/2022/endorsed-implementation-plan-of-food-security-roadmap-2030---2-sep-2022-(clean).pdf).
- Attavanich, W., K. Thampanichvong, & P. Srijuntrapun. 2022. Enhancing Green MSMEs' Competitiveness for a Sustainable and Inclusive Asia Pacific: Food Sector Waste Reduction in Food Supply Chain. APEC. <https://www.apec.org/publications/2022/11/enhancing-green-msmes-competitiveness-for-a-sustainable-and-inclusive-asia-pacific-food-sector-waste-reduction-in-food-supply-chain>.
- Attawanich, W., S. Petchranon, P. Sirisupalak, I. Bunyasiri, S. Udomwit, A. Obidiakru, & S. Phasuk. 2019. Study of food loss in the agricultural production sector of Thailand. Agricultural Research Development Agency (Public Organization), Bangkok.
- Austria, K.S. 2023 (Apr 28). Senate promotes zero food waste. *Philippine Information Agency*. <https://mirror.pia.gov.ph/press-releases/2023/04/28/senate-promotes-zero-food-waste-in-ph>. Accessed Feb 27, 2025.
- Bapanas. 2023. *Serahkan Sapras 2023, Bapanas telah menempatkan 30 unit di provinsi sentra produsen dan konsumen*. <https://badanpangan.go.id/blog/post/penandatanganan-bast-nfa-tahun-2023-sarpras-rantai-dingin-pemanfaatan-oleh-10-pelaku-usaha-pangan>. Accessed Jun 6, 2025.
- Bedoya-Perales, N. S., & G. P. Dal' Magro. 2021. Quantification of Food Losses and Waste in Peru: A Mass Flow Analysis along the Food Supply Chain. *Sustainability*, 13(5), 2807. <https://doi.org/10.3390/su13052807>.
- Buzby, J.C., H.F. Wells, & J. Hyman. 2014. The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States. U.S. Department of Agriculture. <https://www.ers.usda.gov/publications/pub-details?pubid=43836>. Accessed Nov 1, 2024.
- Central Retail Corporation. 2024. Journey to Zero: Food Loss and Waste Reduction. <https://www.centralretail.com/en/sustainability/our-stories/820/journey-to-zero-food-loss-and-waste-reduction>. Accessed Jun 9, 2025.
- Champions 12.3. 2019 (Sep). SDG Target 12.3 on Food Loss and Waste: 2019 Progress Report. <https://champions123.org/publication/sdg-target-123-food-loss-and-waste-2019-progress-report>.
- Champions 12.3. 2025. SDG Target 12.3 on Food Loss and Waste: 2025 Progress Report. <https://champions123.org/publication/sdg-target-123-food-loss-and-waste-2025-progress-report>.
- Charoen Pokphand Group. 2024. Food Loss and Food Waste (webpage). https://www.cpfworldwide.com/en/sustainability/environment/waste_to_value/food_loss_food_waste. Accessed Jun 12, 2025.
- Cho, J.H. 2015 (Jul). 2015 APEC Expert Consultation on Assessment Methodology of Fishery and Livestock Losses. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2015_C_S2-01_Dr.%20Cho,%20Jung-Hee.pdf.
- Collins, R. 2019. National Food Waste Baseline. (reference cited in the FAO FLW Database; however, further details cannot be found).
- Commonwealth of Australia. 2017 (Nov). National Food Waste Strategy: Halving Australia's food waste by 2030. Department of Climate Change, Energy, the Environment and Water. <https://www.dcceew.gov.au/sites/default/files/documents/national-food-waste-strategy.pdf>.
- Consumer Affairs Agency (Japan). 2025. Towards Reducing Food Loss and Waste in Japan. https://www.caa.go.jp/en/policy/consumer_policy/assets/consumer_education_cms201_2_0250421_0002.pdf.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) of Australia. 2024 (Dec). Australia's Circular Economy Framework. Department of Climate Change, Energy, the Environment and Water. <https://www.dcceew.gov.au/sites/default/files/documents/australias-circular-economy-framework.pdf>.

- Díaz, V. 2020 (5-Oct). Cheaf ofrece una solución al desperdicio de alimentos [Cheaf offers a solution to food waste]. *El Economista*. <https://www.eleconomista.com.mx/empresas/Cheaf-ofrece-una-solucion-al-desperdicio-de-alimentos-20201005-0071.html>
- Durán-Sandoval, D., G. Durán-Romero, & A.M. López. 2024. Assessing Food Loss and Waste in Chile: Insights for Policy and Sustainable Development Goals. *Resources* 13(7), 91. <https://doi.org/10.3390/resources13070091>.
- Dy, K.B., C.-C. Chang, S.-H. Hsu, & J.-S. Yew. 2021. APEC Minimizing Food Loss and Waste Survey (Full Survey Report). <https://apec-flows.ntu.edu.tw/publication.aspx>. Accessed 3-Mar-2025.
- Dy, K.B., J.S. Yew, C.C. Chang, & SH Hsu. 2023. Reducing Food Loss and Waste by Strengthening Resilience and Digitalization in APEC Food System and Enhancing Digitalization and Innovative Technologies. <https://www.apec.org/publications/2024/05/reducing-food-loss-and-waste-by-strengthening-resilience-of-apec-food-system-and-enhancing-digitalization-and-innovative-technologies>.
- Dy, K.B., J.-S. Yew, C.-C. Chang, & S.-H. Hsu. 2024 (May). Reducing Food Loss and Waste by Strengthening Resilience of APEC Food System and Enhancing Digitalization and Innovative Technologies. APEC Agricultural Technical Cooperation Working Group. <https://www.apec.org/publications/2024/05/reducing-food-loss-and-waste-by-strengthening-resilience-of-apec-food-system-and-enhancing-digitalization-and-innovative-technologies>.
- Espinoza, M. 2023 (Jul). Initiatives impulse by Chile: National Commission for the Prevention and Reduction of Losses and Waste. APEC Workshop on Reducing Food Loss and Waste by Strengthening Resilience and Digitalization in APEC Food System. <https://apec-flows.ntu.edu.tw/upload/edit/file/S4.0%20ME%20Report%20CHILE.pdf>.
- Eguillor, P. 2017 (Jun). Chile Report Food Losses and Waste Reduction. 2017 APEC Expert Consultation of Food Losses and Waste Reduction. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2017_C_S3-01_Chile.pdf.
- Eguillor, P. 2021 (Jul). Chile Member Economy Progress Report and Information Sharing "Action to Reduce Food Loss and Waste in Chile". Workshop Reducing Food Loss and Waste along the Food Value Chain in APEC during and post COVID-19 Pandemic. <https://apec-flows.ntu.edu.tw/upload/edit/file/S7-Chile%20-%20Pilar%20Eguillor%20FINAL.pdf>.
- Food and Agriculture Organization of the United Nations (FAO). 2018 (Jan 4). Spotlight on SAVE FOOD member MARDI – Directing the Dialogue on Food Loss and Waste in Malaysia. <https://www.fao.org/save-food/news-and-multimedia/news/news-details/en/c/1093062/>. Accessed May 23, 2025.
- . 2019. The State of Food and Agriculture: Moving Forward on Food Loss and Waste Reduction. <https://www.fao.org/family-farming/detail/en/c/1245425/>.
- Food Act 2014. <https://www.legislation.govt.nz/act/public/2014/0032/latest/DLM5431609.html>. Accessed 25 February 2025.
- Food Innovation Australia Limited (FIAL). 2021. National Food Waste Strategy Feasibility Study Final Report. Food Innovation Australia Limited. <https://workdrive.zohopublic.com.au/external/06152b9ff5971843391f39fc4d32a847e56fb907c167a4a645887b0a4bc43000>. Accessed Jul 7, 2025.
- Fuentes-Rascón, R.A. 2017 (Jul). 2017 APEC Expert Consultation of Food Losses and Waste Reduction. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2017_C_S3-05_Mexico.pdf.
- García, A.K. 2021 (25-Apr). En México se desperdicia el 35% de los alimentos que se producen; hay que crear canales para aprovechar estos excedentes: Cheaf [In Mexico 35% of food produced is wasted; there must be a way to make good use of this excess: Cheaf]. *El Economista*. <https://www.eleconomista.com.mx/empresas/En-Mexico-se-desperdicia-el-35-de-los-alimentos-que-se-producen-hay-que-crear-canales-para-aprovechar-estos-excedentes-Cheaf-20210425-0004.html>
- Gooch, M.V., & A. Felfel. 2014. "\$27 Billion" Revisited: The Cost of Canada's Annual Food Waste. *Value Chain Management Centre*. <https://sustainontario.com/greenhouse/resource/27-billion-revisited-the-cost-of-canadas-annual-food-waste>. Accessed Mar 18, 2025.

- Goodman-Smith, F., M. Miroso, & S. Skeaff. 2020. A mixed-methods study of retail food waste in New Zealand. *Food Policy* 92, 101845. <https://doi.org/10.1016/j.foodpol.2020.101845>
- Government of Papua New Guinea. 2006 (1-Jan). National Implementation Plan for Management of Persistent Organic Pollutants in Papua New Guinea. <https://www.fao.org/faolex/results/details/es/c/LEX-FAOC219022/>. Accessed 3-Mar-2025.
- Han, D.B. 2016 (Jul). 2016 APEC Expert Consultation on Food Loss and Waste at Retail and Consumer Level. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2016_C_S5-01_Prof.%20Doo-Bong%20Han.pdf.
- Hsu, S.-H., C.-C. Chang, & T.T.T. Nguyen. 2018 (Dec). APEC Survey Report on Feasible Solutions for Food Loss and Waste Reduction. APEC: M SCE 02 2013A. <http://apec-flows.ntu.edu.tw/publication.aspx>. Accessed Feb 25, 2025.
- International Fund for Agricultural Development (IFAD). 2024 (13-Aug). Papua New Guinea 2000000899: Market Village Farmers (MVF) Supervision Report. Report No. 6951-PG. <https://www.ifad.org/en/w/corporate-documents/projects-programmes/papua-new-guinea-2000000899-market-village-farmers-mvf-supervision-report-august-2024>. Accessed 3-Mar-2025.
- Iriani E.S., Setyadjit, D.A. Setyabudi, S.M. Widayanti, I. Mulyawanti, S.I. Kailaku, R. Tjahjohutomo, A.B. Arief, K.S. Sasmitaloka, & N. Setyawan. 2018. Network Establishment and Inserting Postharvest Technology for Improving Shallot Quality in Indonesia. *Laporan Akhir. Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian* [Final report. Center for Agricultural Postharvest Research and Development].
- Jakrawatana, N., R. Mungkung, W. Imcharoen, & S. Dangsiiri. 2020. Assessment of food loss and waste throughout rice supply chain in Thailand (*in Thai*).
- Katsumi, J. 2016 (Jul). 2016 APEC Expert Consultation on Food Loss and Waste at Retail and Consumer Levels. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2016_C_S4-01_Ms.%20Junko%20Katsumi.pdf.
- Kim, H, & J. Park. 2023. Quantification of FLW and its percentage estimation along the food supply chain in Korea. *Waste Management & Research* 41(10), 1529–1538. <https://doi.org/10.1177/0734242X231178476>.
- Kim, K.Y. 2023 (Jul). APEC Workshop on Reducing Food Loss and Waste by Strengthening Resilience and Digitalization in APEC Food System. <https://apec-flows.ntu.edu.tw/upload/edit/file/S3.2%20KIM%20Kwang-yim.pdf>.
- Lee, E., G. Shurson, S.-H. Oh, & J.-C. Jang. 2024. The Management of Food Waste Recycling for a Sustainable Future: A Case Study on South Korea. *Sustainability* 16(2), 854. <https://doi.org/10.3390/su16020854>.
- Li, C., P. Bremer, M.K. Herder, M.S.W. Lee, K. Parker, E.C. Gaugler, & M. Miroso. 2022. A systematic review of food loss and waste in China: Quantity, impacts and mediators. *Journal of Environmental Management* 303, 114092. <https://doi.org/10.1016/j.jenvman.2021.114092>.
- Lo, I.M.C., & K.S. Woon. 2016. Food waste collection and recycling for value-added products: potential applications and challenges in Hong Kong. *Environmental Science and Pollution Research* 23(8), 7081–7091. <https://doi.org/10.1007/s11356-015-4235-y>.
- Mahmud, R. 2023 (Apr 9). Fighting food waste during Ramadhan. *Borneo Bulletin*. <https://borneobulletin.com.bn/fighting-food-waste-during-ramadhan>. Accessed Feb 25, 2025.
- Mandasari, P. 2018. Quantifying and analysing food waste generated by Indonesian undergraduate students. *IOP Conference Series: Earth and Environmental Science* 131, 012058. <https://doi.org/10.1088/1755-1315/131/1/012058>.
- Martianto, D., E. Mudjajanto, & P. Novitasari. 2013. *Estimasi Sisa Lauk Hewani, Lauk Nabati, dan Sayuran Konsumen Beberapa Jenis Rumah Makan di Kota Bogor* [Estimated Leftover Animal Side Dishes, Vegetable Side Dishes, and Vegetables for Consumers of Several Types of Restaurants in Bogor City]. <https://repository.ipb.ac.id/jspui/handle/123456789/66055>.
- McKenzie, T.J., L. Singh-Peterson, & S.J.R. Underhill. 2017. Quantifying Postharvest Loss and the Implication of Market-Based Decisions: A Case Study of Two Commercial Domestic Tomato Supply Chains in Queensland, Australia. *Horticulture* 3(3), 44. <https://doi.org/10.3390/horticulturae3030044>.
- Méndez-Lazarte, C. 2025. Survey and Workshop on Preventing and Reducing Food Loss and Waste (FLW) to Achieve Sustainable Food Systems in APEC Economies. <https://www.apec.org/publications/2025/01/survey-and-workshop-on-preventing-and->

- [reducing-food-loss-and-waste-\(flw\)-to-achieve-sustainable-food-systems-in-apec-economies](#).
- Ministry for the Environment (NZ). 2023. *Food loss and waste definition for Aotearoa New Zealand*. <https://environment.govt.nz/assets/publications/Waste/Food-loss-and-waste-definition-for-Aotearoa-New-Zealand.pdf>.
- Ministry of National Development Planning (Indonesia). 2021. Food Loss and Waste in Indonesia: Supporting the Implementation of Circular Economy and Low Carbon Development. <https://nutritionconnect.org/food-loss-waste-indonesia-supporting-implementation-circular-economy-low-carbon-development>.
- Ministry of Agriculture (Indonesia). 2018. Pilot Activities of Reduction of Postharvest Losses (Phl) Case on Selected Country in the ASEAN Region. Final Technical Report P.T. Agro Indo Mandiri and Indonesian Center for Agricultural Postharvest Research and Development (ICAPRD).
- Ministry of Agriculture Forestry and Fisheries (MAFF) (Japan). 2017 (Jul). 2017 APEC Expert Consultation of Food Losses and Waste Reduction. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2017_C_S2-02_Mr.%20Kenta%20Suzuki.pdf
- . 2019 (Jul). APEC 2019 Expert Consultation on Reducing Food Loss & Waste (FLW) for Addressing Interlinked Challenges of Food Security and Climate Change. <https://apec-flows.ntu.edu.tw/upload/edit/file/APEC2019403.pdf>. (Accessed Feb 25, 2025)
- Ministry of Environment (Chile). 2021. N.Organic Waste Strategy Chile 2040. <https://economiacircular.mma.gob.cl/residuos-organicos/>.
- Ministry of Environment (Japan). 2024. MOE Japan Discloses the Estimated Amount of Japan's Food Loss and Waste Generated in FY2022. https://www.env.go.jp/en/press/press_02937.html. Accessed Feb 25, 2025.
- Ministry of Environment (Peru). 2019 (Jul). APEC 2019 Expert Consultation on Reducing Food Loss & Waste (FLW) for Addressing Interlinked Challenges of Food Security and Climate Change. <https://apec-flows.ntu.edu.tw/upload/edit/file/APEC2019407.pdf>.
- Ministry of Environment and Water Resources (Singapore). 2019. Zero Waste Masterplan. <https://isomer-user-content.by.gov.sg/23/85029cae-9ba1-4144-8a52-26c7f86c04ba/zero-waste-masterplan.pdf>.
- Mungkung, R. 2023. Food losses, agricultural products and national food loss assessment to form the baseline, identifying the measures to reduce losses throughout the value chain and report the results according to the Sustainable Development Goal # 12.3.1. (*in Thai*) Agricultural Research Development Agency (Public Organization), Bangkok.
- MungKung, R. (editor). 2025. Food Loss: Evaluation methods, national baseline establishment, and food loss index calculation (*in Thai*). Kasetsat University, Bangkok. 166p. <https://www.arda.or.th/api/component-file/image/9969/o>
- N. Council for Sustainable Development (Chinese Taipei). 2023. 臺灣永續發展目標追蹤檢討報告. [Chinese Taipei Sustainable Development Goals Tracking and Review Report]. https://ncsd.ndc.gov.tw/ofu/FileDatabase/8f388789-e40d-47e0-9d01-2477b1a39eb1/2022_臺灣永續發展目標年度總檢討報告（已核定）.pdf
- N. Council for Sustainable Development (Chinese Taipei). 2022. 臺灣永續發展目標修正本 [Revised Edition of Chinese Taipei's Sustainable Development Goals]. <https://ncsd.ndc.gov.tw/Fore/aboutsdg>.
- Nafiroh, F., & I.L. Fuad. 2019. *Estimasi Food Waste Beras Rumah Tangga Di Pemukiman Industri* [Estimation of Household Rice Food Waste in Industrial Settlements]. *Agromix* 10(1), 30-43. <https://doi.org/10.35891/agx.v10i1.1461>.
- Natsir, M. 2015 (July). 2015 APEC Expert Consultation on Assessment Methodology of Fishery and Livestock Losses. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2015_C_S3-01_Mr.%20Mohamad%20Natsir.pdf.
- Naziri, D., W. Quaye, B. Siwoku, S. Wanlapatit, T.V. Phu, & B. Bennett. 2014. The diversity of postharvest losses in cassava value chains in selected developing countries. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* 115(2), 111–123. <https://gala.gre.ac.uk/id/eprint/12877>.
- Norton, E. 2023 (Aug). How Japan reduces food waste. <https://blog.secondharvest.ca/2023/08/28/how-japan-reduces-food-waste>. Accessed Feb 25, 2025.
- Office of the Prime Minister's Chief Science Advisor (NZ). 2024. *Preventing Food Loss and Waste in Aotearoa New Zealand: Evidence for Action Across the Supply Chain*. REPORT:

- [Preventing food loss and waste in Aotearoa New Zealand: Evidence for action across the supply chain - June 2024 - Office of the Prime Minister's Chief Science Advisor](#)
- Okayama, T., & K. Watanabe. 2024. Performance of the Food Waste Recycling Law in Japan with Reference to SDG 12.3. *Recycling* 9(1), 18. <https://doi.org/10.3390/recycling9010018>.
- Organization for Economic Co-operation and Development (OECD). 2025. "Beyond food loss and waste reduction targets: Translating reduction ambitions into policy outcomes," *OECD Food, Agriculture and Fisheries Papers*, No. 214, OECD Publishing, Paris, <https://doi.org/10.1787/59cf6c95-en>.
- Park, D. 2016 (Jul). 2016 APEC Expert Consultation on Food Loss and Waste at Retail and Consumer Level. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2016_C_S3-03_Ms.%20Dawoom%20Park.pdf.
- Pastolero, A., & M. Sassi. 2022. Food loss and waste accounting: the case of the Philippine food supply chain. *Bio-based and Applied Economics* 11(3), 207–218. <https://doi.org/10.36253/bae-11501>.
- Pontificia Universidad Católica de Valparaíso (PUCV) and Subsecretaría de Desarrollo Regional y Administrativo (SUBDERE). 2024 (Dec). Estudio de Caracterización de los Residuos Sólidos Domiciliarios y Asimilables Generados A Nivel Municipal En Chile. Licitación Id: 761-17-Lr23 Informe N°6-Informe Final Consolidado. <https://proactiva.subdere.gov.cl/bitstream/handle/123456789/649/Informe%20N%c2%b06Informe%20Final%20Consolidado.pdf?sequence=1&isAllowed=y>. Accessed Aug 6, 2025.
- Quezada, C. 2019 (Jul). Expert consultation on reducing food loss and waste (FLW) for addressing interlinked challenges of food security and climate change. <https://apec-flows.ntu.edu.tw/upload/edit/file/APEC2019401.pdf>.
- Rabobank. 2025. *Rabobank New Zealand Food Waste Survey 2025 Results*. Prepared for Rabobank by Kantar. [New Zealand Food Waste Survey - 2025 \(1\).pdf](#) Accessed Oct 29, 2025.
- Reardon, T., K. Chen, B. Minten, & L. Adriano. 2012. The Quiet Revolution in Stable Food Value Chains: Enter the Dragon, the Elephant, and the Tiger. *Asian Development Bank (ADB) and International Food policy Research Institute (IFPRI)*.
- Report Ocean. 2025 (Mar 6). Vietnam Waste Management Market – Growth, Trends, and Forecast (2025-2030). *Taiwan News*. <https://www.taiwannews.com.tw/news/6053340>. Accessed Mar 12, 2025.
- Reynolds, C., M. Miroso, & B. Clothier. 2016. New Zealand's Food Waste: Estimating the Tonnes, Value, Calories and Resources Wasted. *Agriculture* 6(1), 9–25. <https://foodwaste-otago.org/resources/new-zealands-food-waste-estimating-the-tonnes-value-calories-and-resources-wasted>
- Rogers, G., J. Ekman, & M. Titley. 2013. Identifying new products, uses, and markets for Australian vegetables: A desktop study. Horticulture Australia Ltd., Applied Horticultural Research P/L, Project Number: VG12046.
- Santiano, M.B.P. 2024 (Jul 21) Banned from the Bin: A Comparative Study of Food Waste Prevention Laws in France and the Philippines. <https://legalresearchph.com/2024/07/21/banned-from-the-bin-a-comparative-study-of-food-waste-prevention-laws-in-france-and-the-philippines>. Accessed Feb 27, 2025.
- Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGAPRA) (Mexico). 2015 (Jul). 2015 APEC Expert Consultation on Assessment Methodology of Fishery and Livestock Losses. https://apec-flows.ntu.edu.tw/upload/edit/file/2%20SR_2015_C_S3-02_Ms.%20Leticia%20Albarran%20Mena.pdf.
- Secretariat of National Food Committee (Thailand). 2024. *Thailand Food Management Action Plan Phase I (2023-2027)*. <https://online.pubhtml5.com/lmon/urvm/?1749709220>.
- Secretariat of the Pacific Regional Environment Programme (SPREP). 2023. Papua New Guinea National Waste Audit Analysis Report. <https://library.sprep.org/content/papua-new-guinea-national-waste-audit-analysis-report-august-2023>. Accessed 3-Mar-2025.
- Shahar, A., A. bin Harun, M.T. Ahmad, R. Ahmad, Y. Sahari. 2017. Post-harvest Management of Rice for Sustainable Food Security in Malaysia. *FFTC Agriculture Policy Platform, September*, 1–4. <https://ap.ffc.org.tw/article/1162>.
- Shams, S., J.N. Sahu, & N.M. Mubarak. 2024. A route for energy recovery from municipal solid waste and developing a framework for waste management in Brunei Darussalam. *Scientific Reports* 14, 19767. <https://doi.org/10.1038/s41598-024-70845-1>.
- Sulaiman, N.S., & M.S. Ab Talib. 2024. Promoting Sustainability in Utilizing Halal Food Waste in Producing Value-added Products. *Proceedings of the 4th International Conference on*

- Halal Development. https://doi.org/10.2991/978-2-38476-261-3_17.
- Thai Beverage. 2023. Food Loss and Waste Data Breakdown. https://sustainability.thaibev.com/2023/en/food_loss_and_waste_management.php. Accessed Apr 28, 2025.
- Thanh, N.P., Y. Matsui, & T. Fujiwara. 2010. Household solid waste generation and characteristic in a Mekong Delta city, Vietnam. *Journal of Environmental Management* 91(11), 2307–2321. <https://doi.org/10.1016/j.jenvman.2010.06.016>.
- Umeda, S. 2019. Japan: Diet Passes New Act Aimed at Reducing Food Loss. <https://www.loc.gov/item/global-legal-monitor/2019-10-09/japan-diet-passes-new-act-aimed-at-reducing-food-loss>. Accessed Feb 25, 2025.
- UN-Habitat. 2021a. Waste Wise Cities Tool in Hội An, Vietnam. <https://unh.rwm.global/factsheet/open/77>.
- UN-Habitat. 2021b. Waste Wise Cities Tool in Tam Kỳ, Vietnam. <https://unh.rwm.global/factsheet/open/79>.
- United Nations Environment Programme (UNEP). 2021. Food Waste Index Report 2021. <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>.
- United Nations Environment Programme (UNEP). 2024. Food Waste Index Report 2024. <https://www.unep.org/resources/publication/food-waste-index-report-2024>.
- United Nations Framework Convention on Climate Change (UNFCCC). 2022 (Sep 5). Unofficial translation of “Strategy of socio-economic development of the Russian Federation with low greenhouse gas emissions until 2050,” <https://unfccc.int/documents/613780>. Accessed March 28, 2025.
- U.S. Department of Agriculture. 2024a (Jun 12). National Strategy for Reducing Food Loss and Waste and Recycling Organics. <https://www.usda.gov/about-food/food-safety/food-loss-and-waste/national-strategy-reducing-food-loss-and-waste-and-recycling-organics>. Accessed Nov 6, 2025.
- U.S. Department of Agriculture. 2024b (Jun 12). USDA-FDA Seek Information About Food Date Labeling, Aim is to Provide Further Clarity, Transparency and Cost Savings for U.S. Consumers. <https://www.usda.gov/about-usda/news/press-releases/2024/12/03/usda-fda-seek-information-about-food-date-labeling-aim-provide-further-clarity-transparency-and-cost>. Accessed Nov 6, 2025.
- U.S. Department of Agriculture. 2025 (Oct 1). Food Availability (Per Capita) Data System - Loss-Adjusted Food Availability Documentation. <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/loss-adjusted-food-availability-documentation>. Accessed Nov 11, 2025.
- U.S. Environmental Protection Agency. 2023a (Apr). 2019 Wasted Food Report. https://www.epa.gov/system/files/documents/2024-04/2019-wasted-food-report_508_opt_ec_4.23correction.pdf. Accessed Nov 6, 2025.
- U.S. Environmental Protection Agency. 2023b (Oct). From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways. <https://www.epa.gov/land-research/field-bin-environmental-impacts-us-food-waste-management-pathways>. Accessed Apr 25, 2025.
- U.S. Environmental Protection Agency. 2025a (Apr). Estimating the Cost of Food Waste to American Consumers. <https://www.epa.gov/land-research/estimating-cost-food-waste-american-consumers>. Accessed May 2025.
- U.S. Environmental Protection Agency. 2025b (Jan 17). Environmental Value of Applying Compost: Improving Soil Health for Stormwater Management, Contaminated Site Remediation, Ecosystem Restoration, Landscaping and Agriculture. <https://www.epa.gov/land-research/environmental-value-applying-compost>. Accessed Nov 6, 2025.
- U.S. Food and Drug Administration. 2024 (Jun 1). Memorandum of Understanding among the United States Environmental Protection Agency and the United States Food And Drug Administration and the United States Department of Agriculture and the Founding Partners of the Food Waste Reduction Alliance. <https://www.fda.gov/about-fda/domestic-mous/mou-225-24-005>. Accessed Apr 25, 2025.
- Valencia-Ugalde, N. 2019 (Jul). APEC 2019 Expert Consultation on Reducing Food Loss & Waste (FLW) for Addressing Interlinked Challenges of Food Security and Climate Change. https://apec-flows.ntu.edu.tw/upload/edit/file/APEC2019_405.pdf.

- Vetter-Gindele, J., A. Braun, G. Warth, T.T.Q. Bui, F. Bachofer, & L. Eltrop. 2019. Assessment of Household Solid Waste Generation and Composition by Building Type in Da Nang, Vietnam. *Resources* 8(4), 171. <https://doi.org/10.3390/resources8040171>.
- Vorotnikov, V. 2022 (Nov 24). Russia unveils details of the food waste reform. *All About Feed*. <https://www.allaboutfeed.net/market/market-trends/russia-unveils-details-of-the-food-waste-reform>. Accessed March 28, 2025.
- Wang, W., & J.S. Bagshaw. 2001. Postharvest Handling Systems Assessment of Pak Choi and Chinese Cabbage in Eastern-central China. In T. O'Hare et al. (Eds.), *Post Harvest Handling of Fresh Vegetables: Proceedings of a workshop held in Beijing, China, 9–11 May 2001* (pp.22–25). Australian Centre for International Agricultural Research ACIAR Proceedings No.105. <https://www.aciar.gov.au/publication/technical-publications/postharvest-handling-fresh-vegetables>.
- Warner, J. 2022. Food waste in Canada: Statistics and impact for 2022. *La Merceria*. <https://lamerceria.ca/food-waste-canada-statistics/>.
- WasteMINZ. 2018. *Food waste in the cafe and restaurant sector in New Zealand*. <https://lovefoodhatewaste.co.nz/wp-content/uploads/2022/05/New-Zealand-cafe-andrestaurant-food-waste-WasteMINZ-2018.pdf>.
- Webb, D. 2020. *Briefing to investigate food waste in New Zealand: Report of the Environment Committee*. cebeaf7cf20b40245fdf5c60601d83a2ac5b105f. Accessed Oct 29, 2025.
- Widiriani, R. 2019 (July). APEC 2019 Expert Consultation on Reducing Food Loss and Waste for Addressing Interlinked Challenges of Food Security and Climate Change. <https://apec-flows.ntu.edu.tw/upload/edit/file/APEC2019402.pdf>.
- WRAP and World Bank. (2020). A conceptual framework for a national strategy on food loss and waste in Mexico. <https://www.wrap.ngo/resources/report/conceptual-framework-national-strategy-food-loss-and-waste-mexico>. Accessed 26-Apr-2025.
- Zheng, S., W. Li, L. Gao, & P. Wu. 2001. Assessment of postharvest handling systems for vegetables in Beijing. In T. O'Hare et al. (Eds.), *Post Harvest Handling of Fresh Vegetables: Proceedings of a workshop held in Beijing, China, 9–11 May 2001* (pp.17–21). ACIAR Proceedings No.105.