

# Quantitative and qualitative assessment of food waste of the hospitality sector in Greece

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## Abstract

In Greece, approximately 1.8 million tonnes of food waste are generated each year, mostly disposed of in landfill. Food waste is of concern for businesses in the hospitality and food service sectors, which in Greece dispose of an estimated 100,000 tonnes of food waste annually, almost 6% of the total food waste generated in Greece.

The food waste composition analysis and generation rate were determined through Waste Analysis Campaigns (WACs). It is in the scope of the present work to illustrate the results of food waste compositional analysis on samples from the study area of the targeted hotels of Heraklion and Hersonissos in the Region of Crete. The increased need for food waste diversion from landfill and the existing policy which promotes its separate collection and treatment necessitates the comprehensive characterisation of food waste in order to fill information gaps and uncertainties towards food waste management improvements.

The 'Fresh Fruits' and 'Fresh Vegetable and Salads' represented the greatest proportions (56.5%) in each WAC for the hotels. A certain degree of variability is observed though due to seasonal variation.

The recorded low impurities content (~0.6%) demonstrate that the participating hotels practice effectively the source separation of the generated food waste.

**Keywords:** waste management, food waste, hospitality sector, compositional analysis, Greece

## 1. Introduction

In Greece, approximately 1.8 million tonnes of food waste are generated each year, mostly disposed of in landfill. Food waste is of concern for businesses in the hospitality and food service sectors, which in Greece dispose of an estimated 100,000 tonnes of food waste annually, almost 6% of the total food waste generated in Greece (EPPERAA, 2012).

This research aimed to obtain information for hotels' food waste composition and generating rate. For this study, food waste was defined as organic waste, which has its origin in food. According to national data, food

waste constitutes approximately 35% of overall residential/ commercial waste in Greece [2]. For this study, food waste was defined as organic waste, which has its origin in food. According to national data, food waste constitutes approximately 35% of overall residential/ commercial waste in Greece (EPPERAA, 2012). Food waste has a detrimental impact on the environment. If disposed to landfill, decomposing food gives off methane, a greenhouse gas 28 times more potent than carbon dioxide. If unavoidable food waste is collected separately and appropriately treated it can be turned into valuable end products such as compost, fertiliser and renewable energy, but still the environmental and financial costs of food production are considerably higher than the value of the recovered products.

## 2. Methods

The developed methodology for conducting the compositional analysis of the source separated food waste (residues) from the hotels, was based on different technical reports, standards, and scientific papers, as an international standard methodology has not been established yet, while a variety of waste classification systems have been proposed due to the different focus and objectives of each study. The methodology includes procedures for the collection of a representative sample of unprocessed food waste from the waste collection vehicle, manual sorting of the waste into individual waste components, data recording and reporting of the results.

For characterisation purposes, representative sampling is an established practice for accurately determining waste quantities and waste characteristics for planning purposes. The criteria for the waste characterisation for the participating hotels around Heraklion and Hersonissos in Crete are based in ASTM D5231-92 (2008) standard [ASTM, 2008], RCRA regulation (EPA USA, 2002), and UNEP/IETC (UNEP/IETC, 2009).

The sampling plan consisted of seasonal one-week sampling periods of the hotels in area of Heraklion (Crete) between November 2017 and October 2018.

Fifteen (15) major waste categories were selected for sampling for the purpose of food waste characterisation (Table 1).

**Table 1.** Food waste component categories for the compositional analysis of food waste

No.	Food residue component category
1	Drinks (coffee and tea bags)
2	Fresh vegetables and salads
3	Bread and Bakery
4	Fresh fruit
5	Meat and fish
6	Cooked meals and snacks
7	Dairy (excluding milk) and eggs
8	Dried foods
9	Condiments, sauces, herbs and spices
10	Processed vegetables and salads
11	Desserts
12	Confectionery and snacks
13	Processed fruit
14	Other (organic material that does not fit into category and/or it has a size <15mm)
15	Impurities: i.e. plastics, metals, glass, etc.

The selection of the specific waste components considers the effectiveness and practicability of the categorisation analysis, the usefulness of the information obtained and the compatibility and transferability of the outputs with data from existing and future related studies.

### 3. Results

The results of the food-waste composition analyses on samples from the study area of the targeted hotels (Heraklion and Hersonissos in the Region of Crete, Greece) are illustrated in the following table (Table 2).

**Table 1.** Average composition of hotels' food waste.

Food residue component category	%
Drinks (coffee and tea bags)	-
Fresh vegetables and salads	13.62
Bread and Bakery	5.42
Fresh fruit	42.93
Meat and fish	5.00
Cooked meals and snacks	27.06
Dairy (excluding milk) and eggs	0.75
Dried foods	-
Condiments, sauces, herbs and spices	0.29
Processed vegetables and salads	-
Desserts	0.29
Confectionery and snacks	0.17
Processed fruit	0.20
Other	3.70
Impurities	0.60
	100

The food waste generation rate was estimated by surveying the hotels and direct measurements. It was determined that every employee is generating 851.14 kg of food waste annually.

### 4. Conclusions

The increased need for food waste diversion from landfill, along the lines of the existing policies, which promote its separate collection and treatment, necessitates the comprehensive characterisation of food waste. The analyses throughout the waste analysis campaign period revealed the principal food waste categories found in the collected food waste per season. The 'Fresh Fruits' and 'Fresh Vegetable and Salads' represented the largest fractions. A certain degree of variability is observed though, due to seasonal variations.

The recorded low impurities content (0.6%) demonstrate that the participating hotels practice effectively the source separation of the generated food waste. Source separation is important, especially for the sensitive food waste, since separately collected organics exhibit high purity levels, in order to facilitate effectively any further treatment.

### References

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