MONITORING OF SOLID WASTE IN HONG KONG

Waste Statistics for 2002

Environmental Protection Department

Monitoring of Solid Waste in Hong Kong

Waste Statistics for 2002

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Front page : The Ma Wan Transfer Facility comes into operation in 2003

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
NWNTRTS	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 2002. 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, including the ongoing solid waste monitoring work at waste facilities undertaken by the Environmental Protection Department. 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 iv for ease of reference.

2. Waste Quantities and Characteristics

Plate 2.1 Solid waste disposal by category in 2002

Waste type [1]	Quantity (tpd)			Change from 2001	
	Public[2]	Private[3]	Total	Quantity (tpd)	Percentage
a. Domestic waste					
- waste from household, public cleansing	5,961	1,480	7,441		
- bulky waste [4]	28	50	78		
Sub-total	5,989	1,530	7,519	-32	-0.4%
b. Commercial waste					
- mixed waste from commercial activities	-	1,278	1,278		
- bulky waste [4]	-	64	64		
Sub-total		1,342	1,342	+155	+13.1%
c. Industrial waste					
- mixed waste from industrial activities	-	536	536		
- bulky waste [4]	-	25	25		
Sub-total		561	561	-1	-0.2%
d. Municipal solid waste received at disposal facilities (a+b+c)	**5,989**	**3,433**	**9,422**	**+122**	**+1.3%**
e. Construction & demolition waste	**-**	**10,202**	**10,202**	**+3,794**	**+59.2%**
f. Special waste	**883**	**651**	**1,534**	**+426**	**+38.4%**
g. All waste received at landfills (d+e+f)	**6,872**	**14,286**	**21,158**	**+4,341**	**+25.8%**

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

Notes:

(1) Please refer to Appendix 1 for classification of solid waste.

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

(3) Waste collected by private waste collectors.

(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.

Plate 2.2 Solid waste disposal by category in 2001 & 2002

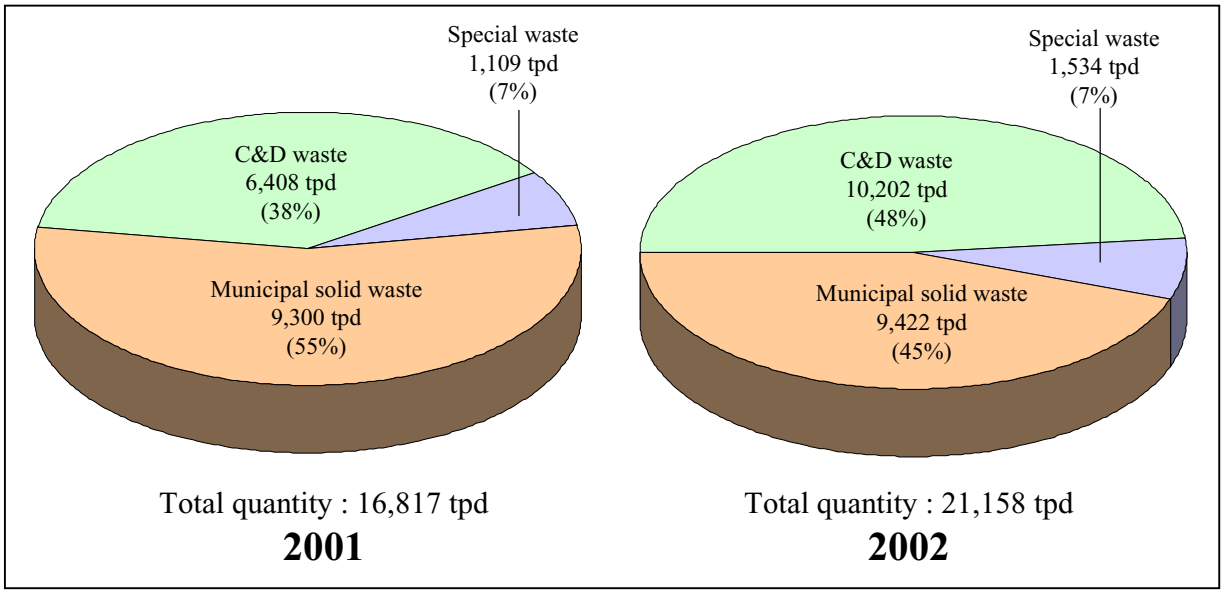


Plate 2.3 Solid waste disposal in 1998 – 2002

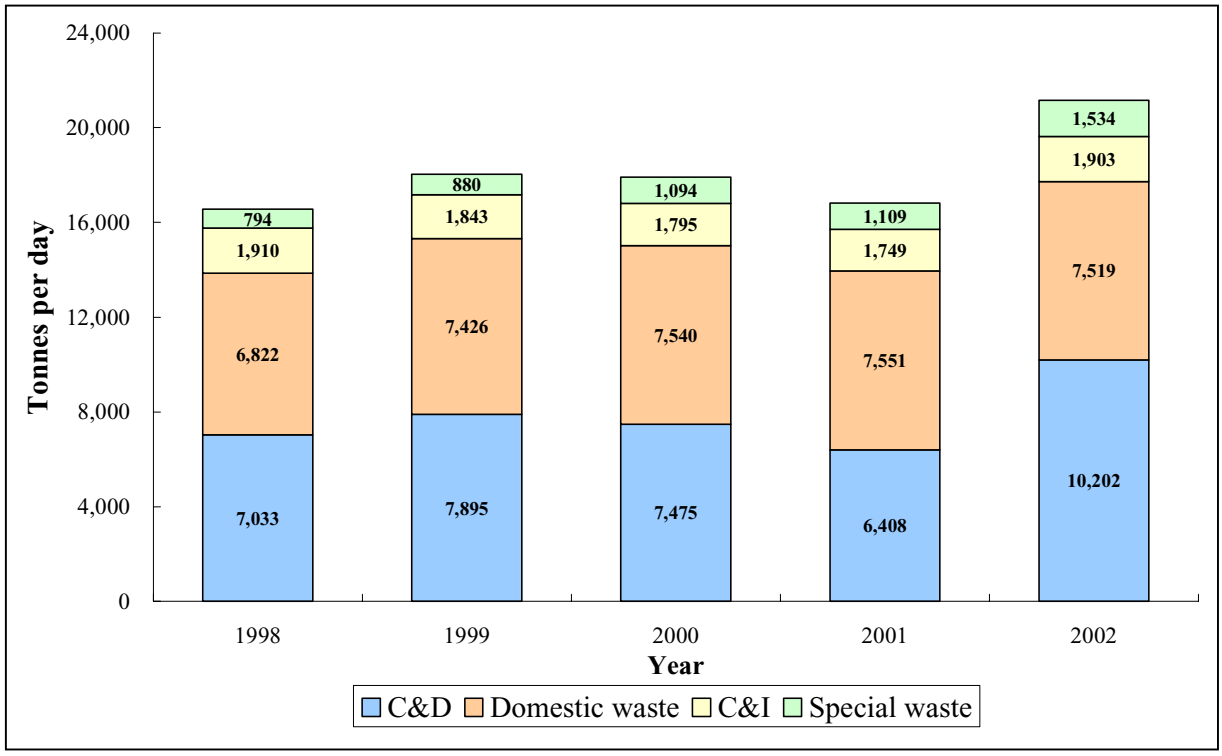
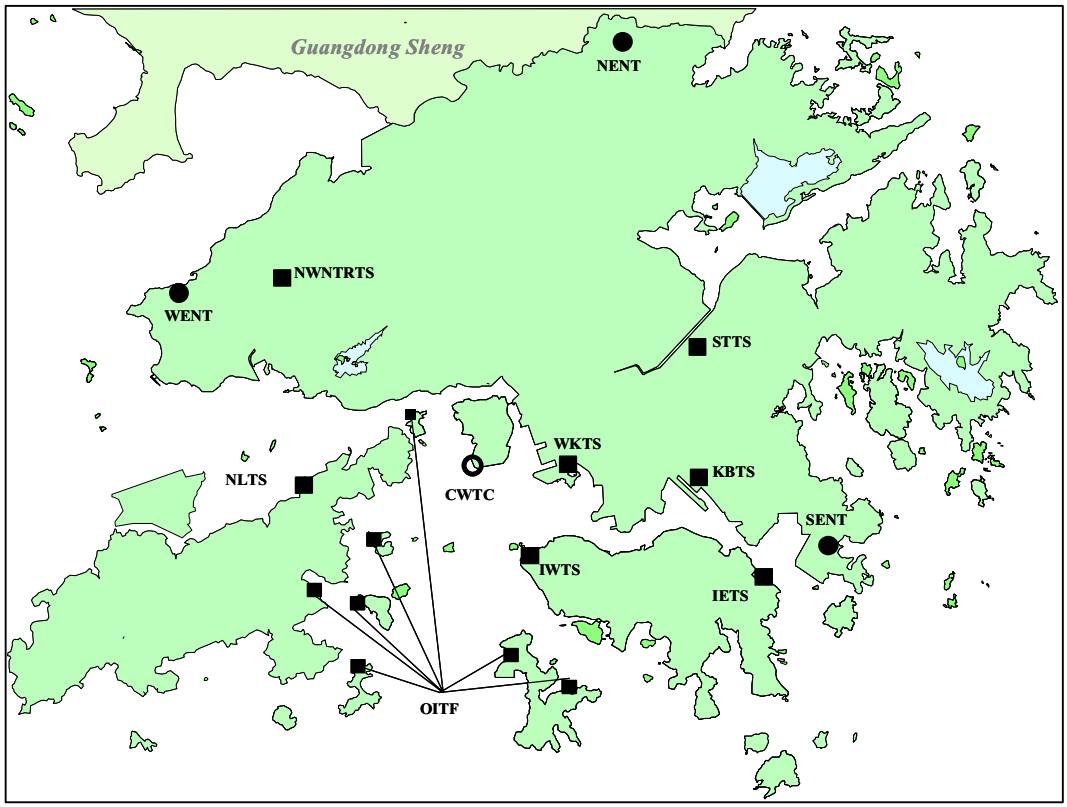


Plate 2.4 Solid waste disposal by destination in 2002



Landfill	●	WENT 6,363 tpd (+8.5%)	SENT 11,116 tpd (+51.1%)	NENT 3,679 tpd (+2.3%)		
RTS	■	IETS [1] 916 tpd (+3.7%)	IWTS [1] 499 tpd (+2.7%)	WKTS [1] 1,635 tpd (+6.7%)	OITF [1] 94 tpd [2] (+6.8%)	NLTS [1] 129 tpd (+2.4%)
		KBTS [3] 1,026 tpd (-4.3%)	STTS [3] 771 tpd (-13.4%)	NWNTRTS [4] 716 tpd (+28.8%)[5]		
CWTC	○	144 tpd (-15.8%)				

Remarks :

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

Notes :

(1) Waste from IETS, IWTS, WKTS, OITF and NLTS was transferred to WENT by sea.
(2) The quantity shown here does not include inert C&D material received by OITF
(3) Waste from KBTS and STTS was transferred to NENT by road.
(4) Waste from NWNTRTS was transferred to WENT by road.
(5) The NWNTRTS was commissioned in September 2001 and the average daily intake for the period of September to December 2001 was 556 tpd.

Plate 2.5 Solid waste delivered to RTS and landfills in 2002

Disposal facilities	Average daily waste intake by waste type in 2002(tpd)				
	MSW		Construction & demolition	Special	Total
	Public[1]	Private[2]			
KBTS - Kowloon Bay Refuse Transfer Station [3]	1,019	-	-	7	1,026
IETS - Island East Refuse Transfer Station [4]	871	45	-	-	916
STTS - Sha Tin Refuse Transfer Station [3]	771	-	-	-	771
IWTS - Island West Refuse Transfer Station [4]	460	39	-	-	499
WKTS - West Kowloon Refuse Transfer Station [4]	1,527	108	-	-	1,635
OITF - Outlying Islands Refuse Transfer Facilities [4]	91	-	-	3	94[5]
NLTS - North Lantau Refuse Transfer Station [4]	45	83	-	1	129
NWNTRTS-North West New Territories Refuse Transfer Station [6]	699	17	-		716
WENT - West New Territories Landfill	3,810[7]	730[7]	909	914[7]	6,363[7]
SENT - South East New Territories Landfill	219	2,094	8,333	471	11,116
NENT - North East New Territories Landfill	1,961[7]	609	960	149	3,679[7]
Sub-total	**5,989**	**3,433**			
Total	**9,422**		**10,202**	**1,534**	**21,158**

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 (42 tpd).
(6) Waste from NWNTRTS was transferred to WENT by road.
(7) The quantity shown here includes the waste transferred from the RTS/OITF.

Plate 2.6 Origin of solid waste by district in 2002

Districts	Quantity[1] (tpd)					
	Domestic waste		C&I waste	Municipal solid waste	C&D waste	Total[3]
	Publicly collected[2] (a)	Privately collected (b)	(c)	(d) =(a)+(b)+(c)	(e)	(f) =(d)+(e)
Central & Western	352	92	77	521	678	1,199
Wanchai	276	70	69	415	221	636
Eastern	413	122	97	632	317	949
Southern	291	8	35	334	67	402
Hong Kong Island Sub-total	**1,331**	**293**	**279**	**1,903**	**1,283**	**3,186**
Yau Tsim Mong	502	80	109	691	579	1,270
Sham Shui Po	346	145	233	725	701	1,426
Kowloon City	271	124	72	467	438	905
Wong Tai Sin	347	52	43	441	373	815
Kwun Tong	446	110	177	733	1,546	2,279
Kowloon Sub-total	**1,913**	**510**	**634**	**3,057**	**3,638**	**6,695**
Kwai Tsing	333	30	106	469	270	739
Tsuen Wan	245	74	162	481	395	876
Tuen Mun	367	77	121	565	414	979
Yuen Long	502	68	175	744	376	1,120
North	188	240	83	512	507	1,019
Tai Po	272	48	34	354	232	586
Sha Tin	482	64	142	687	271	958
Sai Kung	219	124	83	426	2,659	3,085
New Territories Sub-total	**2,607**	**726**	**906**	**4,239**	**5,125**	**9,363**
Cheung Chau[4]	39	-	-	39	-	-
Mui Wo[4]	30	-	-	30	-	-
Peng Chau[4]	8	-	-	8	-	-
Lamma Island[4]	12	-	-	12	-	-
Hei Ling Chau[4]	4	-	-	4	-	-
North Lantau[4]	45	-	85	130	-	-
Outlying Islands Sub-total	**138**	**1**	**85**	**223**	**157[5]**	**379**
Total	**5,989**	**1,530**	**1,903**	**9,422**	**10,202**	**19,624**

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

Notes :

(1) The geographical distribution of solid waste origin 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 mixed non-domestic waste.

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

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

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

Plate 2.7 Per capita disposal rates of municipal solid waste and domestic waste in 1998 - 2002

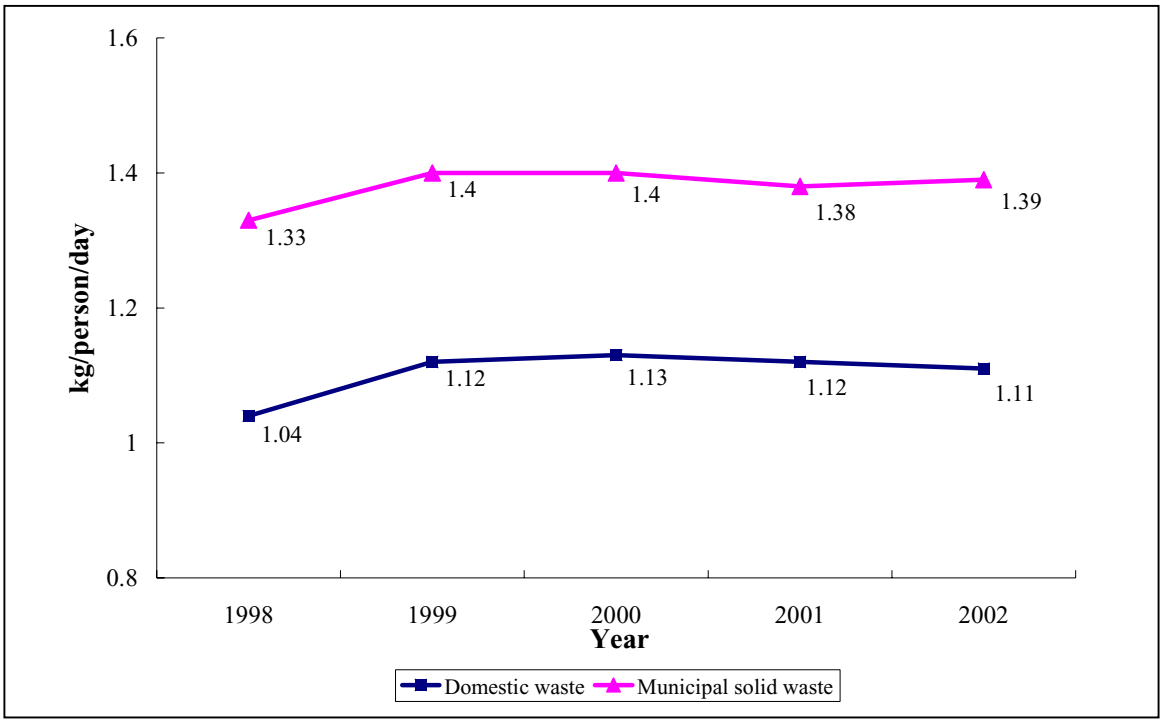


Plate 2.8 Composition of municipal solid waste in 2002

	Quantity (tpd) and percentage by weight				
	Domestic Waste (a)	**Commercial Waste** (b)	**Industrial Waste** (c)	**Commercial & Industrial Waste** (d)=(b)+(c)	**Municipal Solid Waste** (e)=(a)+(d)
Bulky waste	**77** (1.0%)	**64** (4.7%)	**25** (4.4%)	**89** (4.7%)	**166** (1.8%)
Glass	**256** (3.4%)	**33** (2.4%)	**6** (1.0%)	**39** (2.1%)	**295** (3.1%)
Metals	**262** (3.5%)	**44** (3.3%)	**15** (2.7%)	**59** (3.1%)	**321** (3.4%)
Paper	**1,902** (25.3%)	**415** (30.9%)	**59** (10.6%)	**474** (24.9%)	**2,376** (25.2%)
Plastics	**1,394** (18.5%)	**309** (23.0%)	**100** (17.8%)	**409** (21.5%)	**1,803** (19.1%)
Putrescibles	**3,129** (41.6%)	**387** (28.9%)	**17** (3.0%)	**404** (21.3%)	**3,533** (37.5%)
Textiles	**191** (2.5%)	**37** (2.7%)	**36** (6.4%)	**73** (3.8%)	**264** (2.8%)
Wood/rattan	**67** (0.9%)	**23** (1.7%)	**184** (32.7%)	**207** (10.9%)	**274** (2.9%)
Household Hazardous Wastes (HHWs) (1)	**111** (1.5%)	**9** (0.7%)	**17** (3.0%)	**26** (1.4%)	**137** (1.5%)
Others	**130** (1.7%)	**21** (1.6%)	**103** (18.3%)	**124** (6.5%)	**254** (2.7%)
Total	**7,519** (100%)	**1,342** (100%)	**562** (100%)	**1,902** (100%)	**9,422** (100%)

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

Note :

(1) Household Hazardous Wastes (HHWs) include paints, detergents, pesticides, fuels, cylinders, batteries, electrical appliances, computer products, mercury-containing fluorescent lamps and medicines, etc.

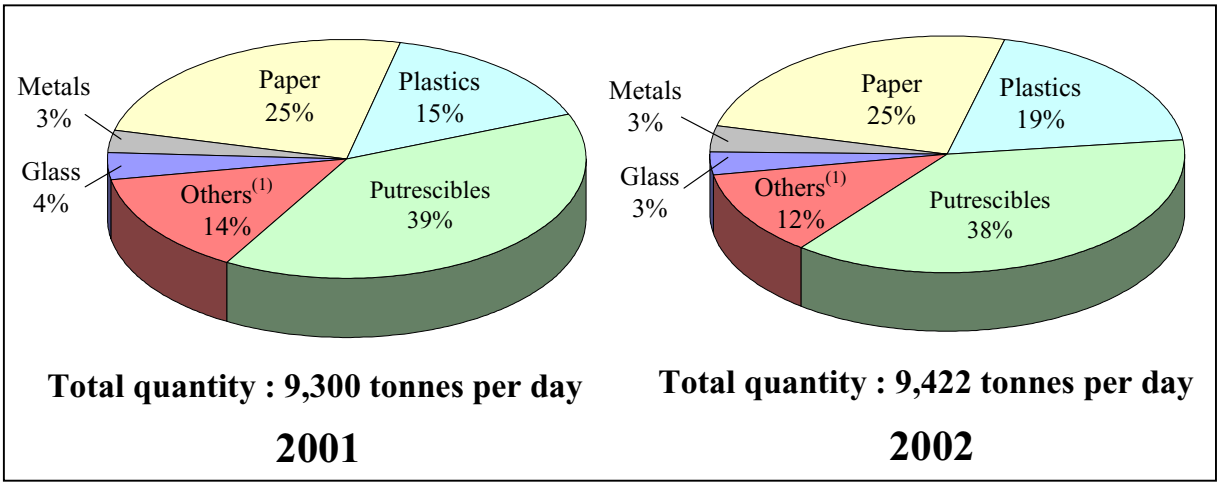
Plate 2.9 Domestic waste and C&I waste by major waste type in 2002

Waste Type	Domestic Waste		C&I Waste	
	Quantity (tpd)	% by weight	Quantity (tpd)	% by weight
Glass				
- Clear Glass Bottles	118	(1.6%)	17	(0.9%)
- Brown Glass Bottles	29	(0.4%)	3	(0.2%)
- Green Glass Bottles	28	(0.4%)	6	(0.3%)
- Other Glass	80	(1.1%)	12	(0.7%)
(Glass) Sub-total	**256**	**(3.4%)**	**39**	**(2.0%)**
Metals				
- Ferrous Metals	227	(3.0%)	45	(2.4%)
- Aluminium Cans	23	(0.3%)	3	(0.1%)
- Other Non-ferrous Metals	12	(0.2%)	11	(0.6%)
(Metals) Sub-total	**262**	**(3.5%)**	**59**	**(3.1%)**
Paper				
- Cardboard	297	(4.0%)	81	(4.3%)
- Newsprint	847	(11.3%)	72	(3.8%)
- Office Paper	148	(2.0%)	73	(3.8%)
- Others (1)	609	(8.1%)	248	(13.0%)
(Paper) Sub-total	**1,902**	**(25.3%)**	**474**	**(24.9%)**
Plastics				
- Clear Plastic Bags	224	(3.0%)	82	(4.3%)
- Colour Bags (white, red, yellow, etc)	649	(8.6%)	109	(5.7%)
- Polyfoam-Dining Wares	54	(0.7%)	23	(1.2%)
- Polyfoam-Other	15	(0.2%)	12	(0.6%)
- PET Bottles	50	(0.7%)	17	(0.9%)
- Other Plastic Bottles	65	(0.9%)	7	(0.4%)
- Off-cuts & Scrap	0	(0.0%)	24	(1.3%)
- Others (2)	337	(4.5%)	135	(7.1%)
(Plastics) Sub-total	**1,394**	**(18.5%)**	**409**	**(21.5%)**
Putrescibles				
- Food Waste	2,782	(37.0%)	373	(19.6%)
- Yard Waste	104	(1.4%)	1	(0.1%)
- Others (3)	243	(3.2%)	29	(1.5%)
(Putrescibles) Sub-total	**3,129**	**(41.6%)**	**404**	**(21.2%)**

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) Other putrescible waste include nappies and other organic waste.

Plate 2.10 Municipal solid waste by waste type in 2001 & 2002



Note:
(1) Others include bulky waste, textile, wood / rattan, household hazardous wastes and other unclassified waste.

Plate 2.11 Disposal of C&D Materials by destination in 2001 & 2002

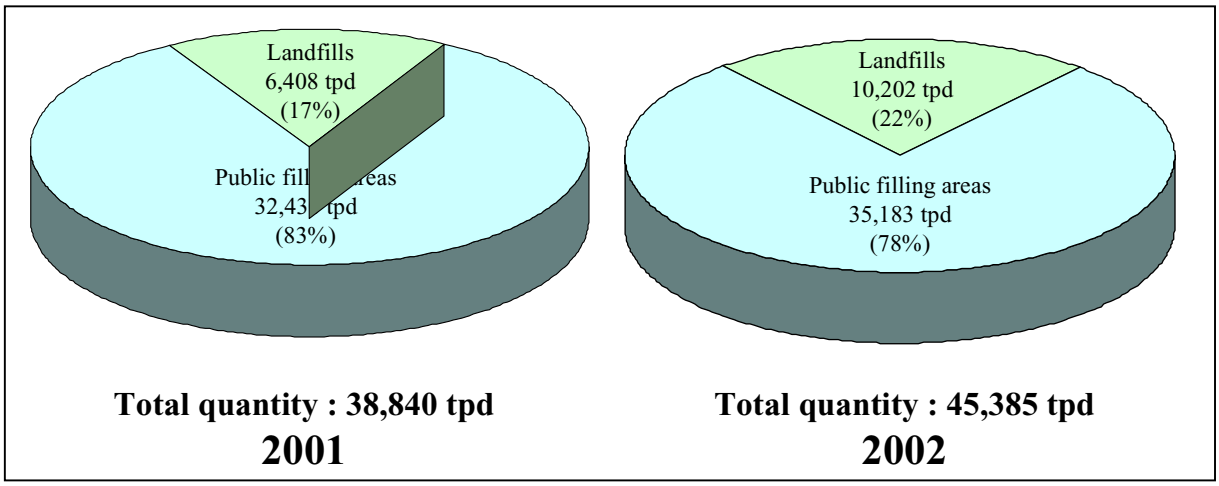


Plate 2.12 Disposal of special and other waste by type in 2002

Waste type	Disposal method	Quantity disposed of (tpd)
Special Waste		
Abattoir waste	Landfilling	34
Animal carcasses	Landfilling	20
Asbestos waste	Co-disposal at landfills (1)	13
Chemical waste other than asbestos waste	Co-disposal at landfills (1)	7
Clinical waste	Co-disposal at landfills (1)	4
Condemned goods	Landfilling	21
CWTC stabilised residue	Landfilling	34
Dewatered dredged materials	Landfilling	40
Dewatered sewage sludge	Landfilling	779
Dewatered waterworks sludge	Landfilling	8
Grease trap waste	Co-disposal at landfill (2)	352(3)
Livestock waste	Landfilling (4)	130
Sewage works screenings	Landfilling	60
Waste tyres (5)	Landfilling	33
Other Waste		
Chemical waste other than asbestos waste	CW TC	144
Dredged mud (6)	Marine dumping	183,288
Excavated materials (6)	Marine dumping	1,370
Furnace bottom ash	Concrete manufacturing, stored in lagoon(7)	204
Livestock waste	Composting and other environmentally acceptable means (8)	670
Pulverised fuel ash	Concrete manufacturing, stored in lagoon(7)	1,375

Notes :

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

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

(3) The figure is the quantity of grease trap waste received at WENT Landfill before processing

(4) At the WENT Landfill.

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

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

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

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

3. Waste Recovery and Recycling

Plate 3.1 Recovery of municipal solid waste in 2001 & 2002

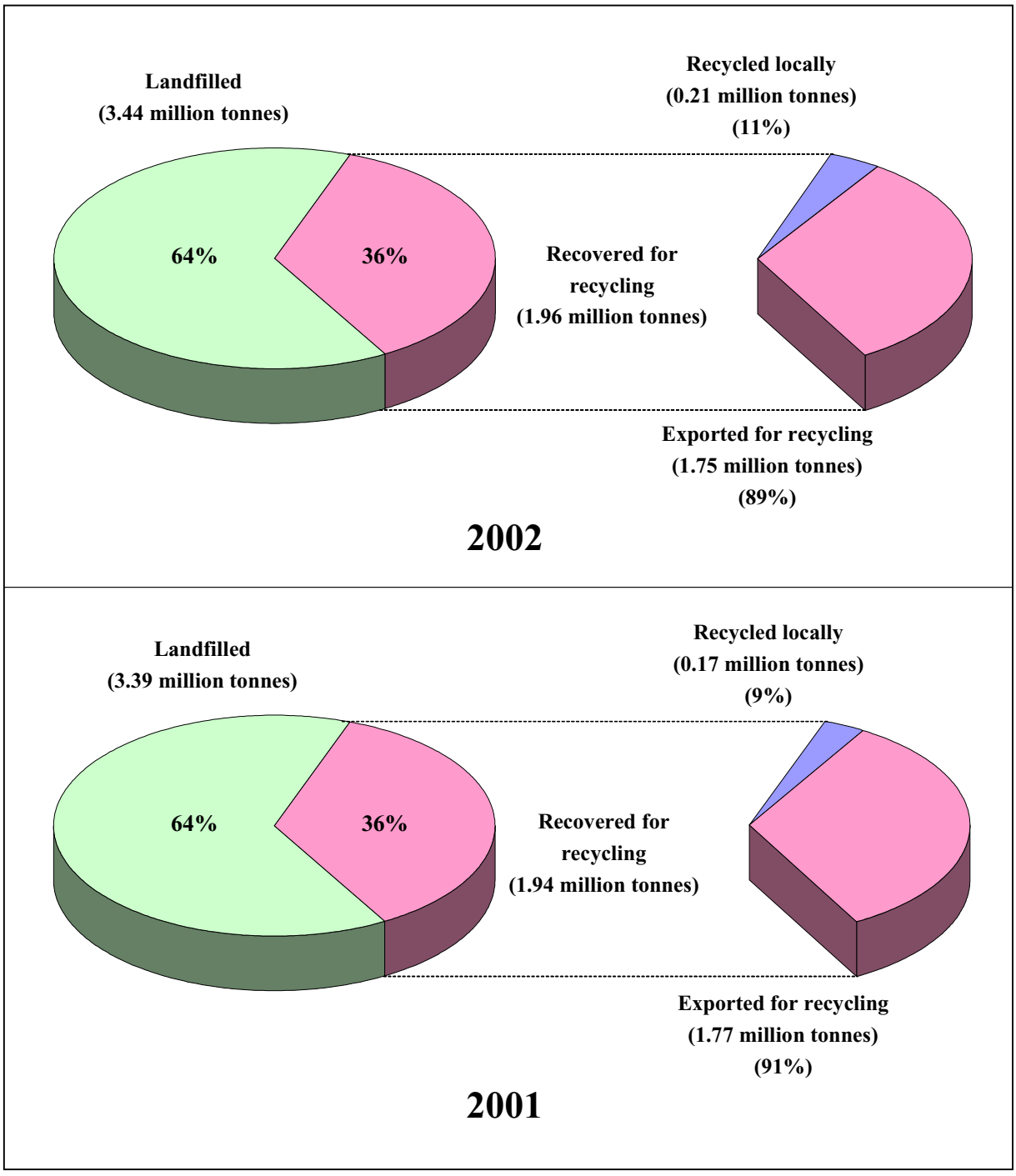


Plate 3.2 Municipal solid waste recovery rates in 1998 – 2002

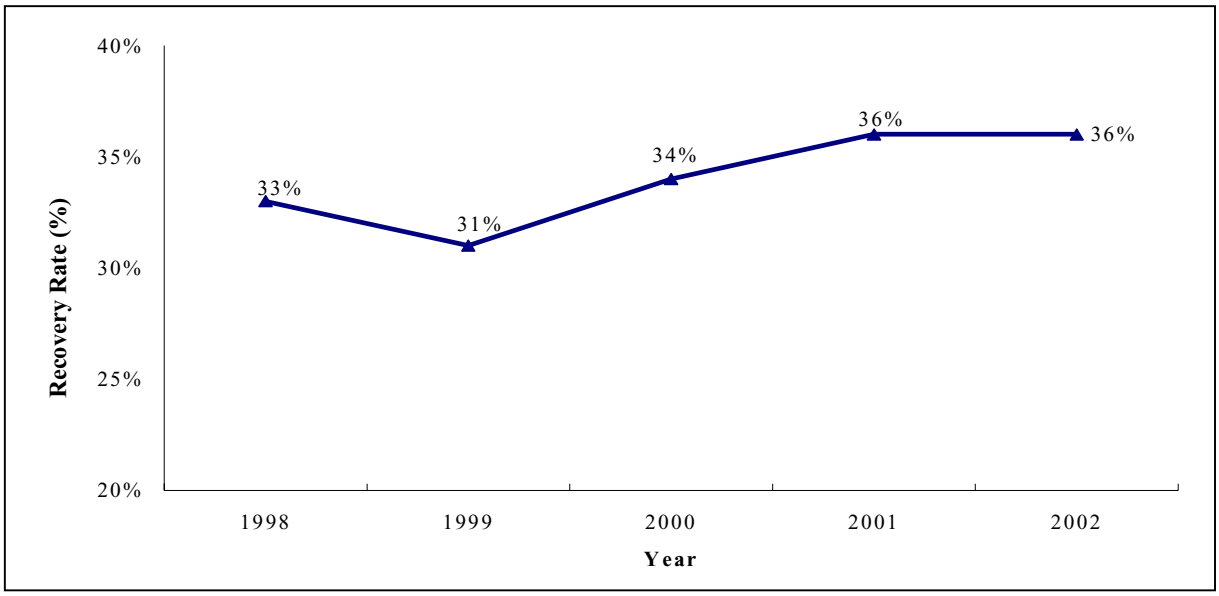


Plate 3.3 Recovered recyclable materials by type in 2002

Waste Type	Quantity of recovered recyclable materials (thousand tonnes)		
	Exported for Recycling[1] (a)	Recycled Locally[2] (b)	Total recovered for recycling (c) = (a) + (b)
Ferrous metals	859	0	859
Glass	0	1.5 [3]	1.5
Non-ferrous metals	47	6	53
Paper	593	170	763
Plastics	156	10	166
Rubber tyres	0	12.5 [4]	12.5
Textiles	18	0	18
Wood	16	2	18
Electrical and Electronic equipment	60 [2]	8	68
Total	**1,749**	**210**	**1,959**

Notes :

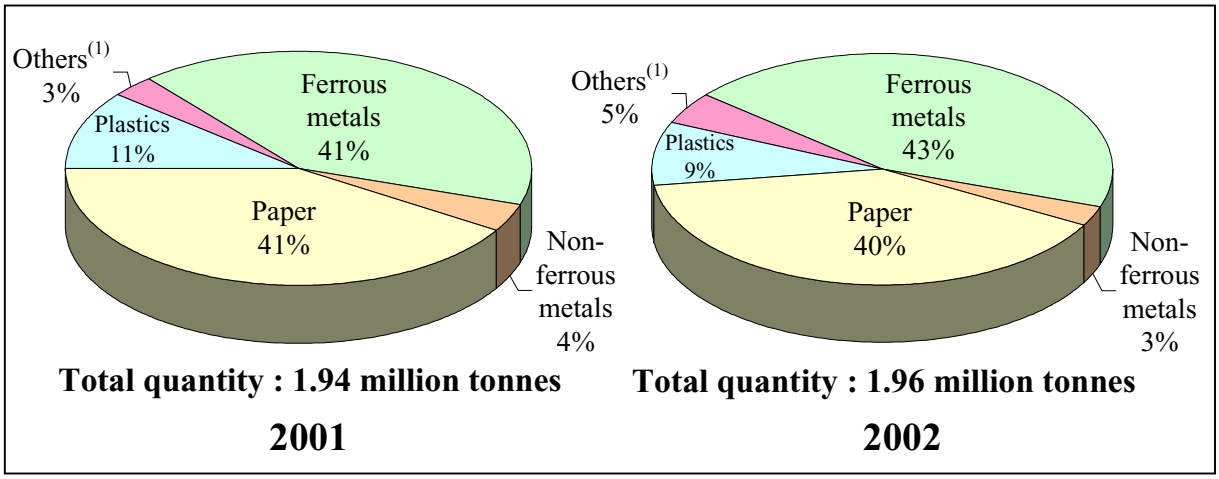
(1) Except information on Electrical and Electronic equipment, all figures are based on records of the Census and Statistics Department.

(2) Waste Recovery Survey conducted in Feb – Mar 2003.

(3) Excluding glass beverage bottles recovered through deposit-and-refund system operated by local beverage manufacturers. According to a survey performed by Hong Kong Beverage Association, about 5,000 tonnes of glass beverage bottles are reused / recycled every year.

(4) Quantity includes reuse, retreading and recycling of vehicle tyres (8,100 tonnes) and retreading of aircraft tyres in Hong Kong (4,400 tonnes).

Plate 3.4 Recovered recyclable materials by type in 2001 & 2002



Notes :

(1) Others include glass, wood, rubber tyres, textiles and electrical & electronic equipment.

Plate 3.5 Total quantities and export values of recovered recyclable materials in 1998 – 2002

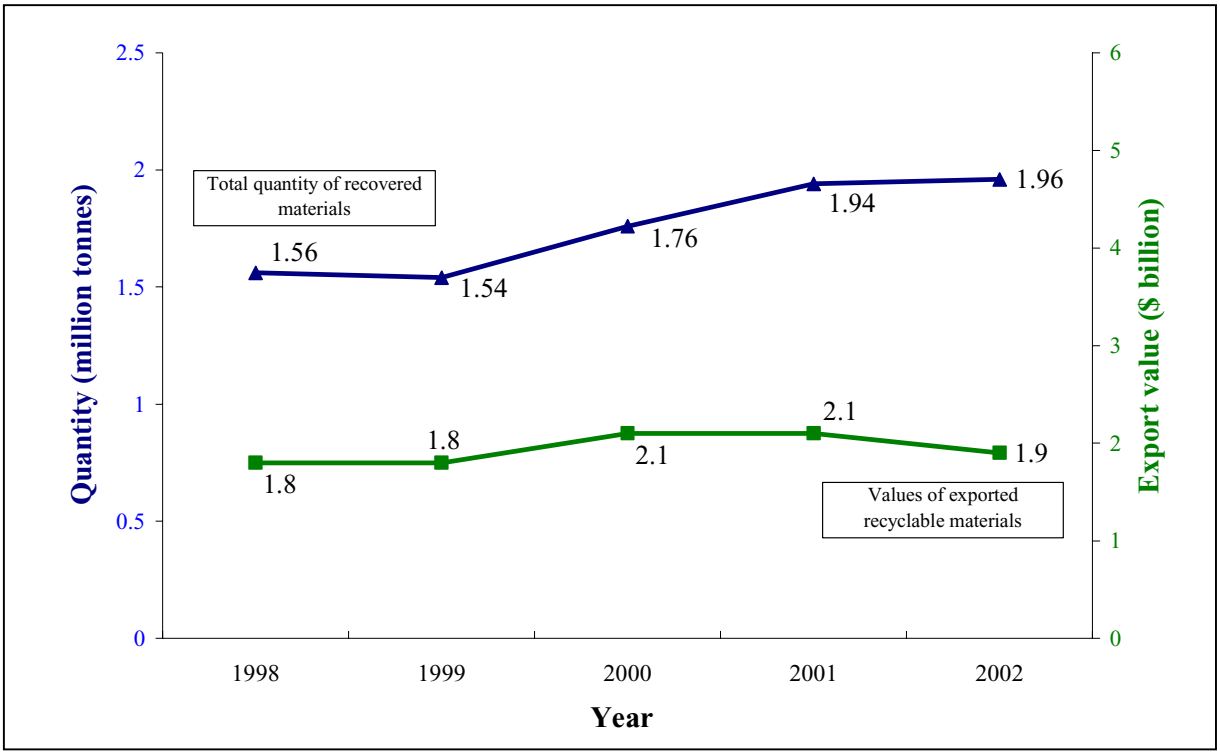


Plate 3.6 Values of exported recyclable materials in 2001 & 2002

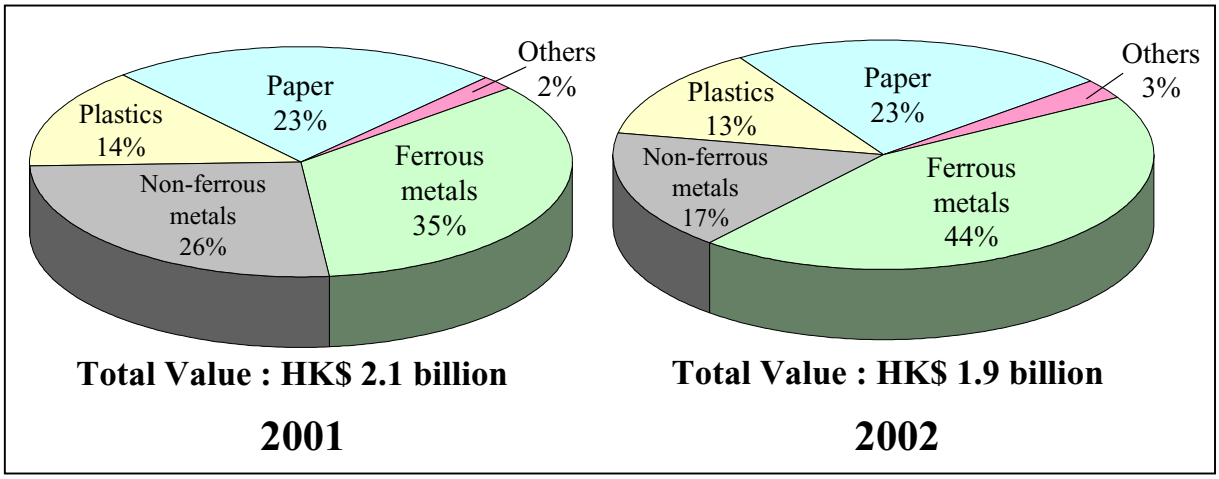


Plate 3.7 Quantities and values of exported recyclable materials by type

Category of recyclable materials	Quantity [1] (tonnes)	Value [1] ($ thousand)	Value per Unit Weight ($ / tonne)
a. Ferrous metals			
~ alloy steel scrap	11,025	47,947	4,349
~ pig or cast iron	38,139	47,747	1,252
~ tinplate	397	726	1,827
~ other scraps	809,619	759,929	939
b. Non-ferrous metals			
~ aluminium	11,860	41,445	3,495
~ copper & alloys	33,318	231,897	6,960
~ lead	920	1,634	1,777
~ metal ash & residues	79	347	4,397
~ nickel	170	3,462	20,396
~ precious metal	58	39,306	679,823
~ tin	0	0	0
~ zinc	912	8,947	9,809
c. Plastics			
~ polyethylene	90,556	113,860	1,257
~ polystyrene & copolymers	18,799	44,553	2,370
~ polyvinyl chloride	2,903	6,372	2,195
~ others	43,833	86,009	1,962
d. Textiles			
~ cotton	11,102	17,623	1,587
~ man-made fibres	0.15	2	13,333
~ old clothing & other textile articles, rags, etc.	6,420	24,231	3,774
e. Wood & paper			
~ paper	592,830	437,096	737
~ wood (include sawdust)	16,088	11,802	734
f. Electrical & Electronic equipment [2]	60,036	N/A	N/A

Notes :
(1) Figures provided by the Census & Statistics Department.
(2) Waste Recovery Survey conducted in Feb – Mar 2003.

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.

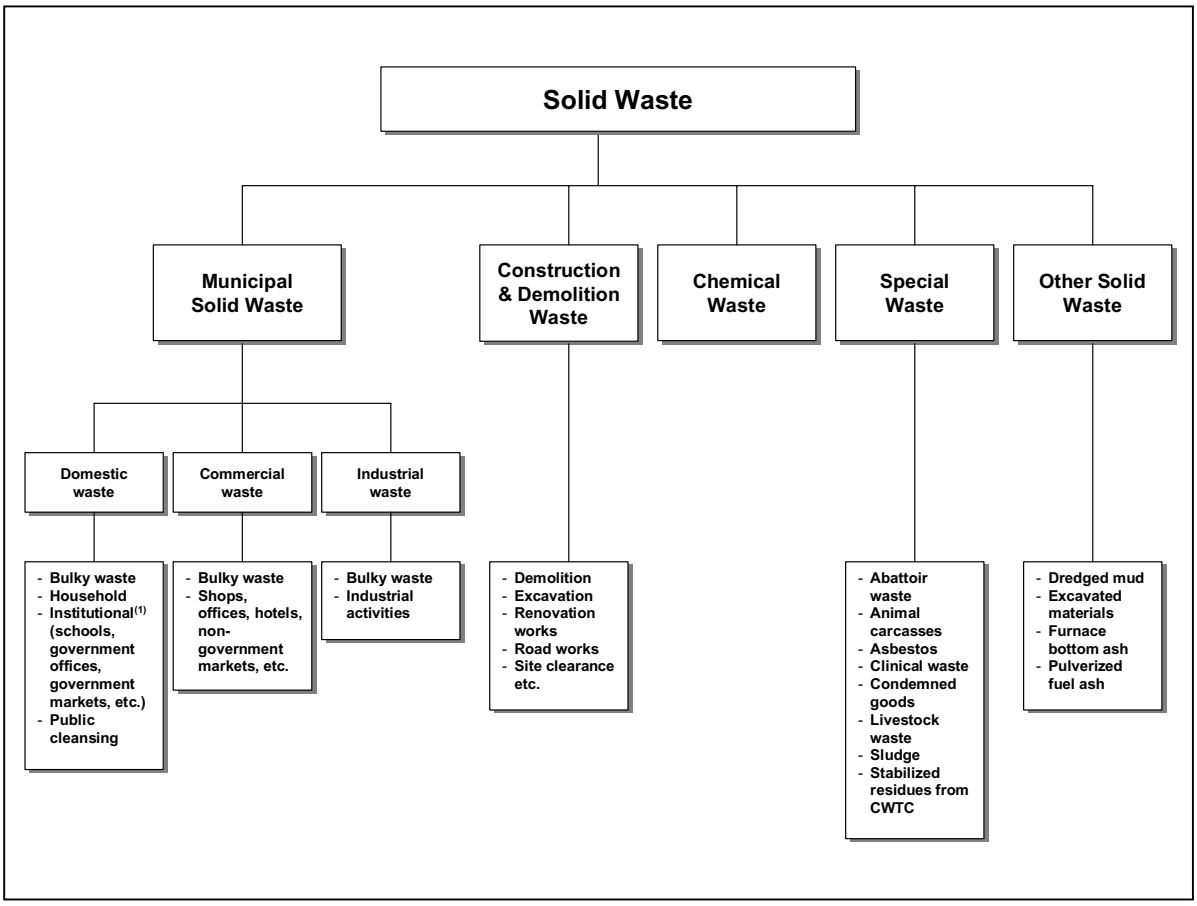
Construction and Demolition (C&D) Material is a mixture of surplus materials arising from site clearance, excavation, construction, refurbishment, renovation, demolition and road works. Over 80% of C&D material are inert and are known as public fill. **Public fill** includes debris, rubble, earth and concrete which is suitable for land reclamation and site formation. When properly sorted, materials such as concrete and asphalt can be recycled for use in construction. The remaining non-inert substances in C&D material are called **C&D waste** which includes bamboo, timber, vegetation, packaging waste and other organic materials. In contrast to public fill, C&D waste is not suitable for land reclamation and is disposed of at landfills.

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.

Current classification of solid waste



Notes :

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

Methodology

Solid waste data are mainly collected by the following sources:

- Waste intake records taken at weighbridges of landfills and refuse transfer stations (RTS);
- Results of annual survey on waste composition conducted in November - December 2002 at landfills and RTS;
- Results of waste recovery survey conducted in February – March 2003 by ACNielsen (China) Ltd.;
- Monthly statistics provided by other departments including FEHD, Civil Engineering Department and Census and Statistics Department; and
- Statistics on special and other wastes (Plate 2.12 of the main text) provided by relevant specialist groups of EPD and concerned government departments.