ASSESSMENT OF EEE SERVICE LIFETIME, STORAGE, AND DISPOSAL IN GREEK HOUSEHOLDS

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Abstract

In the past two decades, several statistical models have been employed in order to calculate the amount of Electrical and Electronic Equipment (EEE) put on the market and the generated Waste Electrical and Electronic Equipment (WEEE). This lifespan distribution varies over space and time, as differences in purchasing power and consumption habits result in differences in the replacement time of the various EEE items. To date there is no reliable lifespan estimate of EEE categories in Greece, neither a robust prediction of their stock and WEEE generation rate. This preliminary study aims at the identification and quantification of EEE to define the lifespan statistics for Greek households, thus refining the results of population balance models, through the use of a questionnaire study. The estimation of generated WEEE amounts is based on the EEE put on the market, a detailed questionnaire-based study, and the lifespan distribution of EEE. The questionnaire was targeted to Greek between the age of 18 and 80, and distributed to over 250 households. The analysis of the questionnaires showed that the average amount of EEE (lamps are excluded) in Greek households is 48 items. The age distribution of EEE in Greek households seems to differ from the one reported in the EU Member States of North Europe. The lifespan of EEE stock tends to expand as consumers choose to repair them.

Keywords: WEEE, reuse, sorting centres, social life cycle assessment, Greece

Introduction

According to Zhang et al. (2019), university students in China possess higher number of personal electronics than the average household. Moreover, the average lifespan of their personal electronics is shorter than that of the average inhabitant in China. These findings indicate that different that different types of households may correspond to different habits, regarding consumption, utilization and disposal of commodities.

This exploratory study aims to define the EEE stock in Greek households through the use of a questionnaire study. More specifically, this paper investigates both the service and storage lifetime of EEE in households. In this study EEE stock is defined as the amount of: i. EEE in service, regardless the frequency of its use, ii. obsolete EEE, which may be functional or non-functional, but is not in use any longer, and iii. non-functional EEE, which has not been discarded yet or is not intended to get discarded.

Methodology

This exploratory research was conducted through the utilization of a structured questionnaire from October 2017 to March 2018, in Greece. The questionnaire was developed in order to facilitate the collection of primary qualitative and quantitative data regarding the EEE stock in Greek households, excluding lamps. The questionnaire comprised of approximately 25 questions, regarding the quantity and quality of the owned EEE (in service, out of service and obsolete) in the participating households, the intention of the interviewees to keep, repair, recycle or dispose obsolete and out of service EEE, and the reasons why the interviewees might or would have stored an obsolete or an out of function electronic or electrical appliance. The questionnaire was filled in by 167 households, corresponding to 386 residents (distributed to over 250 households). The groups of interviewees were selected upon the household types in Greece, to investigate whether they influence the number and the lifespan of the EEE useful life. Therefore, the survey is based on the distribution of the different types of household, rather than the geographical distribution of the Greek population. Lifetime (or lifespan) of commodities is crucial information for material flow analysis and material stock accounting. There are two main approaches to the estimation of commodity lifetime (Magalini et al., 2012): the non-parametric approach, and the parametric one. Up to date, there is no an undisputable estimation of lifetime profiles of the different EEE categories in Greece, neither a robust assessment of their stock and the WEEE generation rate (Lasaridi et al.,

2018). The expected WEEE generated from the Greek households in the next 16 years was estimated through the utilization of the Weibull distribution.

Main results

Of the categories of electrical and electronic items (Directive 2012/19/EU) identified in Greek households, the large household appliances (78.3%), the small household appliances (5.8%) and consumer equipment (6.0%), accounted for the greatest proportions (almost 90%) of the total mass of EEE stocked in the Greek household. In the next 16 years in Greece, the contribution of these categories to the WEEE generation will account for the greatest proportion- the three categories totalling a virtually 90%, of the mass of WEEE that will be generated.

The average stock (equipment in use and hibernated at households) of EEE for Greek households, amounted to 394.04 kg. Consequently, a Greek household will generate an average 583,3 kg of WEEE kg in the next sixteen (16) years or on average 36,5 kg of WEEE annually. This corresponds on average to 13.6 kg per inhabitant or an amount of 146,154 metric tonnes of waste electrical and electronic appliances annually.

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