French national household waste characterization survey

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Abstract

Knowledge of the volume and composition of household waste is a key aspect of waste management policy. This knowledge is needed to strengthen waste prevention measures and to put into place treatment processes to extract an ever higher fraction of valuable materials. Under the National Waste Prevention Plan, the Ministry for Ecology, Energy, Sustainable Development and Land Use Planning (MEEDDAT) asked ADEME to conduct a second national survey for the characterization of household wastes (the first one was carried out in 1993). The aim of this characterization campaign is to ascertain the composition of household waste on a national basis, and determine the share of waste from economic activities that is collected by public services.

Keywords

Household waste, characterisation, waste management

1 Methodology

A representative sample was constituted of 100 municipalities randomly selected to represent the country as a whole. Rubbish in these municipalities was collected in two separate containers, one for household waste and the other for waste generated by economically productive activities. Samples of residual household waste were dried, screened and then sorted into 13 categories and 39 sub-categories. Samples of source-separated materials were simply screened, then sorted. Physico-chemical analyses were also carried out. At waste drop-off centres green (yard and garden) waste and demolition waste were weighed, while other waste materials were sorted into the 13 categories. Insofar as possible household waste was distinguished from commercial/business waste. All amounts were recorded in bulk quantities, as collected by public services.

2 Noteworthy findings

- Of the total tonnage of residual household waste collected by public services in France, 22% is waste generated by economic activities, representing 4.4 million tonnes in 2007.

- Taking into account the margin of uncertainty in these figures, the composition of household waste has changed very little since the first characterization survey in 1993, with the exception of sanitary textiles.
- The composition of household waste (in percentage) does not differ significantly between types of housing or geographical zones.
- Overall toxicity of residual household waste was lower compared to the level of pollutants measured in 1993.
- Organic waste represents 25% of household waste, roughly 100 kg per capita and per year.
- The proportion of sanitary textiles has increased sharply, and now represents more than 8% of total waste, or 33 kg per capita and per year.
- Half of all newspapers, magazines and packaging collected by public services (including from commercial /business activities) are collected separately from general waste. Accordingly the proportion of paper, cardboard and glass in residual household waste has fallen since 1993.
- Packaging waste (including from commercial/business activities) represents one-third of all household waste (approximately 125 kg per capita annually).

Table 1 Volume of household waste in 2007 in kg per capita and per year

Type of collection	**Tonnage collected**	**kg per capita per year**
Residual household waste	20.10 million tonnes	316 kg collected per capita per year
Glass collected separately	1.82 million tonnes	29 kg collected per capita per year
Paper and packaging collected separately	2.90 million tonnes	46 kg collected per capita per year
TOTAL HOUSEHOLD WASTE	24.84 million tonnes	391 kg collected per capita per year

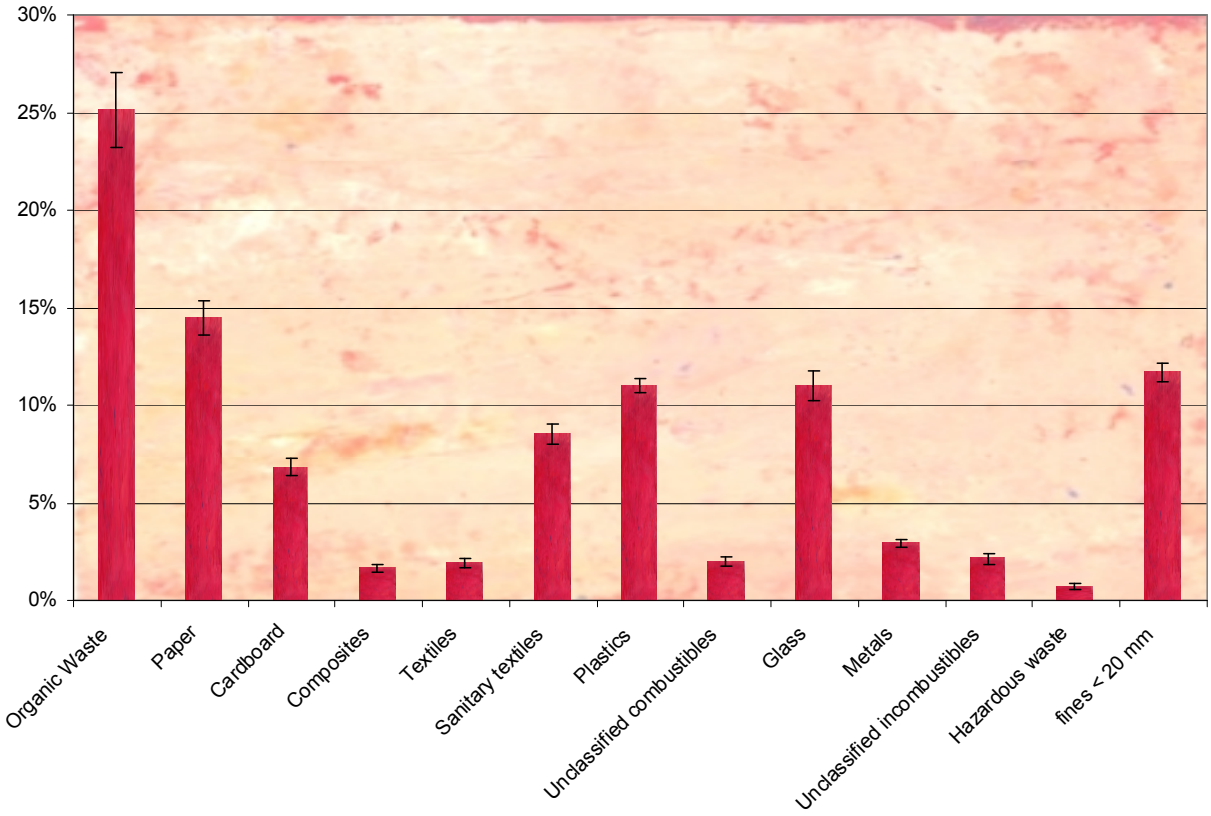

Figure 1 Average composition of household waste nationally

Fines (12% of the total) are composed of 60% organic waste, 13% glass and 19% uncombustible waste.

3 Potential scope of waste prevention and recovery of valuable materials

- 39% of total household waste (about 150 kg per capita per year) could be prevented, via home composting, elimination of unaddressed mail, anti-waste campaigns, reduced printing on office equipment, or broader implementation of separate collection for hazardous household waste items.
- Food waste (unconsumed food still in packaging) amounts to 7 kg per capita per year.
- Packaging waste (including from commercial/business activities) represents one-third of all household waste (approximately 125 kg per capita annually).
- Packaging waste (including from commercial/business activities) that corresponds to categories currently covered by waste sorting and diversion schemes, represents less than one-quarter of household waste (88 kg per capita per year).

- 27% of residual household waste (87 kg per capita per year) could potentially be recycled for valuable materials.
- 63% of residual household waste (organic waste, paper, cardboard, sanitary textiles) representing 200 kg per capita par year could be treated using biological processes to extract valuable resources.

4 Trends in household waste composition since 1993

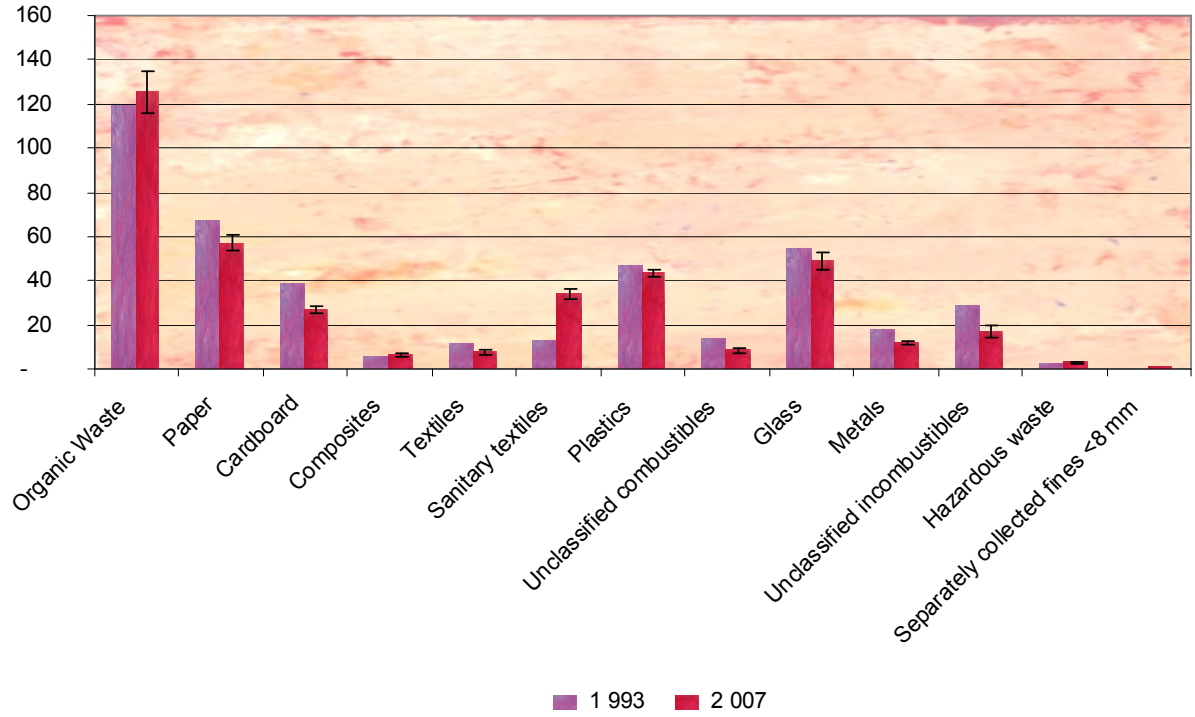

Figure 2 Comparison of household waste per capita, 1993 and 2007, kg per capita per year

Taking into account the margin of uncertainty, the comparison of 2007 figures to 1993 shows no significant difference in the composition of household waste, with the exception of sanitary textiles, which have substantially increased in quantity. Changes in consumption patterns over the last 15 years have had little effect on the composition of household waste. It can be noted, however, that the share of packaging has fallen slightly, from 39% in 1993 to 32% of household waste in 2007.

5 Trends in residual household waste since 1993

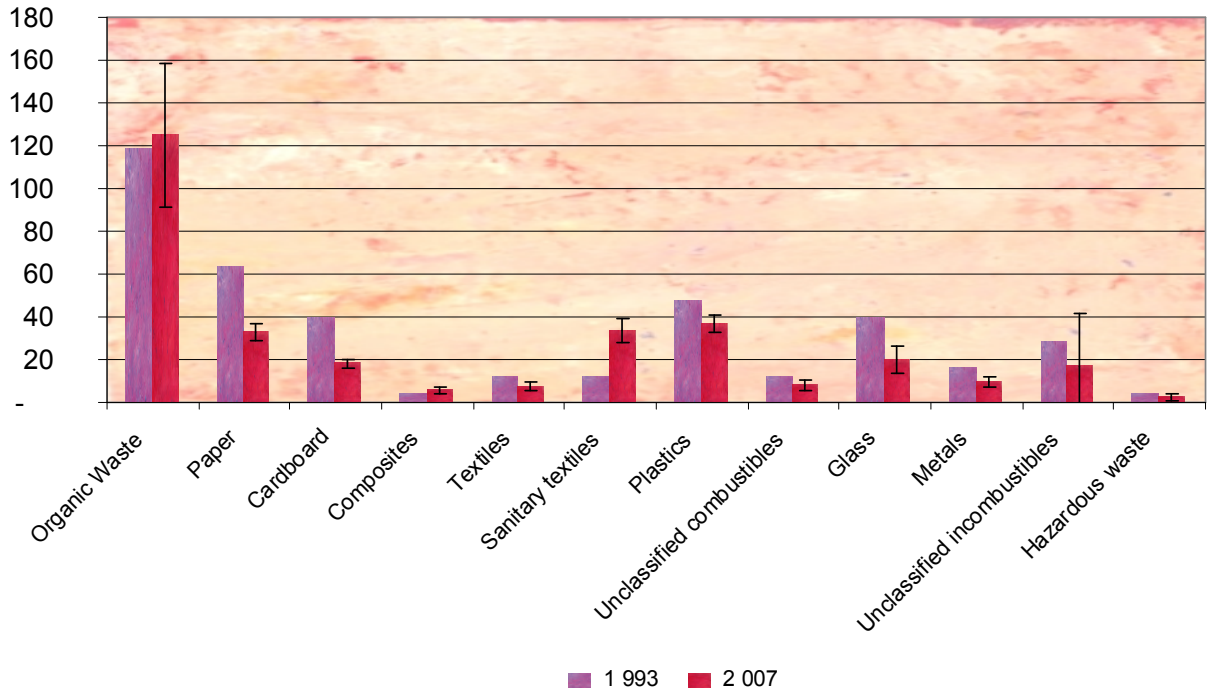

Figure 3 Comparison of residual household waste per capita, 1993 and 2007, kg per capita per year

The composition of residual household waste has changed over the last 15 years. In 1993 waste sorting was still uncommon in France. In 2007 only half as much paper, cardboard and glass was discarded as residual waste compared to 1993.

6 The chemical composition of residual household waste

Table 2 chemical composition of residual household waste

Component	Unit	2007	1993	Component	Unit	2007	1993
Humidity content	%	36,7	35,0	Chlorine	mg/kg	2 878	14 000
Total organic matter	%	65,8	59,2	Fluoride	mg/kg	100	58
Sulphur	%	0,17	0,28	Copper	mg/kg	56	1 048
Hydrogen	%	5,2	4,4	Cadmium	mg/kg	1,3	4
Net energy content (wet)	J/g	9 284	7 592	Chromium	mg/kg	87	183
Net energy content (dry)	J/g	16 123	12 992	Nickel	mg/kg	20	48
Gross energy content (dry)	J/g	17 163	13 943	Zinc	mg/kg	301	1000
Organic carbon	%	34,9	33,4	Mercury	mg/kg	0,1	3
Kjeldahl nitrogen	%	1,1		Arsenic	mg/kg	2,5	5
Organic nitrogen	%	0,71	0,73	Selenium	mg/kg	0,22	0,02
Ammonia nitrogen	%	0,014					

7 Composition of waste brought to drop-off centres

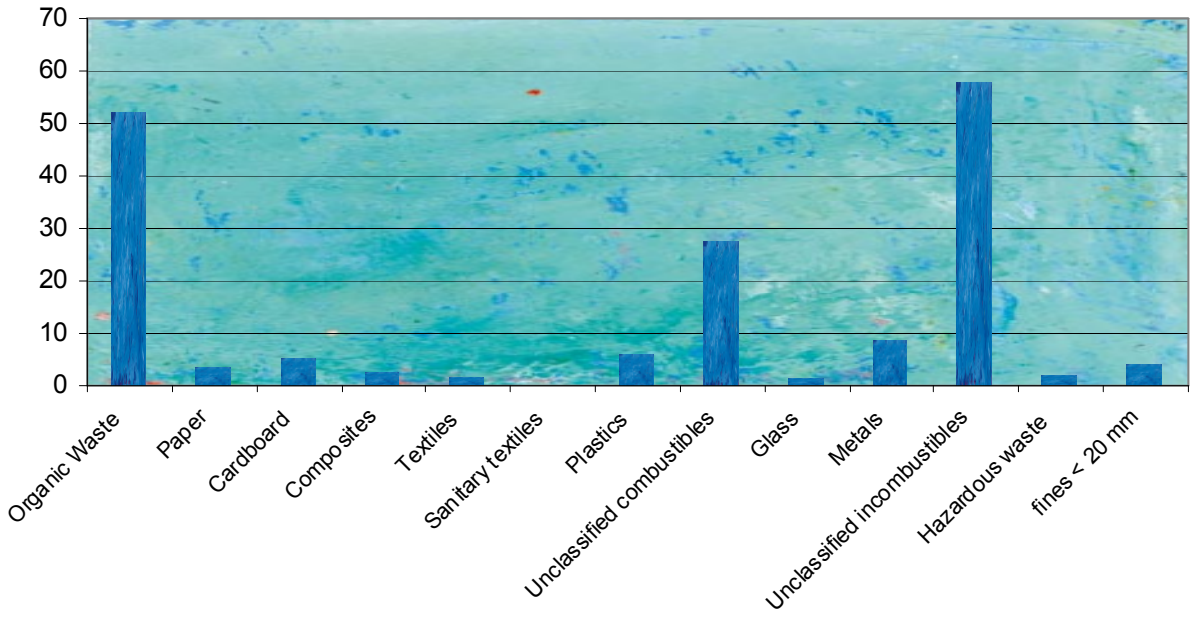

Figure 4 Break-down of waste brought to drop-off centres, kg per capita per year

10.8 million tons of waste were collected in drop-off centres in 2007, the equivalent of 170 kg per capita. These wastes fall into three main categories : organic waste, unclassified incombustible waste (85% of which is rubble) and unclassified combustible items. It has been determined that at least 17% of waste collected at drop-off centres is generated by commercial and business activities.

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