MONITORING OF SOLID WASTE IN HONG KONG

Waste Statistics for 2000

Environmental Protection Department

Monitoring of Solid Waste in Hong Kong
Waste Statistics for 2000

Date	September 2001
Security Classification	Unrestricted

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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
GDP	-	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 East New Territories Landfill
NT	-	North East New Territories Landfill
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

Chapter 1 Introduction

This report presents the statistics on disposal and recovery/recycling of solid waste generated in Hong Kong in the year 2000. 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. All the waste statistics are presented in Chapters 2 and 3 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 ii for ease of reference.

Chapter 2 Waste Quantities and Characteristics

Table 2.1 Quantities of solid waste disposed of at landfills in 2000

Waste type		Quantity (tpd)			Change from 1999	
		Public[1]	Private[2]	Total	Quantity (tpd)	Percentage
a.	**Domestic waste[3]**					
	- waste from household, public cleansing	5,809	1,508	7,317		
	- bulky waste[4]	165	58	223		
	Sub-total	5,974[5]	1,566	7,540	+114	+2%
b.	**Commercial waste[6]**					
	- mixed waste from commercial activities	-	1,075	1,075		
	- bulky waste[4]	-	76	76		
	Sub-total		1,151	1,151	-99	-8%
c.	**Industrial waste**					
	-mixed waste from industrial activities	-	615	615		
	- bulky waste[4]	-	29	29		
	Sub-total		644	644	+51	+9%
d.	**Municipal solid waste**					
	received at disposal facilities (a+b+c)	5,974	3,361	9,335	+66	+1%
e.	**Construction & demolition waste (landfilled)**	-	7,475	7,475	-420	-5%
f.	**Special waste (landfilled)**	460	634	1,094	+214	+24%
g.	**All waste received at landfills (d+e+f)**	6,430[8]	11,470[8]	17,900[8]	-140[8]	-1%

Note :

(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.

(8) Figures are rounded off to the nearest 10 tpd.

Table 2.2 Breakdown of solid waste delivered to RTS and landfills

Disposal facilities	Average daily waste intake by waste type in 2000 (tpd)				
	MSW		Construction & demolition	Special	Total
	Public[1]	Private[2]			
KBTS - Kowloon Bay Refuse Transfer Station[3]	1,060	-	-	7	1,067
IETS - Island East Refuse Transfer Station[4]	851	11	-	-	862
STTS - Sha Tin Refuse Transfer Station[3]	948	-	-	-	948
IWTS - Island West Refuse Transfer Station[4]	472	-	-	-	472
WKTS - West Kowloon Refuse Transfer Station[4]	1,509	38	-	-	1,547
OITF - Outlying Islands Refuse Transfer Facilities[4]	80	-	-	2	82(5)
NLTS - North Lantau Refuse Transfer Station[4]	24	80	-	1	105
WENT - West New Territories Landfill	3,746[6]	625[6]	1,077	656[6]	6,104[6]
SENT - South East New Territories Landfill	211	2,162	5,548	306	8,227
NENT - North East New Territories Landfill	2017[6]	574	850	132	3,573[6]
Sub-total	**5,974**	**3,361**			
Total	**9,335**		**7,475**	**1094**	**17,904**

Note :

(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 delivered to NENT by road.

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

(5) The quantity shown here does not include inert C&D material received by OITF (33 tpd).

(6) The quantity shown here includes the waste transferred from the RTS and OITF.

Table 2.3 Disposal of different kinds of special and other wastes

Waste type	Disposal method	Quantity disposed of (tpd)
Abattoir waste	Landfilling	26
Animal carcasses	Landfilling	18
Asbestos waste	Co-disposal at landfills[1]	7
Chemical waste other than asbestos waste	CWTC	171
	Co-disposal at landfills[1]	59
Clinical waste	Co-disposal at landfills[1]	4
Condemned goods	Landfilling	18
CWTC stabilised residue	Landfilling	64
Dewatered dreged materials	Landfilling	12
Dewatered sewage sludge	Landfilling	352
Dewatered waterworks sludge	Landfilling	12
Dredged mud[2]	Marine dumping	77,165
Excavated materials[2]	Marine dumping	52
Furnace bottom ash	Concrete manufacturing, stored in lagoon	178
Grease trap waste	Co-disposal at landfill[3]	278
Livestock waste	Composting and other environmentally acceptable means[4]	643
	Landfilling[5]	150
Pulverised fuel ash	Concrete manufacturing, stored in lagoon	1,637
Sewage works screenings	Landfilling	48
Waste tyres[6]	Landfilling	28

Note :

(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) Co-disposal at WENT Landfill.

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

(5) At the WENT Landfill.

(6) 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	All solid waste[3]
	Publicly collected[2] (a)	Privately collected (b)	(c)	(d)	(e)	(f)
Central & Western	368	88	67	523	425	948
Wanchai	247	114	69	430	255	685
Eastern	419	150	101	670	379	1,049
Southern	290	14	21	325	96	419
Hong Kong Island Sub-total	**1,324**	**366**	**258**	**1,948**	**1,153**	**3,101**
Yau Tsim Mong	564	121	107	792	648	1,440
Sham Shui Po	341	157	111	609	541	1,150
Kowloon City	278	114	68	459	540	999
Wong Tai Sin	338	33	32	403	298	701
Kwun Tong	445	94	188	727	942	1,669
Kowloon Sub-total	**1,966**	**519**	**505**	**2,990**	**2,969**	**5,959**
Kwai Tsing	368	29	117	514	28/2	769
Tsuen Wan	264	117	175	555	341	896
Tuen Mun	403	85	146	634	511	1,145
Yuen Long	403	61	169	633	523	1,156
North	198	167	73	438	478	917
Tai Po	244	53	59	356	139	495
Sha Tin	470	92	139	701	354	1,055
Sai Kung	213	77	69	359	626	985
NT - Mainland Sub-total	**2,563**	**681**	**946**	**4,190**	**3,255**	**7,445**
Cheung Chau[4]	36	-	-	36	-	-
Mui Wo[4]	25	-	-	25	-	-
Peng Chau[4]	8	-	-	8	-	-
Discovery Bay[4]	18	-	-	18	-	-
Lamma Island[4]	6	-	-	6	-	-
Hei Ling Chau[4]	4	-	-	4	-	-
North Lantau[4]	24	-	86	110	-	-
NT - Outlying Islands Sub-total	**121**	**-**	**86**	**207**	**98[5]**	**305**
Territorial Total	**5,974**	**1,566**	**1,795**	**9,335**	**7,475**	**16,810**

Note :

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

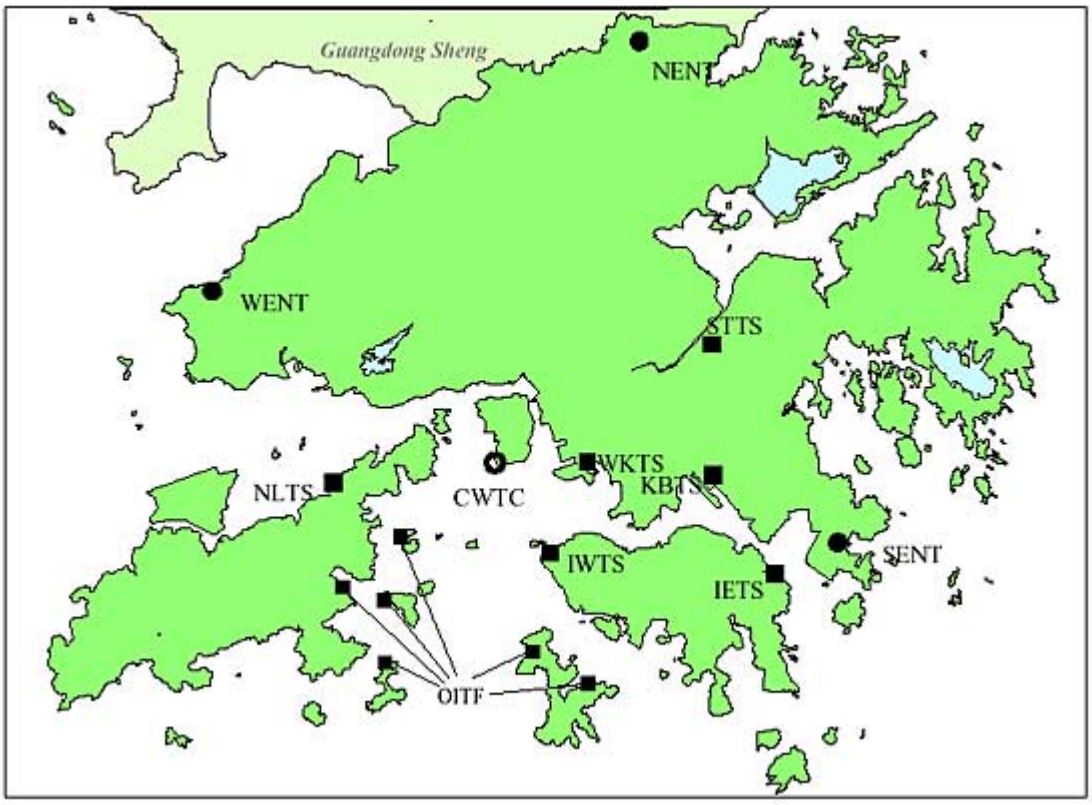
(2) Publicly collected domestic waste also included public cleansing waste as well as some commercial and industrial waste.

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

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

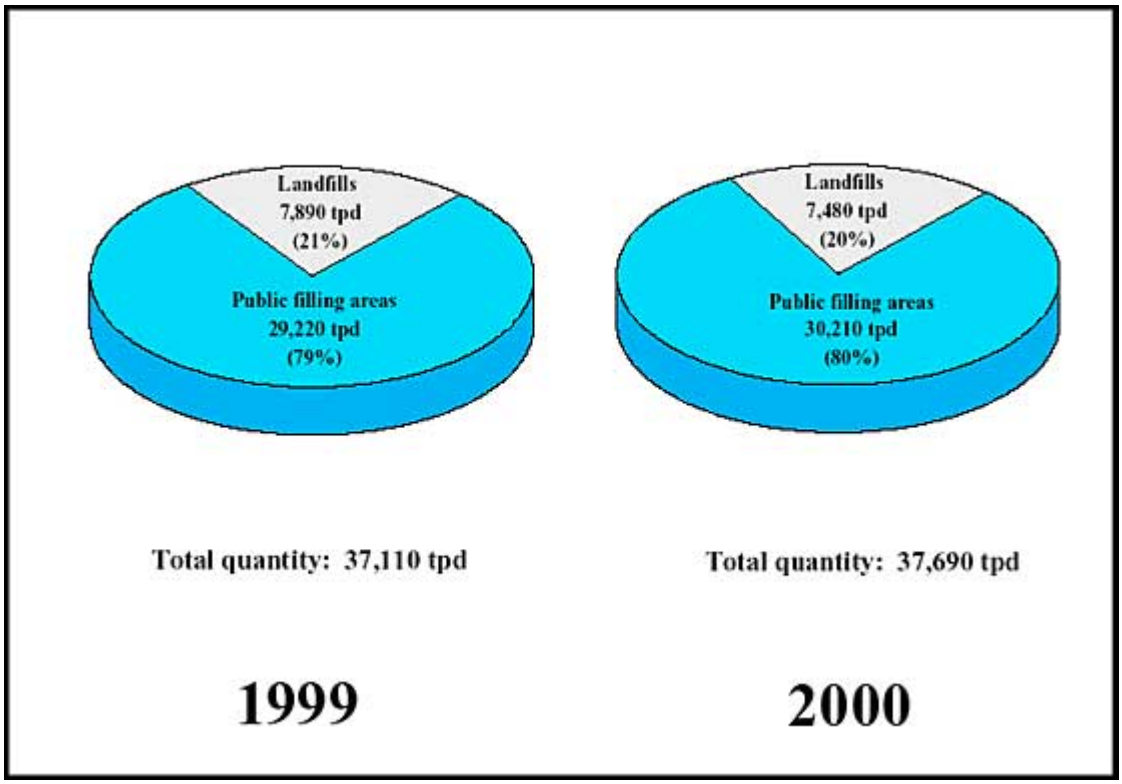
(5) Breakdown into individual islands/areas is not available.

Figure 2.1 Waste Intake at waste facilities



Landfill	●	WENT 6,104 tpd (-1.5%)	SENT 8,227 tpd (-1.6%)	NENT 3,573 tpd (+2.4%)		
RTS	■	IETS[1] 862 tpd (0.0%)	IWTS[1] 472 tpd (-1.0%)	WKTS[1] 1,547 tpd (+0.1%)	OITF[1] 115 tpd (-4.2%)	NLTS[1] 105 tpd (+14.1%)
		KBTS[2] 1,067 tpd (-2.8%)	STTS[2] 948 tpd (-2.6%)			
CWTC	○	171 tpd (+0.6%)				

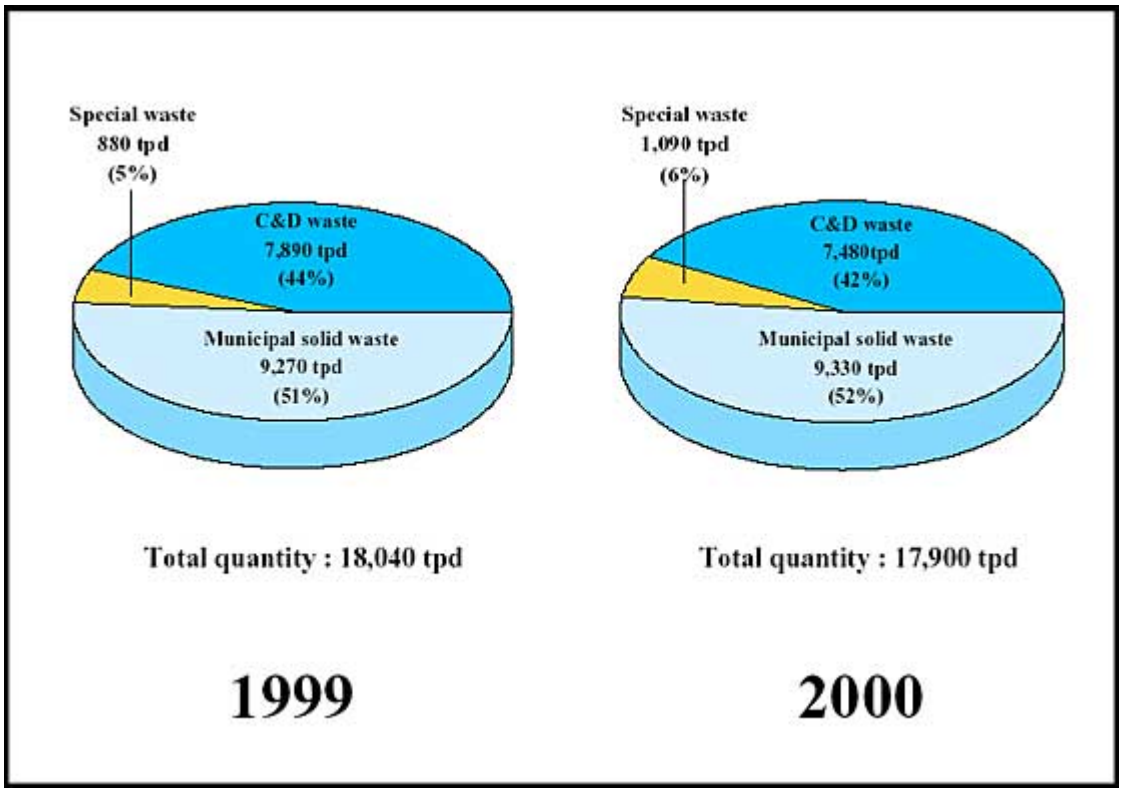
Figure 2.2 Quantities and percentages of inert C&D materials delivered to public filling areas and C&D waste disposed of at landfills



Remark :

Figures are rounded off to the nearest 10 tpd

Figure 2.3 Proportion of C&D waste out of the total waste intake at landfills



Remark :

Figures are rounded off to the nearest 10 tpd.

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

Component	Quantity (tpd) and its percentage by weight		
	Domestic Waste (a)	Commercial & Industrial Waste (b)	Municipal Solid Waste (c)=(a)+(b)
Bulky waste	223 (3.0%)	106 (5.9%)	329 (3.5%)
Glass	260 (3.4%)	28 (1.6%)	288 (3.1%)
Metals	232 (3.1%)	52 (2.9%)	284 (3.0%)
Paper	2,003 (26.6%)	490 (27.3%)	2,493 (26.7%)
Plastics	1,210 (16.0%)	334 (18.6%)	1,544 (16.6%)
Putrescibles	2,792 (37.0%)	299 (16.7%)	3,091 (33.1%)
Textiles	224 (3.0%)	73 (4.0%)	297 (3.2%)
Wood/rattan	152 (2.0%)	247 (13.7%)	399 (4.3%)
Others	444 (5.9%)	166 (9.3%)	610 (6.5%)
Total	**7,540 (100%)**	**1,795 (100%)**	**9,335 (100%)**

Remark:

Figures indicate the quantities and percentages by wet weight.

Table 2.6 Major recyclable materials in domestic waste and C&I waste disposed of at waste facilities

Component		Domestic Waste		C&I Waste	
		Quantity (tpd)	% by weight	Quantity (tpd)	% by weight
Glass bottles	- Brown glass bottles	37	(0.5%)	3	(0.2%)
	- Clear glass bottles	151	(2.0%)	13	(0.7%)
	- Green glass bottles	61	(0.8%)	5	(0.3%)
	- Green glass bottles	11	(0.1%)	7	(0.4%)
	(Glass) Sub-total	**260**	**(3.4%)**	**28**	**(1.6%)**
Metals	- Ferrous metals	188	(2.5%)	46	(2.5%)
	- Non-ferrous metals	44	(0.6%)	6	(0.4%)
	(Metals) Sub-total	**232**	**(3.1%)**	**52**	**(2.9%)**
Paper	- Cardboard	114	(1.5%)	69	(3.8%)
	- Newsprint	900	(11.9%)	74	(4.1%)
	- Writing paper	111	(1.5%)	68	(3.8%)
	- Others[(1)]	878	(11.7%)	279	(15.6%)
	(Paper) Sub-total	**2,003**	**(26.6%)**	**490**	**(27.3%)**
Plastics	- Clear bags	122	(1.6%)	76	(4.2%)
	- Colour bags (white, red, yellow, etc)	563	(7.5%)	64	(3.6%)
	- EPS food/drink containers	61	(0.8%)	20	(1.1%)
	- Other Polyfoams	12	(0.2%)	15	(0.8%)
	- PET bottles	51	(0.7%)	12	(0.7%)
	- Other beverage bottles	56	(0.7%)	9	(0.5%)
	- Off-cuts & scraps	1	(0.0%)	22	(1.3%)
	- Others[(2)]	344	(4.5%)	116	(6.4%)
	(Plastics) Sub-total	**1,210**	**(16.0%)**	**334**	**(18.6%)**
	Total	**3,705**	**(49.1%)**	**904**	**(50.4%)**

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

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.

Chapter 3 Waste Recovery and Recycling

Figure 3.1 Recovery of municipal solid waste

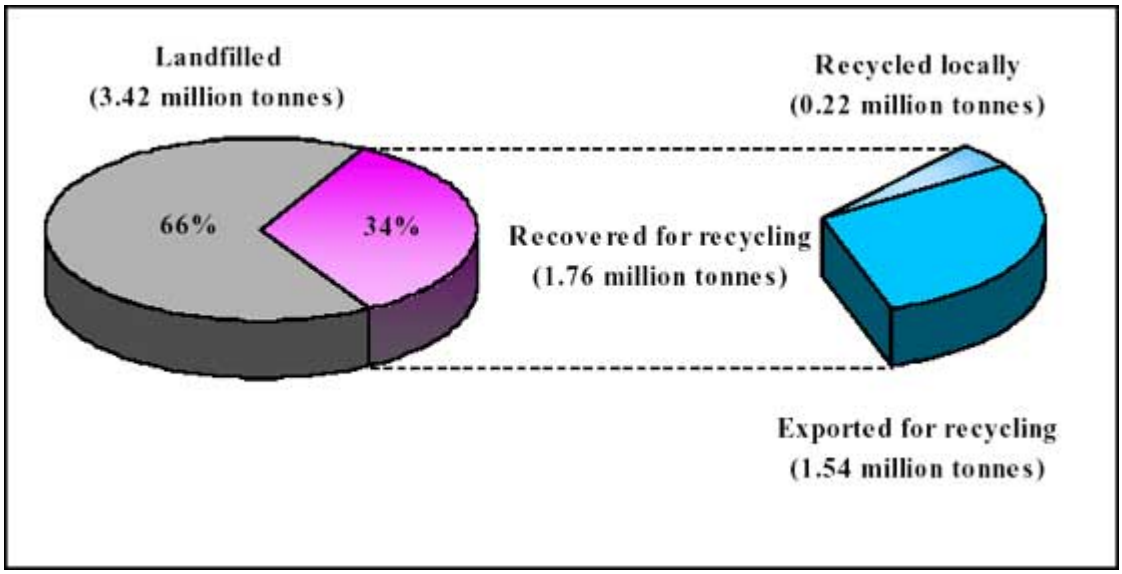


Figure 3.2 Proportion of major recyclable materials recovered from municipal solid waste

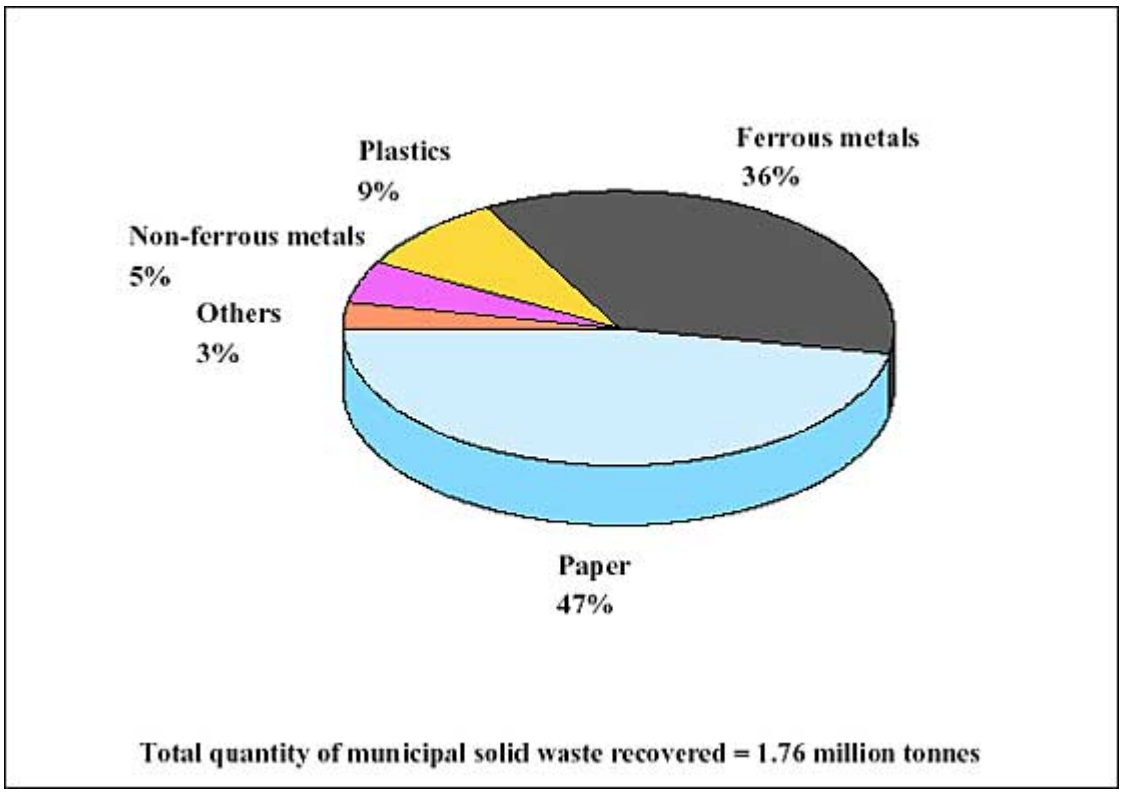


Table 3.1 Recovery of major recyclable materials

Waste type	Quantity of recyclables recovered in 2000 (thousand tonnes)		
	Exported for recycling [1]	Recycled locally	Total recovered for recycling
	(a)	(b)	(c) = (a) + (b)
Ferrous metals	637	0	637
Glass[2]	0.02	0.6	0.62
Non-ferrous metals	76	17	93
Paper	644	182	826
Plastics	151	14	165
Rubber tyres	0	7[4]	7
Textiles	24	0	24
Wood	5	1	6
Total[3]	**1,540**	**220**	**1,760**

Note :

(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.

Figure 3.3 Values of exported recyclable materials

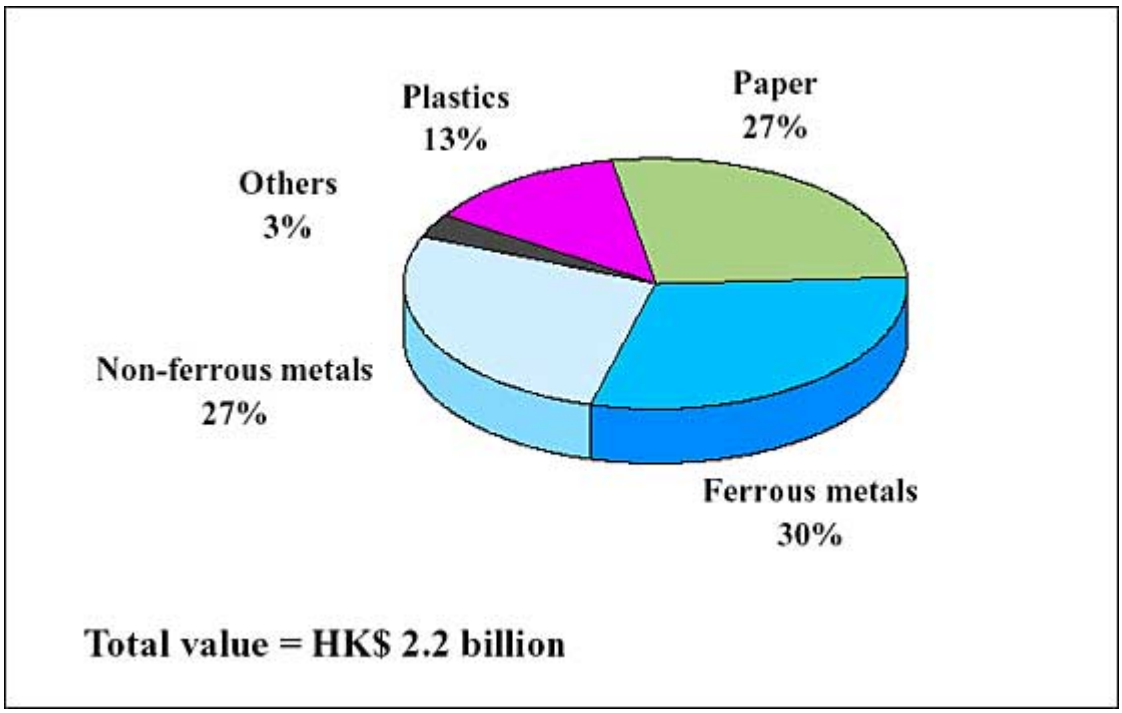


Table 3.2 Quantities and values of exported recyclable materials by type

Categories of waste materials	Quantity[(1)] (tonnes)	Value[(1)] ($ thousand)	Value per unit weight ($ / tonne)
a. Ferrous metals & steel			
- alloy steel scrap	30,323	146,674	4,837
- pig or cast iron	43,806	38,335	875
- tinplate	1,706	2,860	1,676
- other scraps	561,134	460,007	820
Sub-total	**636,969**	**647,876**	**1,017**
b. Glass			
Sub-total	**22**	**281**	**12,773**
c. Non-ferrous metals			
- aluminium	18,020	88,170	4,893
- copper & alloys	54,793	374,882	6,842
- lead	1,313	2,184	1,663
- metal ash & residues	214	22,786	106,324
- nickel	136	3,988	29,425
- precious metal	13	96,137	7,329,728
- tin	3	60	20,141
- zinc	1,260	12,170	9,661
Sub-total	**75,752**	**600,377**	**7,926**
d. Plastics			
- polyethylene	16,746	22,472	1,342
- polystyrene & copolymers	25,498	63,597	2,494
- polyvinyl chloride	6,819	10,165	1,491
- others	101,757	187,578	1,843
Sub-total	**150,820**	**283,812**	**1,882**
e. Textile fibre			
- cotton	14,791	24,974	1,688
- man-made fibres	22	82	3,748
- wool/other animal hair	5	108	23,910
- old clothing & other textile articles, rags, etc.	9,263	51,195	5,527
Sub-total	**24,081**	**76,359**	**3,171**
f. Wood & paper			
- paper	644,061	584,241	907
- wood (include sawdust)	4,708	2,743	583
Sub-total	**648,769**	**586,984**	**905**
Total	**1,536,413**	**2,195,689**	**1,429**

Notes :

(1) Figures provided by the Census & Statistics Department and rounded off to the nearest 1.

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. Some not mixed is also collected by the FEHD for historical reasons.

- **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.

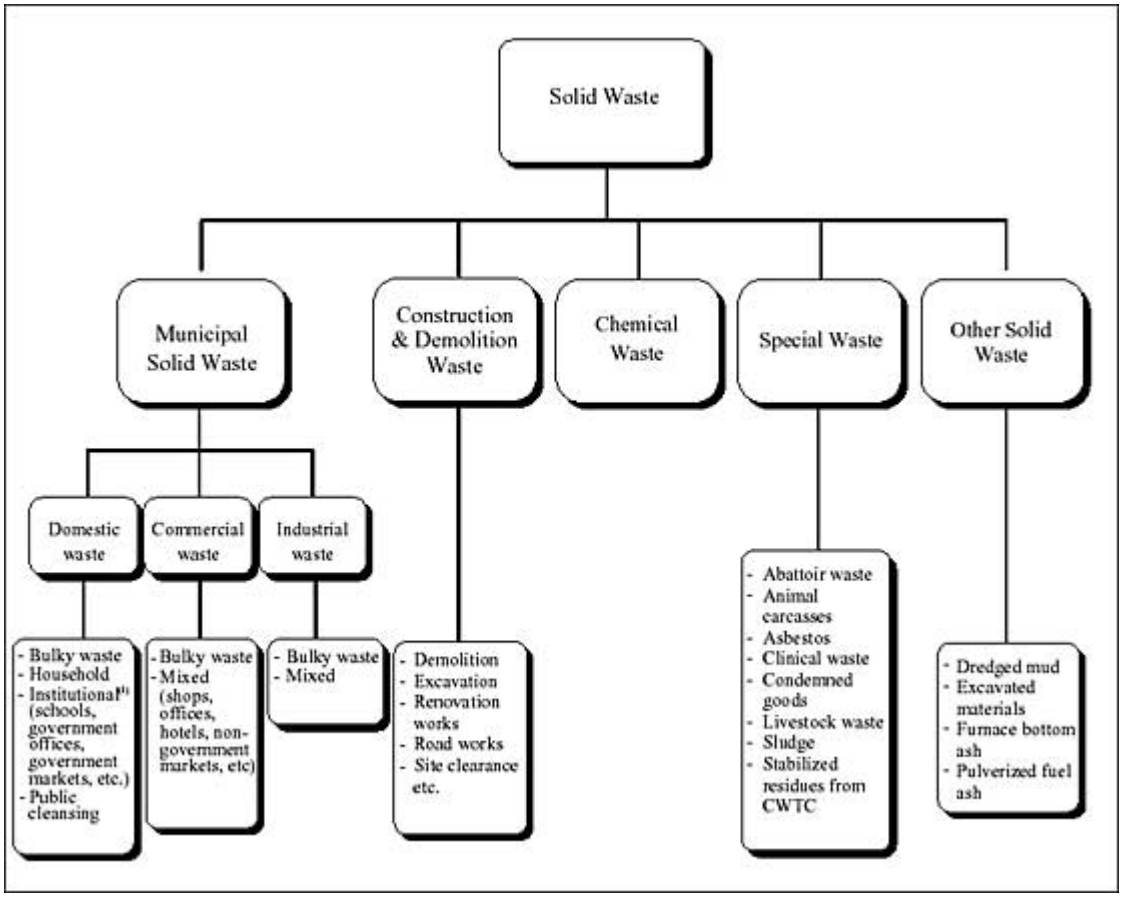
Construction & Demolition (C&D) waste includes waste arising from any land excavation or formation, civil/building construction, site clearance, demolition activities, roadworks and building renovation. It includes various types of building debris, rubble, earth, concrete, timber and mixed site clearance 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 material disposed of at marine dumping sites.



Note :

(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 2000 at landfills and RTS;
- results of quarterly exercises of weighing waste from various districts conducted by the FEHD and EPD;
- annual figures of total gross domestic product (GDP), population and employment provided by the Census and Statistics Department; and
- quantities of special waste and other solid waste from relevant specialist groups of the EPD and concerned government departments.