

Databook on Waste Management in the Republic of Korea and Japan

May 2026

National Institute of Environmental Research, Republic of Korea

National Institute for Environmental Studies, Japan

Preface

Waste management has long been a challenge for both the Republic of Korea and Japan. Over the years, both countries have implemented various initiatives at the national and local government levels. National governments establish laws, policies, and institutional frameworks to promote proper waste management and recycling, while local governments are responsible for practical operations such as collection, transportation, treatment, and disposal.

National and local governments in each country have worked together to develop a wide range of statistics related to waste management. However, opportunities to directly compare waste management statistics between the Republic of Korea and Japan have been limited. In recent years, the National Institute of Environmental Research of the Republic of Korea and the National Institute for Environmental Studies of Japan have therefore collaborated to compare selected waste management statistics, resulting in the compilation of the Databook on Waste Management in the Republic of Korea and Japan.

Definitions of waste vary to some extent from country to country, and those used in the Republic of Korea and Japan are no exception. Similarly, the laws, policies, and institutional frameworks for waste management also differ between the two countries. This Databook aims to facilitate mutual understanding and policy learning by highlighting similarities and differences in waste management systems and statistical data in the Republic of Korea and Japan.

We hope this Databook will serve as a useful resource for those who are interested.

Contents

	Republic of Korea	Japan
Explanation	04	05
Waste generation	06	07
Waste flows	08	09
Municipal solid waste generation	10	11
Incineration facilities	12	13
Composition of municipal solid waste	14	15
Food loss and food waste generation	16	17
Construction waste generation	18	19
Types of designated waste	20	21
Designated waste generation	22	23
Medical waste generation	24	25
Waste used for cement production	26	27
Plastic waste generation	28	29
Agricultural plastic waste generation	30	31
Recycling rates of packaging waste	32	33
End-of-life vehicle generation	34	35

Explanation

- ✓ In this publication, the official country name 'the Republic of Korea' is abbreviated as 'Korea' for the purpose of maintaining consistent notation and design.
- ✓ Recycling capacity is determined by the amount of waste delivered to recycling facilities.
- ✓ The fiscal year (FY) in Korea runs from January to December, and most statistical data are compiled by fiscal year.
- ✓ The National Institute of Environmental Research has translated the statistical information from Korean to English.
- ✓ To enhance comparability, tables and figures related to waste management in the Republic of Korea are presented on the left-hand pages, while the corresponding information for Japan is shown on the right-hand pages, accompanied by brief explanatory notes.
- ✓ Links to the original data sources are provided, and readers are encouraged to consult them for further details. The most recent statistics available at the time of editing are presented. As a result, reference years for the Republic of Korea may differ from those for Japan in some tables and figures.

Explanation

- ✓ Definitions of rates, such as recycling rates, vary across different industries.
- ✓ The fiscal year (FY) in Japan runs from April to March, and most statistical data are compiled by fiscal year.
- ✓ The National Institute for Environmental Studies has translated the statistical information from Japanese to English.
- ✓ To enhance comparability, tables and figures related to waste management in Japan are presented on the right-hand pages, while the corresponding information for the Republic of Korea is shown on the left-hand pages, accompanied by brief explanatory notes.
- ✓ Links to the original data sources are provided, and readers are encouraged to consult them for further details. The most recent statistics available at the time of editing are presented. As a result, reference years for Japan may differ from those for the Republic of Korea in some tables and figures.



Waste generation

Table 1-1. Annual waste generation

Category	Unit	FY2019 ⁽¹⁾	FY2020 ⁽²⁾	FY2021 ⁽³⁾	FY2022 ⁽⁴⁾	FY2023 ⁽⁵⁾
Municipal solid waste	Thousand tonnes	21,156	22,545	22,695	23,039	22,409
	Y/Y Change rate(%)	3.4	6.6	0.7	1.5	-2.7
Industrial waste	Thousand tonnes	73,956	80,868	84,900	81,062	83,264
	Y/Y Change rate(%)	20.8	9.3	5.0	-4.5	2.7
Construction waste	Thousand tonnes	80,702	86,443	83,810	76,183	64,374
	Y/Y Change rate(%)	6.8	7.1	-3.0	-9.1	-15.5
Designated waste	Thousand tonnes	5,442	5,413	5,761	5,945	5,935
	Y/Y Change rate(%)	1.1	-0.5	6.4	3.2	-0.2
Medical waste	Thousand tonnes	236	195	218	230	204
	Y/Y Change rate(%)	-	-17.1	11.6	5.3	-11.1
Total	Thousand tonnes	181,492	195,464	197,385	186,457	176,186
	Y/Y Change rate(%)	11.5	7.7	1.0	-5.5	-5.5

[Comments]

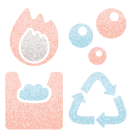
- ✓ The waste generation was 176,186 thousand tonnes in 2023, marking a continuous decline since 2021, when it reached 197,385 thousand tonnes.
- ✓ In 2023, industrial waste accounted for the largest share of total waste at 83,264 thousand tonnes, followed by 64,374 thousand tonnes of construction waste and 22,409 thousand tonnes of municipal solid waste.
- ✓ Designated waste-meaning the industrial wastes which may contaminate the surrounding environment, such as waste oil and waste acid-totaled 5,935 thousand tonnes.
- ✓ Medical waste refers to the waste discharged from public health and medical institutions, veterinary clinics, testing and inspection institutions, and other similar institutions, which may cause harm to human health through infection or other means and therefor require special control for public health and environmental conservation, such as parts and extracts of human bodies and carcasses of laboratory animals.

Table 1-2. Annual waste generation

Category	Unit	FY2018	FY2019	FY2020	FY2021	FY2022
Municipal solid waste ⁽¹⁾	Thousand tonnes	42,727	42,737	41,699	40,953	40,344
	Y/Y Change rate(%)	-0.4	0.0	-2.4	-1.8	-1.5
Industrial waste ⁽²⁾	Thousand tonnes	378,832	385,955	373,818	375,917	374,069
	Y/Y Change rate(%)	-1.2	1.9	-3.1	0.6	-0.5
Construction waste ⁽²⁾	Thousand tonnes	75,481	79,712	78,214	80,937	80,235
	Y/Y Change rate(%)	-4.1	5.6	-1.9	3.5	-0.9
Specifically controlled industrial waste ^{(2),(3),(4)}	Thousand tonnes	3,125	3,155	2,775	2,727	2,720
	Y/Y Change rate(%)	13.9	1.0	-12.0	-1.7	-0.3
Total	Thousand tonnes	421,559	428,692	415,517	416,870	414,413
	Y/Y Change rate(%)	-1.1	1.7	-3.1	0.3	-0.6

[Comments]

- ✓ Industrial waste includes construction waste and specifically controlled industrial waste.
- ✓ Compared with the period before the COVID-19 pandemic, waste generation trends clearly changed during the pandemic, and in the early stage of the pandemic, the impacts of working from home and restrictions on going out led to notable changes in both household and business waste generation.
- ✓ Acid waste was the largest of the specially controlled industrial waste streams, followed by waste oil, waste alkali, and infectious industrial waste.
- ✓ Among specifically controlled industrial waste, waste containing particularly hazardous substances such as heavy metals, PCBs, and dioxins is referred to as specified hazardous industrial waste, and approximately 800 thousand tonnes are generated annually.



Waste flows

Table 2-1. Municipal solid waste flows (thousand tonnes)

Category	FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽³⁾	FY 2022 ⁽⁴⁾	FY 2023 ⁽⁵⁾
Recycling	12,634	13,418	12,865	13,786	13,156
Incineration	5,445	5,754	5,640	5,530	5,565
landfill	2,678	2,652	2,918	2,356	2,390
Other treatment	399	720	1,271	1,366	1,299
Total	21,156	22,545	22,695	23,039	22,409

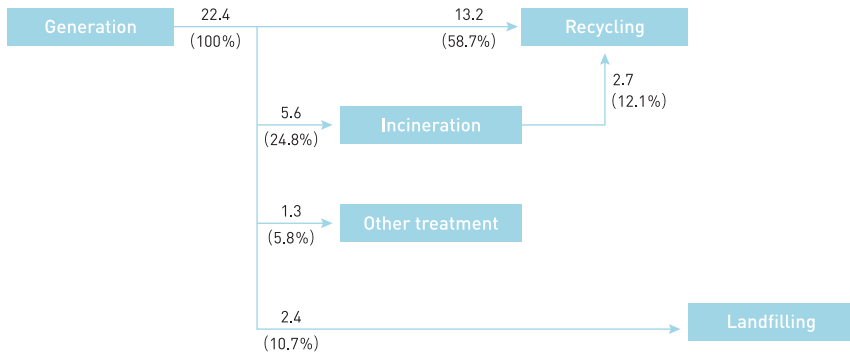


Figure 1-1. Municipal solid waste flows in Korea in FY2023 (million tonnes)

[Comments]

- ✓ In 2023, 22,409 thousand tonnes of municipal solid waste were generated, with 13,156 thousand tonnes (58.7%) recycled, 5,565 thousand tonnes (24.8%) incinerated, and 2,390 thousand tonnes (10.7%) disposed of by landfill.
- ✓ The amount of waste processed through other treatment, including compression, shredding, solidification, neutralization, coagulation, and biological digestion, totaled 1,299 thousand tonnes (5.8%).

Table 2-2. Municipal solid waste flows (thousand tonnes)⁽¹⁾

Category	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Direct landfill	398	367	340	338	312
Direct Incineration	32,947	31,872	31,491	31,139	30,239
Other treatment	9,514	9,489	9,184	8,937	8,524
Total	42,859	41,728	41,015	40,414	39,075

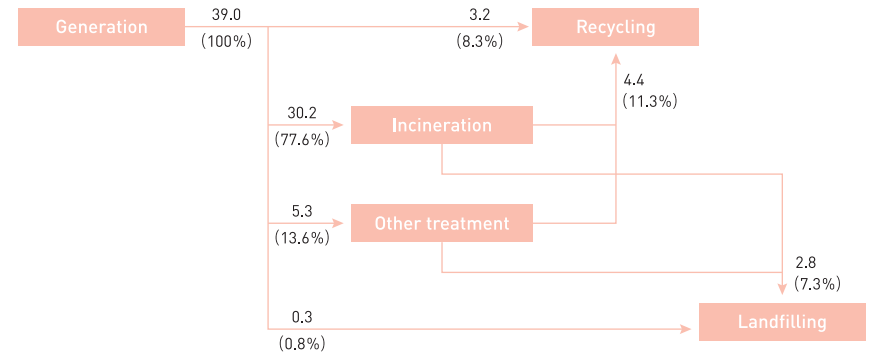


Figure 1-2. Municipal solid waste flows in Japan in FY2023 (million tonnes)

[Comments]

- ✓ Other treatments include bulky waste treatment, composting, anaerobic digestion, and other processes.
- ✓ Direct recycling accounted for only 8.3% of generated waste, with the majority of municipal solid waste being directly incinerated, and 4.4 million tonnes of waste recycled after treatment at facilities.
- ✓ The total amount of recycling in FY2023, including direct recycling and post-treatment recycling, was 7.6 million tonnes, representing a recycling rate of 19.5%.



Municipal solid waste generation

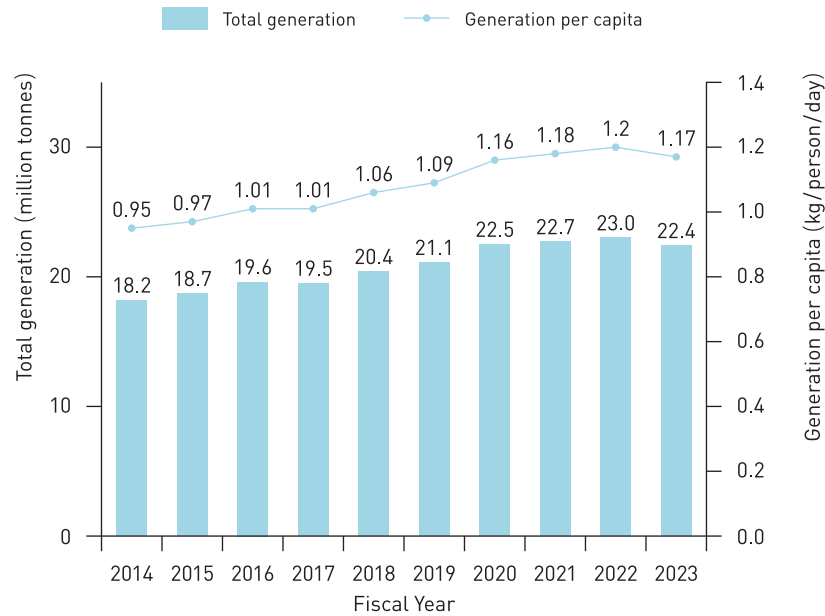


Figure 2-1. Historical trend of municipal solid waste generation

[Comments]

- ✓ Municipal solid waste reached 23 million tonnes in 2022, with a per capita generation rate of 1.2 kg/day, marking its peak.
- ✓ By 2023, both figures declined slightly, with annual waste decreasing to 22.4 million tonnes and daily per capita generation falling to 1.17 kg/day.

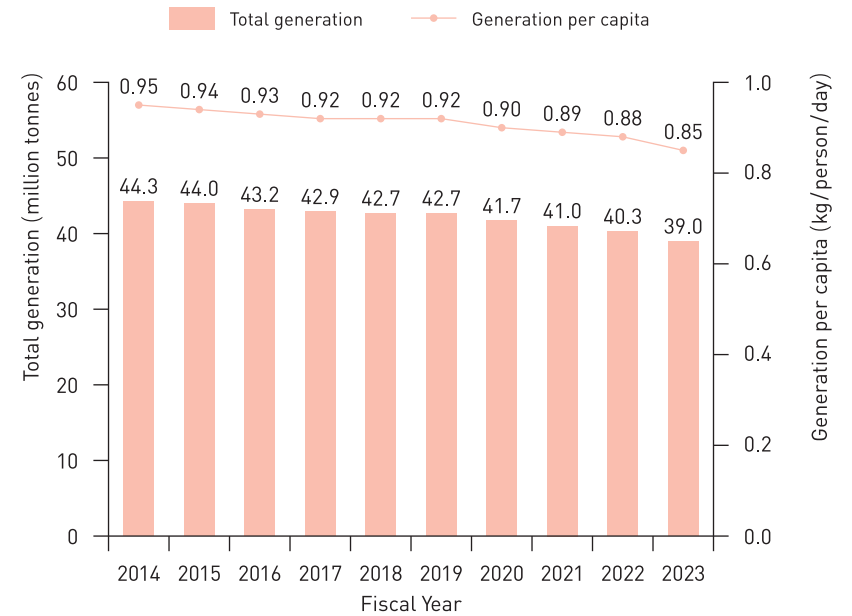


Figure 2-2. Historical trend of municipal solid waste generation

[Comments]

- ✓ Municipal solid waste generation in Japan has been on a declining trend in recent years, reflecting decreases in both population and per capita waste generation.
- ✓ Municipal solid waste in Japan is defined as waste other than industrial waste.
Approximately 70% of municipal solid waste comes from households and 30% from businesses (offices, stores, restaurants).
- ✓ Total waste generation has been declining due to reductions in per-capita generation and population decline since 2008.



Incineration facilities

Table 3-1. Incineration facilities for municipal solid waste in FY2023 ⁽¹⁾

Category	Number of Facilities	Treatment Capacity (ton/day)	Amount of incineration in FY2023 (ton/day)
Public sector	179	19,626	13,391
Private sector	225	21,746	11,902
Total	404	41,373	25,293

[Comments]

- ✓ As of 2023, there are 404 incineration facilities with a daily treatment capacity of 25,293 tonnes, operating at 61% of total capacity.
- ✓ Of the 404 facilities, 179 (44%) belong to the public sector and 225 (56%) to the private sector.
- ✓ Public sector facilities have a daily treatment capacity of 13,391 tonnes (53%), while private facilities handle 11,902 tonnes/day (47%).

Table 3-2. Incineration facilities for municipal solid waste in FY2023 ⁽¹⁾

Category	Number of Facilities	Treatment Capacity (ton/day)	Number of facilities with power generation	Capacity of power generation (MW)	Total power generation (GWh/year)
Public sector	1,004	174,598	411	2,230	10,254
Private sector	317	101,401	81	409	1,519
Total	1,321	275,999	492	2,639	11,773

[Comments]

- ✓ The number of incineration facilities exceeded 2,000 in the 1970s, but it has gradually decreased, and there are approximately 1,000 incineration facilities owned by municipalities today.
- ✓ Since many incineration facilities are relatively small in scale, power generation efficiency is not high; the average power generation efficiency of municipally owned incineration facilities is 14.2%.
- ✓ In anticipation of future population decline in Japan, each prefecture is planning to consolidate its incineration facilities.



Composition of municipal solid waste

Table 4-1. Annual municipal solid waste generation by category (thousand tonnes)

Category		FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽³⁾	FY 2022 ⁽⁴⁾	FY 2023 ⁽⁵⁾
Combustible	Plastics	2,712	1,897	1,891	2,282	2,385
	Paper	1,822	1,859	2,065	1,638	1,600
	Food	615	498	556	556	569
	Wood, grass	770	472	460	486	469
	Rubbers	213	158	113	137	139
	Others	2,680	2,433	2,467	2,266	2,304
	Subtotal	8,813	7,317	7,551	7,366	7,466
Non-combustible	Glass	235	229	258	220	227
	Metals	164	163	189	169	171
	Sands	220	84	79	49	43
	Others	915	466	483	499	459
	Subtotal	1,534	942	1,008	937	900
Others (Unspecified disposal)	423	260	260	386	408	
Separate disposal of recyclable resources	5,161	8,863	8,998	9,351	8,833	
Separate disposal of food waste	5,225	5,162	4,877	4,998	4,799	
Total	21,156	22,545	22,695	23,038	22,409	

[Comments]

- ✓ In 2023, municipal solid waste included 7,466 thousand tonnes of combustible waste, 900 thousand tonnes of non-combustible waste, and 408 thousand tonnes classified as other waste.
- ✓ Additionally, recyclable resources such as plastic, paper, and glass accounted for 8,833 thousand tonnes, and food waste totaled 4,799 thousand tonnes of municipal solid waste.

Table 4-2. Annual municipal solid waste generation by category (thousand tonnes)

Category		FY 2018 ⁽¹⁾	FY 2019 ⁽²⁾	FY 2020 ⁽³⁾	FY 2021 ⁽⁴⁾	FY 2022 ⁽⁵⁾
Combustible	Paper	14,893	14,722	14,826	14,695	14,474
	Food	12,964	13,010	11,959	11,079	10,542
	Wood, grass	4,990	4,769	4,412	4,649	4,878
	Plastics	3,961	4,091	4,230	4,498	4,594
	Textiles	1,228	1,346	1,336	1,401	1,370
	Subtotal	38,036	37,938	36,763	36,322	35,858
Non-combustible	Metals	2,094	2,127	2,041	1,908	1,827
	Glass	1,136	1,192	1,281	1,243	1,173
	Ceramics	945	937	983	915	846
	Subtotal	4,175	4,256	4,305	4,066	3,846
PET bottles	635	672	669	632	715	
Total	42,846	42,866	41,737	41,020	40,419	

[Comments]

- ✓ Among municipal solid waste, paper waste has the highest generation, followed by food waste.
- ✓ The data in this table exclude disaster waste (136 thousand tonnes in FY2022).
- ✓ Of the 10,542 thousand tonnes of food waste generated in FY2022, 93.8%, or 9,893 tonnes, was directly incinerated.



Food loss and food waste generation

Table 5-1. Food waste generation and processing status (thousand tonnes)

Category	FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽³⁾	FY 2022 ⁽⁴⁾	FY 2023 ⁽⁵⁾
Landfill	55	48	38	35	69
Incineration	123	64	65	39	33
Recycling	5,027	4,556	4,337	4,444	4,295
Other	20	2	36	39	35
Total	5,225	4,670	4,476	4,558	4,432

[Comments]

- ✓ Food waste within household waste is primarily treated through recycling methods, while a smaller portion is processed by incineration or landfill.
- ✓ Recycling primarily involves utilizing materials as animal feed or agricultural fertilizer, or converting them into energy through methods such as anaerobic digestion.
- ✓ The amount treated through other methods refers to waste processed by mechanical, chemical, or biological methods.

Table 5-2. Food loss and food waste generation (thousand tonnes)

Category	FY 2018 ⁽¹⁾	FY 2019 ⁽²⁾	FY 2020 ⁽³⁾	FY 2021 ⁽⁴⁾	FY 2022 ⁽⁵⁾
Food-related businesses					
Reduction	166	183	176	181	162
Recycling	1,218	1,223	1,143	1,187	1,121
Disposal	381	350	305	302	242
Total	1,765	1,756	1,624	1,670	1,525
Household					
Recycling	56	55	56	56	55
Disposal	710	699	692	676	652
Total	766	754	748	732	707

[Comments]

- ✓ Food-related businesses include food manufacturing, food wholesale, food retail, and the food service industry.
- ✓ “Reduction” refers to decreasing the amount of food loss and food waste, prior to recycling or disposal, through methods such as dehydration, drying, fermentation, or carbonization.
- ✓ “Disposal” refers to incineration or landfilling.



Construction waste generation

Table 6-1. Annual construction waste generation (thousand tonnes)

Category	FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽³⁾	FY 2022 ⁽⁴⁾	FY 2023 ⁽⁵⁾
Non-combustible					
Waste concrete	50,303	53,939	54,489	47,485	38,005
Waste asphalt concrete	15,024	15,841	13,778	12,149	12,550
Construction waste soil	3,061	4,088	4,702	4,976	3,576
Waste bricks	1,219	1,572	1,120	1,254	1,307
Construction debris	411	839	1,001	1,181	786
Waste blocks	761	514	359	261	362
Waste tile and waste ceramics	12	8	13	11	9
Waste tiles	8	7	10	7	5
Waste glass	1	2	8	3	4
Scrap metal	0	0	1	0	0
Subtotal	70,802	76,811	75,480	67,327	56,604
Combustible					
Waste synthetic resin	587	589	531	596	695
Waste wood	315	422	350	344	373
Waste fiber	4	6	5	4	2
Waste wallpaper	1	0	0	0	0
Subtotal	907	1,018	887	944	1,069
Combustible/Non-combustible mixtures					
Mixed construction waste	8,894	8,536	7,358	7,802	6,610
Waste boards	75	58	49	85	64
Waste panel	3	4	19	13	16
Subtotal	8,972	8,598	7,426	7,900	6,690
Other	22	16	17	12	10
Total	80,702	86,443	83,811	76,183	64,374

[Comments]

- ✓ Construction waste, defined as at least 5 tonnes of waste generated from a construction site during construction works, totaled 64,374 thousand tonnes in 2023, continuing a decline since 2020 (86,443 thousand tonnes).
- ✓ Non-combustible waste accounts for 56,604 thousand tonnes (87%), with waste concrete comprising 38,005 thousand tonnes.

Table 6-2. Annual construction waste generation (thousand tonnes)⁽¹⁾

Category	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Concrete debris	53,530	56,181	57,025	59,233	58,834
Sludge	10,696	11,702	9,785	10,129	9,649
Wood	5,643	5,977	5,879	5,744	5,765
Glass and ceramics	2,552	2,704	2,620	2,812	2,812
Plastics	1,424	1,540	1,323	1,378	1,395
Metals	957	932	918	944	1,015
Paper	335	321	293	305	310
Oil	114	130	111	108	107
Slag	61	58	62	85	69
Textiles	49	55	65	71	68
Alkali	45	49	60	63	55
Cinders	61	54	54	56	53
Acid	5	7	5	6	7
Dust	7	2	14	3	3
Rubber	1	1	1	1	1
Total	75,480	79,713	78,215	80,938	80,143

[Comments]

- ✓ "Construction waste" refers to construction by-products that fall under the category of waste as defined in Article 2, Paragraph 1 of the Waste Management and Public Cleansing Law, and includes both municipal solid waste and industrial waste.
- ✓ "Construction soil" refers to soil and sand removed during construction work, and does not fall under the category of waste as defined by the Law.
- ✓ "Sludge" generated during construction work is defined as industrial waste according to the Law.



Types of designated waste

Table 7-1. Types of designated waste (1)

Waste generated in a specific facility	
(1) Waste synthetic polymer compounds	1) Waste synthetic resin (excluding solid state) 2) Waste synthetic rubber (excluding solid state)
(2) Sludge	1) Wastewater sludge (facility notified by the Minister) 2) Process sludge (facility notified by the Minister)
(3) Waste pesticides (occurring at pesticide manufacturing-sales businesses)	
Corrosive waste	
(1) Waste acid (liquid pH 2.0 or less)	
(2) Waste alkali (liquid pH 12.5 or higher)	
Waste containing hazardous substances	
(1) Slag (excluding blast furnace slag)	
(2) Dust (incineration facilities excluded)	
(3) Waste foundry sand and sandblast waste sand	
(4) Waste Glazed and Unglazed Ceramic Pieces	
(5) Incineration ash	
(6) Stabilized or solidified/solidified processings	
(7) Waste catalyst	
(8) Waste adsorbents and waste absorbents	
Waste organic solvent	
(1) Halogen group (limited to substances specified or contained by Ordinance of the Ministry of Environment)	
(2) Other waste organic solvents (organic solvents other than item A)	
Waste Paint and Waste Locker	
(1) Paints and lacquers mixed with organic solvents (generated in painting facilities with a volume of 5 m ³ or more or a power of 3 horsepower or more, and waste recycling facilities)	
(2) Paint storage container mixed with organic solvent to remove remaining paint	
(3) Waste paint containers (excluding those where the residue is no more than 6 mm from the bottom of the container)	
Waste oil	
Containing more than 5% oil content	
Waste Asbestos	
(1) Products and equipment that contain more than 1% asbestos based on dry content are generated during dismantling and removal	
(2) In grinding, cutting, and processing factories for asbestos products such as slate. Generated debris and dust from dust collectors in facilities	
(3) Vinyl floor sheets, dust masks, work clothes, etc. used in asbestos removal work.	
Waste containing polychlorinated biphenyls	
(1) Liquid (limited to containing more than 2mg/L)	
(2) Anything other than liquid (limited to containing more than 0,003mg/L)	
Waste toxic substances	
Limited to toxic substances under Article 2, Article 2 of the Corrosion Act	
Medical waste	
Limited to those generated by medical agencies, testing/inspection agencies, etc. by the Ministry of Environment	
Natural radioactive product waste	
Products that do not meet the safety standards in accordance with Article 15, Paragraph 1 of the Environmental Radiation Safety Management Act (radioactivity concentration less than 10 Bq/g)	
Mercury waste	
(1) Mercury-containing waste	
(2) Mercury composition waste (Mercury and its compounds separated from mercury-containing waste)	
(3) Mercury-containing waste disposal residues (limited to containing more than 0,005 mg/L)	
Other substances notified by the Minister of Ministry Environment as hazardous substances that may contaminate the surrounding environment	

[Comments]

- ✓ Designated waste must be collected, transported, and treated in accordance with the Wastes Control Act.

Table 7-2. Types of specially controlled waste (1)

Specially controlled municipal solid waste	
Parts containing PCBs	Contained in discarded air-conditioners, televisions, and microwave ovens
Mercury	Recovered from municipal solid waste originating from mercury-containing products
Fly ash	Generated in dust collection facilities at waste treatment plants
Fly ash, incineration residue, and sludge	Generated from waste incinerators designated as specified facilities under the Dioxins Special Measures Law, containing dioxins in excess of 3 ng/g
Infectious municipal solid waste	Generated from medical institutions, which may contain or be contaminated with infectious pathogens
Specially controlled industrial waste	
Waste oil	Volatile oils, kerosene, and light oil (excluding non-flammable substances such as tar pitch)
Waste acid	Strong corrosiveness and a pH of 2.0 or lower
Waste alkali	Strong corrosiveness and a pH of 12.5 or higher
Infectious industrial waste	Generated from medical institutions, which may contain or be contaminated with infectious pathogens
Specified hazardous industrial waste	
Waste PCBs	PCBs and waste oil containing PCBs
PCB-contaminated materials	Sludge contaminated with PCBs, paper coated or impregnated with PCBs, wood or textile impregnated with PCBs, plastics or metals attached with PCBs, or enclosed, and ceramic or concrete debris attached with PCBs
PCB-treated waste	Containing PCBs for treating PCBs or PCB-contaminated materials
Waste mercury	(1) Mercury generated at specified facilities, (2) Mercury recovered from industrial waste containing mercury or its compounds, or from mercury-containing products that have become industrial waste
Designated sewage sludge	Sewage sludge designated under Article 13-4 of the Cabinet Order for Enforcement of the Sewerage Act
Slag	Containing heavy metals, etc., in concentrations exceeding specified levels
Waste asbestos, etc.	Materials removed in asbestos-containing building material removal projects or those generated at facilities designated under the Air Pollution Control Act as specified dust-emitting, which are likely to disperse
Cinders	Containing heavy metals and dioxins in excess of specified concentrations
Dust	Dust containing heavy metals, 1,4-dioxane, and dioxins in excess of specified concentrations
Waste oil	Containing organochlorine compounds, etc., and 1,4-dioxane
Sludge, waste acid, or waste alkali	Containing heavy metals, PCBs, organochlorine compounds, pesticides, 1,4-dioxane, and dioxins in excess of specified concentrations

[Comments]

- ✓ The Waste Management and Public Cleansing Law stipulates that waste with properties that may cause explosion, toxicity, infection, or other harm to human health or the living environment shall be classified as "specially controlled municipal solid waste" or "specially controlled industrial waste".
- ✓ It also establishes necessary treatment standards and enforces stricter regulations compared to ordinary waste.



Designated waste generation

Table 8-1. Annual generation of designated waste (thousand tonnes)

Category	FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽³⁾	FY 2022 ⁽⁴⁾	FY 2023 ⁽⁵⁾
Other waste organic solvent	1,215	1,210	1,344	1,413	1,333
Waste oil	1,169	1,186	1,275	1,253	1,292
Waste acid	1,048	1,033	1,181	1,228	1,202
Dust	543	518	543	524	502
Incineration ash	384	367	326	317	321
Medical waste	236	195	218	230	204
Wastewater sludge	214	207	215	243	283
Process sludge	209	180	141	182	269
Waste asbestos	165	198	186	166	149
Waste paint and waste lacquer	136	135	136	135	145
Waste alkali	107	109	138	169	136
Slag	113	101	97	133	110
Waste toxic substances	36	46	61	65	81
Stabilization or solidification treatment	23	36	36	33	31
Spent catalyst	26	27	25	23	25
Waste synthetic resin	20	19	19	22	15
Halogen organic solvent	18	20	19	18	17
Waste adsorbent	7	8	7	8	9
PCB containing waste	4	5	5	5	4
Waste pesticide	3	5	2	3	3
Waste foundry sand and waste sand	1	1	1	1	5
Waste refractories and waste ceramic fragments	2	2	3	3	2
Waste synthetic rubber	0	1	0	0	0
Mercury waste	-	-	0	0	0
Natural radioactive product waste	-	-	0	0	0
Total	5,678	5,608	5,979	6,174	6,139

[Comments]

- ✓ In 2023, designated wastes such as waste organic solvents, waste oil, and waste acid accounted for approximately 64% of the total generation.
- ✓ Mercury waste and natural radioactive product waste were included in the statistics starting in 2021, but the generated amount remains minimal.

Table 8-2. Annual generation of specially controlled industrial waste (thousand tonnes)

Category	FY 2019 ⁽¹⁾	FY 2020 ⁽²⁾	FY 2021 ⁽²⁾	FY 2022 ⁽³⁾	FY 2023 ⁽³⁾
Waste acid	574	505	571	573	531
Waste oil	522	503	504	480	484
Infectious industrial waste	519	485	464	503	457
Waste alkali	467	433	459	416	457
Specified hazardous industrial waste					
Asbestos	43	32	45	51	41
Dust	227	219	241	275	194
Sludge	148	128	129	126	138
Waste alkali	367	260	142	129	95
Waste oil	151	115	81	67	56
Waste acid	107	69	64	72	51
Cinders	24	23	24	24	24
Slag	7	3	3	5	3
Waste mercury	0	0	0	0	0

[Comments]

- ✓ Regarding waste oil, waste acid, and waste alkali, the proportion of specially controlled industrial waste within industrial waste is over 20%.
- ✓ The chemical industry generates the largest amount of specially controlled industrial waste, followed by the medical and welfare industry.
- ✓ The largest amount of specially controlled industrial waste generated was waste acid, followed by waste oil, infectious industrial waste, and waste alkali, with these four categories accounting for three-quarters of the total amount generated.



Medical waste generation

Table 9-1. Status of medical waste treatment by year (thousand tonnes)

Category	FY2019 ⁽¹⁾	FY2020 ⁽²⁾	FY2021 ⁽³⁾	FY2022 ⁽⁴⁾	FY2023 ⁽⁵⁾
Self-processing					
Incineration	-	0	0	-	-
Sterilization/Grinding	1.2	1.4	2.2	1.7	2.6
Others	15.5	4.8	3.8	3.9	4.2
Subtotal	16.7	6.3	6.0	5.6	6.8
Consignment processing					
Incineration	219	189	212	224	197
Sterilization/Grinding	-	-	-	-	-
Others	-	0	0	0	0
Subtotal	219	189	212	224	197
Total	236	195	218	230	204

[Comments]

- ✓ The majority of medical waste is treated through contracted incineration, while the remainder undergoes sterilization and crushing treatment or recycling.
- ✓ Except for the placenta, the recycling of medical waste is generally prohibited.

Table 9-2. Annual generation of infectious industrial waste

Category	Unit	FY2019 ⁽¹⁾	FY2020	FY2021 ⁽²⁾	FY2022 ⁽³⁾	FY2023 ⁽⁴⁾
Recycling	Thousand tonnes	3	-	3	3	3
	%	0.6	-	0.6	0.7	0.6
Treatment	Thousand tonnes	516	-	479	436	453
	%	99.4	-	99.1	99.0	99.1
Direct landfill	Thousand tonnes	0	-	1	1	1
	%	0.0	-	0.3	0.3	0.3
Total	Thousand tonnes	519	-	483	440	457
	%	100.0	-	100.0	100.0	100.0

[Comments]

- ✓ Approximately 250 private companies nationwide treat infectious industrial waste.
- ✓ Most infectious industrial waste is treated, with the majority being incinerated and the remainder being melted or steam-sterilized.
- ✓ The largest amount of infectious industrial waste is treated in the Kanto region, where Tokyo is located.



Waste used for cement production

Table 10-1. Wastes and by-products used for cement production (thousand tonnes)⁽¹⁾

Category	FY2019	FY2020	FY2021	FY2022	FY2023
Alternative raw material					
Coal ash	3,179	2,792	2,856	2,506	2,694
Inorganic sludge	727	883	935	626	385
Organic sludge	1,588	1,744	1,827	1,939	1,801
Others (tailings, etc.)	591	330	476	424	276
Waste foundry sand	606	610	708	642	597
Subtotal	6,691	6,359	6,802	6,137	5,753
Assistant fuel					
Waste tire	275	186	165	128	136
Waste synthetic resin	1,016	1,407	1,952	2,291	2,340
Waste rubbers	76	88	112	102	104
Others (waste wood, etc.)	35	40	16	0.8	3
Subtotal	1,402	1,720	2,245	2,522	2,584
Total	8,093	8,079	9,047	8,659	8,337

[Comments]

- ✓ In 2023, approximately 8,337 thousand tonnes of waste were utilized in the production of cement.
- ✓ Waste is utilized as both an alternative raw material for cement and an assistant fuel in kilns, with approximate quantities of 5,753 thousand tonnes and 2,584 thousand tonnes, respectively.

Table 10-2. Wastes and by-products used for cement production (thousand tonnes)^{(1), (2)}

Category	Used for	FY2020	FY2021	FY2022	FY2023	FY2024
Coal ash	RM, AD	7,286	7,450	6,893	6,294	6,188
Blast Furnace Slag	RM, AD	6,981	6,939	6,519	5,420	5,110
Sludge	RM	2,950	2,904	2,864	2,653	2,627
By-product gypsum	RM (additive)	2,032	2,098	2,000	1,764	1,740
Incineration ash (excluding coal ash), soot, dust	RM	1,482	1,471	1,534	1,418	1,324
Waste soil from construction	RM	1,241	1,159	946	963	826
Waste Plastic	HE	746	774	784	794	820
Non-Ferrous Slag	RM	725	708	612	539	511
Steel slag	RM	364	439	388	385	450
Woodchips	HE	437	400	379	406	367
Foundry sand	RM	336	379	365	351	336
Waste oil	HE	245	302	273	257	284
Waste white clay	RM, HE	260	267	272	291	269
Recycled oil	HE	282	236	256	266	284
Cullet	RM	154	151	142	162	121
Meat and bone meal	RM, HE	71	71	68	62	58
Waste tire	RM, HE	69	68	80	62	52
RDF, RPF	HE	46	34	39	51	53
Coal mining waste	RM, HE	0	0	0	0	0
Others		447	445	462	440	447
Total		26,155	26,294	24,878	22,579	21,867

RM: Raw materials, AD: Admixture, HE: Heat energy

[Comments]

- ✓ Cement production has been declining since peaking at 99 million tonnes in FY1996, reaching 46 million tonnes in FY2024, of which 62% was ordinary Portland cement.
- ✓ Of the waste and by-products recovered in Japan, approximately 10%, or 22 million tonnes, was used in cement production.
- ✓ Waste and by-products are utilized as raw materials and as a source of heat energy in the cement industry, with approximately 480 kg of waste and by-products used per ton of cement.



Plastic waste generation

Table 11-1. Plastic waste generation by category (thousand tonnes)

Category	FY2020 ⁽¹⁾	FY2021 ⁽²⁾	FY2022 ⁽³⁾	FY2023 ⁽⁴⁾
Household waste				
Volume-based waste disposal				
Waste synthetic resin	1,707	1,751	2,161	2,249
Waste fiber	371	396	368	398
Waste synthetic rubber	145	107	131	132
Separate disposal of recyclable resources				
Waste synthetic resin				
Vinyl	446	440	415	437
PET bottle	219	186	181	174
Foam resin	75	62	66	70
Other	419	472	477	485
Waste clothing	82	118	107	111
Waste fiber	27	16	13	14
Waste synthetic rubber	9	6	1	0.5
Subtotal	3,500	3,554	3,920	4,072
Industrial household waste				
Mixed disposal				
Waste synthetic resin	191	140	121	137
Waste fiber	5	23	12	14
Waste synthetic rubber	14	5	6	7
Separate disposal				
Waste synthetic resin	1,355	1,632	1,943	1,711
Waste fiber	34	44	45	41
Waste synthetic rubber	33	39	46	29
Subtotal	1,632	1,883	2,173	1,939
Industrial waste				
Waste synthetic resin	5,796	6,700	7,223	8,658
Waste synthetic rubber	150	199	185	201
Waste fiber	66	59	56	55
Subtotal	6,012	6,958	7,463	8,914
Construction waste				
Waste synthetic resin	589	531	596	695
Waste fiber	6	5	4	2
Subtotal	595	537	600	697
Designated waste				
Waste synthetic resin	19	19	22	15
Waste synthetic rubber	0.9	0.3	0.3	0.3
Subtotal	20	20	22	15
Total	11,759	12,952	14,178	15,637

[Comments]

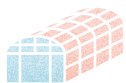
- ✓ In 2023, plastic waste generation included 4,072 thousand tonnes from household waste, 1,939 thousand tonnes from industrial household waste, 8,914 thousand tonnes from industrial waste, 697 thousand tonnes from construction waste, and 15 thousand tonnes from designated waste.
- ✓ Plastic waste from industrial waste increased by approximately 48.3% from 6,012 thousand tonnes in 2020 to 8,914 thousand tonnes in 2023.

Table 11-2. Plastic waste generation by category (thousand tonnes)⁽¹⁾

Category	2019	2020	2021	2022	2023
Municipal solid waste					
Packaging, containers	3,180	3,160	3,260	3,280	2,910
Household goods/clothing and footwear/furniture/toys	540	560	560	580	600
Electrical and electronic equipment/wires and cables/machinery	180	170	170	170	160
Building materials	0	0	0	0	0
Transportation	0	0	0	0	0
Agriculture, forestry, and fisheries	0	0	0	0	0
Others	220	210	200	210	200
Subtotal	4,120	4,100	4,190	4,240	3,870
Industrial waste					
Electrical and electronic equipment/wires and cables/machinery	1,440	1,390	1,310	1,260	1,210
Packaging, containers	800	750	760	750	690
Building materials	600	590	590	580	590
Transportation	240	200	170	170	170
Household goods/clothing and footwear/furniture/toys	170	170	160	160	160
Agriculture, forestry, and fisheries	120	110	120	120	120
Others	340	310	310	310	300
Processing losses	680	600	650	640	580
Subtotal	4,390	4,120	4,070	3,990	3,820
Total	8,510	8,220	8,260	8,230	7,690

[Comments]

- ✓ Total waste plastic generation in 2023 was 7,690 thousand tonnes, of which polyethylene accounted for 34%, or 2.61 million tonnes, and polypropylene accounted for 24%, or 1.87 million tonnes.
- ✓ Approximately 89%, or 6.88 million tonnes, of the total generation was recovered, while the remaining 11%, or 810 thousand tonnes, was landfilled or incinerated without energy recovery.
- ✓ 1.71 million tonnes of waste plastic were materially recycled, of which 28%, or 480 thousand tonnes, were used as raw materials in the plastic production process.



Agricultural plastic waste generation

Table 12-1. Agricultural plastic waste generation (thousand tonnes)⁽¹⁾

Category	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
LDPE for mulching	129	156	153	161	151
HDPE	106	82	96	94	88
LDPE for house	59	54	48	41	33
Others (PVC, EVA, PO)	15	16	21	18	18
Total	310	307	319	315	290

[Comments]

- ✓ Agricultural waste plastic decreased by 20 thousand tonnes (6.5%), from 310 thousand tonnes in 2019 to 290 thousand tonnes in 2023.
- ✓ In 2023, LDPE for mulching accounted for the largest share of plastic waste at 151 thousand tonnes (52.1%), followed by HDPE (88 thousand tonnes, 30.3%), LDPE for house (33 thousand tonnes, 11.4%), and others (18 thousand tonnes, 6.2%) in descending order.

Table 12-2. Agricultural plastic waste generation (thousand tonnes)

Category	FY 2018 ⁽¹⁾	FY 2019	FY 2020 ⁽²⁾	FY 2021	FY 2022 ⁽³⁾
Polyvinyl chloride (PVC) film	24	-	24	-	20
Polyolefin film	56	-	54	-	46
Other plastic films	8	-	7	-	8
Other plastics	18	-	16	-	14
Total	107	-	101	-	87

[Comments]

- ✓ The amount of agricultural plastic waste has been on a downward trend due to factors such as the deduction in agricultural greenhouses areas and improvement in the durability of covering materials.
- ✓ Agricultural waste plastic requires proper management as industrial waste.
- ✓ The recovery rate has remained around 70.0% in recent years.
- ✓ Recovery of polyvinyl chloride (PVC) film is primarily achieved through material recycling into flooring materials, while recovery of polyolefin film is mainly accomplished through energy recovery.



Recycling rates of packaging waste

Table 13-1. Recycling rates of packaging waste (%)⁽¹⁾

Category	FY2019	FY2020	FY 2021	FY 2022	FY2023
Glass bottle	64	67	64	66	82
Paper carton	19	16	14	13	13
Metal can					
Iron can	95	86	84	93	95
Aluminum can	80	76	79	81	78
Synthesis resin packaging material					
Containers	93	97	100	100	100
Foamed synthetic resin	83	89	94	95	91
Film/sheet	83	86	88	83	97
PET bottle	80	76	79	78	77
PVC	32	35	34	29	41

[Comments]

- ✓ Among packaging waste, the recycling rates of containers, foamed synthetic resin, film/sheet, and iron can collectively exceed 80%.
- ✓ Paper carton has a recycling rate of 13% as of 2023, marking the lowest level among all categories.

Table 13-2. Recycling rates of packaging waste (%)

Category	FY2019	FY2020	FY2021	FY2022	FY2023
Paper containers and packaging ⁽¹⁾	-	-	-	-	22.4
Paperboard (paper packs) ⁽²⁾	41.4	38.8	38.8	38.7	38.8
Corrugated cardboard ⁽³⁾	94.6	96.1	96.7	94.8	97.8
Glass bottles ⁽⁴⁾	67.6	69.0	73.4	70.2	75.3
Steel cans ⁽⁵⁾	93.3	94.0	93.1	92.7	93.5
Aluminum can ⁽⁶⁾	97.9	94.0	96.6	93.9	97.5
PET bottles ⁽⁷⁾	85.9	88.8	86.0	86.9	85.1
Plastic containers & packaging ⁽⁸⁾	46.4	46.5	46.7	45.9	45.8

[Comments]

- ✓ The recycling rate for corrugated cardboard, steel cans, and aluminum cans is very high, exceeding 90%.
- ✓ Paperboard (paper packs) refers to paper containers and packaging used for products such as milk and juice, and is made of a combination of paper and plastic film.
- ✓ Paper containers and packaging that use aluminum are classified as Paper containers & packaging.
- ✓ PET bottle recycling rates have been consistently high and broadly stable, while the amount of PET bottles recycled has been increasing in recent years.



End-of-life vehicle generation

Table 14-1. Number of end-of-life vehicles (thousand cars)

Category	FY 2020 ⁽¹⁾	FY 2021 ⁽²⁾	FY 2022 ⁽³⁾	FY 2023 ⁽⁴⁾	FY 2024 ⁽⁵⁾
Passenger vehicle					
Non-business use	713.5	635.5	583.7	603.4	610.0
For business use	7.9	7.6	11.4	7.9	6.2
Subtotal	721.4	643.1	595.2	611.3	616.1
Commercial vehicle					
Non-business use	39.2	35.8	28.0	35.2	31.8
For business use	4.2	4.1	4.6	4.6	5.2
Subtotal	43.4	39.8	32.7	39.8	37.0
Freight					
Non-business use	173.0	165.9	121.4	143.0	125.2
For business use	7.4	7.7	7.9	9.6	9.2
Subtotal	180.4	173.6	129.3	152.6	134.4
Specialized					
Non-business use	1.1	1.7	1.7	1.6	1.4
For business use	1.5	2.3	2.3	2.4	1.5
Subtotal	2.6	4.1	4.0	4.0	3.0
Other					
Non-business use	2.9	3.8	3.3	2.8	2.8
For business use	0.0	0.0	0.0	0.0	0.0
Subtotal	2.9	3.8	3.3	2.9	2.8
Total	950.8	864.4	764.4	810.5	793.3

[Comments]

- ✓ End-of-life vehicles generation decreased from 950.8 thousand cars in 2020 to 793.3 thousand cars in 2024, a decrease of 157.5 thousand cars (16.6%).
- ✓ By category, in 2024, passenger vehicles comprised the highest share at 616.1 thousand cars (77.5%), followed by freight (134.4 thousand cars, 16.9%), commercial vehicle (37.0 thousand cars, 4.7%), specialized (3.0 thousand cars, 0.4%), and other (2.8 thousand cars, 0.4%).

Table 14-2. Number of end-of-life vehicles (thousand cars)⁽¹⁾

Category	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Registered vehicles	1,707	1,574	1,423	1,386	1,295
Light vehicles	1,439	1,468	1,316	1,340	1,265
Total	3,146	3,042	2,739	2,726	2,560

[Comments]

- ✓ The number of end-of-life vehicles generated has been on a downward trend in recent years.
- ✓ Delays in the supply of new vehicles due to shortages of parts such as semiconductors have increased, leading to higher demand for ready-to-drive used cars.
- ✓ In addition, exports have increased in response to strong overseas demand for Japanese secondhand vehicles, resulting in a decrease in the number of end-of-life vehicles generated.

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<https://www.nier.go.kr/eng/index.do>

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Databook on Waste Management

in the Republic of Korea
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