

# Waste generation pattern drivers: the impact of economic crisis, pandemics and war

V. Sousa<sup>1</sup>, A. Drumond<sup>2</sup>, I. Meireles<sup>3</sup>, C. Dias-Ferreira<sup>4,5</sup>

<sup>1</sup>CERIS, Department of Civil Engineering, Architecture and Georresources, IST-University of Lisbon, Lisbon, 1049-001, Portugal

<sup>2</sup>EMAC - Empresa Municipal de Ambiente de Cascais, E.M., S.A., 2645-138 Alcabideche – Portugal,

<sup>3</sup>RISCO, Department of Civil Engineering, University of Aveiro, Aveiro, 3810-193, Portugal

<sup>4</sup>CERNAS, Instituto Politécnico de Coimbra, Portugal

<sup>5</sup>CEG – Centro de Estudos Globais, Universidade Aberta, Lisboa, Portugal

Keywords: waste collection, behaviour change, infrastructure improvement, economic cycle.

Presenting author email: [celia@esac.pt](mailto:celia@esac.pt)

## Abstract

Waste generation patterns are driven by several interacting factors, which include factors related individual awareness/behaviour, waste collection services characteristics and socio-economic context. While the factors within the first two groups tend to impact directly on the waste generation patterns, the latter affect the consumption, which, in turn, will impact the waste generation.

The present contribution evaluates aims at disclosing the importance of some of these drivers analysing waste collection data from almost two decades in the Municipality of Cascais, Portugal. Concerning waste management, this last two decades were particularly dynamic. The first decade (2000-2010) was characterized by a growing awareness to the waste management problem, with significant changes in the requirements and targets for the waste collection services set at European and national level. By the end of the decade, the severe global economic crisis resulted in the need for an international bailout requested by the Portuguese government, which marked the socio-economic context between 2010 and 2014. The following period was characterized by a substantial economic boom, with particular emphasis of tourism and increase of foreign individuals establishing residence in Portugal. More recently, the COVID-19 pandemics and the war on Ukraine are driving the socio-economic context.

Figure 1 top presents the municipal solid waste (mixed + segregated) collected per year in the municipality of Cascais, revealing clearly the impact of the recession and expansion cycles. In the bottom of Figure 1, the analysis of waste collected per capita along with the population provides additional insights. There is an overall decreasing trend that can be associated with behaviour change and waste collection service improvement (that took place mostly until 2010), that is still affected by the economic cycles.

These results are consistent with Figure 2, where the ratio between the Gross Domestic Product (GDP) per capita and the consumer price index is more correlated with the total amount of waste generated than with the amount of waste collected per capita. This difference in explanatory power of the relation can be related with the underlying behaviour change identified in Figure 1.

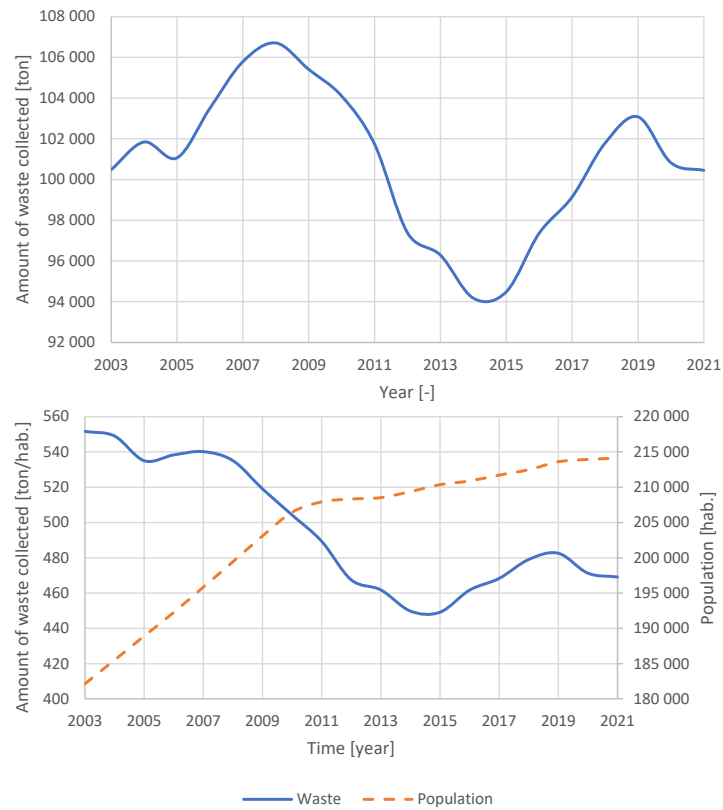


Figure 1 – Evolution of the annual total waste generation (top) and per capita waste generation (bottom)

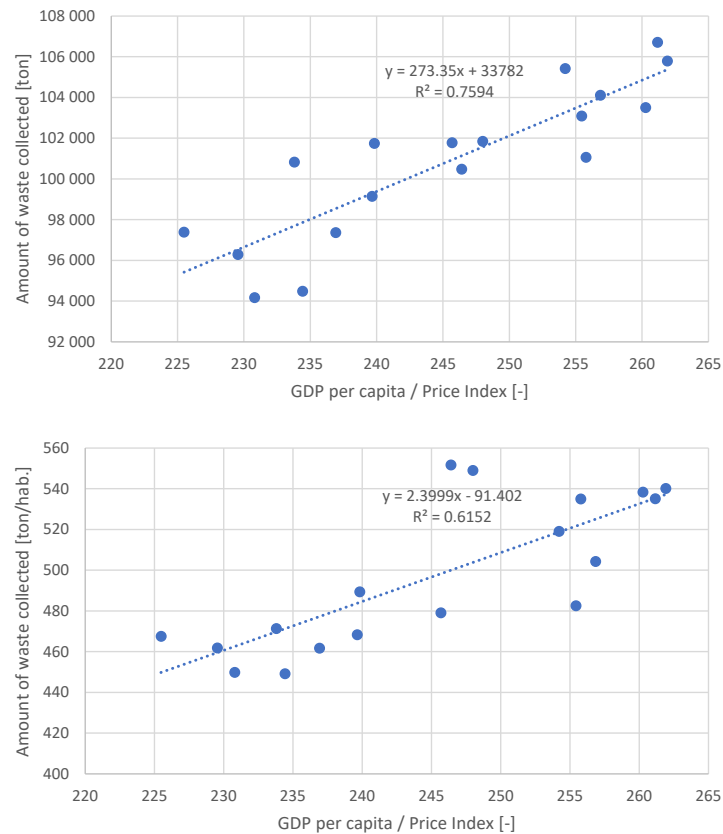


Figure 2 – Relation between the annual total waste generation (top) and the per capita waste generation (bottom) with the ratio between GDP per capita and consumer price index