MONITORING OF SOLID WASTE IN HONG KONG

Waste Statistics for 2016




Environmental Protection Department

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Cover photos

Top left: **Recycling plant for waste construction materials and waste glass in EcoPark**

Bottom left: **Waste composition survey in progress under the supervision of EPD supervisor**

Top right: **Bird's eye view of T ▪ PARK in Tuen Mun**

Bottom right: **South East New Territories Landfill receiving only construction and demolition waste as from 6 January 2016**

Remarks: *The 1st revision includes update of footnotes of Plate 2.13a, revision of statistics on clinical waste treated at the Chemical Waste Treatment Centre in Plate 2.13b, and textual amendments on dewatered sludges throughout the report.*

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Contents

Abbreviations

AFCD	Agriculture, Fisheries and Conservation Department
AWCP	Animal Waste Composting Plant
C&D	Construction and Demolition
C&SD	Census and Statistics Department
CEDD	Civil Engineering and Development Department
CWTC	Chemical Waste Treatment Centre
EPD	Environmental Protection Department
FEHD	Food and Environmental Hygiene Department
IETS	Island East Transfer Station
IWTS	Island West Transfer Station
KBTS	Kowloon Bay Transfer Station
MSW	Municipal Solid Waste
N/A	Not Available
NENT	North East New Territories Landfill
NLTS	North Lantau Transfer Station
NT	New Territories
NWNTRTS	North West New Territories Refuse Transfer Station
OITF	Outlying Islands Transfer Facilities
ORRC	Organic Resources Recovery Centre
PET	Polyethylene Terephthalate
RTS(s)	Refuse Transfer Station(s)
SENT	South East New Territories Landfill
SLCP	Shaling Composting Plant
STTS	Sha Tin Transfer Station
tpd	tonnes per day
WEEE	Waste electrical and electronic equipment
WENT	West New Territories Landfill
WKTS	West Kowloon Transfer Station

1. Introduction

Introduction

This report presents the statistics on disposal and recovery/recycling of solid waste generated in Hong Kong in 2016. The information contained in this report is compiled from the data collected from various sources, including the ongoing solid waste monitoring work at waste treatment facilities undertaken by the Environmental Protection Department (EPD). The classification of solid waste and the methodology adopted in data collection are explained in Appendix 1, whereas terms related to Waste Management System of Hong Kong are elaborated in Appendix 2. Abbreviations used in this report are listed on page iv for ease of reference. Readers may wish to note that due to rounding off, figures of various plates may not add up to total and percentages may not add up to 100.

Key observations of the local waste disposal and resource recovery scene are summarised in the ensuing paragraphs, with a view to facilitating readers to have a quick overview of the achievements and challenges of our waste management efforts. Detailed statistics on waste disposal and resource recovery are provided in Chapters 2 and 3 respectively.

Waste Disposal in 2016

Total Solid Waste

Solid waste comprises municipal solid waste (MSW), overall construction waste, and special waste. In 2016, the total quantity of solid waste disposed of at the strategic landfills was 5.61 million tonnes. The average daily quantity was 15,332 tonnes per day (tpd), which has increased by 1.5% as compared to 2015 (**Plate 2.1**). The growth rate of total solid waste disposal remained steady (it was 1.6% in 2015 and 3.8% in 2014).

Municipal Solid Waste

Municipal solid waste includes three categories: domestic waste, commercial waste and industrial waste.

In 2016, the quantity of MSW disposal was 10,345 tpd (3.79 million tonnes), which represented an increase of 1.8% as compared to 2015. The major component of MSW is domestic waste. Its quantity of disposal was 6,391 tpd (2.34 million tonnes) in 2016, which has decreased by 1.1% as compared to 2015. Separately, the quantity of commercial and industrial (C&I) waste being disposed was 3,954 tpd (1.45 million tonnes) in 2016, which has increased by 7.0% when compared to 2015.

Discounting the factor of population growth, the disposal rate of MSW was 1.41 kg/person/day, as compared to 1.39 kg/person/day in 2015. The disposal rate of domestic waste, being 0.87 kg/person/day, has dropped slightly as compared to 0.89 kg/person/day in 2015. The relatively stable domestic waste disposal rate in recent years implies that the growth in domestic waste disposal has broadly been in line with the growth in population.

However, the increase in the disposal quantity of C&I waste, which rose by 7.0% as compared to 2015, offset the reduction in domestic waste. Generally speaking, commercial waste arising correlates with the level of consumption activities. The increase in commercial waste disposal in 2016 could be partly due to a relatively buoyant local economy.

Plates 2.8 and 2.9 show the composition of MSW disposed of at landfills in 2016.

Of the 10,345 tonnes of MSW landfilled each day in 2016, some 3,600 tonnes (35% of MSW) were ***food waste***. In 2016, food waste disposal at landfills had increased by 6.5% as compared to 2015, as driven by the increase in food waste disposal from C&I sectors. On the contrary, domestic food waste disposal rate dropped to 0.32 kg/person/day in 2016. This showed that households are gradually becoming more aware of food waste reduction. The increase in C&I food waste disposal suggested that more efforts are needed to continue promoting food waste avoidance, reduction and recycling in C&I sectors. In particular, the commencement of Organic Resources Recovery Centre (ORRC) Phase 1 in early 2018 and implementation of MSW Charging by end of 2019 at the earliest are expected to bring down C&I food waste disposal and boost up recovery.

The second largest constituent of MSW was ***waste paper***. Some 2,244 tonnes per day (22% of MSW) were disposed of at landfills in 2016. It was followed by ***waste plastics***, with a daily disposal quantity of 2,132 tonnes per day (21% of MSW) in 2016.

Overall Construction Waste

The quantity of overall construction waste disposed of at landfills in 2016 was 4,422 tpd (1.62 million tonnes), which has increased by 5.3% as compared to 2015. The increase was consistent with the increase in construction work in Hong Kong. In recent years, the reuse rate of inert materials sorted out from construction waste has remained at above 90%, and was 93% in 2016. These materials were delivered to the public fill reception facilities and other outlets for beneficial direct reuse. The increase in construction waste disposal charges, with effect from April 2017, is expected to provide further incentives for the trade to reduce and reuse construction waste.

Special Waste

In 2016, the quantity of special waste disposed of at landfills was 565 tpd (0.21 million tonnes), which has further decreased by 24.1% as compared to 2015. After the commissioning of the Sludge Treatment Facility (T ▪ PARK) in Tuen Mun in April 2015, which treats dewatered sewage sludge from major sewage treatment works managed by Drainage Services Department by incineration, dewatered sewage sludge disposal has dropped remarkably. On average, 1,144 tonnes of dewatered sludges per day was treated at the T ▪ PARK in 2016, leading to a drop in disposal quantity by 78% as compared to 2015.

Resource Recovery in 2016

As one of the world's most service-oriented economies, Hong Kong's capacity to consume raw or recycled materials in local production is severely limited, compared to countries that rely heavily on primary or secondary industries to sustain and promote their economies. As a result, over 90% of MSW recyclables locally recovered are exported for recycling outside Hong Kong.

In 2016, the quantity of MSW recyclables recovered was 1.91 million tonnes, which decreased by 5.9% as compared to 2015. Most of the recovered materials (97%) were exported to the Mainland and other countries for recycling, and the export value of 2016 was $4.0 billion, as compared to $4.6 billion in 2015 (**Plate 3.7**). The overall MSW recovery rate was 34%, which slightly decreased from 35% in 2015 (**Plate 3.2**). Similar to other industries that constitute our economy, the local recycling industry is subject to fluctuations induced by business cycles and market conditions. The challenging conditions of international markets that lasted for years have had a dampening effect on the demand and thus prices of local recyclables, and are expected to continue to affect the overall performance of the recycling industry. In addition, authorities in nearby cities and countries have tightened their import control regimes in recent years. Local recyclables falling short of a good quality or unable to meet import standards could no longer easily enter such places for further processing.

Plate 3.3 shows the quantity of recovered recyclables from MSW by type. The recovery performance of major types of recyclables is summarised below.

Metal recyclables have the highest recovery rate at 91% in 2016 among all recyclable types, as they are highly reusable and relatively valuable in international markets. There is a strong economic incentive for the recycling industry to recover metal waste as far as practicable.

Waste electrical and electronic equipment (WEEE) has the second highest recovery rate among MSW recyclables, at 74% in 2016. Similar to metal recyclables, the recyclable value of WEEE is relatively high which attracts local recyclers to actively engage in WEEE recycling and reuse.

Paper recyclables' recovery rate continued to decline and dropped from 63% in 2012 to 50% in 2016. The decline in export quantity of paper recyclables was mainly due to a generally reduced scale and level of economic activities and tightening of import control of the importing countries.

Plastics recyclables' recovery rate has slightly increased from 11% in 2015 to 14% in 2016. In particular, the quantity of plastic recyclables recovered from MSW had increased by 34%. With the rebound of crude oil price in 2016, the demand for plastics recyclables gradually bounced back.

2. Waste Quantities and Characteristics

Plate 2.1 Disposal of total solid waste at landfills in 2016 - By main waste category

Waste category[1]			Average daily quantity (tpd)	
a.	**Municipal solid waste**		**10,345**	(1.8%)
	(i)	**Domestic waste**	**6,391**	(-1.1%)
	(ii)	**Commercial waste**	**3,029**	(8.1%)
	(iii)	**Industrial waste**	**925**	(3.8%)
b.	**Overall construction waste**		**4,422**	(5.3%)
c.	**Special waste[2]**		**565**	(-24.1%)
d.	**Total waste received at landfills (a+b+c)**		**15,332**	(1.5%)

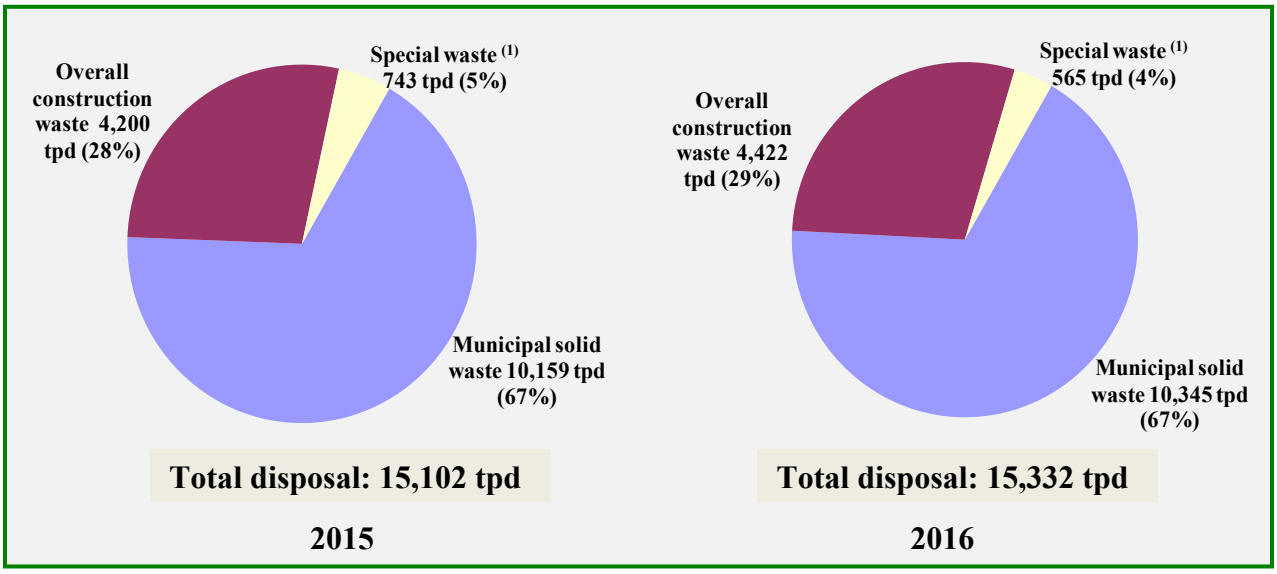
Notes:

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

(2) The quantity does not include special waste not disposed of at landfills. From April 2015 onwards, dewatered sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T▪PARK, and the residue and ash of incineration have been disposed of at the West New Territories Landfill (WENT).

(3) Figures in brackets refer to year-on-year (y-o-y) growth rates.

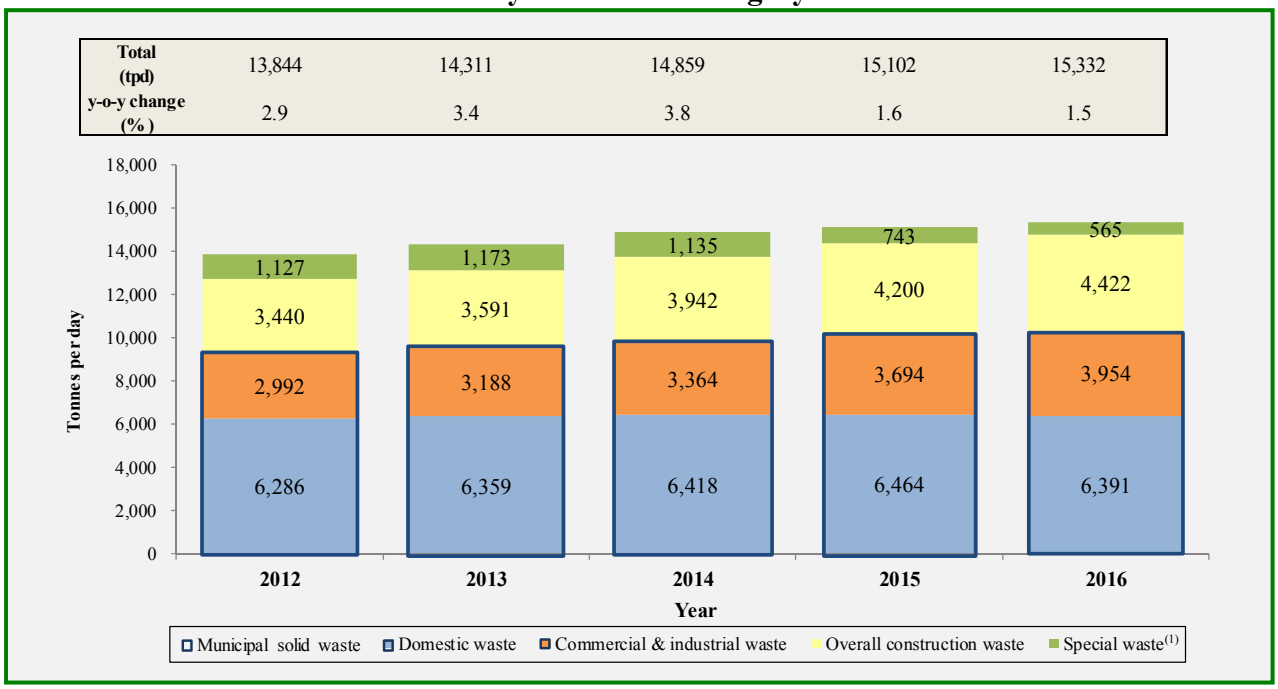
Plate 2.2 Disposal of total solid waste at landfills in 2015 and 2016 - By main waste category



Note:

(1) The quantity does not include special waste not disposed of at landfills. From April 2015 onwards, dewatered sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T ▪ PARK, and the residue and ash of incineration have been disposed of at WENT.

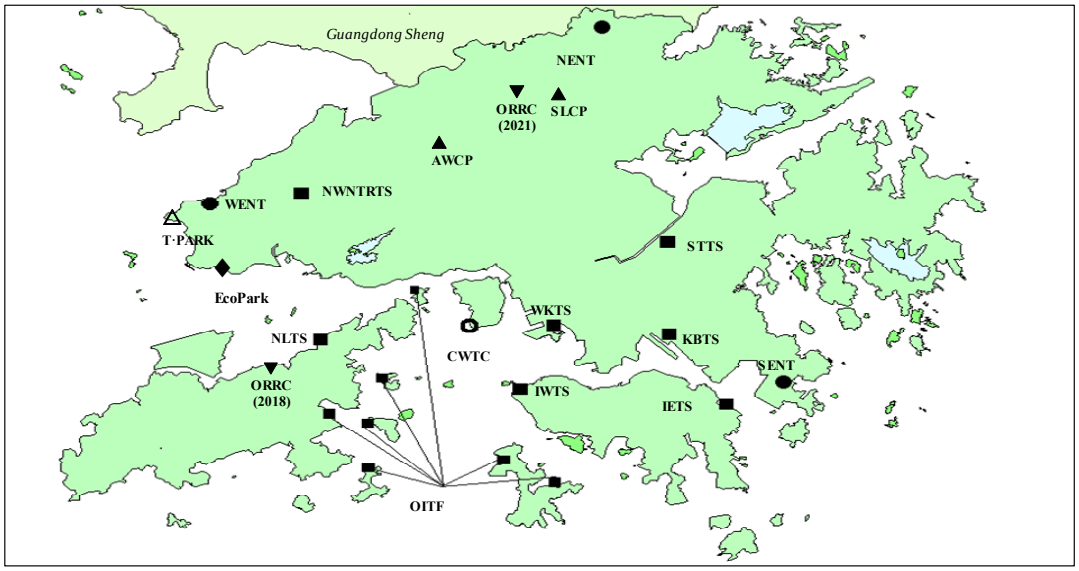
Plate 2.3 Disposal of total solid waste at landfills from 2012 to 2016 - By main waste category



Note:

(1) The quantity does not include special waste not disposed of at landfills. From April 2015 onwards, dewatered sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T ▪ PARK, and the residue and ash of incineration have been disposed of at WENT.

Plate 2.4 Waste management facilities in Hong Kong



Landfill	●	WENT - West New Territories Landfill
		SENT - South East New Territories Landfill [1]
		NENT - North East New Territories Landfill
RTS	■	IETS - Island East Transfer Station[2]
		IWTS - Island West Transfer Station[2]
		WKTS - West Kowloon Transfer Station[2]
		OITF - Outlying Islands Transfer Facilities[2]
		NLTS - North Lantau Transfer Station[2]
		STTS - Sha Tin Transfer Station[3]
		NWNTRTS - North West New Territories Refuse Transfer Station[4]
		KBTS - Kowloon Bay Transfer Station[5]
CWTC	◎	CWTC - Chemical Waste Treatment Centre
Composting Plant	▲	AWCP - Animal Waste Composting Plant
		SLCP - Shaling Composting Plant[6]
EcoPark	♦	EcoPark
ORRC	▼	ORRC - Organic Resources Recovery Centre [7]
Sludge Treatment Facility	△	T ▪ PARK [8]

Notes:

(1) From 6 January 2016 onwards, SENT Landfill has been designated to accept only C&D waste.

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

(3) Waste from STTS was transferred to NENT by road.

(4) Waste from NWNTRTS was transferred to WENT by road.

(5) KBTS was closed in April 2005 and converted to a waste recycling centre.

(6) SLCP has stopped operation since October 2010.

(7) Phase 1 of the ORRC at Siu Ho Wan is scheduled for commissioning in the first half of 2018, whilst Phase 2 of the ORRC at Shaling has commenced tendering in December 2016 with a view to commencing operation in 2021.

(8) From April 2015 onwards, dewatered sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T ▪ PARK, and the residue and ash of incineration have been disposed of at WENT.

Plate 2.5 Total solid waste received by RTSs and landfills in 2016 - By main waste category

Disposal facility - RTS	Average daily quantity (tpd)							
	MSW		Overall construction waste		Special waste[1]		Total	
IETS - Island East Transfer Station	1,175	(30.9%)	-	-	-	-	1,175	(30.9%)
STTS - Sha Tin Transfer Station	1,369	(17.2%)	-	-	-	-	1,369	(17.2%)
IWTS - Island West Transfer Station	1,111	(29.3%)	-	-	-	-	1,111	(29.3%)
WKTS - West Kowloon Transfer Station	2,665	(12.2%)	-	-	371	(-9.7%)	3,036	(9.0%)
OITF - Outlying Islands Transfer Facilities	84	(2.2%)	45	(-16.2%)	5	(11.8%)	134	(-4.6%)
NLTS - North Lantau Transfer Station	635	(74.7%)	-		1	(-24.1%)	635	(74.4%)
NWNTRTS - North West New Territories Refuse Transfer Station	1,165	(4.2%)	-	-	-	-	1,165	(4.2%)

Disposal facility - Landfill[2]	Average daily quantity (tpd)							
	MSW		Overall construction waste		Special waste[1]		Total	
WENT - West New Territories Landfill	7,405[2]	(20.0%)	1,020[2]	(6.7%)	389	(-15.3%)	8,814[2]	(16.2%)
SENT - South East New Territories Landfill[3]	-	-	2,482	(-1.0%)	-	-	2,500[3]	(-39.0%)
NENT - North East New Territories Landfill	2,923[2]	(17.8%)	920	(25.2%)	176	(-13.1%)	4,019[2]	(17.5%)
Landfills' total[3]	10,345	(1.8%)	4,422	(5.3%)	565	(-24.1%)	15,332	(1.5%)

Notes:

(1) Please refer to Plate 2.13b for special waste not disposed of at landfills. From April 2015 onwards, dewatered sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T ▪ PARK, and the residue and ash of incineration have been disposed of at WENT.

(2) Solid waste delivered to RTSs will be transferred to specified landfills after compression. The quantities include solid waste directly delivered to landfills and those transferred from RTSs to landfills.

(3) From 6 January 2016 onwards, SENT Landfill has been designated to accept only C&D waste. The total intake of solid waste of SENT in tonnes per day is computed based on the intake of overall construction waste in 2016 and the intakes of MSW and special waste from 1st to 5th January 2016.

(4) Figures in brackets refer to year-on-year (y-o-y) growth rates.

Plate 2.6 Arisings of solid waste disposed of at landfills in 2016 - By district by main waste category

District[4]	Average daily quantity[1] [2][3] (tpd)			
	Domestic waste (a)	Commercial & industrial waste (b)	Municipal solid waste (c) =(a)+(b)	Overall construction waste (d)
Central & Western	336	199	535	183
Eastern	442	162	604	89
Southern	234	66	300	84
Wanchai	237	104	341	102
Hong Kong Island Sub-total	**1,249**	**530**	**1,779**	**459**
Kowloon City	298	83	382	329
Kwun Tong	470	246	716	360
Sham Shui Po	382	92	473	91
Wong Tai Sin	249	93	342	45
Yau Tsim Mong	544	309	854	267
Kowloon Sub-total	**1,944**	**824**	**2,767**	**1,092**
Kwai Tsing	377	394	770	180
North	296	268	564	91
Sai Kung	326	89	415	1,190
Sha Tin	441	427	868	148
Tai Po	304	143	446	77
Tsuen Wan	277	207	484	91
Tuen Mun	397	387	785	798
Yuen Long	618	470	1,088	189
NT- Mainland Sub-total	**3,036**	**2,384**	**5,420**	**2,764**
Cheung Chau	25	-	-	-
Hei Ling Chau	2	-	-	-
Lamma Island	8	-	-	-
Ma Wan	11	-	-	-
Mui Wo	23	-	-	-
North Lantau	87	-	-	-
Peng Chau	6	-	-	-
NT-Outlying Islands Sub-total	**163**	**216[5]**	**379[5]**	**108[5]**
Total	**6,391**	**3,954**	**10,345**	**4,422**

Notes:

(1) The geographical distribution of solid waste arisings is mainly estimated from waste intake records taken at waste treatment facilities and should be regarded as indicative reference only.

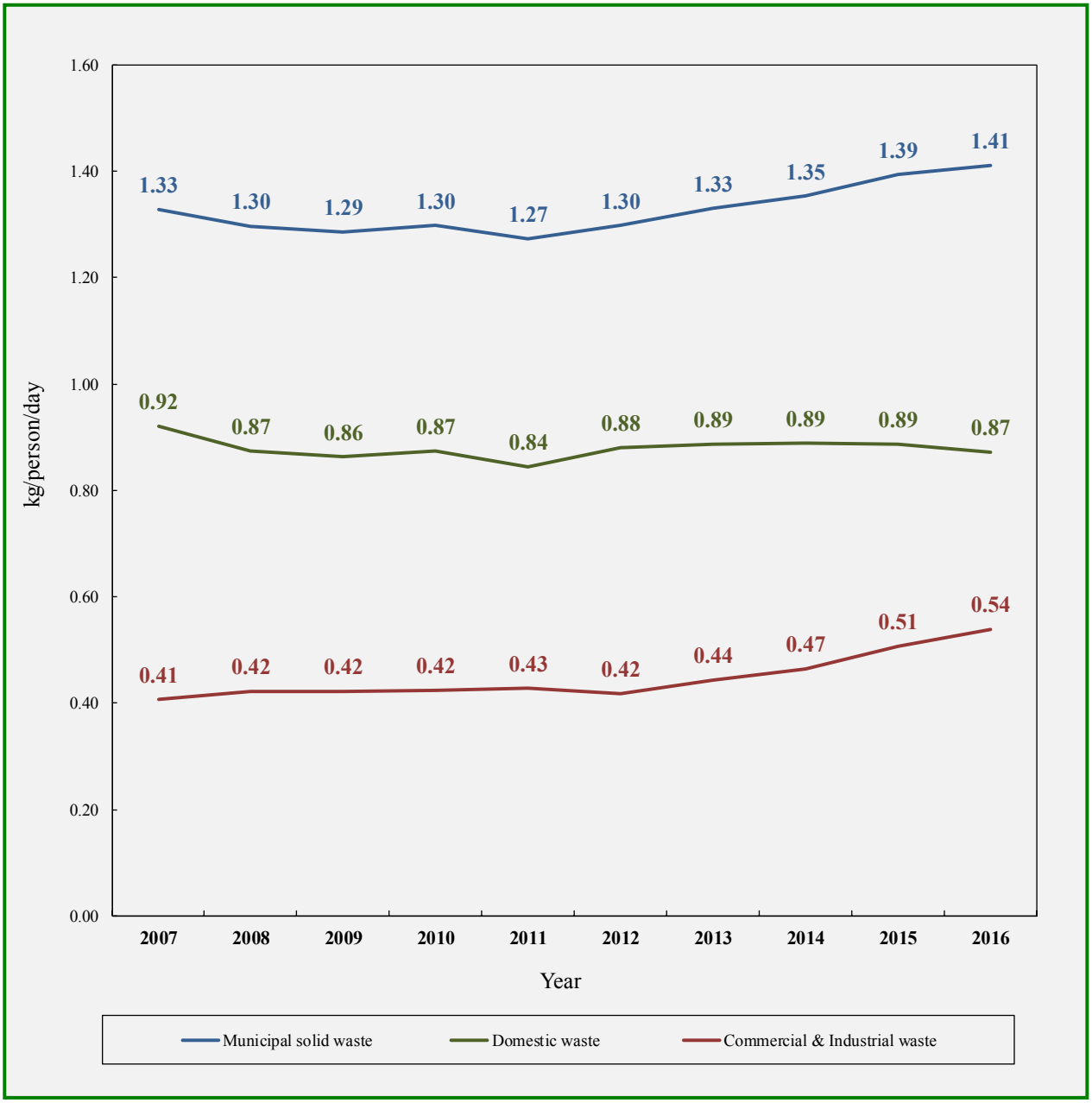
(2) Special waste is not included.

(3) Statistics in this table are not directly comparable with those of previous years, as a revised estimation methodology has been adopted.

(4) Districts under each main region are sorted in alphabetical order.

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

Plate 2.7 Per capita disposal rates of MSW, domestic waste and commercial & industrial waste from 2007 to 2016



Note:

(1) The per capita disposal rates are calculated based on the population data (mid-year) updated by the C&SD in August 2017.

Plate 2.8 Composition of MSW disposed of at landfills in 2016 - By waste type

Composition	Average daily quantity (tpd) and percentage shares by weight				
	Domestic waste (a)	Commercial waste (b)	Industrial waste (c)	Commercial & industrial waste (d)=(b)+(c)	Municipal solid waste (e)=(a)+(d)
Glass	**193** (3.0%)	**98** (3.2%)	**37** (4.0%)	**136** (3.4%)	**329** (3.2%)
Metals	**139** (2.2%)	**73** (2.4%)	**30** (3.2%)	**103** (2.6%)	**242** (2.3%)
Paper	**1,358** (21.2%)	**707** (23.3%)	**179** (19.4%)	**886** (22.4%)	**2,244** (21.7%)
Plastics	**1,257** (19.7%)	**650** (21.5%)	**225** (24.3%)	**875** (22.1%)	**2,132** (20.6%)
Putrescibles	**2,893** (45.3%)	**1,235** (40.8%)	**151** (16.3%)	**1,386** (35.0%)	**4,279** (41.4%)
Textiles	**230** (3.6%)	**69** (2.3%)	**44** (4.7%)	**113** (2.9%)	**343** (3.3%)
Wood/Rattan	**84** (1.3%)	**104** (3.4%)	**138** (14.9%)	**241** (6.1%)	**325** (3.1%)
Household hazardous wastes (HHWs)[(1)]	**109** (1.7%)	**32** (1.1%)	**24** (2.6%)	**56** (1.4%)	**165** (1.6%)
Others[(2)]	**129** (2.0%)	**60** (2.0%)	**98** (10.6%)	**159** (4.0%)	**287** (2.8%)
Total	**6,391** (100%)	**3,029** (100%)	**925** (100%)	**3,954** (100%)	**10,345** (100%)

Notes:

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

(2) Others include bulky items directly disposed of at landfills and other miscellaneous waste materials.

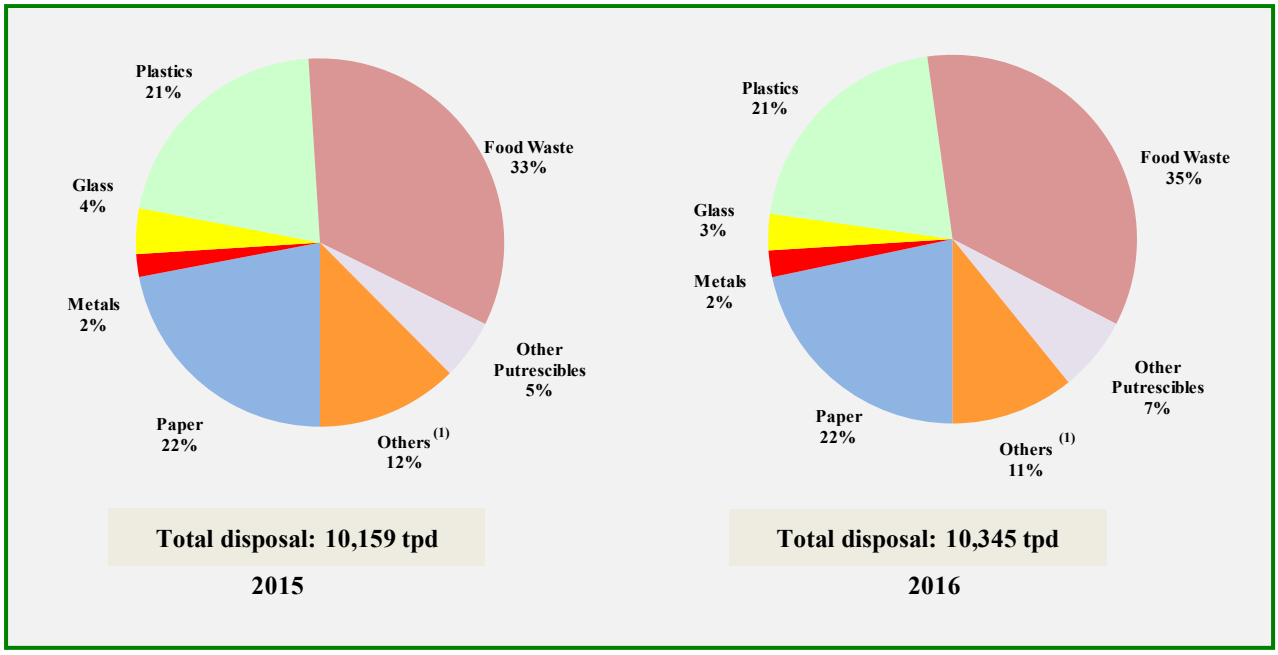
(3) Figures in brackets refer to percentage shares by weight.

Plate 2.9 Composition of MSW disposed of at landfills in 2016 – By major waste type

Composition	Average daily quantity (tpd) and percentage shares by weight					
	Domestic waste (a)		Commercial & industrial waste (b)		Municipal solid waste (c) = (a) + (b)	
Glass						
- Glass bottles	**157**	(2.5%)	**86**	(2.2%)	**243**	(2.3%)
- Other glass	**37**	(0.6%)	**49**	(1.2%)	**86**	(0.8%)
(Glass) Sub-total	**193**	**(3.0%)**	**136**	**(3.4%)**	**329**	**(3.2%)**
Metals						
- Aluminium cans	**18**	(0.3%)	**7**	(0.2%)	**25**	(0.2%)
- Ferrous metals	**102**	(1.6%)	**79**	(2.0%)	**181**	(1.7%)
- Other non-ferrous metals	**19**	(0.3%)	**17**	(0.4%)	**36**	(0.4%)
(Metals) Sub-total	**139**	**(2.2%)**	**103**	**(2.6%)**	**242**	**(2.3%)**
Paper						
- Cardboard	**235**	(3.7%)	**283**	(7.2%)	**518**	(5.0%)
- Newsprint	**313**	(4.9%)	**76**	(1.9%)	**389**	(3.8%)
- Office paper	**76**	(1.2%)	**56**	(1.4%)	**132**	(1.3%)
- Tetrapak	**44**	(0.7%)	**39**	(1.0%)	**83**	(0.8%)
- Others (1)	**690**	(10.8%)	**431**	(10.9%)	**1,121**	(10.8%)
(Paper) Sub-total	**1,358**	**(21.2%)**	**886**	**(22.4%)**	**2,244**	**(21.7%)**
Plastics						
- Non-PET plastic bottles	**52**	(0.8%)	**17**	(0.4%)	**69**	(0.7%)
- PET plastic bottles	**79**	(1.2%)	**78**	(2.0%)	**158**	(1.5%)
- Plastic bags	**443**	(6.9%)	**247**	(6.3%)	**690**	(6.7%)
- Plastic dining wares	**83**	(1.3%)	**71**	(1.8%)	**154**	(1.5%)
- Polyfoam-dining wares	**28**	(0.4%)	**11**	(0.3%)	**39**	(0.4%)
- Polyfoam-others	**24**	(0.4%)	**28**	(0.7%)	**53**	(0.5%)
- Others (2)	**548**	(8.6%)	**422**	(10.7%)	**970**	(9.4%)
(Plastics) Sub-total	**1,257**	**(19.7%)**	**875**	**(22.1%)**	**2,132**	**(20.6%)**
Putrescibles						
- Food waste	**2,326**	(36.4%)	**1,274**	(32.2%)	**3,600**	(34.8%)
- Yard waste(3)	**140**	(2.2%)	**37**	(0.9%)	**177**	(1.7%)
- Others(4)	**427**	(6.7%)	**75**	(1.9%)	**502**	(4.8%)
(Putrescibles) Sub-total	**2,893**	**(45.3%)**	**1,386**	**(35.0%)**	**4,279**	**(41.4%)**

Notes:
(1) Other paper waste includes tissue paper, paper bags, etc.
(2) Other plastics waste includes packaging materials, toys, off-cuts, scrap, etc.
(3) Yard waste not disposed of at landfills is not included. For example, part of the yard waste collected by AFCD is treated in country parks managed by the Department.
(4) Other putrescibles waste includes cotton personal care products, other organic waste, etc.
(5) Figures in brackets refer to percentage shares by weight.

Plate 2.10 Composition of MSW disposed of at landfills in percentages in 2015 and 2016 – By major waste type



Note:

(1) Others include textiles, wood/rattan, household hazardous wastes, bulky items directly disposed of at landfills, and miscellaneous waste materials.

Plate 2.11 Composition of municipal food waste disposed of at landfills in percentages in 2015 and 2016 - By waste category

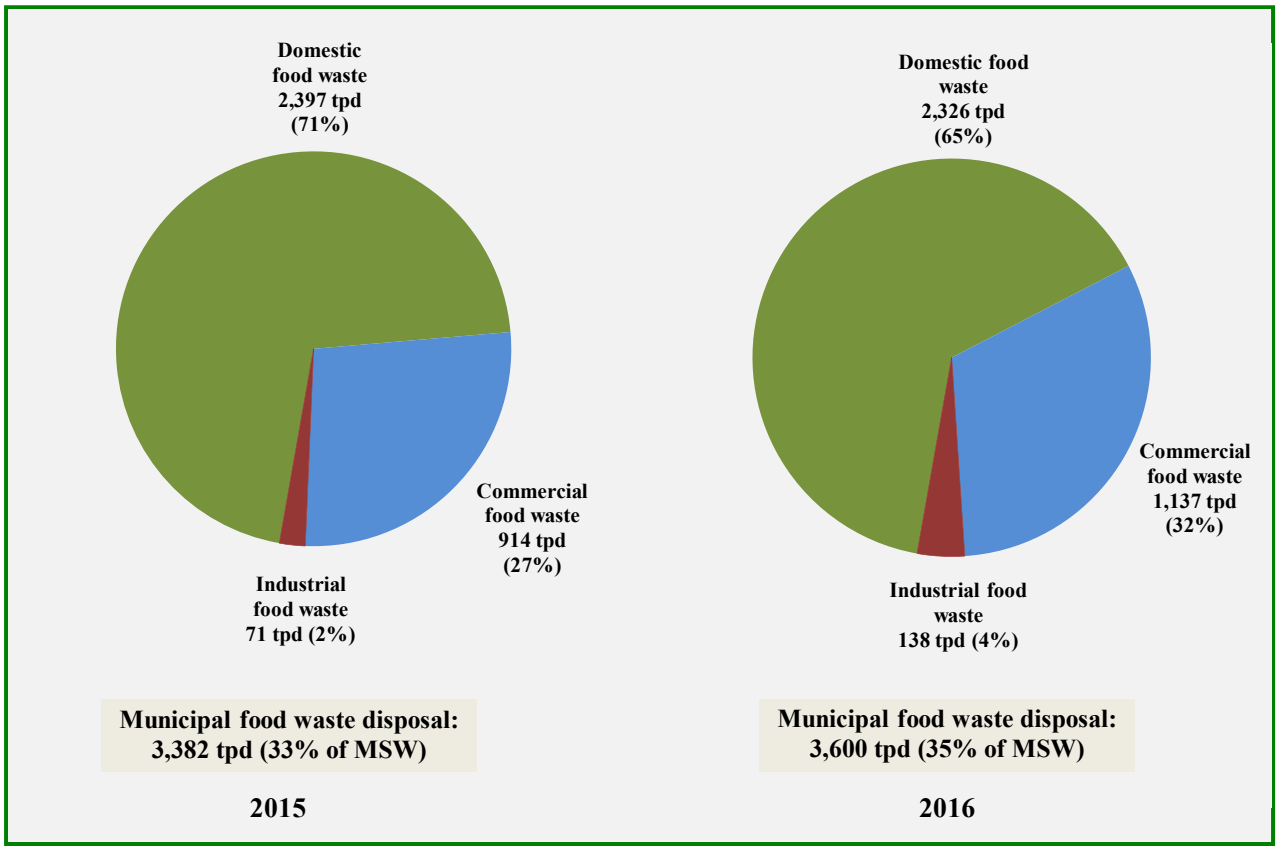
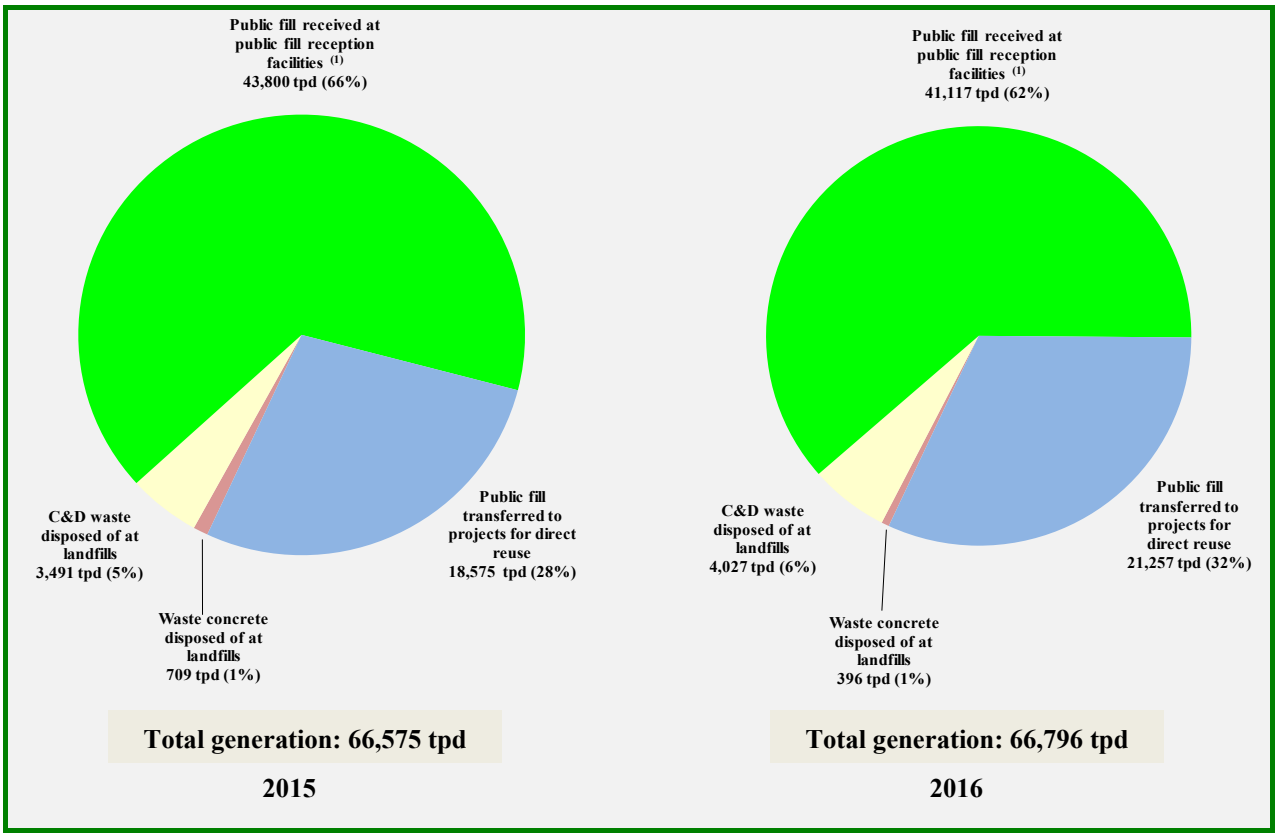


Plate 2.12 Disposal and reuse of overall construction waste in 2015 and 2016



Note:

(1) Public fill reception facilities (PFRFs) are managed by CEDD for receiving inert construction waste (also known as public fill) appropriate for reuse. At present, four PFRFs are in operation, namely Tseung Kwan O Area 137 Fill Bank, Tuen Mun Area 38 Fill Bank, Chai Wan Public Fill Barging Point and Mui Wo Temporary Public Fill Reception Facility.

Plate 2.13a Disposal of special waste at landfills in 2016 - By special waste type

Special waste type	Average daily quantity[1] (tpd)	
Abattoir waste	**9**	(7.1%)
Animal carcasses and kennel waste	**7**	(-22.0%)
Asbestos waste	**4**	(40.9%)
Chemical waste other than asbestos waste	**9**	(106.1%)
Clinical waste (with package material) [2]	**1**	(5.9%)
Condemned goods	**32**	(-26.7%)
Dewatered dredged materials	**4**	(1,849.9%)
Dewatered sludges[3]	**68**	(-77.7%)
Dewatered waterworks sludge	**58**	(0.3%)
Incineration ash and stabilised residue	**173**	(25.2%)
Livestock waste[4]	**63**	(3.6%)
Sewage works screenings	**65**	(1.4%)
Waste tyres[5]	**71**	(45.5%)
Disposal at Landfills Sub-total	**565**	(-24.1%)

Notes:

(1) Some types of special waste may not arise and be disposed of daily throughout the whole year. The average daily quantity is obtained by dividing the total amount of waste disposed of at landfills in the whole year by the number of days in the whole year.

(2) Clinical waste is incinerated at CWTC except during normal maintenance or emergency shut-down maintenance of the incineration treatment system for more than two days. During the shutdown, clinical waste is packed and transferred to designated landfill for disposal in accordance with the Clinical Waste Disposal License of CWTC.

(3) Dewatered sludges originate from sewage treatment works managed by the Drainage Services Department, wastewater treatment facilities and grease trap waste treatment facility at refuse transfer stations managed by the EPD, and private sewage treatment plants. Except that dewatered sludge from major sewage treatment works managed by Drainage Services Department is treated by incineration at T ▪ PARK, other dewatered sludges are disposed of at WENT and NENT Landfills.

(4) In 2016, the generation of livestock waste amounted to 160 tpd, out of which 63 tpd were disposed of at landfills. Livestock waste disposed of at landfills mainly include the livestock waste collected by the free collection service for solid livestock waste provided to local livestock farmers by the Government. The remaining livestock waste was treated by other environmentally-acceptable means such as on-site composting, aerobic treatment, and dry muck-out.

(5) Waste tyres are shredded or cut prior to disposal at landfills.

(6) Figures in brackets refer to year-on-year (y-o-y) growth rates. It should be noted that special waste types with small tpd figures may be subject to strong y-o-y fluctuations due to small base numbers.

Plate 2.13b Treatment of special waste in 2016 (Not disposed of at landfills) - By special waste type

Special waste type	Treatment method	Average daily quantity[1] (tpd)	
Chemical waste other than asbestos waste	**CWTC**	**35**	(11.1%)
Clinical waste	**CWTC**	**6**	(5.5%)
Grease trap waste	**WKTS[2]**	**371**	(-9.7%)
Horse stable waste	**AWCP**	**21**	(5.5%)
Dredged mud and excavated materials	**Marine dumping[3]**	**53,552**	(-27.6%)
Dewatered sewage sludge[4]	**Incineration at T ▪ PARK**	**1,144**	(42.8%)
Furnace bottom ash	**Concrete manufacturing, stored in lagoon[5]**	**115**	(6.5%)
Pulverised fuel ash	**Concrete manufacturing, stored in lagoon[5]**	**1,236**	(9.7%)

Notes:

(1) Some types of special waste may not arise and be treated daily throughout the whole year. The average daily quantity is obtained by dividing the total amount of waste treated outside landfills in the whole year by the number of days in the whole year.

(2) The figure is the quantity of grease trap waste treated by the Grease Trap Waste Treatment Facility at WKTS.

(3) The density of the dredged mud and excavated materials is assumed to be one tonne per cubic metre.

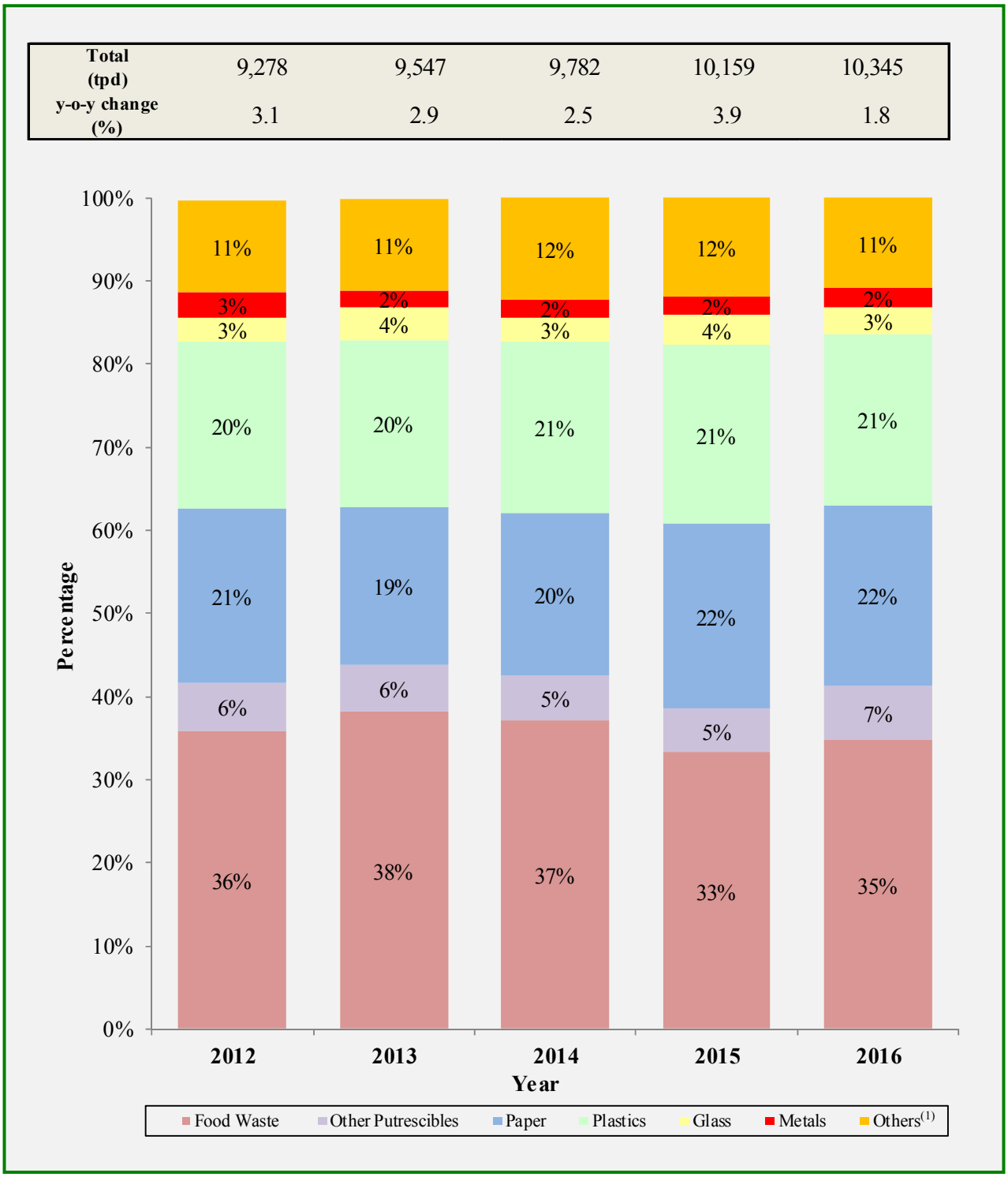
(4) Dewatered sewage sludge from major sewage treatment works managed by Drainage Services Department has been treated by incineration at T ▪ PARK from April 2015 onwards.

(5) Furnace bottom ash and pulverised fuel ash are wastes resulting from coal-fired electricity generation. Their figures are provided by the Power Companies.

(6) Figures in brackets refer to year-on-year (y-o-y) growth rates. It should be noted that special waste types with small tpd figures may be subject to strong y-o-y fluctuations due to small base numbers.

Plate 2.14 Composition of MSW disposed of at landfills in percentages from 2012 to 2016 – By major waste type

	2012	2013	2014	2015	2016
Total (tpd)	9,278	9,547	9,782	10,159	10,345
y-o-y change (%)	3.1	2.9	2.5	3.9	1.8

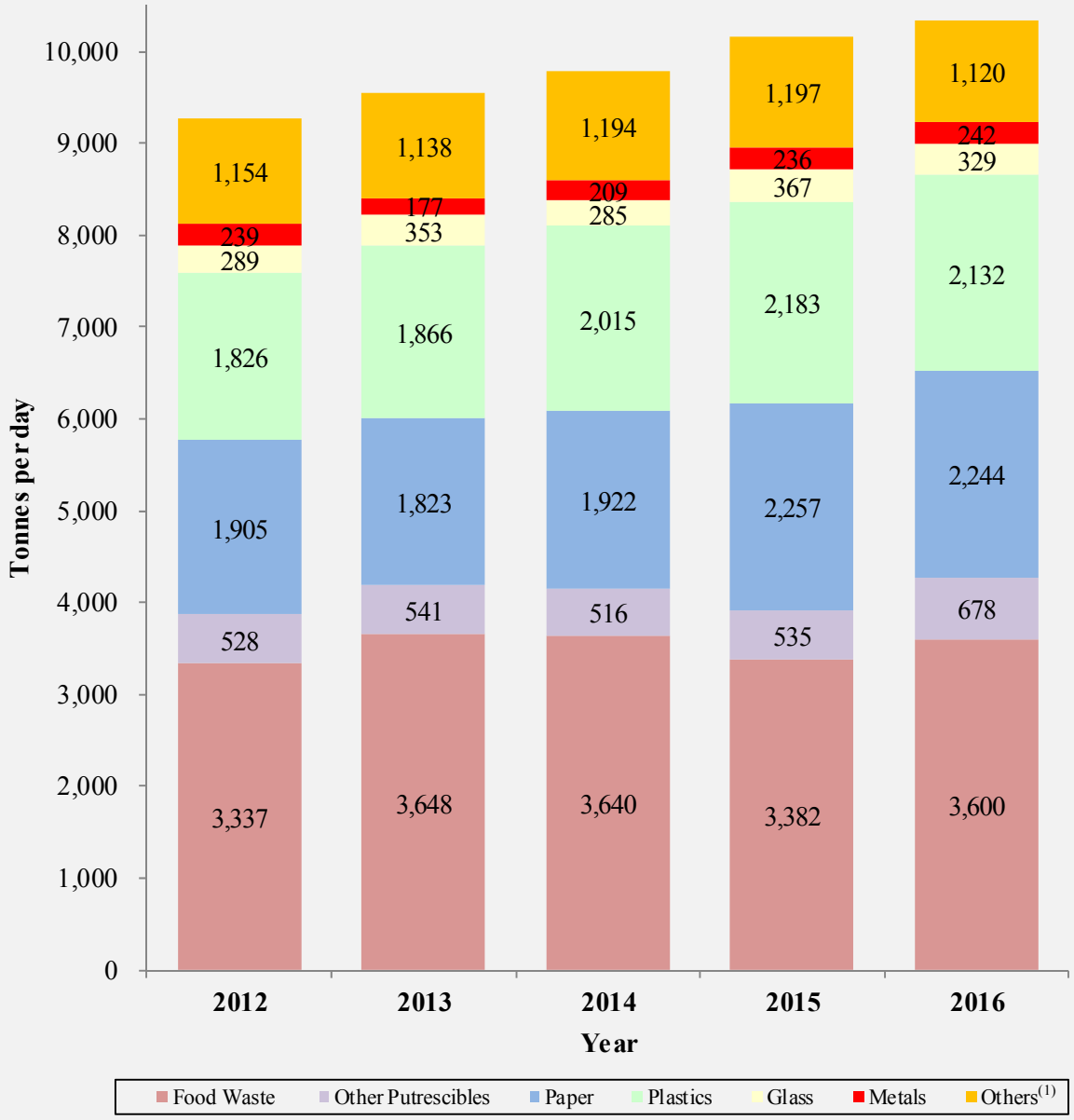


Note:

(1) Others include textiles, wood/rattan, household hazardous wastes, bulky items directly disposed of at landfills, and miscellaneous waste materials.

Plate 2.15 Composition of MSW disposed of at landfills in quantities from 2012 to 2016 – By major waste type

	2012	2013	2014	2015	2016
Total (tpd)	9,278	9,547	9,782	10,159	10,345
y-o-y change (%)	3.1	2.9	2.5	3.9	1.8

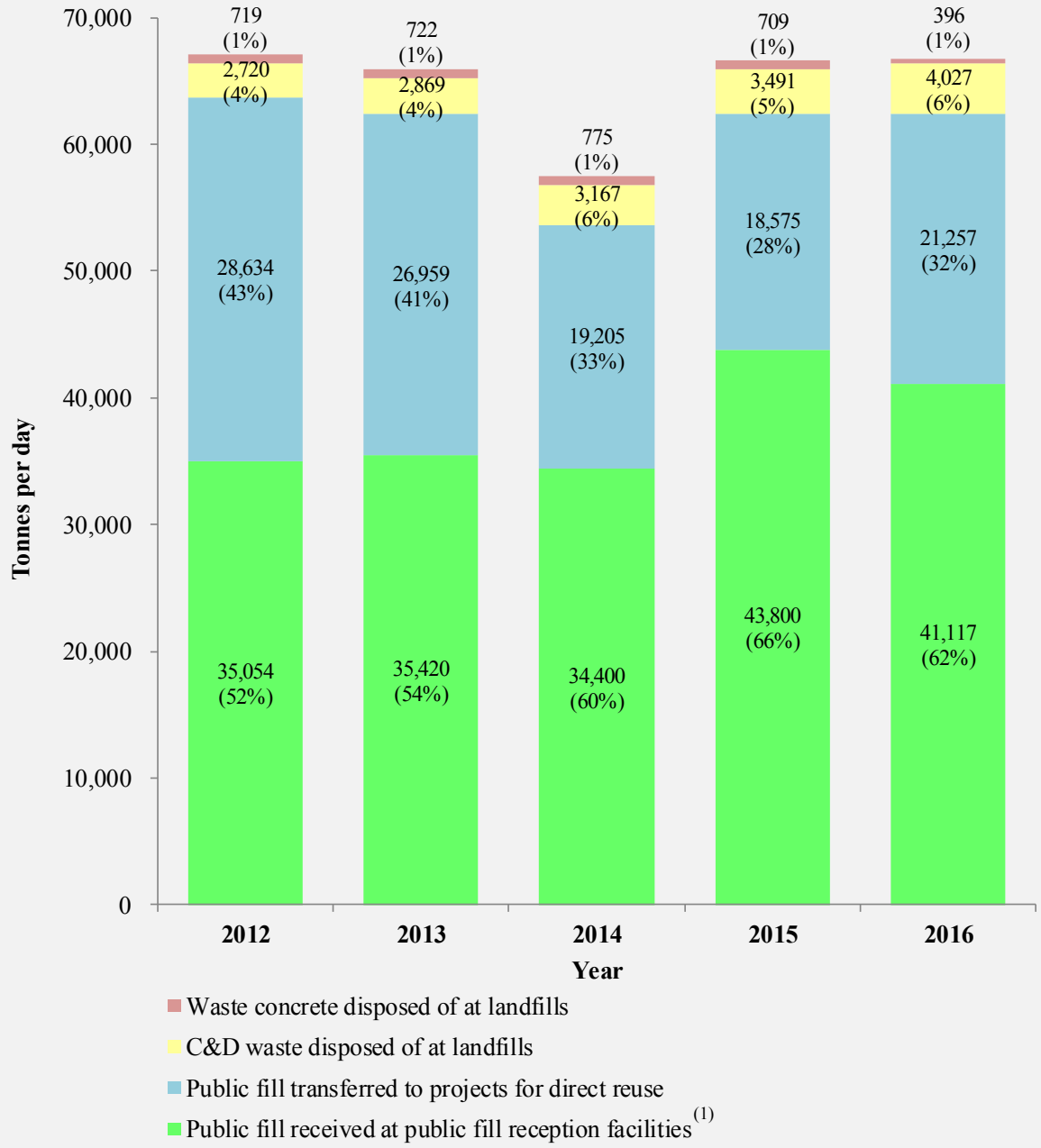


Note:

(1) Others include textiles, wood/rattan, household hazardous wastes, bulky items directly disposed of at landfills and miscellaneous waste materials.

Plate 2.16 Disposal and reuse of overall construction waste from 2012 to 2016

	2012	2013	2014	2015	2016
Total (tpd)	67,127	65,971	57,547	66,575	66,796
y-o-y change (%)	30.5	-1.7	-12.8	15.7	0.3



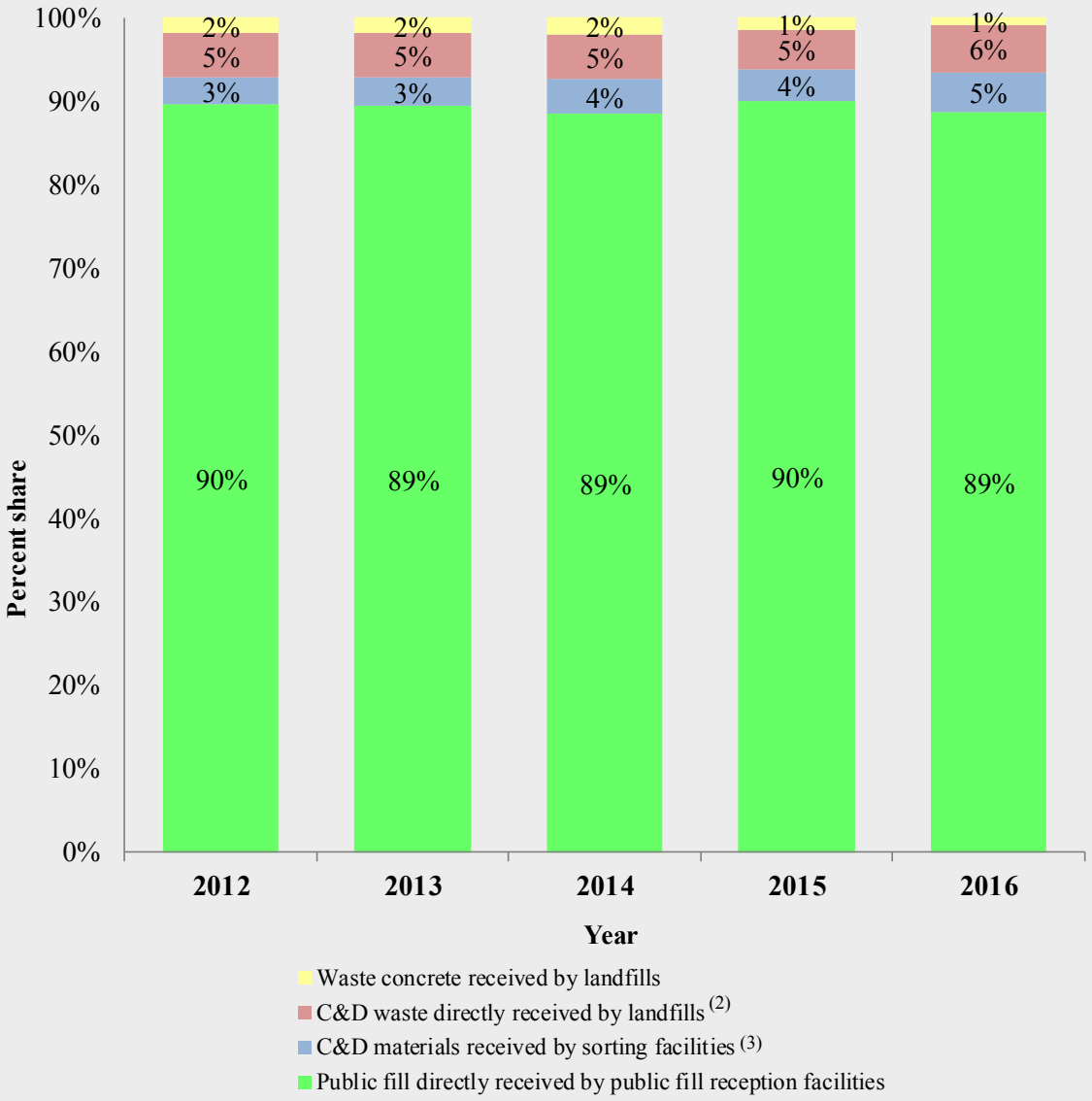
Notes:

(1) Public fill reception facilities (PFRFs) are managed by CEDD for receiving inert construction waste (also known as public fill) appropriate for reuse. At present, four PFRFs are in operation, namely Tseung Kwan O Area 137 Fill Bank, Tuen Mun Area 38 Fill Bank, Chai Wan Public Fill Barging Point and Mui Wo Temporary Public Fill Reception Facility.

(2) Figures in brackets refer to percentage shares by weight.

Plate 2.17 Overall construction waste received by treatment facilities from 2012 to 2016

Public fill reception facilities (tpd)	34,529	34,867	33,947	43,211	40,395
Sorting facilities (tpd)	1,197	1,361	1,591	1,863	2,191
Landfills (tpd)	2,764	2,759	2,811	2,917	2,940
Waste concrete (tpd)	*719*	*722*	*775*	*709*	*396*
C&D waste (tpd)	*2,044*	*2,037*	*2,037*	*2,208*	*2,544*



Notes:

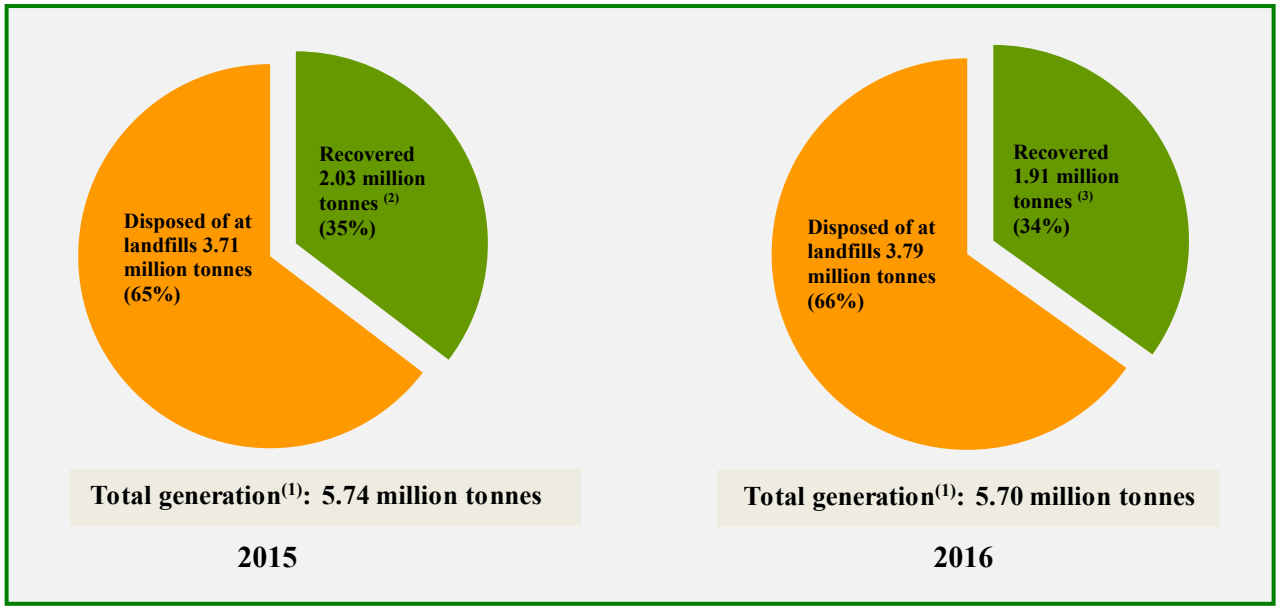
(1) Under the Construction Waste Disposal Charging Scheme, 71 dollars is charged per tonne of public fill disposed of at public fill reception facilities, 175 dollars per tonne of construction waste at sorting facilities and 200 dollars per tonne of construction waste at landfills.

(2) C&D waste directly received by landfills excludes C&D waste from sorting facilities, but includes a small quantity of C&D waste from OITF.

(3) After sorting, inert material will be transferred from sorting facilities to public fill banks, and non-inert construction and demolition waste (C&D waste) to landfills.

3. Resource Recovery and Recycling

Plate 3.1 Generation, disposal and recovery of MSW in 2015 and 2016



Notes:

(1) Generation of MSW is the sum of MSW disposed of at landfills and MSW recovered for recycling.

(2) A total of 2.03 million tonnes of recyclables were recovered for recycling in 2015, of which, 1.99 million tonnes (98%) were exported for recycling and 0.05 million tonnes (2%) recycled locally.

(3) A total of 1.91 million tonnes of recyclables were recovered for recycling in 2016, of which, 1.86 million tonnes (97%) were exported for recycling and 0.06 million tonnes (3%) recycled locally.

Plate 3.2 Recovery rates of MSW, domestic waste, and commercial and industrial waste from 2012 to 2016

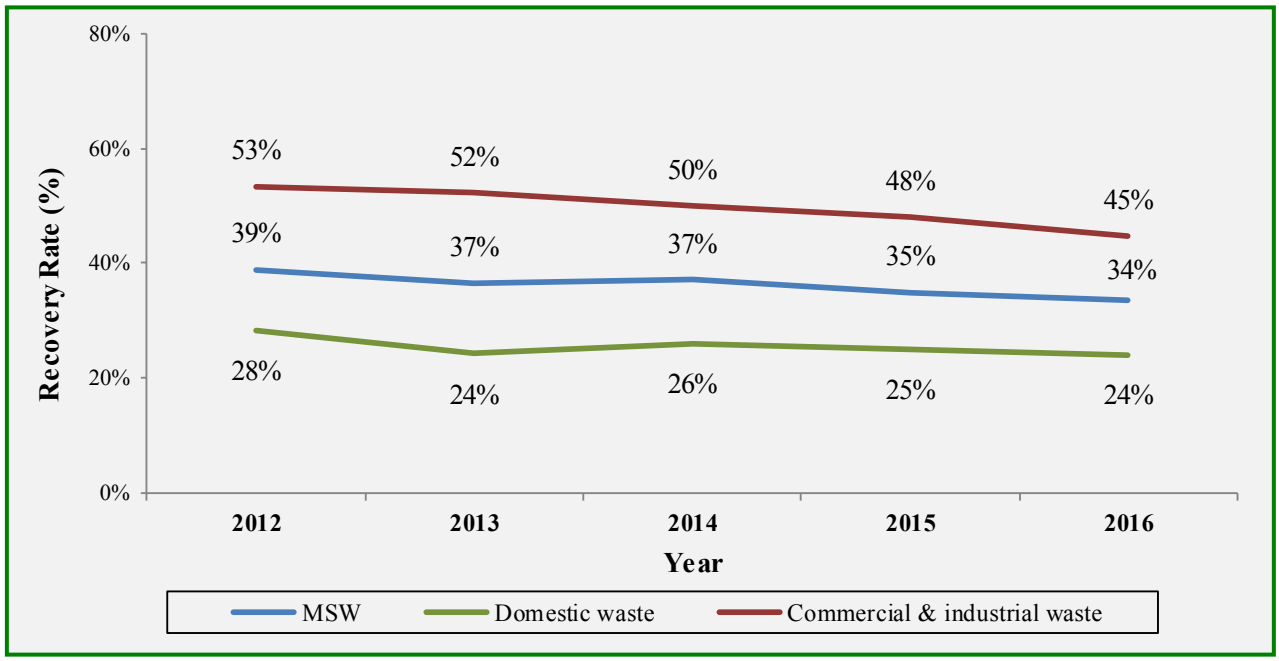


Plate 3.3 Recyclables recovered from MSW in 2016 - By type of recyclable

Recyclable type	Quantity of recovered recyclables (thousand tonnes)					
	Exported for recycling (a)		Recycled locally (b)		Total recovered for recycling (c) = (a) + (b)	
Paper	**805.7**	(43.4%)	**0.0**	(0.0%)	**805.7**	(42.1%)
Plastics	**118.7**	(6.4%)	**7.2**	(12.9%)	**125.9**	(6.6%)
Ferrous metals	**807.9**	(43.5%)	**0.2**	(0.3%)	**808.1**	(42.3%)
Non-ferrous metals	**71.5**	(3.9%)	**0.1**	(0.1%)	**71.6**	(3.7%)
Glass(1)	**0.1**	(0.0%)	**9.2**	(16.4%)	**9.3**	(0.5%)
Rubber tyres(2)	**0.0**	(0.0%)	**12.5**	(22.3%)	**12.5**	(0.7%)
Textiles	**0.3**	(0.0%)	**3.9**	(6.9%)	**4.2**	(0.2%)
Wood	**1.0**	(0.1%)	**2.9**	(5.2%)	**3.9**	(0.2%)
Food waste(3)	**0.0**	(0.0%)	**15.6**	(27.8%)	**15.6**	(0.8%)
Electrical and electronic equipment(4)	**51.0**	(2.7%)	**4.4**	(7.9%)	**55.4**	(2.9%)
Total	**1,856.4**	(100.0%)	**55.9**	(100.0%)	**1,912.3**	(100.0%)

Notes:

(1) Glass beverage bottles recovered for reuse through deposit-and-refund system operated by local beverage manufacturers are not included.

(2) The quantity includes reuse, retreading and recycling of vehicle tyres and retreading of aircraft tyres in Hong Kong.

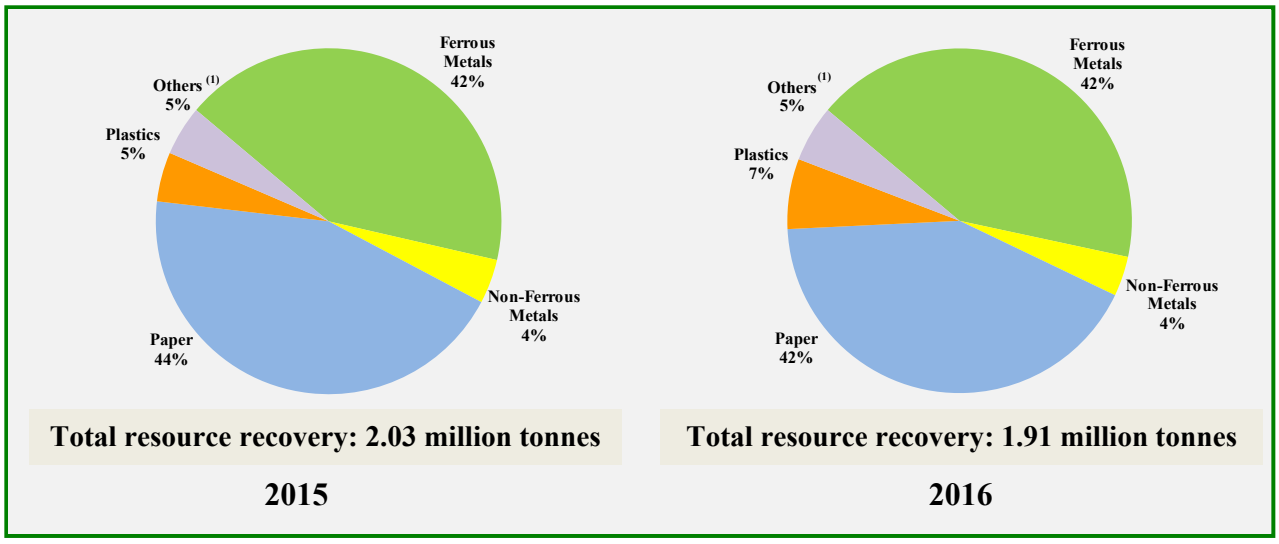
(3) The quantity of food waste recycled locally includes those recycled by industrial operators, those recycled at OITF, and those recycled at EPD's composting facilities at Kowloon Bay.

(4) The volume of waste electrical and electronic equipment recovered for recycling is compiled from results of a biennial survey on "Generation & Disposal Practice of Used/ End-of-Life Electrical & Electronic Equipment and Batteries in Hong Kong" commissioned by EPD.

(5) Figures less than 50 tonnes are shown as 0.0.

(6) Figures in brackets refer to percentage shares.

Plate 3.4 Recyclables recovered from MSW in percentages in 2015 and 2016 - By type of recyclable



Note:

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

Plate 3.5 Total quantities and export values of recyclable materials recovered from MSW from 2012 to 2016

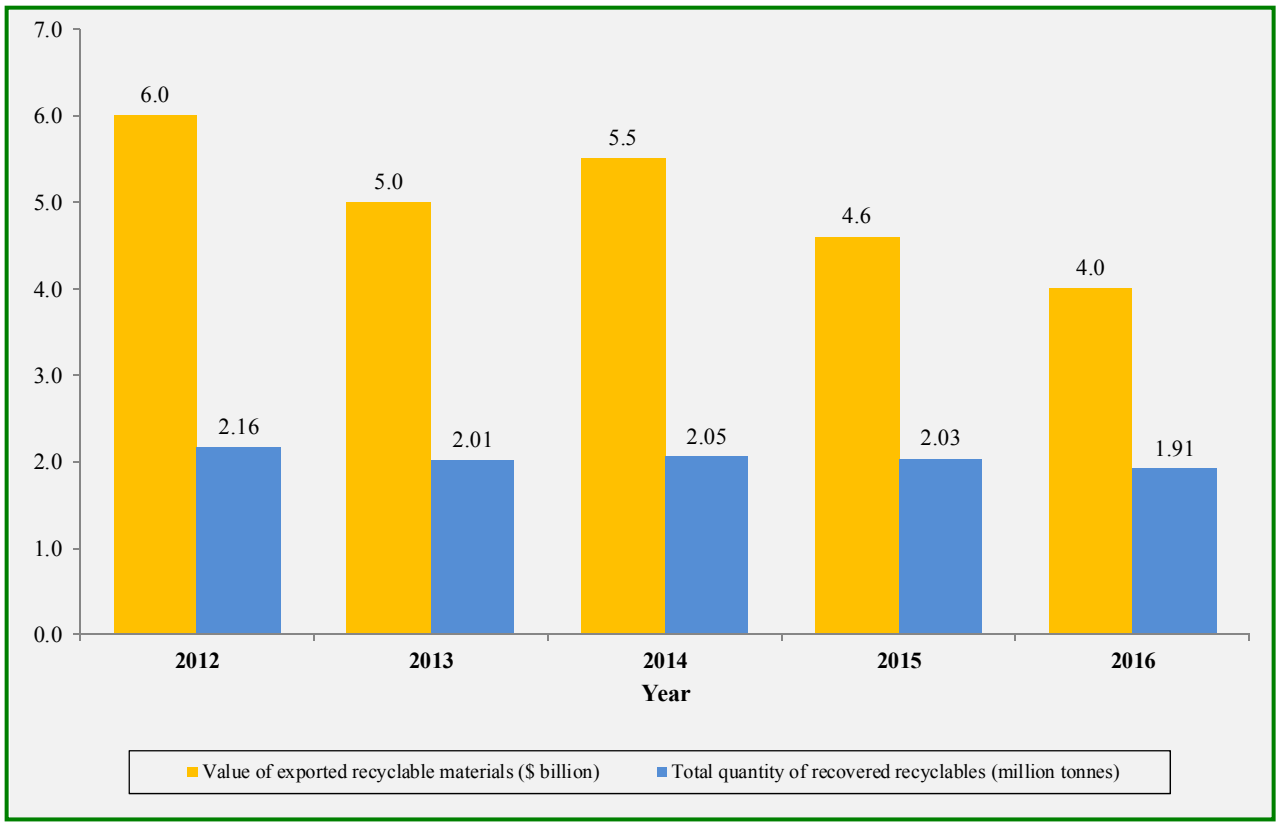
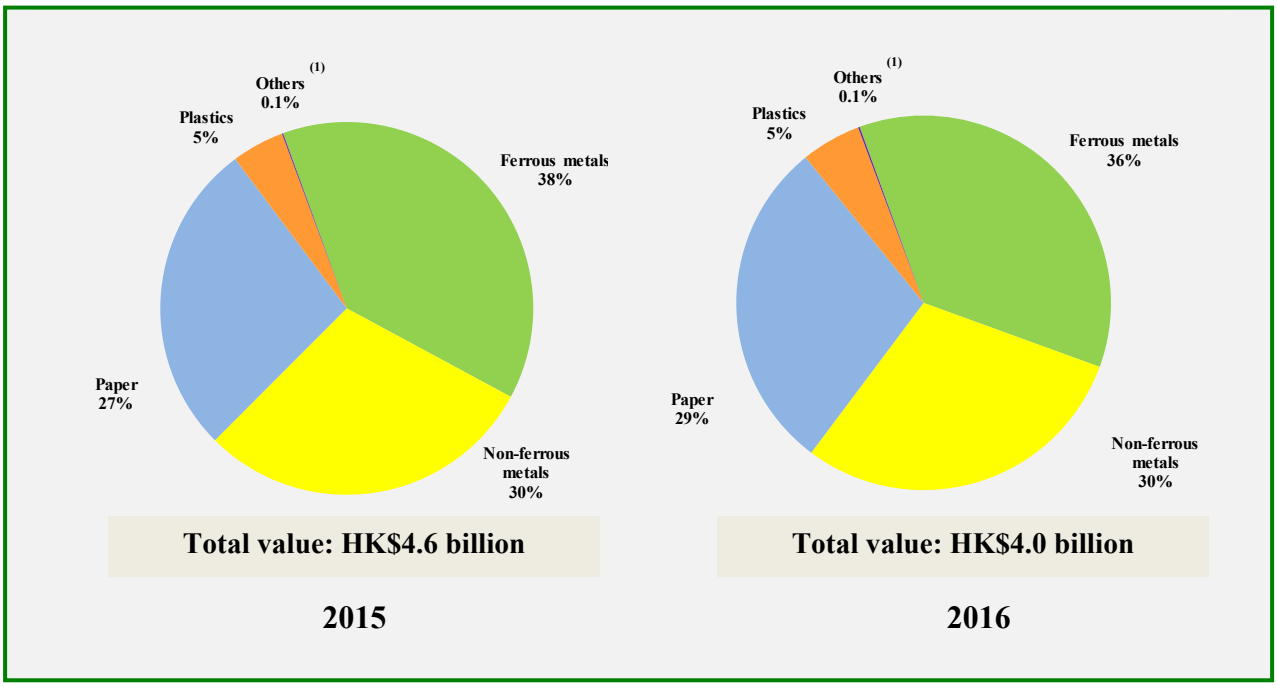


Plate 3.6 Values of exported recyclable materials recovered from MSW in percentages in 2015 and 2016 - By major type of recyclable material



Note:

(1) Others include glass, wood, textiles and rubber tyres only.

Plate 3.7 Quantities and values of exported recyclable materials recovered from MSW in 2016 - By major type of recyclable material

Recyclable type	Quantity (tonnes)		Value ($ thousand)		Value per unit ($ / tonne)
a. Ferrous metals					
- Alloy steel scrap	**14,280**	(1.8%)	**121,764**	(8.5%)	**8,527**
- Pig or cast iron	**0**	(0.0%)	**0**	(0.0%)	**-**
- Tinplate	**0**	(0.0%)	**0**	(0.0%)	**-**
- Other scraps	**793,605**	(98.2%)	**1,304,848**	(91.5%)	**1,644**
(Ferrous metals) Sub-total	**807,885**	**(100.0%)**	**1,426,612**	**(100.0%)**	**1,766**
b. Non-ferrous metals					
- Aluminium	**49,874**	(69.7%)	**319,990**	(27.3%)	**6,416**
- Copper & alloys	**16,675**	(23.3%)	**489,014**	(41.7%)	**29,326**
- Lead	**601**	(0.8%)	**4,669**	(0.4%)	**7,767**
- Metal ash & residues	**0**	(0.0%)	**0**	(0.0%)	**-**
- Nickel	**99**	(0.1%)	**996**	(0.1%)	**10,110**
- Precious metal	**4,280**	(6.0%)	**358,150**	(30.5%)	**83,688**
- Tin	**0**	(0.0%)	**0**	(0.0%)	**-**
- Zinc	**0**	(0.0%)	**0**	(0.0%)	**-**
(Non-ferrous metals) Sub-total	**71,529**	**(100.0%)**	**1,172,820**	**(100.0%)**	**16,396**
c. Plastics					
- Polyethylene (PE)	**33,194**	(28.0%)	**52,432**	(25.8%)	**1,580**
- Polyethylene terephthalate (PET)	**5,365**	(4.5%)	**19,070**	(9.4%)	**3,554**
- Polypropylene (PP)	**180**	(0.2%)	**281**	(0.1%)	**1,560**
- Polystyrene & copolymers (PS)	**36,964**	(31.1%)	**57,973**	(28.5%)	**1,568**
- Polyvinyl chloride (PVC)	**21,040**	(17.7%)	**33,096**	(16.3%)	**1,573**
- Others[(1)]	**21,964**	(18.5%)	**40,241**	(19.8%)	**1,832**
(Plastics) Sub-total	**118,706**	**(100.0%)**	**203,093**	**(100.0%)**	**1,711**
d. Textiles					
- Cotton	**0.2**	(0.1%)	**6**	(0.2%)	**30,000**
- Man-made fibres	**0**	(0.0%)	**0**	(0.0%)	**-**
- Old clothing & other textile articles, rags, etc.	**345**	(99.9%)	**3,590**	(99.8%)	**10,396**
(Textiles) Sub-total	**346**	**(100.0%)**	**3,596**	**(100.0%)**	**10,408**
e. Wood & paper					
- Paper	**805,718**	(99.9%)	**1,142,663**	(99.9%)	**1,418**
- Wood (include sawdust)	**1,042**	(0.1%)	**1,487**	(0.1%)	**1,428**
(Wood & paper) Sub-total	**806,760**	**(100.0%)**	**1,144,151**	**(100.0%)**	**1,418**
f. Glass					
(Glass) Sub-total	**148**	(100.0%)	**177**	(100.0%)	**1,195**
g. Electrical and electronic equipment					
(Electrical and electronic equipment) Sub-total	**50,984**	(100.0%)	**N/A**		**N/A**

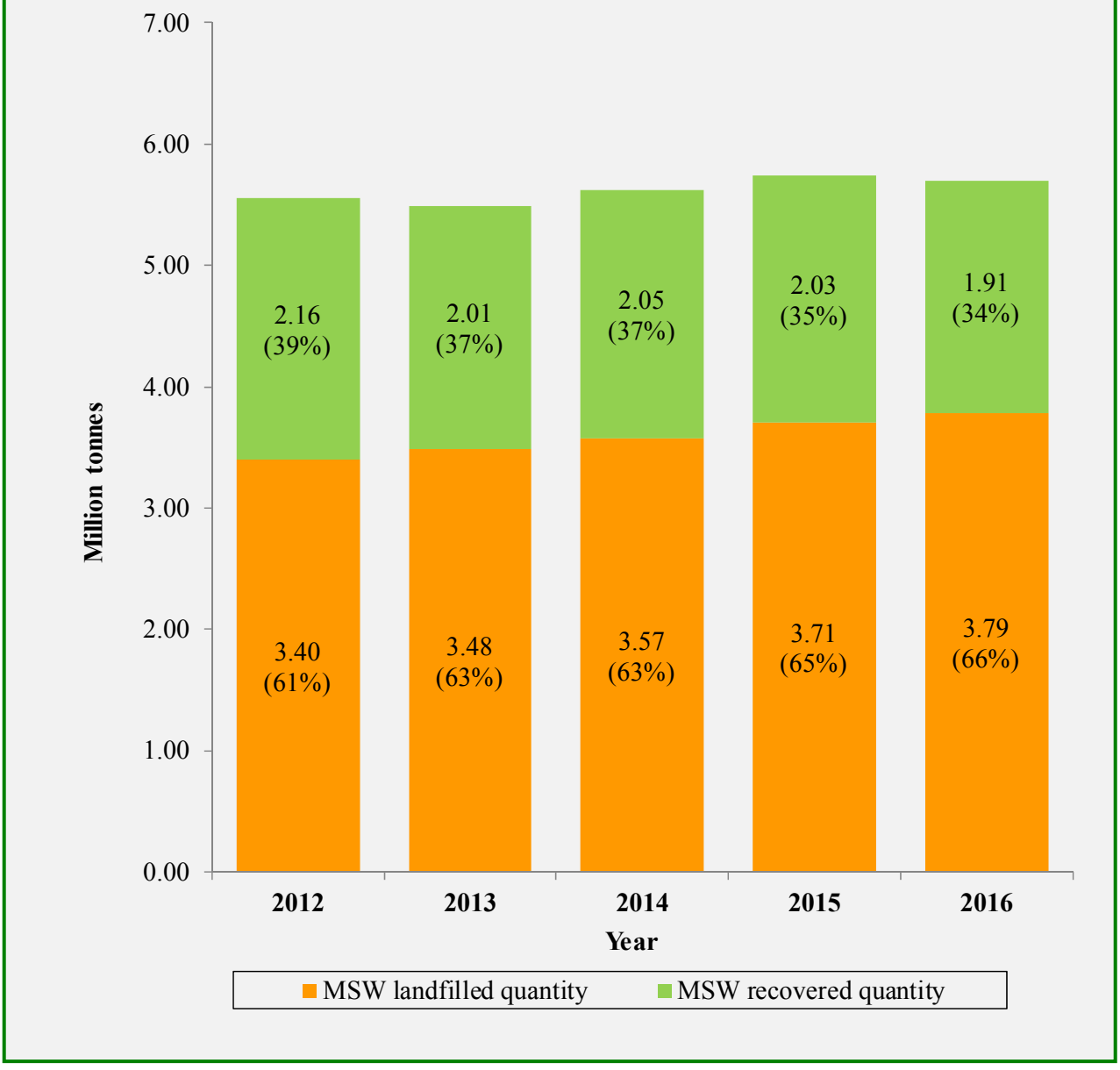
Notes:

(1) Other recyclable plastics include waste, parings and scrap not elsewhere classified.

(2) Figures in brackets refer to percentage shares.

Plate 3.8 Generation, disposal and recovery of MSW from 2012 to 2016

	2012	2013	2014	2015	2016
Total (million tonnes)	5.56	5.49	5.62	5.74	5.70
y-o-y change (%)	(-11.8%)	(-1.2%)	(2.4%)	(2.1%)	(-0.7%)



Note:

(1) Generation of MSW is the sum of MSW disposed of at landfills and MSW recovered for recycling.

Plate 3.9 Recyclables recovered from MSW in percentages from 2012 to 2016 - By major type of recyclable

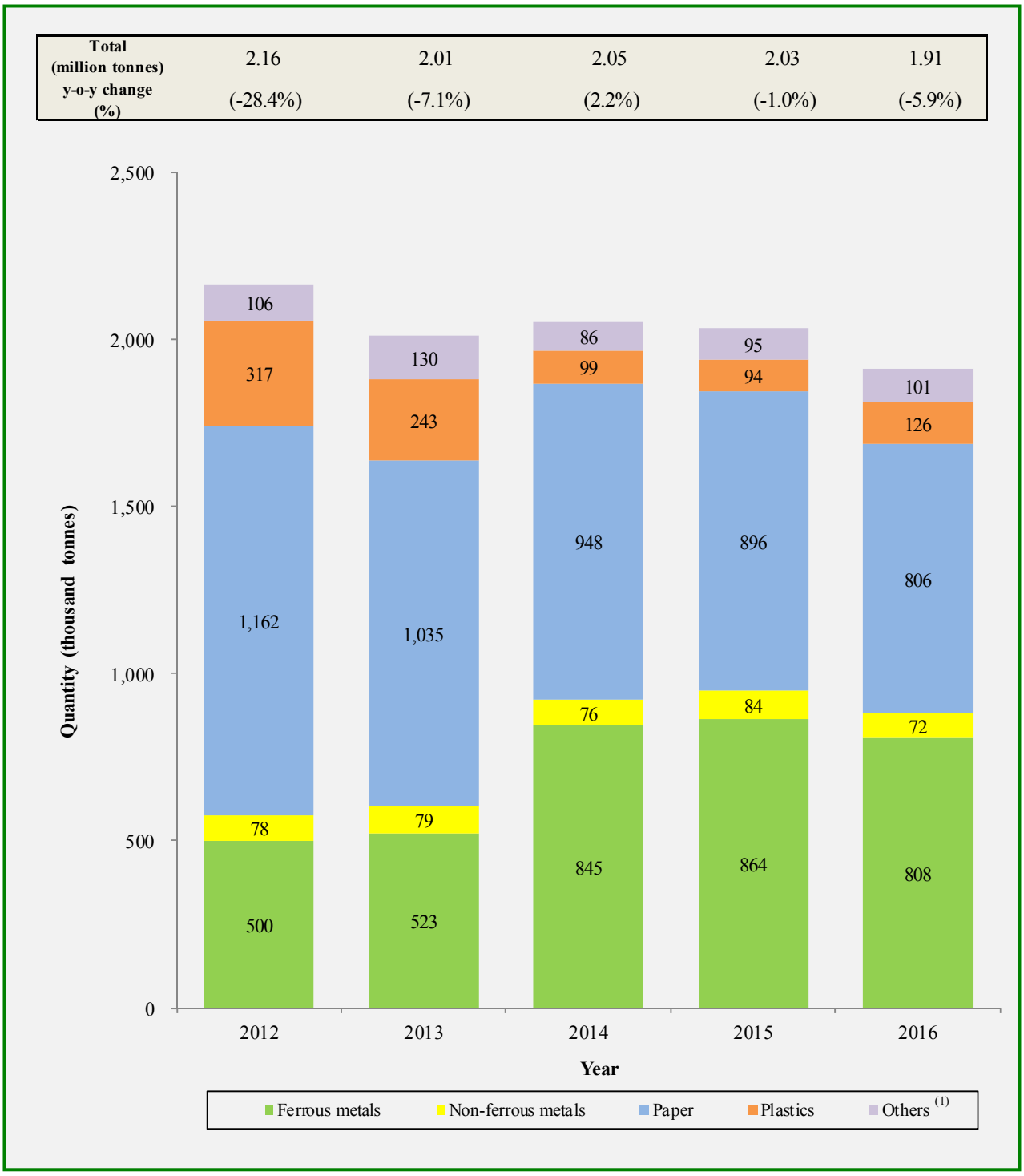
	2012	2013	2014	2015	2016
Total (million tonnes)	2.16	2.01	2.05	2.03	1.91
y-o-y change (%)	(-28.4%)	(-7.1%)	(2.2%)	(-1.0%)	(-5.9%)

Note:

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

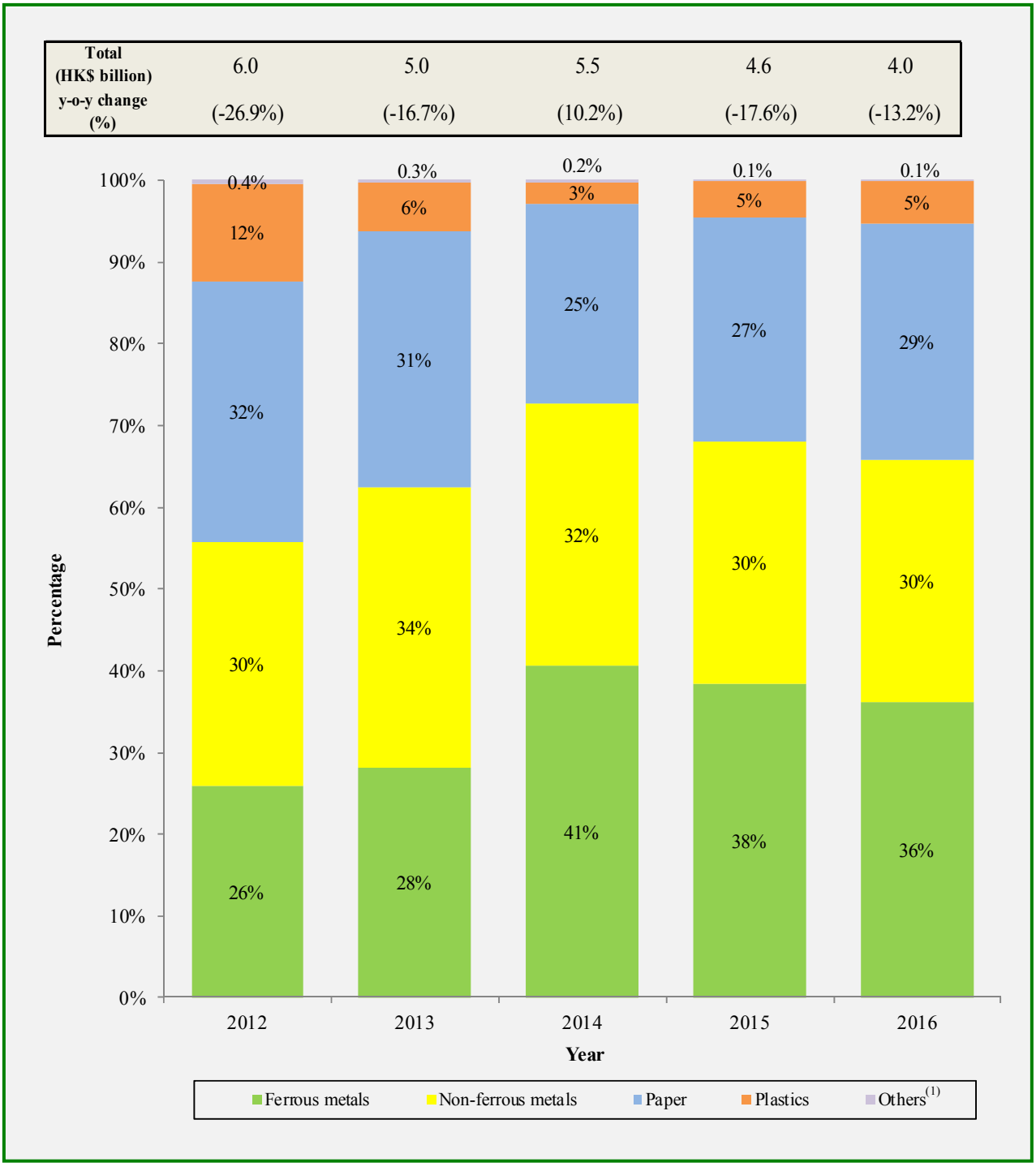
Plate 3.10 Recyclables recovered from MSW in quantities from 2012 to 2016 - By major type of recyclable

	2012	2013	2014	2015	2016
Total (million tonnes)	2.16	2.01	2.05	2.03	1.91
y-o-y change (%)	(-28.4%)	(-7.1%)	(2.2%)	(-1.0%)	(-5.9%)



Note:
(1) Others include glass, wood, rubber tyres, textiles, food waste, and electrical and electronic equipment.

Plate 3.11 Values of exported recyclable materials recovered from MSW in percentages from 2012 to 2016 – By major type of recyclable material



Note:
(1) Others include glass, wood, textiles and rubber tyres only.

Plate 3.12 Values of exported recyclable materials recovered from MSW from 2012 to 2016 - By major type of recyclable material

Notes:

(1) Others include glass, wood, textiles and rubber tyres only.

(2) Values less than HK$5 million are shown as 0.00.

Appendix 1: Classification of Solid Waste and Monitoring Methodology

Waste Classification and Terminology

Solid waste is classified into three main categories by making reference to the sources of waste and the institutional arrangements for waste collection and disposal. These three main categories of solid waste are municipal solid waste, overall construction waste and special waste. The detailed interpretations of some commonly used terms are described below.

Municipal solid waste includes three categories: domestic waste, commercial waste and industrial waste.

- **Domestic waste** refers to household waste, waste generated from daily activities in institutional premises (e.g. schools, government offices) and refuse collected from public cleansing services. Public cleansing waste includes dirt and litter collected by the Food and Environmental Hygiene Department, 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.

- **Industrial waste** is waste arising from industrial activities and does not include construction 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.

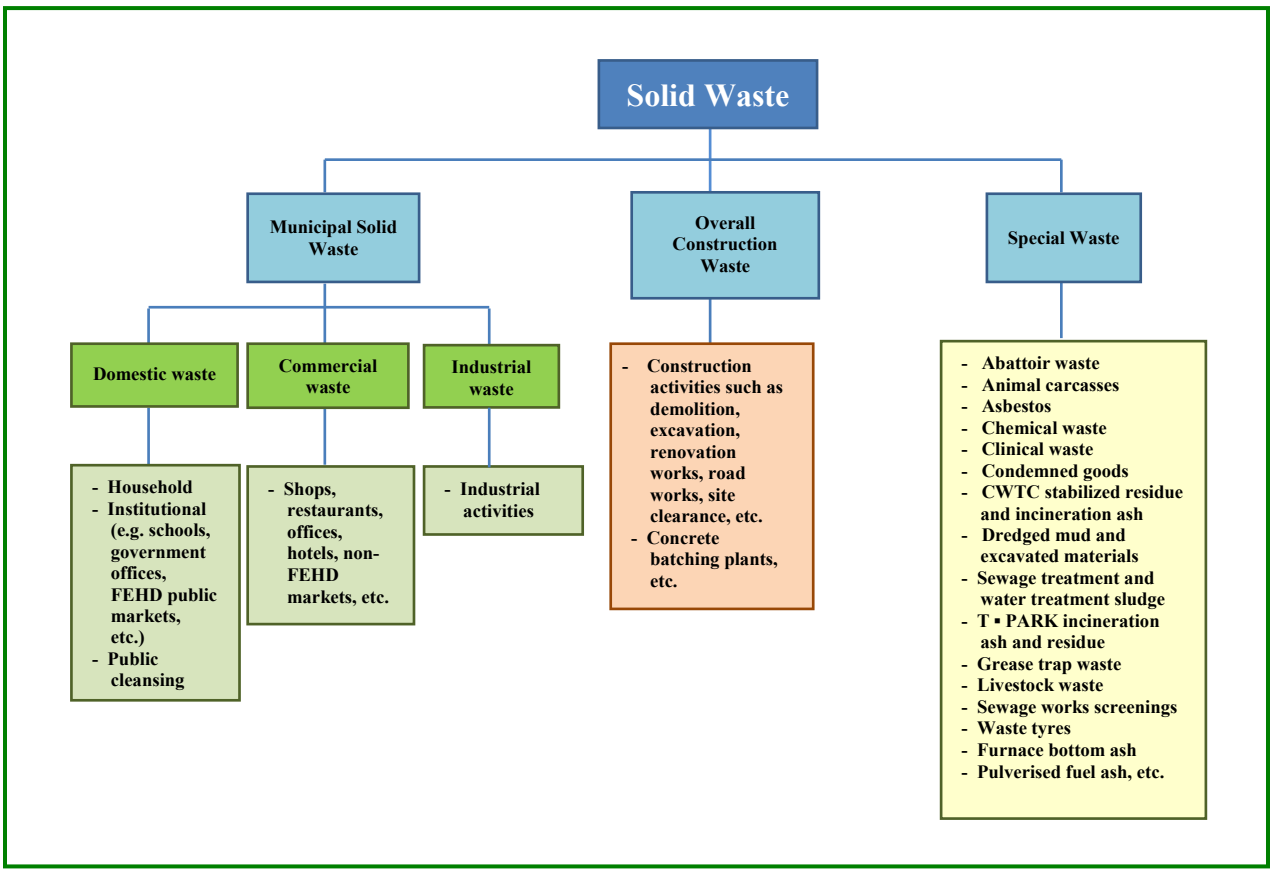
- Municipal solid waste contains a small portion of bulky items like furniture and domestic appliances which cannot be handled by conventional compactor type refuse collection vehicles. These items are regarded as **bulky waste** and are usually collected separately.

Overall construction waste includes waste or surplus materials arising from construction activities such as site clearance, refurbishment, renovation, demolition, land excavation and road works. It also includes waste concrete that is generated from concrete batching plants, cement plaster/mortar plants not set up inside construction sites. The overall construction waste is sorted into inert materials (called public fill) and construction and demolition (C&D) waste (basically non-inert waste), where inert materials like debris, rubble, concrete and earth are reused in construction sites, or as fill in reclamation sites when available. C&D waste are disposed of at landfills.

Special waste is waste that requires special disposal arrangement. It includes abattoir waste, animal carcasses, asbestos, chemical waste, clinical waste, condemned goods, CWTC stabilized residue and incineration ash, dredged mud and excavated materials, sewage treatment and water treatment sludge, T ▪ PARK incineration ash and residue, grease trap waste, livestock waste, sewage works screenings, waste tyres, furnace bottom ash, pulverised fuel ash, etc.

- **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.

Current classification of solid waste



Monitoring Methodology

Solid waste data are mainly collected from the following sources:

- Waste intake records taken at waste management facilities;
- Results of annual survey on waste composition conducted at landfills and RTSs;
- Results of waste recovery survey conducted on the local recycling industry;
- Statistics provided by relevant groups of EPD; and
- Statistics provided by other departments including FEHD, CEDD and C&SD.

Appendix 2: Terminology of Waste Management System

Under the statistical framework of solid waste, waste is an unwanted material or product which has been consumed, or is unsuitable for consumption as perceived by the generator. The interpretations of common terminology of Hong Kong's Waste Management System are detailed below[1].

- **Waste management system (WMS)** of Hong Kong comprises the public sector, private recyclers, and green groups in Hong Kong which engage in treatment of wastes or recyclables.

- **Waste disposal** is locally generated waste that are disposed of at strategic landfills managed by EPD.

- **Resource recovery** refers to recycling, reuse, or composting of locally recovered recyclables in Hong Kong or other jurisdictions/countries. Resource recovery activities divert wastes from local landfills for further uses.

- **Waste generation** is waste locally generated in Hong Kong and passes through the WMS. The generation quantity of waste equals the sum of quantities of waste disposal and resource recovery.

- **Waste avoidance** refers to the reduction in the quantity of waste entering the WMS, as a result of preventing the creation of waste at source or treatment of waste outside of the WMS. For example, wastes directly recycled or reused at the place of generation (e.g. on-site composting) or exchange of unprocessed second-hand products are regarded as waste avoidance. Waste avoidance falls outside of the scope of WMS, and is not measured in waste statistics in this report.

- **Waste recovery rate** is calculated as the proportion of resource recovery in waste generation.

- **Per capita waste disposal rate** is the quantity of waste disposed of at landfills on a daily basis by an average person of the Hong Kong population.

[1] The terminology applies to municipal solid waste (MSW) and overall construction waste only.