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Environmental performance of two WEEE sorting centers operating in Greece

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Abstract The Life ReWeee Project aims to prevent the creation of Waste Electrical and Electronic Equipment (WEEE), by collecting, shorting and preparing them for reuse or treatment. For this project, two WEEE sorting centers (SCs) were established and operating in the wider region of Attica and Central Macedonia. In SCs the collected WEEE will be transferred, stored and sorted after three control stages. The examined WEEE will be driven either for repair and reuse or recycling. Within the framework of the present LCA study, a total number of 6 types of WEEE will be examined, as decided according to the input flows data of the SCs. The LCA would pay particular attention to the potential environmental impacts of the repair and reuse of WEEE, in comparison with buying new products.

Keywords: WEEE; Reuse; Refurbish;

1. Introduction

The LIFE REWEEE Project aims to prevent the creation of Waste Electrical and Electronic Equipment (WEEE). In order to achieve this objective, two WEEE Sorting Centers (SCs) operated for the first time in Greece, in the wider region of Attika and Central Macedonia correspondingly.

The main objective of this paper is to evaluate the environmental impact of the Project, performing a Life Cycle Assessment (LCA) for a selection of products that could be reused, through the process of the WEEE sorting centers.

Within the framework of the present LCA study, a total number of 6 types of WEEE were examined, as decided according to the input flows data of the SCs and various other requirements. The types of WEEE under examination were Laptops, Desktops, Printers, Smartphones, Monitors & Vacuum Cleaners.

2. Methodology

In order to set a common basis for the alternative scenario, the timeframe for the reuse of the repaired WEEE, was selected to be one (1) year. Moreover, for all 6 types of WEEE, the functional unit was selected to be "1 unit" per WEEE type. A schematic illustration of the examined system boundaries of the LCA study is provided in Figure 1 and Figure 2.

LCA, assessed two different scenarios, i.e. the Basic scenario (refurbished product) & the Alternative scenario (new product). The collected data for the life cycle inventories included:

- energy inputs, raw material inputs, ancillary inputs, other physical inputs,
- products, co-products and waste,
- releases to air, water and soil, and
- other environmental aspects

3. Results

In case of Laptops, Desktops, Monitors and Smartphones, a clear benefit is attributed to the Basic Scenario (product refurbishment). Environmental impact benefits are caused mainly from the minimization of electronic components, which include metals such as copper, gold, tin, aluminum etc. This benefit is maximized when during the repair stage, the replacement of metal intensive parts with new, is limited. However, in case that spare parts from other WEEE are used, the benefit could be maximized even more.

In case of printers, lifecycle impacts are mainly attributed to electricity consumption, paper & cartridges during usage. Thus, a clear benefit would be visible, only if more efficient printers (in terms of energy and ink/toner) would be refurbished.

Finally, in case of vacuum cleaners, lifecycle impacts are also mainly attributed to electricity consumption during usage. Thus, the refurbishment of older models, may have an environmentally contradictive result. A clear benefit would be visible, only if more efficient vacuum cleaners would be refurbished.

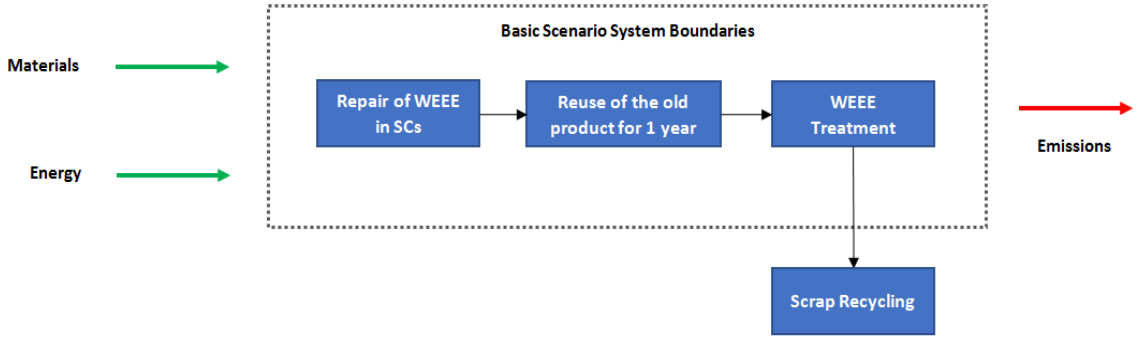

Figure 1: Life cycle stages included in the system boundaries

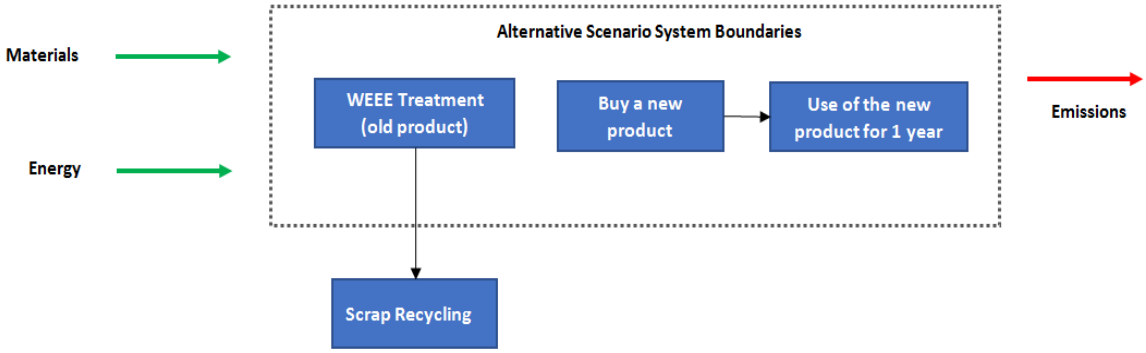

Figure 2: System boundaries of the alternative scenario

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