

Hazardous Household Waste in the Municipality of Athens: Qualitative and quantitative characteristics

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LIFE-IP CEI-Greece “Circular Economy Implementation in Greece”



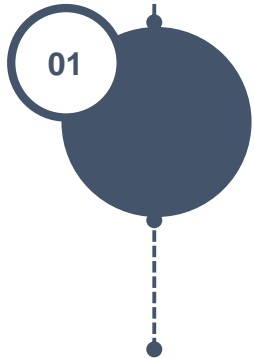
The LIFE IP CEI-Greece project (LIFE18 IPE/GR/000013) is co-funded by the LIFE Programme of the European Union.



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2002

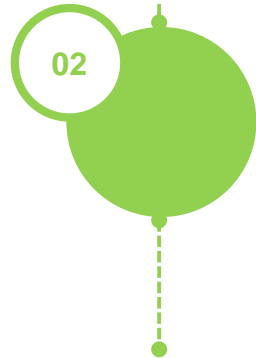


**European Commission
DG Environment
WRc Ref: CO 5089-2, July 2002**

Study on Hazardous Household Waste (HHW) with a main emphasis on Hazardous Household Chemicals (HHC)

Evaluation of national experiences of the management of hazardous products likely to become (HHW), and formulation of proposals for strategies for the appropriate management of such products within a lifecycle perspective.

2008

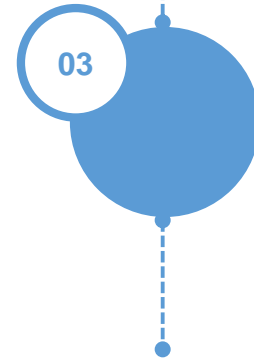


**2008/98/EC
Waste Framework Directive (WFD)**

It is the first legislative reference for this particular type of waste (HHW), although at its initial version it didn't include detailed provisions addressed to them.

Nevertheless, Article 20, as amended by the Directive 2018/851 10 years after, defines that by the 1st of January 2025, Member States shall set up separate collection and management of HHW following the waste hierarchy, ensuring the protection of human health and the environment and avoiding the contamination of other municipal waste streams.

2020



**2020/C 375/01
Commission Notice
Separate Collection of
Household Hazardous Waste**

It includes guidelines, in accordance to Article 20 of the WFD, addressed to Member States' authorities at local, regional and central level, and to waste management operators, assisting and facilitating their task in developing and implementing separate collection programmes for Household Hazardous Waste.

Law 4819/2021

Integrated framework for waste management

Article 46 provides for the separate collection of Household Hazardous Waste with starting point the 1st of January 2024.

Furthermore, it defines that the separate collection of HHW, as well as their safe final management, falls into the responsibility of the Local Municipal Authorities.

LIFE-IP CEI-Greece

A.2.4

Preparatory Studies
for the integrated management
of hazardous household waste
(HHW)

Scope:

Design of integrated systems
for the separate collection and management of HHW
in Municipality of Athens & in the Western Macedonia Region

1
Legislative framework

4
**Identification and
engagement of
stakeholders**

2
**Compilation of HHW
Catalogue
(with corresponding
EWC codes)**

5
**Investigation of the level
of public knowledge
on HHW**

3
**Municipal Solid Waste
composition analysis
regarding HHW**







6
**Proposed measures for the
integrated management
of HHW**

The compilation of the HHW Catalogue was based on the following criteria:

- A The waste must be of household origin
- B The waste must be classified as hazardous according to the Decision 2014/955/EC
- Γ The waste must have “hazardous” characterization according to the Regulation 1272/2008/EC (CLP)



European Waste Catalogue codes

01	Household chemical waste		○ 20 01 13*, 15 01 10*, 02 01 08*, 20 01 19*, 16 05 04*, 15 01 11*, 20 01 27*, 03 02 01*, 03 02 02*, 03 02 03*, 03 02 04*, 03 02 05*
02	Domestic health care waste		○ 20 01 31*, 20 01 32, 18 01 06*, 18 01 03*, 20 01 21*
03	Waste Electrical and Electronic Equipment		○ 20 01 21*, 20 01 35*, 20 01 36, 13 03 07*
04	Batteries		○ 20 01 33 *, 20 01 34
05	Automotive maintenance waste		○ 16 06 01*, 13 02 06*, 16 01 07*, 15 02 02*, 16 01 13*, 16 01 4*
06	Construction and demolition waste of domestic origin		○ 17 06 05*, 17 03 03*, 20 01 37*

In most cases the waste chemical product is disposed of with its packaging.

As a result the EWC code 15 01 10* (packaging containing residues of or contaminated by hazardous substances) accompanies the EWC codes of the actual chemical waste in the respective HHW categories of the HHW catalogue.



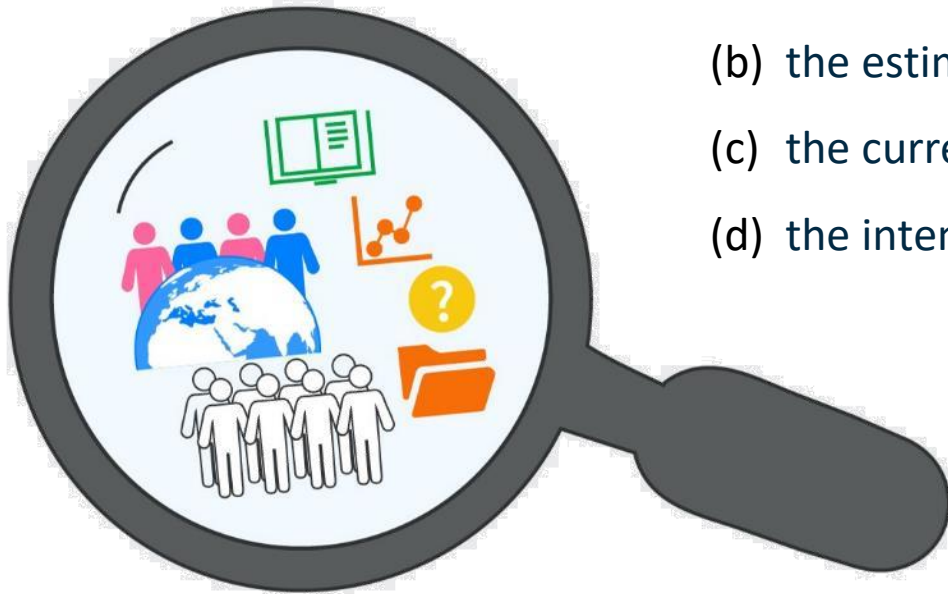
The HHW catalogue includes some categories of waste, which are not classified as hazardous but due to their characteristics should be managed separately from other household waste:

- 20 01 32 - Medicinal substances, other than those mentioned in 20 01 31*
- 20 01 34 - Batteries and accumulators, other than those mentioned in 20 01 33*
- 20 01 36 - Disposable electrical and electronic equipment other than those mentioned in 20 01 21*, 20 01 23*, 20 01 35*

Investigation of the level of knowledge of citizens of Athens' Municipality on HHW

In the context of Action A.2.4 of LIFE IP CEI-Greece, a Public Survey Research was conducted in the Municipality of Athens to investigate the following issues:

- (a) the level of public knowledge about HHW
- (b) the estimated quantities of HHW generated by households
- (c) the current practices followed by the citizens to handle this waste
- (d) the intention of the citizens to apply specific HHW management practices



Public Survey Research Facts

- The survey was conducted:
 - ✓ during the period 4-21 June, 2021
 - ✓ on a sample of 1,053 households
 - ✓ at all 7 Municipal Districts (MD) of Athens.
- The sample of population consisted of 485 men and 568 women, 18 years and older
- The survey was performed to 150 households per MD, in order to ensure sufficient and representative samples



Consolidated conclusions based on the answers of the respondents

97.9% of the respondents consider recycling a positive measure for the protection of the environment

90.1% of the respondents had knowledge about the existence of hazardous waste in their household waste and that it should not end up in the Municipal Solid Waste

80.2% of the respondents were aware of the negative impacts of HHW to the environment

Main results based on the answers of the respondents

Household chemical waste

Quantities

Based on the respondents, **12.32** pieces/household/year are disposed off.

Most answers referred to the packaging of hazardous and non-hazardous products under pressure (estimated quantities by the respondents were **2.4** and **3.58** pieces/household/year respectively).



Management practice

The main current management practice followed is the disposal into the green (mixed waste) and the blue (recyclable waste) bins.

There is a significant lack of information on the proper management of these types of waste. Citizens manage them randomly, based on the closest access to a disposal bin or based on their level of knowledge on the subject.

For some particular waste, citizens choose their accumulation in the house (mainly for paints and adhesives) since the respective products are kept in-house for potential future use.

Main results based on the answers of the respondents

Domestic health care waste

Quantities

The vast majority of responses regarding household health care waste refers to waste with biological load (**234.84** pieces/household/year).



Management practice

A significant percentage of these waste are diverted by the stream of Municipal Solid Waste and are disposed off in special bins that are installed in pharmacies for this purpose.

Waste Electrical and Electronic Equipment

Quantities

Of the total number of respondents, the largest share of WEEE concerns fluorescent lamps (**3.74** pieces/household/year)



Management practice

The main management method (more than **68%**) concerns the disposal of these waste in the special bins that are installed for this purpose in the shops selling electrical appliances.

Batteries

Quantities

Based on the respondents, **19.91** pieces of batteries are disposed off per household per year



Management practice

83.2% of the respondents stated that they dispose off these waste into the special bins that are installed in shops for this purpose.

Main results based on the answers of the respondents

Automotive maintenance waste

Quantities

The majority of the respondents didn't produce such waste. Of those responded positively, mostly they were referred to vehicle lead batteries.



Management practice

37.2% of the respondents producing this type of waste, replied that they dispose off them to special bins installed in car workshops, while **34.5%** of them replied that they apply other method of disposal (mainly delivery of the lead batteries to scrap collectors).

Construction and demolition waste of domestic origin

Quantities

This type of waste, although quite rare compared to other categories, is of particular importance due to the potential existence of asbestos, as well as of waste containing organic solvents.



Management practice

All answers regarding this type of waste revealed a very low level of knowledge on environmentally sound management practices. Asbestos waste end up in the conventional waste bins, while varnished or preserved wood waste, when not burned in stoves or fireplaces, is also discarded into the blue and green bins.

HHW composition in Municipal Solid Waste

The work for determining the composition of HHW in the produced MSW of the Municipality of Athens was designed, organized and implemented under the guidance and supervision of the Accredited Laboratory of Environmental Measurements of TERRA NOVA, according to the following Standards:

- ☑ EN 14899 Characterization of waste – Sampling of waste materials – Framework for the preparation and application of sampling plan
- ☑ CEN/TR 15310-1:2006 Characterization of waste materials: Part 1: Guidance on selection and application of criteria for sampling under various conditions
- ☑ CEN/TR 15310-2:2006 Characterization of waste materials: Part 2: Guidance on sampling techniques
- ☑ CEN/TR 15310-3:2006 Characterization of waste materials: Part 3: Guidance on procedures for sampling in the field

HHW composition in Municipal Solid Waste

The composition analysis study was carried out during the **4 weeks of September 2021**.

Each week, **3 mixed waste bins** (green bin) and **3 recyclable waste bins** (blue bin) were collected from representative spots of each one of the 7 Municipal Districts (MD) of the Municipality of Athens and they were transferred to the premises of the Cleaning-Recycling Division to be analysed regarding their HHW content.

Each week the bins were collected from different locations of each MD in order to ensure the greatest possible geographical coverage of the waste samples collected.

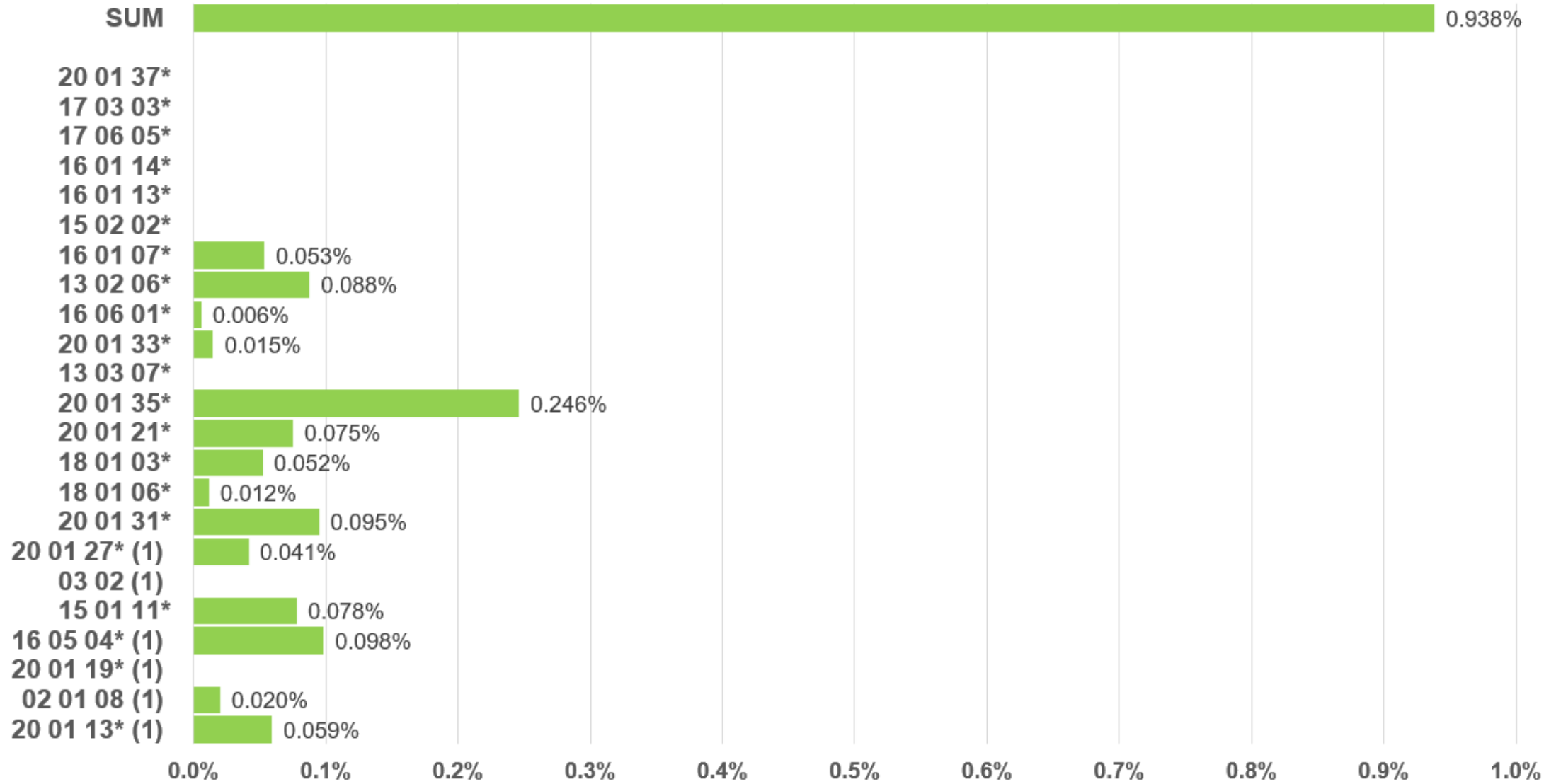
The locations from which the bins were collected, were selected based on the type of use of the buildings they serve (selection of areas where the domestic use prevails).



EWC Code	Waste description	Quantity (Kg)	Percentage %	Total municipality quantity (tn)
Total sample quantity		1.724,18		306.361,00
20 01 13* ⁽¹⁾	Solvents	1,022	0,059%	181,59
02 01 08 ⁽¹⁾	Agrochemical waste containing hazardous substances	0,345	0,020%	61,30
20 01 19* ⁽¹⁾	Pesticides	-	0%	-
16 05 04* ⁽¹⁾	Gases in pressure containers (including halons) containing hazardous substances	1,694	0,098%	301,00
15 01 11*	Metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	1,343	0,078%	238,63
03 02 ⁽¹⁾	Waste from wood preservation	-	0%	-
20 01 27* ⁽¹⁾	Paint, inks, adhesives and resins containing hazardous substances	0,715	0,041%	127,04
20 01 31*	Cytotoxic and cytostatic medicines	1,636	0,095%	290,69
18 01 06*	Chemicals consisting of or containing hazardous substances	0,200	0,012%	35,54
18 01 03*	Waste whose collection and disposal is subject to special requirements in order to prevent infection	0,900	0,052%	159,92
20 01 21*	Fluorescent tubes and other mercury-containing waste	1,293	0,075%	229,75
20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	4,244	0,246%	754,10
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils	-	0%	-
20 01 33*	Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	0,256	0,015%	45,49
16 06 01*	Lead batteries	0,100	0,006%	17,77
13 02 06*	Synthetic engine, gear and lubricating oils	1,510	0,088%	268,30
16 01 07*	Oil filters	0,921	0,053%	163,65
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances	-	0%	-
16 01 13*	Brake fluids	-	0%	-
16 01 14*	Antifreeze fluids containing hazardous substances	-	0%	-
17 06 05*	Construction materials containing asbestos	-	0%	-
17 03 03*	Coal tar and tarred products	-	0%	-
20 01 37*	Wood containing hazardous substances	-	0%	-
SUM		16,179	0,938%	2.874,77

⁽¹⁾ 15 01 10 * is included

Composition of HHW in Mixed municipal Waste (Green Bins)

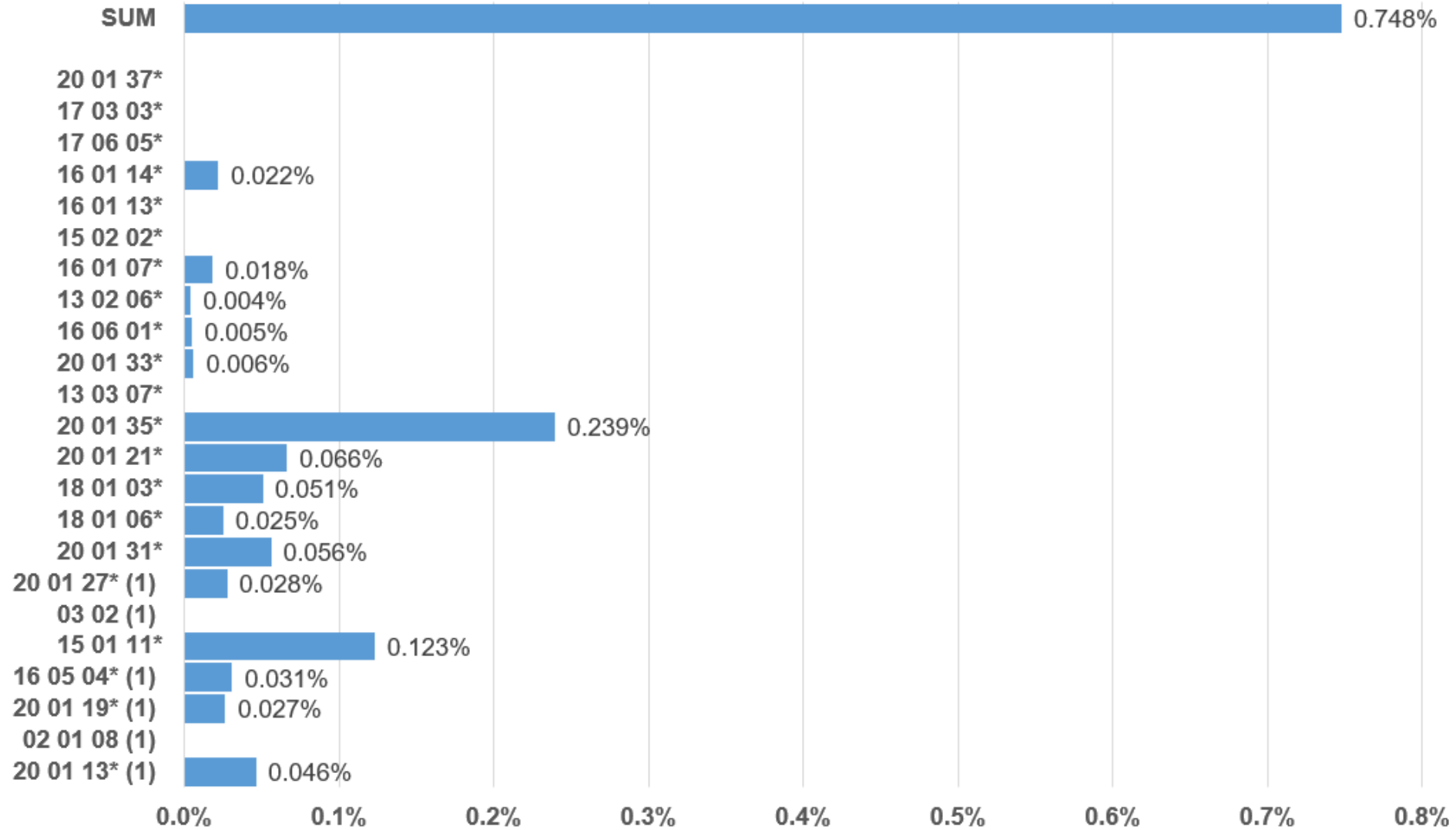


(1) 15 01 10 * is included

EWG Code	Waste description	Quantity (Kg)	Percentage %	Total municipality quantity (tn)
Total sample quantity		2,442.37		19,990.00
20 01 13* ⁽¹⁾	Solvents	1.129	0.0462%	9.24
02 01 08 ⁽¹⁾	Agrochemical waste containing hazardous substances	-	0%	-
20 01 19* ⁽¹⁾	Pesticides	0.650	0.0266%	5.32
16 05 04* ⁽¹⁾	Gases in pressure containers (including halons) containing hazardous substances	0.758	0.0310%	6.20
15 01 11*	Metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	3.004	0.1230%	24.59
03 02 ⁽¹⁾	Waste from wood preservation	-	0%	-
20 01 27* ⁽¹⁾	Paint, inks, adhesives and resins containing hazardous substances	0.673	0.0276%	5.51
20 01 31*	Cytotoxic and cytostatic medicines	1.368	0.0560%	11.20
18 01 06*	Chemicals consisting of or containing hazardous substances	0.611	0.0250%	5.00
18 01 03*	Waste whose collection and disposal is subject to special requirements in order to prevent infection	1.237	0.0506%	10.12
20 01 21*	Fluorescent tubes and other mercury-containing waste	1.620	0.0663%	13.26
20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	5.848	0.2394%	47.86
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils	-	0%	-
20 01 33*	Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	0.150	0.0061%	1.23
16 06 01*	Lead batteries	0.125	0.0051%	1.02
13 02 06*	Synthetic engine, gear and lubricating oils	0.100	0.0041%	0.82
16 01 07*	Oil filters	0.450	0.0184%	3.68
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances	-	0%	-
16 01 13*	Brake fluids	-	0%	-
16 01 14*	Antifreeze fluids containing hazardous substances	0.540	0.0221%	4.42
17 06 05*	Construction materials containing asbestos	-	0%	-
17 03 03*	Coal tar and tarred products	-	0%	-
20 01 37*	Wood containing hazardous substances	-	0%	-
SUM		18.263	0.748%	149.48

⁽¹⁾ 15 01 10 * is included

Composition of HHW in Recyclable waste (Blue Bins)



(1) 15 01 10 * is included

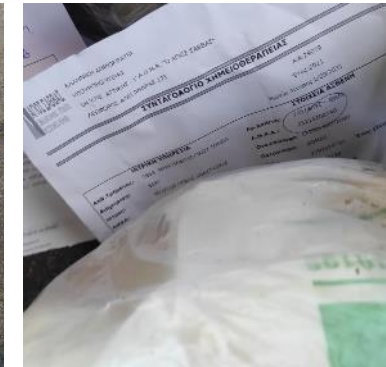
Quantities of HHW found in the bins but excluded from the analysis' calculations

Green bins

1,319 Kg	professional printer inks
15 Kg	hospital waste
4 Kg	packaging of paints
2.5 Kg	WEEE various
2 Kg	painted wood
7 Kg	WEEE (damaged TV)
1.5 Kg	infectious waste from a nearby health center
1 Kg	WEEE (damaged telephone)
1.5 Kg	WEEE (cables, lamp)
18 Kg	expired cockroach control preparations

Blue bins

1 Kg	professional acetone packaging
2.5 Kg	full bag with urine
2 Kg	WEEE
5 Kg	WEEE (washing machine thermostat)
6 Kg	expired cockroach control preparations
8 Kg	waste from a car repair shop

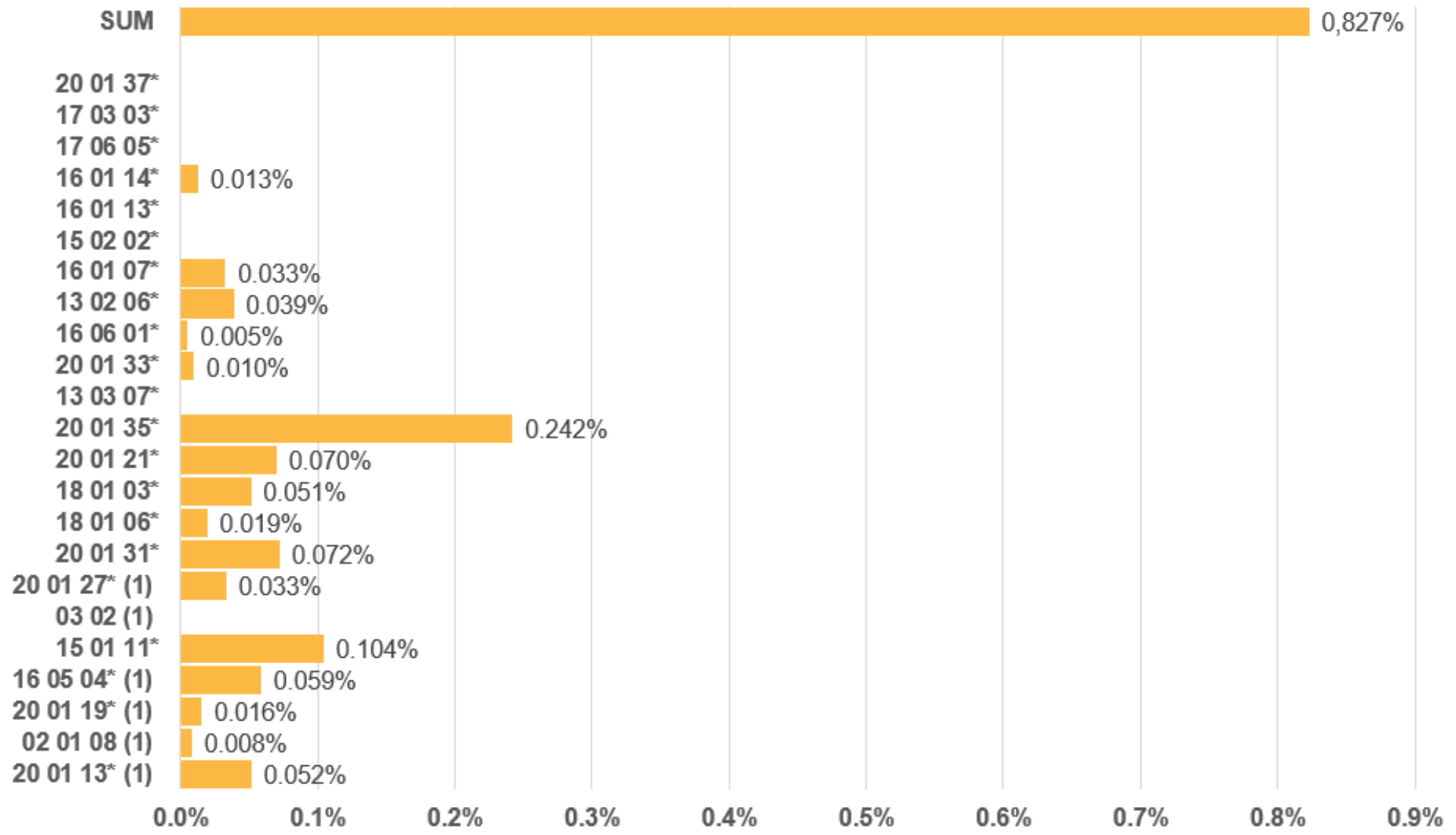


Total results (Blue and Green Bins)

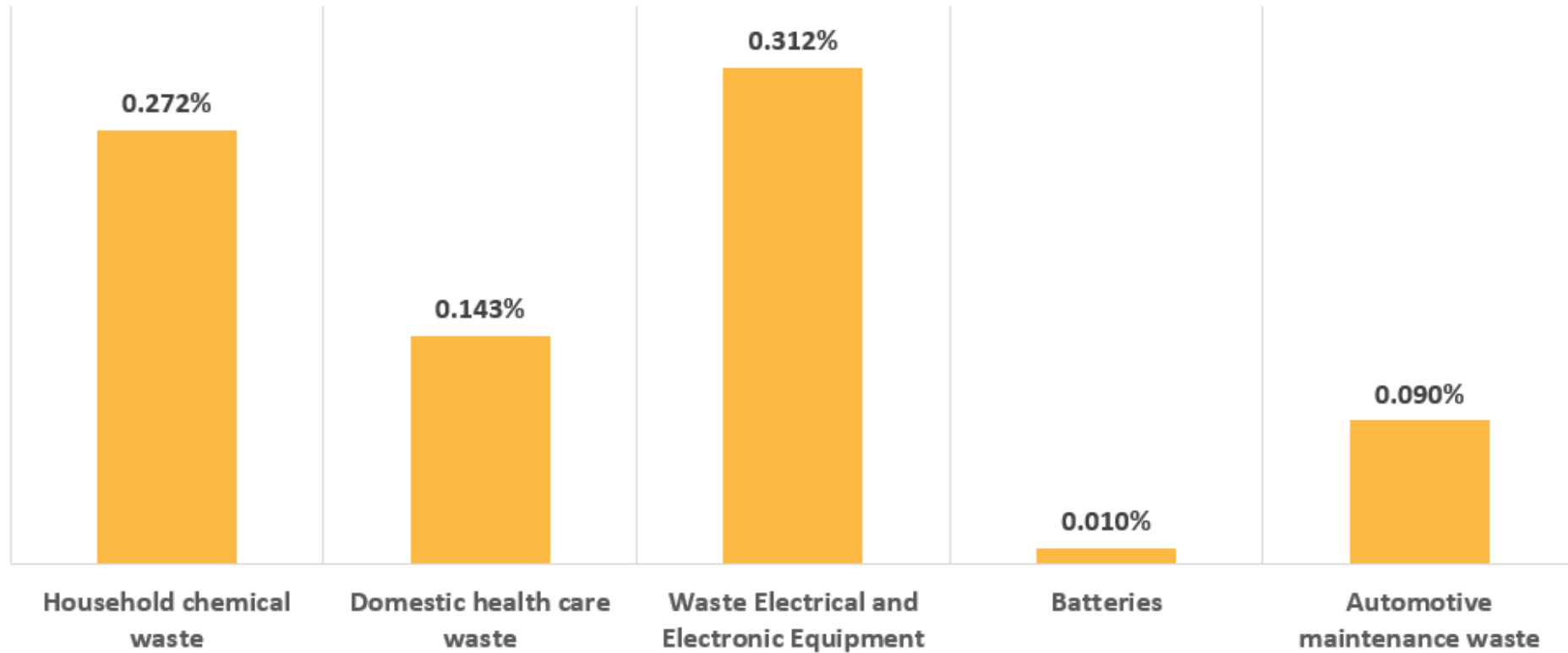
EWG Code	Waste description	Quantity (Kg)	Percentage %	Total municipality quantity (tn)
Total sample quantity		4,166.55		326,351.00
20 01 13* ⁽¹⁾	Solvents	2.15	0.052%	168.48
02 01 08 ⁽¹⁾	Agrochemical waste containing hazardous substances	0.35	0.008%	27.02
20 01 19* ⁽¹⁾	Pesticides	0.65	0.016%	50.91
16 05 04* ⁽¹⁾	Gases in pressure containers (including halons) containing hazardous substances	2.45	0.059%	192.06
15 01 11*	Metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	4.35	0.104%	340.49
03 02 ⁽¹⁾	Waste from wood preservation	-	0.000%	-
20 01 27* ⁽¹⁾	Paint, inks, adhesives and resins containing hazardous substances	1.39	0.033%	108.72
20 01 31*	Cytotoxic and cytostatic medicines	3.00	0.072%	235.29
18 01 06*	Chemicals consisting of or containing hazardous substances	0.81	0.019%	63.52
18 01 03*	Waste whose collection and disposal is subject to special requirements in order to prevent infection	2.14	0.051%	167.38
20 01 21*	Fluorescent tubes and other mercury-containing waste	2.91	0.070%	228.17
20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	10.09	0.242%	790.47
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils	-	0.000%	-
20 01 33*	Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	0.41	0.010%	31.80
16 06 01*	Lead batteries	0.23	0.005%	17.62
13 02 06*	Synthetic engine, gear and lubricating oils	1.61	0.039%	126.11
16 01 07*	Oil filters	1.37	0.033%	107.39
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances	-	0.000%	-
16 01 13*	Brake fluids	-	0.000%	-
16 01 14*	Antifreeze fluids containing hazardous substances	0.54	0.013%	42.30
17 06 05*	Construction materials containing asbestos	-	0.000%	-
17 03 03*	Coal tar and tarred products	-	0.000%	-
20 01 37*	Wood containing hazardous substances	-	0.000%	-
SUM		34.44	0.827%	2,697.72

⁽¹⁾ 15 01 10 * is included

Composition of HHW in both bins (Green and Blue)



(1) 15 01 10 * is included



HHW composition in Municipal Solid Waste produced by households in the Municipality of Athens and collected in the Green and Blue bins

HHW in the household MSW collected in the Green bins (mixed waste):

0.938% w/w

HHW in the household MSW collected in the Blue bins (recyclable waste):

0.748% w/w

HHW in the household MSW collected in total in the Green and Blue bins:

0.827% w/w

Composition of HHW in the total MSW produced by households in the Municipality of Athens

Total household MSW collected into the Green & Blue bins [2019 data]	326,351 tn
Other solid waste of household (not commercial) origin, which are collected separately [2019 data]	1,457.20 tn
<ul style="list-style-type: none">▪ paper/cardboard▪ glass▪ organic waste [brown bin]▪ clothes/textiles	
Total quantity of the produced household MSW in the Municipality of Athens [2019 data]	<u>327,808.20 tn</u>

HHW in the total household MSW produced in the Municipality of Athens: 0.823% w/w

Thank you for your attention