MONITORING OF SOLID WASTE IN HONG KONG

Waste Statistics for 2001

Environmental Protection Department

Front cover : The North West New Territories Refuse Transfer Station came into operation in September 2001.

Monitoring of Solid Waste in Hong Kong

Waste Statistics for 2001

Date	May 2002
Security Classification	Unrestricted

Content

Abbreviations

C&D	Construction and Demolition
C&I	Commercial and Industrial
CED	Civil Engineering Department
CWTC	Chemical Waste Treatment Centre
EPD	Environmental Protection Department
EPS	Expanded Polystyrene
FEHD	Food and Environmental Hygiene Department
IETS	Island East Refuse Transfer Station
IWTS	Island West Refuse Transfer Station
KBTS	Kowloon Bay Refuse Transfer Station
MSW	Municipal Solid Waste
NENT	North East New Territories Landfill
NLTS	North Lantau Refuse Transfer Station
NT	New Territories
NWNTTS	North West New Territories Refuse Transfer Station
OITF	Outlying Islands Refuse Transfer Facilities
RTS	Refuse Transfer Station(s)
SENT	South East New Territories Landfill
STTS	Sha Tin Refuse Transfer Station
tpd	tonnes per day
WENT	West New Territories Landfill
WKTS	West Kowloon Refuse Transfer Station

1. Introduction

This report presents the statistics on disposal and recovery/recycling of solid waste generated in Hong Kong in the year 2001. It is a result of the ongoing solid waste monitoring work undertaken by the Environmental Protection Department, with the support of other government departments. It aims to provide the readers with the latest information available on solid waste. The information contained in this report is compiled from the data collected from various sources throughout the year. The statistics on waste disposal and recovery/recycling are presented in Chapters 2 and 3 respectively, whereas the classification of the solid waste and the methodology adopted in the data collection are explained in Appendix 1. Abbreviations that are used in the report are listed in page iii for ease of reference.

2. Waste Quantities and Characteristics

Table 2.1 Quantities of solid waste disposed of at landfills in 2001

Waste type	Quantity (tpd)			Change from 2000	
	Public[1]	Private[2]	Total	Quantity (tpd)	Percentage
a. Domestic waste [3]					
- waste from household, public cleansing	5,822	1,644	7,466		
- bulky waste [4]	28	57	85		
Sub-total	5,850[5]	1,701	7,551	+11	+0.1%
b. Commercial waste [6]					
- mixed waste from commercial activities	-	1,120	1,120		
- bulky waste [4]	-	68	68		
Sub-total		1,187	1,187	+36	+3.1%
c. Industrial waste					
mixed waste from industrial activities	-	534	534		
bulky waste [4]	-	28	28		
Sub-total		562	562	-82	-12.7%
d. Municipal solid waste received at disposal facilities (a+b+c)	**5,850**	**3,450**	**9,300**	**-35**	**-0.4%**
e. Construction & demolition waste (landfilled)	**-**	**6,408**	**6,408**	**-1,067**	**-14.3%**
f. Special waste [7] (landfilled)	**502**	**607**	**1,109**	**+15**	**+1.4%**
g. All waste received at landfills (d+e+f)	**6,352**	**10,465**	**16,817**	**-1,087**	**-6.1%**

Notes:

(1) Waste collected by the FEHD, FEHD contractors and other government vehicles.

(2) Waste collected by private waste collectors.

(3) Domestic waste also includes waste collected from government markets.

(4) These are bulky items like furniture and domestic appliances which cannot be handled by conventional compactor type refuse collection vehicles and are usually collected separately. They may come from residential premises, commercial and industrial activities.

(5) Publicly collected domestic waste included some commercial and industrial waste.

(6) Commercial waste also includes waste collected from non-government markets.

(7) Special waste included abattoir waste, animal carcasses, asbestos, clinical waste, condemned goods, livestock waste, sewage treatment and waterworks treatment sludge, sewage works screenings and stabilized residues from Chemical Waste Treatment Centre.

Table 2.2 Breakdown of solid waste delivered to RTS and landfills

Disposal facilities	Average daily waste intake by waste type in 2001(tpd)				
	MSW		Construction & demolition	Special	Total
	Public[1]	Private[2]			
KBTS - Kowloon Bay Refuse Transfer Station [3]	1,065	-	-	7	1,072
IETS - Island East Refuse Transfer Station [4]	866	17	-	-	883
STTS - Sha Tin Refuse Transfer Station [3]	890	-	-	-	890
IWTS - Island West Refuse Transfer Station [4]	463	24	-	-	487
WKTS - West Kowloon Refuse Transfer Station [4]	1,480	53	-	-	1,533
OITF - Outlying Islands Refuse Transfer Facilities [4]	86	-	-	2	88[5]
NLTS - North Lantau Refuse Transfer Station [4]	39	86	-	1	126
NWNTTS-North West New Territories Refuse Transfer Station [6]	194[7]		-		194[7]
WENT - West New Territories Landfill	3,689[8]	623[8]	837	714[8]	5,862[8]
SENT - South East New Territories Landfill	137	2,238	4,732	251	7,359
NENT - North East New Territories Landfill	2024[8]	589	839	144	3,596[8]
Sub-total	**5,850**	**3,450**			
Total	**9,300**		**6,408**	**1109**	**16,817**

Remark: Figures may not add up to total due to rounding off.

Notes :

(1) Waste collected by the FEHD, FEHD contractors and other government vehicles.

(2) Waste collected by private waste collectors.

(3) Waste from KBTS, and STTS (except special waste) was transferred to NENT by road.

(4) Waste from IETS, IWTS, WKTS, OITF and NLTS was transferred to WENT by sea.

(5) The quantity shown here does not include inert C&D material received by OITF (27tpd).

(6) Waste from NWNTTS was transferred to WENT by road.

(7) The NWNTTS was commissioned in September 2001 and the average daily intake for the period of September to December 2001 was 556 tpd. For computation of average daily intake consistent with the other facilities for the whole year of 2001, the total waste intake of NWNTTS during the September – December period was divided by 365 days, giving an average daily figure of 194 tpd as presented above.

(8) The quantity shown here includes the waste transferred from the RTS/OITF.

Table 2.3 Disposal of different kinds of special and other wastes

Waste type	Disposal method	Quantity disposed of (tpd)
Abattoir waste	Landfilling	40
Animal carcasses	Landfilling	22
Asbestos waste	Co-disposal at landfills (1)	10
Chemical waste other than asbestos waste	CWTC	172
	Co-disposal at landfills (1)	16
Clinical waste	Co-disposal at landfills (1)	4
Condemned goods	Landfilling	21
CWTC stabilised residue	Landfilling	41
Dewatered dredged materials	Landfilling	2
Dewatered sewage sludge	Landfilling	404
Dewatered waterworks sludge	Landfilling	11
Dredged mud (2)	Marine dumping	185,500
Excavated materials (2)	Marine dumping	403
Furnace bottom ash	Concrete manufacturing, stored in lagoon(3)	198
Grease trap waste	Co-disposal at landfill (4)	322(5)
Livestock waste	Composting and other environmentally acceptable means (6)	649
	Landfilling (7)	137
Pulverised fuel ash	Concrete manufacturing, stored in lagoon(3)	1,416
Sewage works screenings	Landfilling	52
Waste tyres (8)	Landfilling	27

Notes :

(1) Co-disposal at SENT and WENT Landfills.

(2) Assuming the density of the dredged mud and excavated materials to be one tonne per cubic metre.

(3) Information provided by CLP Power Hong Kong Limited and the Hongkong Electric Company, Limited.

(4) Co-disposal at WENT Landfill after treatment.

(5) This figure is the quantity of grease trap waste received at WENT Landfill, before treatment at Grease Trap Waste Treatment Facility.

(6) Examples of environmentally acceptable means include on-site composting, aerobic treatment, dry muck-out, etc.

(7) At the WENT Landfill.

(8) Waste tyres were shredded or cut prior to disposal.

Table 2.4 Geographical distribution of major solid wastes disposed of at landfills

Waste Arising District	Quantity[1] (tpd)					
	Domestic waste		C&I waste	Municipal solid waste	C&D waste (Landfilled)	All solid waste[3]
	Publicly collected[2] (a)	Privately collected (b)	(c)	(d) =(a)+(b)+(c)	(e)	(f) =(d)+(e)
Central & Western	369	102	84	555	402	957
Wanchai	259	91	62	412	193	605
Eastern	436	129	89	654	261	915
Southern	277	12	29	318	63	381
Hong Kong Island Sub-total	**1,341**	**334**	**264**	**1,939**	**919**	**2,858**
Yau Tsim Mong	501	139	122	762	603	1365
Sham Shui Po	347	152	132	631	515	1146
Kowloon City	270	111	67	448	417	865
Wong Tai Sin	350	54	33	437	277	714
Kwun Tong	440	102	174	716	777	1493
Kowloon Sub-total	**1,908**	**558**	**528**	**2,994**	**2,589**	**5,583**
Kwai Tsing	330	42	114	486	220	706
Tsuen Wan	244	94	167	505	281	786
Tuen Mun	404	88	103	595	386	981
Yuen Long	410	65	159	634	419	1053
North	208	243	82	533	460	993
Tai Po	252	47	40	339	158	497
Sha Tin	489	71	136	696	258	954
Sai Kung	139	159	67	365	605	970
NT - Mainland Sub-total	**2,476**	**809**	**868**	**4,153**	**2,787**	**6,940**
Cheung Chau[4]	38	-	-	38	-	-
Mui Wo[4]	26	-	-	26	-	-
Peng Chau[4]	8	-	-	8	-	-
Lamma Island[4]	10	-	-	10	-	-
Hei Ling Chau[4]	4	-	-	4	-	-
North Lantau[4]	39	-	89	128	-	-
NT - Outlying Islands Sub-total	**125**	**-**	**89**	**214**	**113[5]**	**327**
Territorial Total	**5,850**	**1,701**	**1,749**	**9,300**	**6,408**	**15,708**

Notes :

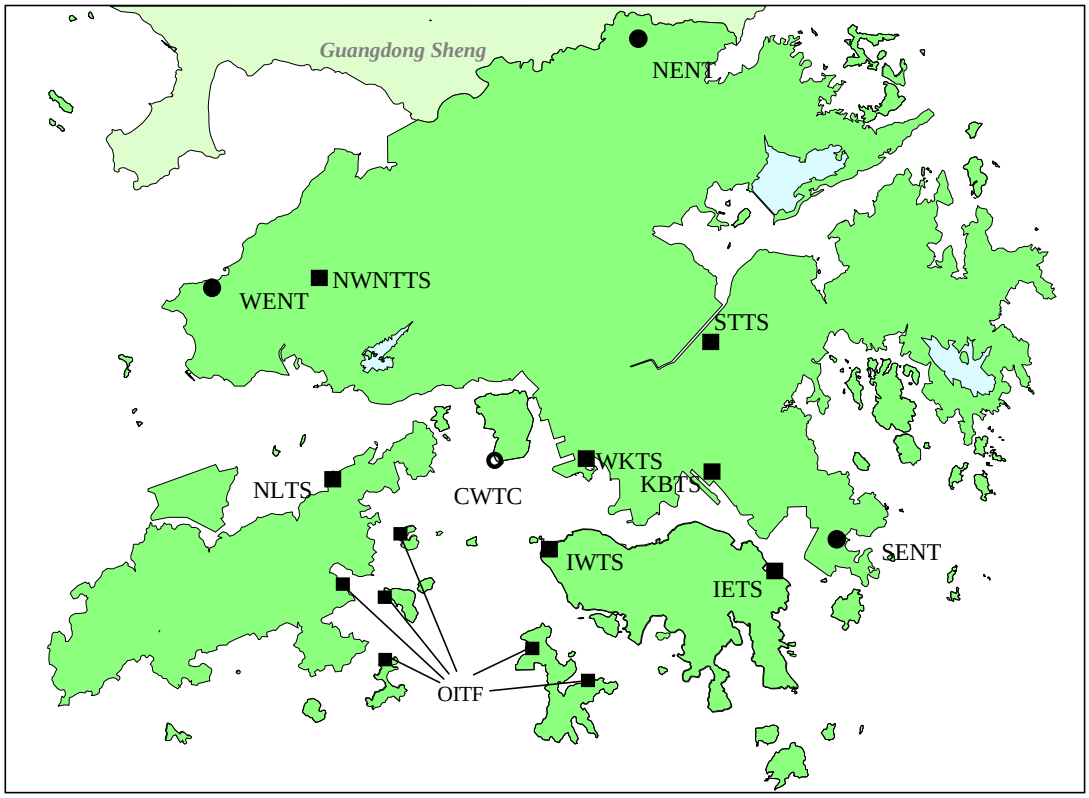
(1) The geographical distribution of solid waste arisings is based on weighbridge records at waste facilities and should be regarded as indicative reference only.

(2) Publicly collected domestic waste also included public cleansing waste as well as some commercial and industrial waste.

(3) Special waste is not included in this table.

(4) These islands/areas are aggregated to form the waste arising district "Outlying Islands".

(5) Breakdown into individual islands/areas is not available.

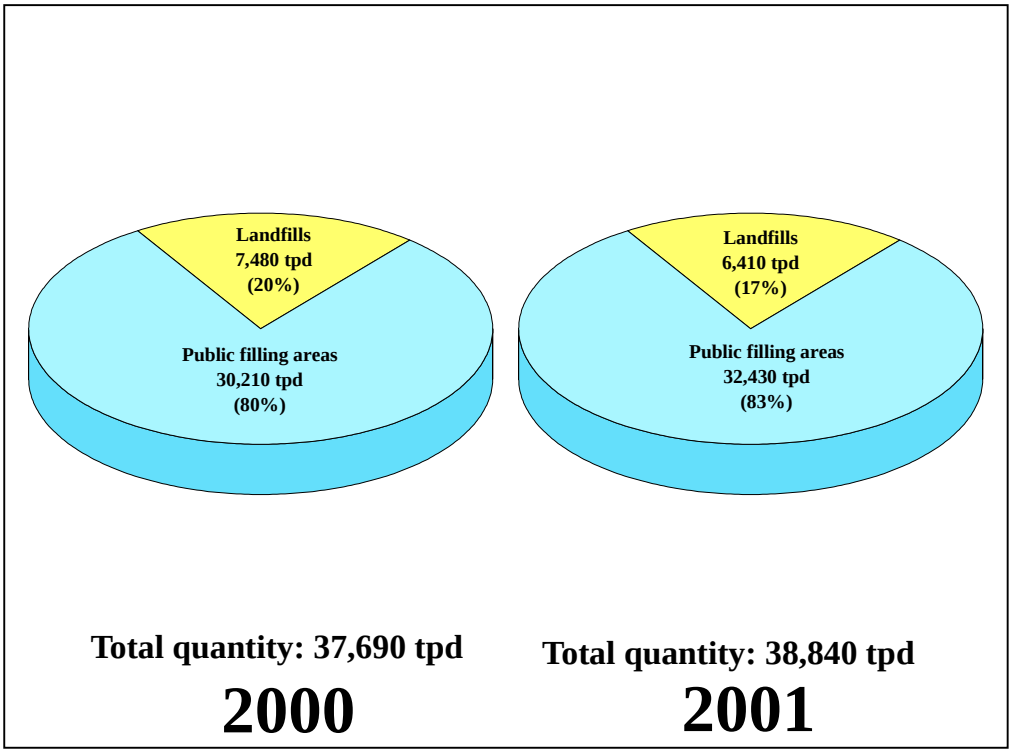


Landfill	●	**WENT** **5,862 tpd** **(-4.0%)**	**SENT** **7,359 tpd** **(-10.6%)**	**NENT** **3,596 tpd** **(+0.6%)**		
RTS	■	**IETS** (1) **883 tpd** **(+2.4%)**	**IWTS** (1) **486 tpd** **(+2.9%)**	**WKTS** (1) **1,533 tpd** **(-0.9%)**	**OITF** (1) **88 tpd** **(-23.5%)**	**NLTS** (1) **126 tpd** **(+20.0%)**
		KBTS (2) **1,072 tpd** **(+0.5%)**	**STTS** (2) **890 tpd** **(-6.1%)**	**NWNTTS** (3) **194 tpd** (4)		
CWTC	○	**171 tpd** **(0.0%)**				

Remark :
Percentage increase/decrease of waste quantity over previous year is shown in brackets.

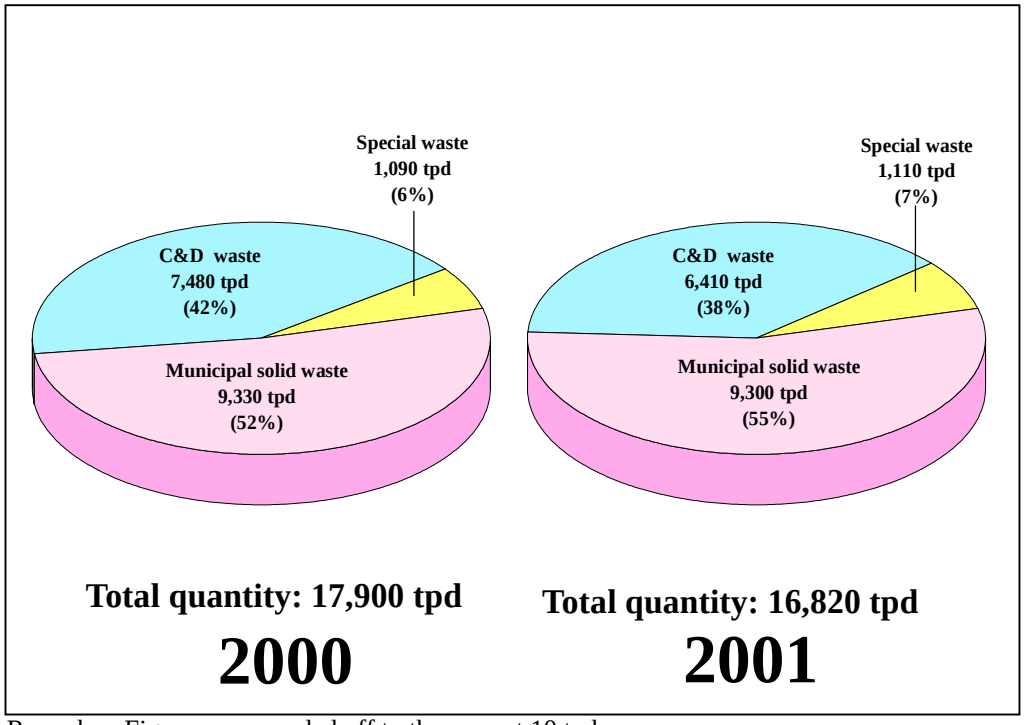
Notes:
(1) Waste from IETS, IWTS, OITF and NLTS was transferred to WENT by sea.
(2) Waste from KBTS and STTS was transferred to NENT by road.
(3) Waste from NWNTTS was transferred to WENT by road.
(4) The NWNTTS was commissioned in September 2001 and the average daily intake for the period of September to December 2001 was 556 tpd. For computation of average daily intake consistent with the other facilities for the whole year of 2001, the total waste intake of NWNTTS during the September – December period was divided by 365 days, giving an average daily figure of 194 tpd as presented above.

Figure 2.1 Waste Intake at waste facilities



Remark : Figures are rounded off to the nearest 10 tpd

Figure 2.2 Quantities and percentages of inert C&D materials delivered to public filling areas and C&D waste disposed of at landfills



Remark : Figures are rounded off to the nearest 10 tpd.

Figure 2.3 Proportion of solid waste disposed of at landfills

Table 2.5 Estimated composition of municipal solid waste disposed of at waste facilities

Component	Quantity (tpd) and percentage by weight		
	Domestic Waste (a)	**Commercial & Industrial Waste** (b)	**Municipal Solid Waste** (c)=(a)+(b)
Bulky waste	**85** (1.1%)	**96** (5.5%)	**181** (1.9%)
Glass	**285** (3.8%)	**52** (3.0%)	**337** (3.6%)
Metals	**229** (3.0%)	**59** (3.4%)	**288** (3.1%)
Paper	**1,827** (24.2%)	**468** (26.7%)	**2,295** (24.7%)
Plastics	**1,198** (15.9%)	**228** (13.0%)	**1,426** (15.4%)
Putrescibles	**3,253** (43.1%)	**405** (23.2%)	**3,658** (39.3%)
Textiles	**193** (2.6%)	**73** (4.2%)	**266** (2.9%)
Wood/rattan	**117** (1.5%)	**175** (10.0%)	**292** (3.1%)
Others	**364** (4.8%)	**193** (11.0%)	**557** (6.0%)
Total	**7,551** (100%)	**1,749** (100%)	**9,300** (100%)

Remark: Figures indicate the quantities and percentages by wet weight.

Table 2.6 Estimated breakdown of glass, metals, paper and plastics in domestic waste and C&I waste disposed of at waste facilities

	Domestic Waste		C&I Waste	
Component	Quantity (tpd)	% by weight	Quantity (tpd)	% by weight
Glass				
- Brown glass bottles	42	(0.6%)	6	(0.4%)
- Clear glass bottles	162	(2.2%)	16	(0.9%)
- Green glass bottles	64	(0.8%)	12	(0.7%)
- Other glass	17	(0.2%)	18	(1.0%)
(Glass) Sub-total	**285**	**(3.8%)**	**52**	**(3.0%)**
Metals				
- Ferrous metals	177	(2.3%)	46	(2.6%)
- Non-ferrous metals	52	(0.7%)	13	(0.8%)
(Metals) Sub-total	**229**	**(3.0%)**	**59**	**(3.4%)**
Paper				
- Cardboard	326	(4.3%)	101	(5.7%)
- Newsprint	764	(10.1%)	87	(5.0%)
- Writing paper	165	(2.2%)	83	(4.7%)
- Others (1)	572	(7.6%)	197	(11.3%)
(Paper) Sub-total	**1,827**	**(24.2%)**	**468**	**(26.7%)**
Plastics				
- Clear bags	131	(1.8%)	39	(2.2%)
- Colour bags (white, red, yellow, etc)	536	(7.1%)	64	(3.6%)
- EPS food/drink containers	50	(0.7%)	21	(1.2%)
- Other Polyfoams	26	(0.3%)	5	(0.3%)
- PET bottles	61	(0.8%)	7	(0.4%)
- Other beverage bottles	60	(0.8%)	4	(0.2%)
- Off-cuts & scraps	0	(0.0%)	7	(0.4%)
- Others (2)	334	(4.4%)	83	(4.7%)
(Plastics) Sub-total	**1,198**	**(15.9%)**	**228**	**(13.0%)**
Total	**3,539**	**(46.9%)**	**807**	**(46.1%)**

Remark: Figures indicate the quantities and percentages by wet weight, and may not add up to total due to rounding-off.

Notes :
(1) Other paper sub-components are drink pack (tetrapak), tissue paper, etc.
(2) Other plastics sub-components are household utensils, packaging materials, toys, etc.

3. Waste Recovery and Recycling

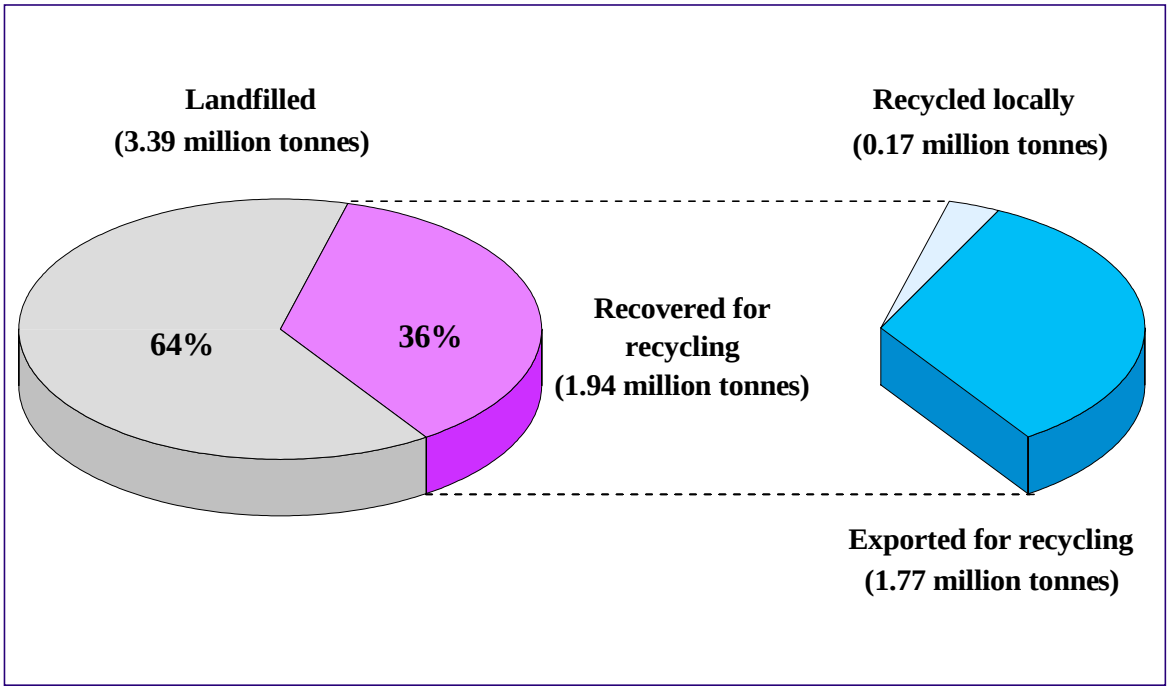


Figure 3.1 Recovery of municipal solid waste

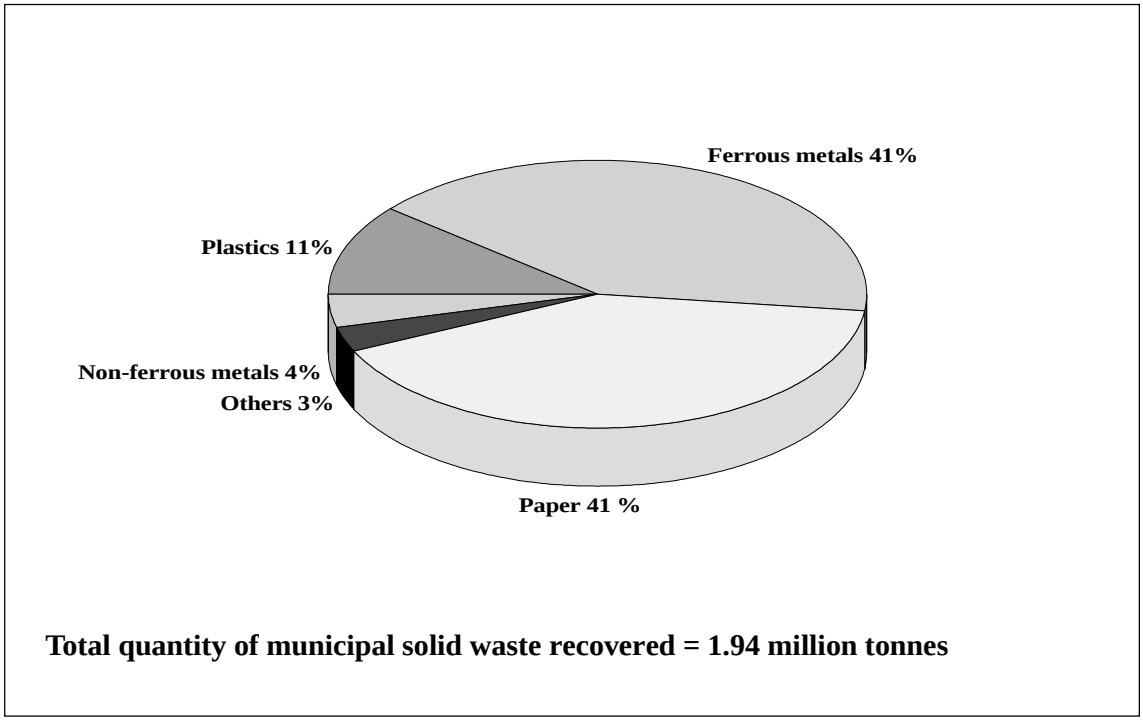


Figure 3.2 Proportion of major recyclable materials recovered from municipal solid waste

Table 3.1 Recovery of major recyclable materials

Waste type	Quantity of recyclables recovered in 2001 (thousand tonnes)		
	Exported for recycling [1] (a)	Recycled locally (b)	Total recovered for recycling [5] (c) = (a) + (b)
Ferrous metals	803	0	803
Glass [2]	0	4	4
Non-ferrous metals	69	8	77
Paper	657	143	800
Plastics	208	7	214
Rubber tyres	0	10 [4]	10
Textiles	20	0	20
Wood	8	2	10
Total [3]	**1,770**	**170**	**1,940**

Notes :

(1) Figures are based on records of the Census and Statistics Department.

(2) Excluding glass beverage bottles recovered through deposit-and-refund system operated by local beverage manufacturers.

(3) Figures are rounded off to the nearest 10 thousand tonnes.

(4) Quantity includes reuse, retreading and recycling of waste tyres.

(5) Figures may not add up to total due to rounding off.

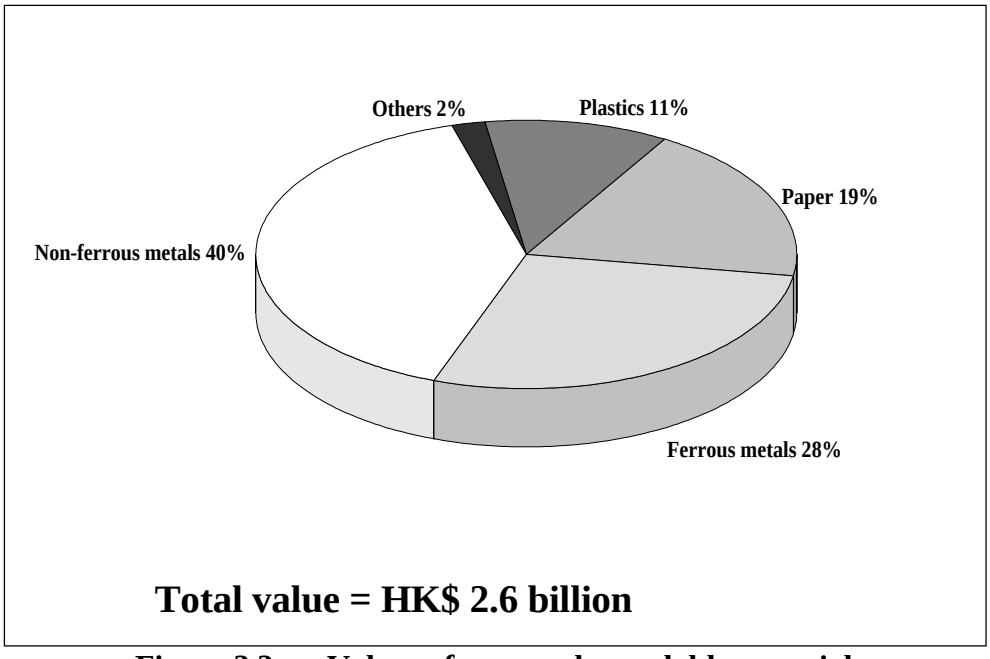


Figure 3.3 Values of exported recyclable materials

Table 3.2 Quantities and values of exported recyclable materials by type

Category of recyclable materials		Quantity[(1)] (tonnes)	Value[(1)] ($ thousand)	Value per Unit weight ($ / tonne)
a. Ferrous metals				
- alloy steel scrap		16,471	72,171	4,382
- pig or cast iron		42,970	46,667	1,086
- tinplate		572	1,134	1,983
- other scraps		743,177	606,669	816
	Sub-total	**803,190**	**726,641**	**905**
b. Non-ferrous metals				
- aluminium		17,044	69,285	4,065
- copper & alloys		47,580	296,645	6,235
- lead		2,785	4,424	1,589
- metal ash & residues		226	13,144	58,203
- nickel		63	1,273	20,106
- precious metal		117	656,386	5,629,431
- tin		2	39	20,176
- zinc		1,270	11,251	8,858
	Sub-total	**69,087**	**1,052,447**	**15,234**
c. Plastics				
- polyethylene		115,653	124,594	1,077
- polystyrene & copolymers		18,445	48,076	2,606
- polyvinyl chloride		2,234	5,065	2,267
- others		71,401	120,381	1,686
	Sub-total	**207,733**	**298,116**	**1,435**
d. Textiles				
- cotton		16,539	25,746	1,557
- man-made fibres		57	295	5,184
- old clothing & other textile articles, rags, etc.		3,434	11,700	3,407
	Sub-total	**20,030**	**37,741**	**1,884**
e. Wood & paper				
- paper		657,336	487,785	742
- wood (include sawdust)		8,203	4,274	521
	Sub-total	**665,539**	**492,059**	**739**
	Total	**1,765,579**	**2,607,004**	**1,477**

Notes :

(1) Figures provided by the Census & Statistics Department.

Appendix 1 Classification of Solid Waste and Monitoring Methodology

Waste Classification and Terminology

Solid waste is classified into five main types by making reference to the sources of waste and the institutional arrangements for waste collection and disposal. These five types of solid waste are municipal solid waste, construction & demolition (C&D) waste, chemical waste, special waste and other solid waste. The detailed interpretations of some commonly used terms are described below.

Municipal solid waste includes domestic waste, commercial waste and industrial waste.

- **Domestic waste** refers to household waste, waste generated from daily activities in institutional premises and refuse collected from public cleansing services. Public cleansing waste includes dirt and litter collected by the Food and Environmental Hygiene Department (FEHD), marine refuse collected by the Marine Department and waste from country parks collected by the Agriculture, Fisheries and Conservation Department.

- **Commercial waste** is waste arising from commercial activities taking place in shops, restaurants, hotels, offices, markets in private housing estates, etc. It is collected mainly by private waste collectors. However, some commercial waste is mixed with domestic waste and collected by the FEHD.

- **Industrial waste** is waste arising from industrial activities and does not include C&D waste and chemical waste. It is usually collected by private waste collectors. However, some industries may deliver their industrial waste directly to landfills for disposal.

  It should be noted that there are bulky items like furniture and domestic appliances which cannot be handled by conventional compactor type refuse collection vehicles. These items are regarded as bulky waste and are usually collected separately. They may come from residential premises, commercial and industrial activities.

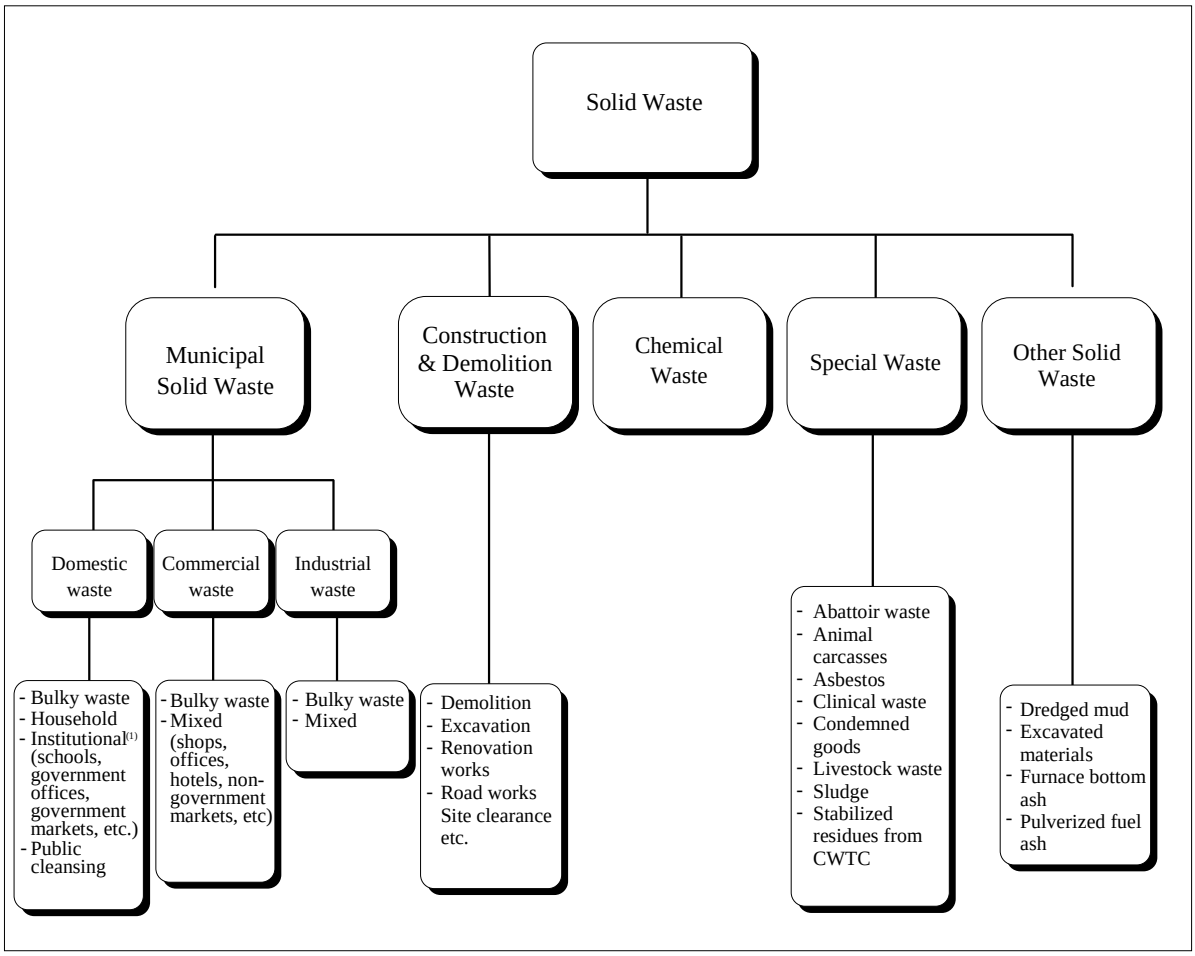
Construction & Demolition (C&D) waste includes waste arising from any land excavation or formation, civil/building construction, site clearance, demolition activities, roadworks and building renovation. It includes various types of building debris, rubble, earth, concrete, timber and mixed site clearance material. Type I C&D waste, as stated in the landfill contracts, is defined as C&D waste containing not more than 20% by volume (or 30% by weight) of inert material. Inert material comprises dirt/soil/mud, concrete, reinforced concrete, asphalt, brick/sand, cement plaster/mortar, aggregate, inert building debris, and rock/rubble. Type II C&D waste, which is not normally accepted by landfills, consists of more than 20% by volume (or 30% by weight) of inert material content.

Chemical waste is defined in the Waste Disposal (Chemical Waste) (General) Regulation under the Waste Disposal Ordinance (Cap. 354). Chemical waste can be any substance arising

from any process or trade activity which contains chemical in such form, quantity or concentration that can cause pollution to the environment or become a risk to health.

Special waste includes abattoir waste, animal carcasses, asbestos, clinical waste, condemned goods, livestock waste, sewage treatment and waterworks treatment sludge, sewage works screenings and stabilized residues from Chemical Waste Treatment Centre.

Other solid waste refers to solid waste types not covered by the above descriptions. These include coal ash, dredged mud and excavated materials disposed of at marine dumping sites.



Notes :

(1) Waste generated from schools, government offices, goverment markets, etc. was usually mixed with household waste and/or public cleansing refuse during the process of collection carried out by the FEHD.

Current classification of solid waste

Methodology

Solid waste data are mainly collected by two approaches: weighing exercise at all waste facilities throughout the year and waste characterization using sampling techniques. All solid waste facilities in Hong Kong are managed by the Environmental Protection Department (EPD) whereas public filling areas and barging points accepting inert C&D material are managed by the Civil Engineering Department (CED). Whilst the wasteload intake is recorded immediately at each waste facility, waste composition is characterized through sampling exercises in a

separate survey. Other departments, such as the CED, the FEHD, Census and Statistics Department and Planning Department, provide the EPD with relevant statistics regularly.

The following data were collected from various sources throughout the year :

- waste intake records taken at weighbridges of landfills and refuse transfer stations (RTS);
- results of survey on waste composition conducted in November/December 2001 at landfills and RTS;
- results of quarterly exercises of weighing waste from various districts conducted by the FEHD and EPD; and
- quantities of special waste and other solid waste from relevant specialist groups of the EPD and concerned government departments.