CHAPTER 2

WASTE GENERATION, COMPOSITION AND MANAGEMENT DATA

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2 WASTE GENERATION, COMPOSITION AND MANAGEMENT DATA

Users are expected to go to Mapping Tables in Annex 1, before reading this chapter. This is required to correctly understand both the refinements made and how the elements in this chapter relate to the corresponding chapter in the 2006 IPCC Guidelines.

2.1 INTRODUCTION

The starting point for the estimation of greenhouse gas emissions from solid waste disposal, biological treatment and incineration and open burning of solid waste is the compilation of activity data on waste generation, composition and management. General guidance on the data collection for solid waste disposal, biological treatment and incineration and open burning of waste is given in this chapter in order to ensure consistency across these waste categories. More detailed guidance on choice of activity data, emission factors and other parameters needed to make the emission estimates is given under Chapter 3, Solid Waste Disposal, Chapter 4, Biological Treatment of Solid Waste, and in Chapter 5, Incineration and Open Burning of Waste.

Solid waste generation is the common basis for activity data to estimate emissions from solid waste disposal, biological treatment, and incineration and open burning of waste. Solid waste generation rates and composition vary from country to country depending on the economic situation, industrial structure, waste management regulations and life style. The availability and quality of data on solid waste generation as well as subsequent treatment also vary significantly from country to country. Statistics on waste generation and treatment have been improved substantially in many countries during the last decade, but at present only a small number of countries have comprehensive waste data covering all waste types and treatment techniques. Historical data on waste disposal at solid waste disposal sites (SWDS) are necessary to estimate methane (CH_4) emissions from this category using the First Order Decay method (see Chapter 3 Solid Waste Disposal, Section 3.2.2). Very few countries have data on historical waste disposal going back several decades.

Solid waste is generated from households, offices, shops, markets, restaurants, public institutions, industrial installations, water works and sewage facilities, construction and demolition sites, and agricultural activities (emissions from manure management as well as on-site burning of agricultural residues are treated in the Agriculture, Forestry and Other Land Use (AFOLU) Volume). It is a *good practice* to account for all types of solid waste when estimating waste-related emissions in the greenhouse gas inventory.

Solid waste management practices include: collection, recycling, solid waste disposal on land, biological and other treatments as well as incineration and open burning of waste. Although recycling (material recovery) activities will affect the amounts of waste entering into other management and treatment systems, the impact on emissions due to recycling (e.g., changes in emissions in production processes and transportation) is covered under other sectors and will not be addressed here in more detail

This chapter provides updated data for the year (2010) for waste generation rates and waste composition by region according to UN classification. Waste generation rate and waste composition are key parameters used in the First Order Decay (FOD) model for estimation of CH_4 emissions from SWDS. These two parameters are subject to change over time depending on waste policies such as promotion of waste to energy, recycling and other treatment technologies. The refinement tables provide data which are based on references found during the period 2005 to 2010 which are assumed to be applicable for estimates of the year 2010. Data provided in *Revised 1996 IPCC Guidelines* and *2006 IPCC Guidelines* also help countries construct proper historical time series for waste generation which varies by time. In case data for countries are available beyond 2010, such data can be used to improve estimates of emissions for these years. The update of waste composition by country and region based on city and country level information is provided. Waste composition provided are in line with IPCC FOD model. The refinement provides detailed information per country in the tables in the Annexes. When country values are not available in the annex, default regional values provided in Table 2.1 (Updated) and Table 2.3 (Updated) can be used.

In addition to waste generation rate and waste composition, this refinement provides data on carbon, nitrogen and degradable organic carbon (DOC) contents in sludge which are also used in Chapters 5 and 6, Volume 5 (Waste) and Chapter 11, Volume 4 (AFOLU).

2.2 WASTE GENERATION AND MANAGEMENT DATA

No refinement.

2.2.1 Municipal Solid Waste (MSW)

Default data

Updated default data of region-specific waste generation rate per capita per year are provided in updated Table 2.1. To generate data sets on waste practice at the country level for EU countries, the data were derived from Eurostat, for other countries‑World Bank data based on references. These data are based on weight of wet waste and can be assumed to be applicable for the year 2010. Waste generation per capita for subsequent or earlier years can be estimated using the same guidance indicated in *2006 IPCC Guidelines*. Data from *Revised 1996 IPCC Guidelines* and *2006 IPCC Guidelines* provided in Table 2A.1 (Updated) help countries construct proper historical time series for waste generation which varies by time.

For developing countries using regional waste generation rates provided in the Table 2.1 (Updated) and for developing countries in italics in the Table 2 A.1 (Updated), the generation rates should be multiplied by the urban population only to obtain the total waste generated in the country since these rates assume that the waste is generated by urban population only and not rural population. Hoornweg and Bhada (2012) was the main reference used for data from developing countries. The methodology used for most developing countries in this reference estimated the waste generation rates from the total waste generated in the country divided by the urban population[1]. For other countries (not in italics in the table), the generation rates should be multiplied by the total population to estimate the total waste generated in the country.

TABLE 2.1 (UPDATED)
MSW GENERATION AND TREATMENT DATA – REGIONAL DEFAULTS

Region	MSW Generation Rate[1,2,3] (tonnes/cap/yr)	Fraction of MSW open dumped	Fraction of MSW disposed to landfills	Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified[4]
Asia						
Central Asia	0.34					
Eastern Asia	0.48	0.00	0.23	0.24	0.00	0.52
South-Eastern Asia	0.46					
Southern Asia	0.50					
Western Asia	0.69	0.11	0.68	0.08	0.01	0.12
Africa						
Northern Africa	0.41	0.79	0.17	0.00	0.00	0.04
Eastern Africa	0.29	0.98	0.00	0.00	0.01	0.01
Middle Africa	0.19	0.95	0.00	0.00	0.00	0.05
Southern Africa	0.33					
Western Africa	0.18	0.00	0.64	0.00	0.00	0.36

[1] During the time of finalizing this refinement, a new version of the report was issued in September 2018. Inventory compilers are encouraged to refer to the new version of the report for any updated values taking into account any updates in the methodology of estimating the generation rates.

TABLE 2.1 (UPDATED) (CONTINUED)
MSW GENERATION AND TREATMENT DATA – REGIONAL DEFAULTS

Region	MSW Generation Rate[1,2,3] (tonnes/cap/yr)	Fraction of MSW open dumped	Fraction of MSW disposed to landfills	Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified[4]
Europe						
Eastern Europe	0.37	0.00	0.71	0.06	0.04	0.19
Northern Europe	0.48	0.00	0.47	0.20	0.09	0.24
Southern Europe	0.47	0.00	0.76	0.04	0.03	0.17
Western Europe	0.59	0.00	0.08	0.40	0.21	0.31
America						
Caribbean	0.78	0.03	0.78	0.00	0.01	0.18
Central America	0.58	0.13	0.62	0.00	0.00	0.25
South America	0.43	0.43	0.40	0.00	0.00	0.18
Northern America	0.96	0.00	0.22	0.26	0.13	0.38
Oceania						
Australia and New Zealand	0.60	0.00	0.69	0.04	0.00	0.27
Melanesia	1.18					
Polynesia	1.35					

[1] Data are based on weight of wet waste.

[2] To obtain the total waste generation in the country, the per-capita values should be multiplied with the population whose waste is collected. For developing countries using regional values from the table above, the generation rates should be multiplied by the urban population.

[3] The data are default data for the year 2010, although for some countries the year for which the data are applicable was not given in the reference, or data for the year 2010 were not available. This year for which the data are collected, where available, is given in Annex 2A.1 (Updated)

[4] Other, unspecified, includes data on recycling for some countries.

Country-specific data

It is *good practice* that countries use data on country-specific MSW generation, composition and management practices as the basis for their emission estimation.

Country-specific data on MSW generation and management practices can be obtained from waste statistics, surveys (municipal or other relevant administration, waste management companies, waste association organisations, other) and research projects (World Bank, Organization for Economic Co-operation and Development (OECD), Asian Development Bank (ADB), Japan International Cooperation Agency (JICA), US Environmental Protection Agency (US EPA), International Institute for Applied Systems Analysis (IIASA), European environment Agency (EEA), etc.).

Large countries with differences in waste generation and treatment within the domestic regions are encouraged to use data from these regions to the extent possible. Additional guidance on data collection in general and on waste surveys is given in Chapter 2, Approaches to Data Collection, in Volume 1.

Data from waste stream analyses

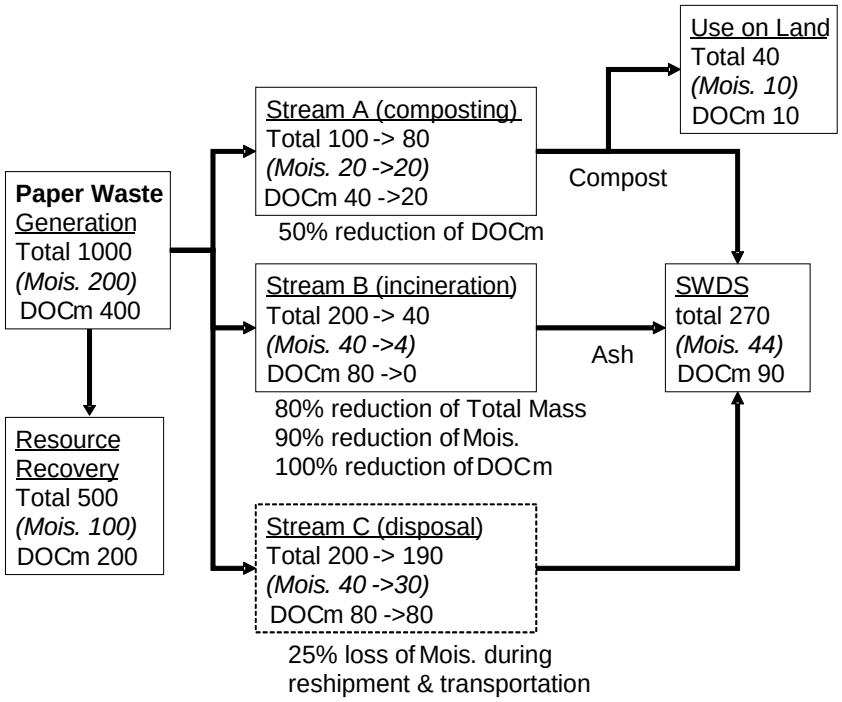
MSW treatment techniques are often applied in a chain or in parallel. A more accurate but data intensive approach to data collection is to follow the streams of waste from one treatment to another taking into account the changes in composition and other parameters that affect emissions. Waste stream analyses should be combined with high quality country-specific data on waste generation and management. The approach is often complemented with modelling. When using this approach, it is *good practice* to verify the data using separately collected data on MSW generation, treatment and disposal, especially in cases where they are based largely on modelling. This method is only more accurate than the approaches given above if countries have good quality, detailed data on each end point and have verified the information.

An example of applying the approach for estimating the amount of paper waste disposed at SWDS is given in Box 2.1, Example of Activity Data Collection for Estimation of Emissions from Solid Waste Treatment Based on Waste Stream Analysis by Waste Type. Using this approach following all waste streams in the country would provide activity data for all solid waste treatment and disposal (including waste incineration and open burning of waste). The data needed for the approach could be estimated based on surveys to industry, households and waste management companies/facilities, complemented with statistical data on MSW generation, treatment and disposal.

BOX 2.1

EXAMPLE OF ACTIVITY DATA COLLECTION FOR ESTIMATION OF EMISSIONS FROM SOLID WASTE TREATMENT BASED ON WASTE STREAM ANALYSIS BY WASTE TYPE

Waste streams begin at the point of generation, flow through collection and transportation, separation for resource recovery, treatment for volume reduction, detoxification, stabilisation, recycling and/or energy recovery and terminate at SWDS. Waste streams are country-specific. Traditionally most solid waste has been disposed at SWDS in many countries. Recent growing recognition of the need for resource conservation and environmental protection has increased solid waste recycling and treatment before disposal in developed countries. In developing countries, recovery of valuable material at collection, during transportation and at SWDSs has been common. Degradable organic carbon (DOC) is one of the main parameters affecting the CH_4 emissions from solid waste disposal. DOC is estimated based on the waste composition, and varies for different waste fractions. Accurate estimates of the amount of waste and amount of DOC in waste (DOCm) disposed at SWDS could be achieved by sampling waste at the gate of SWDS and measuring DOCm in that waste, or specifying the waste stream for each waste type and/or source. Intermediate processes in the waste stream can significantly change physical and chemical properties of waste, including moisture and DOCm. DOCm in waste at SWDS will differ considerably from that at generation, depending on the treatment before the disposal. For those countries that do not have reliable data based on measurements on DOCm disposed at SWDS, the analysis on the change in mass of moisture and DOCm during earlier treatment for each waste type, could provide a method to avoid over-/under-estimating the CH4 emissions at SWDS.



Note 1: 'Mois.' means moisture and DOCm is the mass of degradable organic carbon.
Note 2: Values in each box give the weight of the total mass (Total), moisture (Mois.) and DOCm in mass units (tonnes or kilograms or other).

BOX 2.1 (CONTINUED)
EXAMPLE OF ACTIVITY DATA COLLECTION FOR ESTIMATION OF EMISSIONS FROM SOLID WASTE TREATMENT BASED ON WASTE STREAM ANALYSIS BY WASTE TYPE

The figure above shows an example of a paper waste flow chart for analysis of change in DOCm in waste during the treatment before disposal. Some portion of paper waste would be recovered as material, and be diverted from the waste management flow. The DOCm in paper waste is reduced by intermediate processes, such as composting and incineration before disposal at the SWDS. Mass of total waste, DOCm and moisture at the exit of each process can be given by multiplying mass of these components at the entrance by reduction rates of the process. In this figure the changes of mass are studied for paper waste solely, although the treatment steps would usually include also other waste types. Incineration will remove most of the moisture, but the ash will be re-wetted to avoid the fly loss during transportation and loading into SWDS. Greenhouse gas emissions from other categories than SWDS (i.e., resource recovery, composting, incineration and use on land) should be estimated under guidelines in relevant chapters. The estimates in this figure are based on expert judgement only as an example.

To apply this approach national statistics on municipal waste generation and treatment streams, country-specific parameters on waste composition and fraction moisture as well as DOC estimates for each waste type are needed for precise estimation. It may be difficult to obtain all these data and parameters in many countries. If country-specific reduction rates of moisture and DOCm at each intermediate treatment step before disposal at SWDS can be obtained, estimated DOCm disposed into SWDS will be more precise than when based on data measured at generation.

2.2.2 Sludge

No refinement.

2.2.3 Industrial waste

No refinement.

2.2.4 Other waste

No refinement.

2.3 WASTE COMPOSITION

2.3.1 Municipal Solid Waste (MSW)

Waste composition is one of the main factors influencing emissions from solid waste treatment, and is influenced by factors such as cultural norms, level of economic development, climate, and energy consumption etc. In the municipal solid waste stream, waste can be classified into organic and inorganic component. Food waste, garden (yard) and park waste, and wood are classified as organic waste while paper/cardboard, textiles, nappies, and leather/rubber contain some fossil carbon. The different waste types contain different amount of DOC and fossil carbon. Waste compositions, as well as the classifications used to collect data on waste composition in MSW vary widely in different regions and countries.

In this Volume, default data on waste composition in MSW are provided for the following waste types:

(1) food waste;

(2) garden (yard) and park waste;

(3) paper and cardboard;

(4) wood;

(5) textiles;

(6) nappies (disposable diapers);

(7) rubber and leather;

(8) plastics;

(9) metal;

(10) glass (and pottery and china);

(11) other (e.g., ash, dirt, dust, soil, electronic waste).

Waste types from (1) to (6) contain most of the DOC in MSW. Ash, dust, rubber and leather contain also certain amounts of non-fossil carbon, but this is hardly degradable. Some textiles, plastics (including plastics in disposable nappies), rubber and electronic waste contain the bulk part of fossil carbon in MSW. Paper (with coatings) and leather (synthetic) can also include small amounts of fossil carbon.

Based on data on MSW compositions collected from international literatures, the regional average components were calculated and the regional default data on waste composition in MSW are given in Table 2.3 (Updated). These updated default data are by specific region using UN classification in accordance to the updated default data of waste generation rate.

These data are based on weight of wet waste without industrial waste. Table 2.3 (Updated) and Table 2A.2 (New) provide default data for garden and park waste and nappies. These values are based on limited number of countries which have data on these waste types. In Table 2A.2 (New), when values of nappies and garden and yard waste are not included for a country, the country should subtract the assumed value for nappies and garden and park waste from the “others” category.

This refinement updates waste composition by region with the average from city and country level on wet weight basis. Waste components are in line with IPCC Waste model. Detailed information on waste composition is provided in Annex 2A.2 (New).

TABLE 2.3 (UPDATED)
MSW COMPOSITION DATA BY PERCENT – REGIONAL DEFAULTS

Region	Food waste	Garden waste	Paper /cardboard	Wood	Textiles	Nappies	Rubber /Leather	Plastic	Metal	Glass	Other
Asia											
Central Asia	30.0	1.4	24.7	2.5	3.5	0	0	8.4	0.8	5.9	23.0
Eastern Asia	40.3	0.0	20.4	2.1	1.0	0.0	0.0	6.5	2.7	4.3	22.9
South-Eastern Asia	49.9	1.0	11.2	0.8	0.4	0.0	0.0	10.2	4.2	3.7	18.6
Southern Asia	66.1	0.0	9.2	0.0	1.2	0.0	0.4	7.0	0.9	1.5	13.9
Western Asia	42.2	3.2	15.3	0.8	3.0	0.4	0.3	17.2	2.5	3.4	11.8
Africa											
Northern Africa	50.4	0.0	12.1	0.0	5.8	0.0	0.0	13.8	4.4	3.3	10.5
Eastern Africa	44.4	6.9	10.4	0.5	3.0	0.0	0.4	8.0	2.6	2.1	21.7
Middle Africa	28.4	0	8	0	1.3	0	0	7.1	1.4	1.1	52.7
Southern Africa	24.0	0.0	14.5	0.0	5.5	0.0	0.0	26.5	6.5	9.0	14.0
Western Africa	53.9	0.0	7.5	0.0	1.9	0.0	0.0	6.4	2.7	1.3	26.5

TABLE 2.3 (UPDATED) (CONTINUED)
MSW COMPOSITION DATA BY PERCENT – REGIONAL DEFAULTS

Region	Food waste	Garden waste	Paper/ cardboard	Wood	Textiles	Nappies	Rubber/ Leather	Plastic	Metal	Glass	Other
Europe											
Eastern Europe	31.8	2.4	17.1	2.5	3.1	0.1	0.5	4.6	0.7	1.8	35.3
Northern Europe	30.3	5.2	13.8	1.8	3.2	1.2	0.0	4.9	1.4	4.3	34.0
Southern Europe	35.8	1.4	21.4	1.2	2.8	1.1	0.2	14.1	2.0	3.5	16.7
Western Europe	33.2	2.7	17.2	2.3	5.9	3.0	0.0	20.5	1.5	1.4	12.3
America											
Central America	62.7	0.0	12.6	0.3	2.2	0.0	0.0	10.3	2.7	3.3	6.0
South America	54.1	3.3	12.4	0.0	1.7	1.9	0.6	13.7	2.0	3.0	7.2
Northern America	20.2	6.8	23.3	4.1	3.9	0	1.6	15.8	6.4	4.2	14.0
Oceania											
Australia and New Zealand	25.9	12.2	12.0	6.5	2.9	3.5	0.0	8.3	1.8	2.8	24.1

Note 1: Data are based on weight of wet waste of MSW without industrial waste at generation around year 2010.

Note 2: The region-specific values are calculated from national, partly incomplete composition data. The percentages given may therefore not add up to 100percent. Some regions may not have data for some waste types - blanks in the table represent missing data.

Note 3: Data of rest of Oceania and Caribbean are not refined

2.3.2 Sludge

The *2006 IPCC Guidelines* elaborate sludge as "…Sludge from domestic and industrial wastewater treatment plants is addressed as a separate waste category in this Volume. In some countries, sludge from domestic wastewater treatment is included in MSW and sludge from industrial wastewater treatment in industrial waste. Countries may also include all sludge in industrial waste. When country-specific categorization is used, it should be documented transparently…".

In this refinement, definition of sludge is addressed. Sludge is a mixture of liquid and solid components and can be produced as sewage sludge from wastewater treatment processes or as a settled suspension obtained from conventional drinking water treatment or from numerous other industrial processes. Sludge from industrial processes is usually process-specific and it is *good practice* to obtain sludge composition data from producers.

Data characterizing sludge composition needed for emission estimations include carbon content, nitrogen content and DOC of sludge. Default values are presented percent or fraction of sludge as dry mass in Table 2.4a (New).

The carbon (C) content and nitrogen (N) content are result of ultimate analysis (quantifying C or N disregarding the form or chemical compound in which they are present in sludge).

The DOC content in sludge will vary depending on the wastewater treatment method producing the sludge, and be different for domestic and industrial sludge.

For domestic sludge, the default DOC value (as percentage of wet waste assuming a default dry matter content of 10 percent) is 5 percent (range 4 - 5 percent, which means that the DOC content would be 40-50 percent of dry matter

In this refinement, the DOC in sludge was estimated as multiplication of carbon content and volatile suspended solids fraction of sludge. It is assumed, that volatile suspended solids fraction is equivalent to degradable organics in sludge. This approach is applicable to sludge (mainly from industrial activities), where carbon is evenly distributed in the sludge. In case of sludge from wastewater treatment, which consists from inorganic and organic fractions, majority of carbon is concentrated in organic fraction and therefore DOC of sewage sludge is equivalent to total carbon content. The DOC content 40-50 percent as shown in *2006 IPCC Guidelines* is applicable to untreated sludge. The default DOC value for treated sludge is 30 percent (Werle, 2013; Werle and Dudziak, 2014; He *et al*. 2007; Boutchich *et al*. 2015; Phyllis 2 database).

A rough default value of 9 percent DOC (assuming the dry matter content to be 35 percent) can be used for industrial sludge, when country and/or industry-specific is not available. The default DOC value applies for total industrial sludge in a country. Sewage, food industry, paper industry, textile industry and chemical industry will generate organic sludge. DOC is also found in sludge from water work and dredging. The DOC in sludge can vary much by industry type. Examples of carbon contents in some organic sludge (percentage of dry matter) in Japan are: 27 percent for pulp and paper industry, 30 percent for food industry and 52 percent for chemical industry (Yamada *et al*. 2003).

TABLE 2.4A (NEW)
DEFAULT VALUE AND UNCERTAINTY OF CARBON CONTENT, NITROGEN CONTENT AND DOC OF DOMESTIC AND INDUSTRIAL SLUDGE (PERCENT OF DRY MATTER)

Sludge	Carbon content		Nitrogen content		DOC	
	Default value (percent)	Uncertainty (percent)	Default value (percent)	Uncertainty (percent)	Default value (percent)	Uncertainty (percent)
Domestic Sewage Treated Sludge [2-6]	31	+/- 27	4.2	+/- 56	30	+/- 61
Domestic Sewage Untreated Sludge [1]					50	+/- 30
Food Industry (fruits & vegetables)[2]	44	+/- 33	1.1	+/- 45	36	+/- 69
Paper Industry (process sludge)[2]	28	+/- 49	0.5	+/- 100	12	+/- 25
Paper Industry (Wastewater sludge)[2]	31	+/- 15	0.9	+/- 60		
Chemical Industry[1]	52	+/- 100				
Default for Industrial Sludge[1]					26	

Source:

[1] Derived from *2006 IPCC Guidelines*

2 Derived from Phyllis2 database for biomass and waste, https://www.ecn.nl/phyllis2 Energy research Centre of the Netherlands with uncertainty is estimated as 95 percentile (2*sigma)

3 Werle and Dudziak, 2014

4 Werle, 2013

5 He *et al*. 2007

6 Boutchich *et al.* 2015

In addition to emission estimate and reporting in the 2006 *IPCC Guidelines* Chapter 2, Section 2.2.2 estimation of CH_4 generated from anaerobic sludge stabilization at a wastewater treatment plant should be estimated according to methodology Chapter 4 (Volume 5) and resulting emissions should be included in Chapter 6 (Volume 5).

2.3.3 Industrial waste

No refinement.

2.3.4 Other waste

No refinement.

Annex 2A.1 (Updated) Waste Generation and Management Data – by country and regional averages

TABLE 2A.1 (UPDATED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Asia											
Central Asia	**0.12**	**0.21**	**0.34**	**0.60**	**0.74**						
Tajikistan			0.32								1
Turkmenistan			0.36								1
Eastern Asia	**0.41**	**0.37**	**0.48**	**0.38**	**0.55**	**0.00**	**0.23**	**0.24**	**0.00**	**0.52**	
China		0.27	0.37		0.97						2
Hong Kong Special Administrative Region, China			0.93			0.00	0.51	0.00	0.00	0.49	3
Macao Special Administrative Region, China			0.62			0.00	0.23	0.00	0.00	0.77	3
Japan	0.41	0.47	0.35	0.38	0.25	0.00	0.01	0.76	0.00	0.22	4
Mongolia			0.24								1
Republic of Korea		0.38	0.35		0.42	0.00	0.18	0.22	0.00	0.61	5

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		FRACTION OF MSW INCINERATED	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
South-Eastern Asia		**0.27**	**0.46**		**0.59**						
Brunei Darussalam			0.32								1
Indonesia		0.28	0.19		0.80						1
Lao People's Democratic Republic		0.25	0.26		0.40						1
Malaysia		0.30	0.55		0.70						6
Myanmar		0.16	0.16		0.60						1
Philippines		0.19	0.18		0.62						1
Singapore		0.40	1.28		0.20	0.00	0.03	0.40	0.00	0.57	7, 8
Thailand		0.40	0.64		0.80						1
Viet Nam		0.20	0.53		0.60						1
Southern Asia	**0.12**	**0.21**	**0.50**	**0.60**	**0.74**						
Bangladesh		0.18	0.18		0.95						9
Bhutan			0.53								1
India	0.12	0.17	0.12	0.60	0.70						1
Iran (Islamic Republic of)			0.06								1
Maldives			0.91								10

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Nepal		0.18	0.04		0.40						1
Pakistan			0.31								1
Sri Lanka		0.32	1.86		0.90						1
Western Asia			**0.69**			**0.11**	**0.68**	**0.08**	**0.01**	**0.12**	
Armenia			0.25			0.00	1.00	0.00	0.00	0.00	1
Bahrain			0.40								1
Cyprus		0.68	0.69		1.00	0.00	0.86	0.00	0.00	0.14	11
Georgia			0.62								1
Israel			0.62			0.00	0.89	0.00	0.00	0.11	4
Jordan			0.38			0.00	0.85	0.00	0.00	0.15	1
Kuwait			3.05			0.00	0.75	0.00	0.00	0.25	3
Lebanon			0.43			0.37	0.46	0.00	0.08	0.09	1
Oman			0.26								12
Qatar			1.25								3
Saudi Arabia			0.47								12
State of Palestine			0.38			0.00	0.29	0.69	0.00	0.02	3
Syrian Arab Republic			0.50			0.60	0.23	0.00	0.04	0.13	1, 12

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Turkey		0.50	0.41		0.99	0.00	0.84	0.00	0.01	0.16	11
United Arab Emirates			0.61								1
Africa											
Northern Africa		**0.29**	**0.41**		**0.69**	**0.79**	**0.17**	**0.00**	**0.00**	**0.04**	
Algeria			0.44			0.97	0.00	0.00	0.01	0.02	1
Egypt			0.50		0.70						1
Morocco			0.53			0.95	0.01	0.00	0.00	0.04	1
Sudan		0.29	0.29		0.82						1
Tunisia			0.30			0.45	0.50	0.00	0.00	0.05	1
Eastern Africa		**0.29**	**0.29**		**0.69**	**0.98**	**0.00**	**0.00**	**0.01**	**0.01**	
Burundi			0.20								1
Comoros			0.81								1
Eritrea			0.18								1
Ethiopia			0.11								13
Kenya			0.11								1
Madagascar			0.29			0.96	0.00	0.00	0.04	0.00	1
Malawi			0.18								1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Mauritius			0.31			0.98	0.00	0.00	0.00	0.02	1, 3
Mozambique			0.05								1
Réunion			0.69								3
Rwanda			0.19								1
Seychelles			1.09								1
Uganda			0.12			1.00	0.00	0.00	0.00	0.00	1
United Republic of Tanzania			0.09								1
Zambia			0.08								1
Zimbabwe			0.19								1
Middle Africa		**0.29**	**0.19**		**0.69**	**0.95**	**0.00**	**0.00**	**0.00**	**0.05**	
Angola			0.18								1
Cameroon			0.28			0.95	0.00	0.00	0.00	0.05	1, 14
Central African Republic			0.18								1
Chad			0.18								1
Congo			0.18								1
Democratic Republic of the Congo			0.18								1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Gabon			0.16								1
Sao Tome and Principe			0.18								1
Southern Africa		**0.29**	**0.33**		**0.69**						
Botswana			0.38								1
Lesotho			0.18								1
Namibia			0.18								1
South Africa			0.73	1.00	0.90						1
Swaziland			0.19								1
Western Africa		**0.29**	**0.18**		**0.69**	**0.00**	**0.64**	**0.00**	**0.00**	**0.36**	
Benin			0.20								1
Burkina Faso			0.19								1
Cabo Verde			0.18								1
Côte d'Ivoire			0.18								1
Gambia			0.19								1
Ghana			0.03								1
Mali			0.24								15
Mauritania			0.18								1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Niger			0.18			0.00	0.64	0.00	0.00	0.36	1
Nigeria			0.20		0.40						16
Senegal			0.19								1
Sierra Leone			0.16								17
Togo			0.19								1
Europe											
Eastern Europe		**0.38**	**0.37**		**0.90**	**0.00**	**0.71**	**0.06**	**0.04**	**0.19**	
Belarus			0.38								3
Bulgaria		0.52	0.55		1.00	0.00	0.74	0.00	0.00	0.26	11
Czechia		0.33	0.32		0.75	0.00	0.65	0.15	0.02	0.18	11
Hungary		0.45	0.40		0.92	0.00	0.70	0.10	0.04	0.16	11
Poland		0.32	0.32		0.98	0.00	0.62	0.00	0.07	0.31	11
Romania		0.36	0.31		1.00	0.00	0.76	0.00	0.10	0.14	11
Russian Federation	0.32	0.34	0.34	0.94	0.71						1
Slovakia		0.32	0.32		1.00	0.00	0.77	0.11	0.03	0.09	11
Northern Europe		**0.64**	**0.48**		**0.47**	**0.00**	**0.47**	**0.20**	**0.09**	**0.24**	
Denmark	0.46	0.67	0.76	0.20	0.10	0.00	0.03	0.48	0.18	0.31	11
Estonia		0.44	0.31		0.98	0.00	0.66	0.00	0.08	0.26	11

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Finland	0.62	0.50	0.47	0.77	0.61	0.00	0.45	0.22	0.13	0.20	11
Iceland		1.00	0.48		0.86	0.00	0.72	0.08	0.05	0.15	11
Ireland	0.31	0.60	0.62	1.00	0.89	0.00	0.53	0.04	0.04	0.40	11
Latvia		0.27	0.32		0.92	0.00	0.91	0.00	0.01	0.09	11
Lithuania		0.31	0.40		1.00	0.00	0.86	0.00	0.02	0.12	11
Norway	0.51	0.62	0.47	0.75	0.55	0.00	0.06	0.50	0.16	0.28	11
Sweden	0.37	0.43	0.44	0.44	0.23	0.00	0.01	0.51	0.14	0.34	11
United Kingdom and Northern Ireland	0.69	0.57	0.51	0.90	0.82	0.00	0.46	0.13	0.15	0.26	11
Southern Europe		**0.52**	**0.47**		**0.85**	**0.00**	**0.76**	**0.04**	**0.03**	**0.17**	
Bosnia and Herzegovina			0.33			0.00	0.82	0.00	0.00	0.18	11
Croatia			0.38		1.00	0.00	0.94	0.00	0.01	0.05	11
Greece	0.31	0.41	0.53	0.93	0.91	0.00	0.83	0.00	0.02	0.15	11
Italy	0.34	0.50	0.55	0.88	0.70	0.00	0.46	0.17	0.12	0.25	11
Malta		0.48	0.60		1.00	0.00	0.91	0.00	0.00	0.09	11
Montenegro			0.54			0.00	0.88	0.00	0.00	0.12	11
Portugal	0.33	0.47	0.52	0.86	0.69	0.00	0.62	0.19	0.07	0.11	11

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Serbia			0.36			0.00	0.71	0.00	0.00	0.29	11
Slovenia		0.51	0.49		0.90	0.00	0.57	0.01	0.02	0.40	11
Spain	0.36	0.60	0.51	0.85	0.68	0.00	0.62	0.09	0.12	0.18	11
Republic of Macedonia			0.35			0.00	1.00	0.00	0.00	0.00	11
Western Europe	**0.45**	**0.56**	**0.59**	**0.57**	**0.47**	**0.00**	**0.08**	**0.40**	**0.21**	**0.31**	
Austria	0.34	0.58	0.56	0.40	0.30	0.00	0.03	0.35	0.32	0.30	11
Belgium	0.40	0.47	0.46	0.43	0.17	0.00	0.02	0.40	0.21	0.37	11
France	0.47	0.53	0.53	0.46	0.43	0.00	0.31	0.34	0.17	0.18	11
Germany	0.36	0.61	0.60	0.66	0.30	0.00	0.00	0.37	0.17	0.46	11
Luxembourg	0.49	0.66	0.68	0.35	0.27	0.00	0.18	0.36	0.19	0.27	11
Netherlands	0.58	0.62	0.57	0.67	0.11	0.00	0.02	0.49	0.24	0.25	11
Switzerland	0.40	0.40	0.71	0.23	1.00	0.00	0.00	0.50	0.17	0.34	11
America											
Caribbean		**0.49**	**0.78**		**0.83**	**0.03**	**0.78**	**0.00**	**0.01**	**0.18**	
Anguilla			1.10			0.00	1.00	0.00	0.00	0.00	3
Antigua and Barbuda			1.39			0.00	1.00	0.00	0.00	0.00	3
Bahamas		0.95	1.19		0.70						1
Barbados			1.73								1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Cuba		0.21	0.30		0.90	0.00	0.84	0.00	0.11	0.04	1
Dominica			0.32			0.00	1.00	0.00	0.00	0.00	1, 3
Dominican Republic		0.25	0.43		0.90						1
Grenada			0.99			0.00	0.90	0.00	0.00	0.10	1
Guadeloupe			0.60								3
Haiti			0.37			0.24	0.00	0.00	0.00	0.76	1
Jamaica			0.07			0.00	1.00	0.00	0.00	0.00	1
Saint Kitts and Nevis			1.99			0.00	1.00	0.00	0.00	0.00	1
Saint Lucia		0.55	0.25		0.83	0.00	1.00	0.00	0.00	0.00	3
Saint Vincent and the Grenadines			0.35			0.00	0.85	0.00	0.00	0.15	3
Trinidad and Tobago			0.58			0.06	0.00	0.00	0.00	0.94	1
Central America		**0.21**	**0.55**		**0.50**	**0.13**	**0.62**	**0.00**	**0.00**	**0.25**	
Belize			1.05			0.00	1.00	0.00	0.00	0.00	1
Costa Rica		0.17	0.50			0.22	0.72	0.00	0.00	0.06	1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
El Salvador			0.41								1
Guatemala		0.22	0.73		0.40	0.00	0.22	0.00	0.00	0.78	1
Honduras		0.15	0.53		0.40						1
Mexico		0.31	0.34			0.00	0.96	0.00	0.00	0.04	4
Nicaragua		0.28	0.40		0.70	0.34	0.28	0.00	0.00	0.38	1
Panama			0.44			0.20	0.56	0.00	0.00	0.24	1
South America		**0.26**	**0.43**		**0.54**	**0.43**	**0.40**	**0.00**	**0.00**	**0.18**	
Argentina		0.28	0.37		0.59						18
Bolivia		0.16	0.12		0.70						1
Brazil		0.18	0.31		0.80						3
Chile			0.35			0.00	1.00	0.00	0.00	0.00	4
Colombia		0.26	0.35		0.31	0.54	0.46	0.00	0.00	0.00	1
Ecuador		0.22	0.41		0.40						1
French Guiana			0.37								3
Guyana			1.95			0.37	0.59	0.00	0.00	0.04	1
Paraguay		0.44	0.08		0.40	0.42	0.44	0.00	0.00	0.14	1
Peru		0.20	0.37		0.53	0.19	0.66	0.00	0.00	0.15	1
Suriname			0.50			1.00	0.00	0.00	0.00	0.00	1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

Region/country	MSW [1, 2] Generation Rate IPCC-1996 Values [4] (tonnes/cap/yr)	MSW [1, 2, 3] Generation Rate IPCC-2006 Values [5] (tonnes/cap/yr)	MSW Generation Rate Values [1,2,3] (tonnes/cap/yr)	Fraction of MSW disposed to SWDS IPCC-1996 Values [4]	Fraction of MSW disposed to SWDS IPCC-2006 Values [5]	Fraction of MSW disposed to SWDS		Fraction of MSW incinerated	Fraction of MSW composted	Fraction of other MSW management, unspecified [6]	Source
						Open dumped	Disposed to landfills				
Year	1990	2000	2010	1990	2000	2010	2010	2010	2010	2010	
Uruguay		0.26	0.04		0.72	0.32	0.03	0.00	0.00	0.66	1
Venezuela		0.33	0.42		0.50	0.59	0.00	0.00	0.00	0.41	1
Northern America	**0.70**	**0.65**	**0.96**	**0.69**	**0.58**	**0.00**	**0.22**	**0.26**	**0.13**	**0.38**	
Bermuda			1.30			0.00	0.12	0.68	0.18	0.02	3
Canada	0.66	0.49	0.85	0.75	0.71	0.00	0.00	0.00	0.12	0.88	1
United States of America	0.73	1.14	0.74	0.62	0.55	0.00	0.54	0.12	0.08	0.26	4
Oceania											
Australia and New Zealand	**0.47**	**0.69**	**0.60**	**1.00**	**0.85**	**0.00**	**0.69**	**0.04**	**0.00**	**0.27**	
Australia	0.46	0.69	0.61	1.00	1.00	0.00	0.52	0.08	0.00	0.40	4
New Zealand	0.49		0.58	1.00	0.70	0.00	0.85	0.00	0.00	0.15	1, 4
Melanesia			**1.18**								
Fiji			0.77								1
Solomon Islands			1.57								1
Vanuatu			1.20								1
Polynesia			**1.35**								
Tonga			1.35								1

TABLE 2A.1 (UPDATED) (CONTINUED)
MSW GENERATION AND MANAGEMENT DATA – BY COUNTRY AND REGIONAL AVERAGE

[1] Data are based on weight of wet waste. Blank cells mean that no data is available for the country, regional data may be used in this case.

[2] To obtain the total waste generation in the country, the per-capita values should be multiplied with the population whose waste is collected. For developing countries in italics in the table, the waste generation rates should be multiplied by the urban population only.

[3] The data are default data for the year 2010, although for some countries the year for which the data are applicable was not given in the reference, or data for the year 2010 were not available. The year for which the data are collected is given below with source of the data, where available.

[4] Values shown in this column are the ones included in the *Revised 1996 IPCC Guidelines.*

[5]Values shown in this column are the ones included in the *2006 IPCC Guidelines.*

[6] Other, unspecified, includes data on recycling for some countries.

Source: 1. Hoornweg *et al*. 2012; 2. Hoornweg *et al*. 2005; 3. UNSD 2017; 4. OECD 2017; 5. The Ministry of Environment of Korea, 2011; 6. Saeed *et al.* 2009; 7. Singapore Department of Statistics 2017; 8. National Environment Agency of Singapore 2010; 9. SAARC Workshop 2004; 10. UNEP 2002; 11. Eurostat 2017; 12. UNEP 2003; 13. Tadesse *et al.* 2008; 14. Parrot *et al.* 2009; 15. Samake, *et al*. 2009; 16. Solomon 2009; 17. Vanguard 2007; 18. The Ministry of Environment and Sustainable Development of Argentina, 2012.

Annex 2A.2 (New) Waste composition–by country and regional averages

TABLE 2A.2 (NEW)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Asia												
Central Asia	**30.0**	**1.4**	**24.7**	**2.5**	**3.5**	**0**	**0**	**8.4**	**0.8**	**5.9**	**23.0**	
Kazakhstan	21.5	2.8	26.5	0.0	7.0	0.0	0.0	16.8	1.5	11.8	11.9	1, 2
Uzbekistan	38.4	0	22.8	4.9							34.0	3
Eastern Asia	**40.3**	**0.0**	**20.4**	**2.1**	**1.0**	**0.0**	**0.0**	**6.5**	**2.7**	**4.3**	**22.9**	
China	59.1	0.0	8.5	1.6	4.1	0.0	0.0	13.0	1.1	4.1	8.5	4-9
Japan	26.0	0.0	46.0	0.0	0.0	0.0	0.0	9.0	8.0	7.0	4.0	9
Mongolia	70.8	0.0	4.3	0.0	0.0	0.0	0.0	3.8	0.1	3.7	17.3	10, 11
Republic of Korea	5.2	0.0	22.6	6.6	0.0	0.0	0.0	0.0	1.7	2.3	61.7	9, 12
South-Eastern Asia	**49.9**	**1.0**	**11.2**	**0.8**	**0.4**	**0.0**	**0.0**	**10.2**	**4.2**	**3.7**	**18.6**	
Cambodia	65.0		4.0					13.0	1.0	5.0	12.0	9
Indonesia	74.0	0.0	10.0	0.0	2.0	0.0	0.0	8.0	2.0	2.0	2.0	9, 13
Lao People's Democratic Republic	54.3	0.0	3.3	0.0	0.0	0.0	0.0	7.8	3.8	8.5	22.3	9, 13
Malaysia	32.4	0.0	20.0	0.0	0.0	0.0	0.0	9.8	2.5	3.3	32.0	9, 13-18
Myanmar	80.0		4.0					2.0			14.0	9
Philippines	41.6	0.0	19.5	0.0	0.0	0.0	0.0	13.8	4.8	2.5	17.8	9, 13
Singapore	10.1	4.1	15.1	6.8	1.9	0.0	0.4	10.5	18.6	0.9	31.4	19
Thailand	48.6	0.0	14.6	0.0	0.0	0.0	0.0	13.9	3.6	5.1	14.2	9, 13, 20
Viet Nam	42.7	5.0	10.7	0.0	0.0	0.0	0.0	12.9	1.1	5.8	21.9	9, 13, 21

TABLE 2A.2 (NEW) (CONTINUED)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Southern Asia	**66.1**	**0.0**	**9.2**	**0.0**	**1.2**	**0.0**	**0.4**	**7.0**	**0.9**	**1.5**	**13.9**	
Bangladesh	54.9	0.0	12.6	0.0	4.7	0.0	1.5	14.7	1.6	1.1	8.8	4
India	53.0	0.0	6.4	0.0	0.0	0.0	0.0	5.1	0.2	0.4	35.0	4, 23-27
Nepal	80.0	0.0	7.0	0.0	0.0	0.0	0.0	2.5	0.5	3.0	7.0	4, 13, 28
Sri Lanka	76.4	0.0	10.6	0.0	0.0	0.0	0.0	5.7	1.3	1.3	4.7	4, 29, 30
Western Asia	**42.2**	**3.2**	**15.3**	**0.8**	**3.0**	**0.4**	**0.3**	**17.2**	**2.5**	**3.4**	**11.8**	
Cyprus	34.2	13.1	22.5	0	0	0	0	6.7	0.8	5.3	17.4	31
Iraq	54.8	0.0	7.0	2.6	3.5	0.0	0.5	25.2	3.0	2.9	0.4	32
Jordan	52.0	0.0	13.0	0.0	0.0	0.0	0.0	17.0	1.0	3.0	14.0	33
Oman	8.2	6.1	19.4	1.4	14.3	0.0	0.0	31.3	2.6	2.9	13.8	34
Saudi Arabia	48.0	0.0	21.0	1.0	0.0	0.0	0.0	13.0	6.0	4.0	7.0	35
State of Palestine	56.6	0.0	7.3	0.0	0.0	0.0	0.0	14.0	2.4	2.0	17.7	36, 37
Turkey	48.7	6.8	8.1	0.0	2.9	2.9	0.0	5.9	1.4	3.4	19.9	38
United Arab Emirates	35.4	0.0	24.3	1.0	3.2	0.0	1.7	24.2	2.4	3.4	4.4	39
Africa												
Northern Africa	**50.4**	**0.0**	**12.1**	**0.0**	**5.8**	**0.0**	**0.0**	**13.8**	**4.4**	**3.3**	**10.5**	
Libya	36.3	0.0	15.3	0.0	11.5	0.0	0.0	18.6	6.7	3.5	8.0	40
Tunisia	64.4	0.0	8.9	0.0	0.0	0.0	0.0	8.9	2.0	3.0	12.9	40

TABLE 2A.2 (NEW) (CONTINUED)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Eastern Africa	**44.4**	**6.9**	**10.4**	**0.5**	**3.0**	**0.0**	**0.4**	**8.0**	**2.6**	**2.1**	**21.7**	
Kenya	64.4	0.0	5.9	0.0	0.0	0.0	0.0	11.9	1.0	2.0	14.9	4
Mauritius	29.4	34.7	14.1	0.0	2.4	0.0	0.0	11.7	2.0	1.2	4.4	4
United Republic of Tanzania	57.1	0.0	10.9	2.4	6.7	0.0	0.0	9.3	1.9	3.2	8.4	41
Zambia	39.0	0.0	3.0	0.0	0.0	0.0	0.0	7.0	1.0	2.0	48.0	4
Zimbabwe	32.0	0.0	18.0	0.0	6.0	0.0	2.0	0.0	7.0	2.0	33.0	42
Middle Africa	**28.4**	**0**	**8**	**0**	**1.3**	**0**	**0**	**7.1**	**1.4**	**1.1**	**52.7**	
Cameroon	28.4	0.0	8.0	0.0	1.3	0.0	0.0	7.1	1.4	1.1	52.7	43-45, 97
Southern Africa	**24.0**	**0.0**	**14.5**	**0.0**	**5.5**	**0.0**	**0.0**	**26.5**	**6.5**	**9.0**	**14.0**	
South Africa	24	0	14.5	0	5.5	0	0	26.5	6.5	9	14	46
Western Africa	**53.9**	**0.0**	**7.5**	**0.0**	**1.9**	**0.0**	**0.0**	**6.4**	**2.7**	**1.3**	**26.5**	
Ghana	73.0	0.0	8.0	0.0	4.0	0.0	0.0	8.0	0.0	0.0	7.0	21, 47
Mali	25.0	0.0	4.8	0.0	0.0	0.0	0.0	2.4	4.8	1.2	61.9	4，48
Nigeria	63.6	0.0	9.7	0.0	1.6	0.0	0.0	8.7	3.2	2.6	10.6	49, 50-53
Europe												
Eastern Europe	**31.8**	**2.4**	**17.1**	**2.5**	**3.1**	**0.1**	**0.5**	**4.6**	**0.7**	**1.8**	**35.3**	
Bulgaria	18.7	10.0	13.4	1.7	3.6	0.0	1.9	0.0	0.0	0.0	50.8	54
Czechia	35.0	0.0	16.0	13.0	8.0	0.0	0.0	0.0	0.0	0.0	28.0	55
Hungary	29.0	0.0	15.0	0.0	0.0	0.0	0.0	17.0	2.0	2.0	35.0	7
Poland	35.9	0.3	14.7	0.6	3.7	0.0	0.0	0.0	0.0	0.0	44.8	56, 57, 58
Republic of Moldova	29.2	0.0	10.1	0.0	1.6	0.0	0.0	12.8	1.5	5.7	39.0	59

TABLE 2A.2 (NEW) (CONTINUED)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Romania	43.5	5.3	10.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0	39.2	60, 61
Russian Federation	30.2	0	42.5	1.5	4.0	0	0	0	0	0	21.8	62
Ukraine	33.1	3.8	14.6	1.7	4.0	1.1	1.7	6.9	2.0	6.9	24.2	63, 64
Northern Europe	**30.3**	**5.2**	**13.8**	**1.8**	**3.2**	**1.2**	**0.0**	**4.9**	**1.4**	**4.3**	**34.0**	
Denmark	41.0	4.1	23.2	0.0	0.0	0.0	0.0	9.2	3.3	2.9	16.3	65
Estonia	26.0	12.0	20.0	3.0	2.0	0.0	0.0	9.0	4.0	6.0	18.0	66
Finland	35.1	8.8	20.8	2.2	1.7	0.0	0.0	7.9	0.0	0.5	23.0	36
Iceland	41.2	1.4	10.3	3.0	3.5	5.1	0.0	0.0	0.0	0.0	35.4	68
Latvia	0.0	0.0	6.4	2.1	0.0	0.0	0.0	8.5	2.4	20.6	60.0	69
Lithuania	25.5	0.0	5.7	1.2	7.2	0.0	0.0	0.0	0.0	0.0	60.4	70
Sweden	43.0	10.0	10.0	1.0	8.0	3.0	0.0	0.0	0.0	0.0	25.0	71
Southern Europe	**35.8**	**1.4**	**21.4**	**1.2**	**2.8**	**1.1**	**0.2**	**14.1**	**2.0**	**3.5**	**16.7**	
Croatia	30.9	5.7	23.2	1.0	3.7	4.0	0.7	22.9	2.1	3.7	2.3	72
Greece	43.1	0.0	22.6	1.0	3.3	0.0	0.0	11.1	3.2	4.2	11.5	73, 74
Italy	12.6	0.0	39.2	0.0	0.0	0.0	0.0	27.6	2.4	5.9	12.3	75
Portugal	31.8	0.0	10.0	0.7	8.1	0.0	0.0	12.5	1.6	3.2	32.2	7, 76, 77
Serbia	44.3	0.0	13.0	0.0	4.5	4.0	0.4	13.9	1.4	4.2	14.4	78, 79
Slovenia	31.8	2.0	22.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0	38.0	80
Spain	56.2	1.8	19.0	0.0	0.0	0.0	0.0	10.7	3.0	3.3	6.0	81
Western Europe	**33.2**	**2.7**	**17.2**	**2.3**	**5.9**	**3.0**	**0.0**	**20.5**	**1.5**	**1.4**	**12.3**	
United Kingdom of Great Britain and Northern Ireland	21.3	3.5	18.3	5.3	5.6	3.1	0.0	18.0	3.7	3.0	18.2	82-85

TABLE 2A.2 (NEW) (CONTINUED)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Ireland	17.0	4.5	19.8	0.0	23.4	6.3	0.0	0.0	0.0	0.0	29.1	86
France	18.8	4.0	14.9	4.0	3.0	6.9	0.0	21.8	0.0	0.0	26.7	87
Germany	63.2	0.0	15.5	0.0	5.0	0.0	0.0	10.4	2.8	3.1	0.0	88
Luxembourg	45.5	5.0	8.9	5.0	1.0	5.0	0.0	29.7	0.0	0.0	0.0	89
Netherlands	35.0	0.0	26.0	0.0	0.0	0.0	0.0	19.0	4.0	4.0	12.0	90
Switzerland	31.5	1.7	17.2	1.8	3.2	0.0	0.0	44.6	0.0	0.0	0.0	91
America												
Center American	**62.7**	**0.0**	**12.6**	**0.3**	**2.2**	**0.0**	**0.0**	**10.3**	**2.7**	**3.3**	**6.0**	
Jamaica	62.0	0.0	15.0	1.0	5.0	0.0	0.0	12.0	2.0	3.0	0.0	92
Mexico	51.4	0.0	13.6	0.0	1.5	0.0	0.0	10.7	5.1	5.8	12.0	92
Nicaragua	74.8	0.0	9.1	0.0	0.0	0.0	0.0	8.1	1.0	1.0	6.1	4
Southern America	**54.1**	**3.3**	**12.4**	**0.0**	**1.7**	**1.9**	**0.6**	**13.7**	**2.0**	**3.0**	**7.2**	
Brazil	53.5	0.0	17.6	0.0	0.0	0.0	0.0	17.5	2.2	4.0	5.3	4, 93, 94
Argentina	38.8	10.0	13.7		5.0	5.7	1.9	14.6	1.8	3.1	5.3	95
Peru	70.0	0.0	6.0	0.0	0.0	0.0	0.0	9.0	2.0	2.0	11.0	4
Northern America	**20.2**	**6.8**	**23.3**	**4.1**	**3.9**	**0**	**1.6**	**15.8**	**6.4**	**4.2**	**14.0**	
Canada	18.8	5.6	32.3	0.0	0.0	0.0	0.0	13.1	3.4	3.1	23.7	7
United States of America	21.6	7.9	14.3	8.1	7.7	0.0	3.1	18.5	9.4	5.2	4.2	4, 96, 97, 98

TABLE 2A.2 (NEW) (CONTINUED)
WASTE COMPOSITION – BY COUNTRY AND REGIONAL AVERAGES

Countries	Food waste	Garden (yard) and park waste	Paper and cardboard	Wood	Textiles	Nappies (disposable diapers)	Rubber and leather	Plastics	Metal	Glass (and pottery and china)	Other	Sources
Australia and New Zealand	**25.9**	**12.2**	**12.0**	**6.5**	**2.95**	**3.5**	**0.0**	**8.3**	**1.8**	**2.8**	**24.1**	
Australia	35.0	16.5	13.0	1.0	0	4.0	0	16.7	3.6	5.6	4.6	99, 100
New Zealand	16.8	7.9	10.9	11.9	5.9	3.0	0.0	0.0	0.0	0.0	43.6	101

Sources：

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