

# The Impact of the Packaging Recycling on Environmental Impact Reduction from Energy use and GHG's Perspective

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Keywords: solid waste recycling, packaging, energy, GHGs.

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Packaging is important part of our society, although high rate of consumption causes growing amounts of packaging waste and related both with production and waste related environmental impacts. The most commonly used materials for packaging are paper, wood fibers, plastics, glass, steel and aluminium. To preserve the functional and aesthetic qualities of the food, the types of packaging are often combined with each other (e.g., paper with plastic film, aluminium with plastic film, etc.). However different packaging materials course variety of environmental impacts during the whole life cycle of the packaging. Hence, one of the possible ways of environmental impact reduction is recycling.

The main goal of this research is to evaluate, how energy needed, and greenhouse gas emission depends on using recycled material or not recycled one for beverage packaging. For this purpose packaging use rate was evaluated in Lithuania case, and also in „X“ company (collecting beverage packaging waste) in order to estimate opportunities for environmental impact reduction in terms of energy and greenhouse gases (GHG's) avoided using recycling approach. In the study, the primary energy consumption and GHG's indicator was estimated at 1 kg of packaging.

Analysis of scientific literature and statistical analysis were performed to reach the goal of the study. Review of literature indicates that the energy required for PET packaging can be reduced to 1.94 times (from 179.14 MJ / kg to 92.08 MJ/kg for processing) if recycled. The production of glass packaging would reduce energy needs from 63.61 MJ/kg to 34.98 MJ/kg, (1.82 times), and the reduction of energy consumption for aluminium packaging would be the highest: from 496.21 MJ/kg to 94.28 MJ/kg (5.26 times). These number were applied for the Lithuanian case and selected company to estimate the potential of environmental burden reduction. References used for assessing energy and GHG's factors are presented in the reference list.

On the national level the largest primary energy consumption is for plastic packaging (~ 11 thousand GJ per year). If half of this type of packaging would be recycled around 3.000 GJ of energy could be saved. In the case of glass, the energy saving would reach 640 GJ, in the case of aluminium – even 4.000 GJ a year. In terms of GHG's in total about 37.000 tons of these emission could be saved with the aluminium packaging contributing the most into GHG's reduction. In analysed „X“ company, environment impact is reduced in all cases when packaging waste is recycled, the best effect was reached, when 80% of package waste was recycled. Though in the total terms the glass packaging dominated within collected packaging waste, aluminium recycling had the most significant input for the energy consumption and GHG's reduction.

The indicators analysed and results also depends on amount of collected waste, this means that it is important to create effective waste collection scheme. In addition, the recycling of the packaging wastes could make a positive effect on the other environmental aspects, such as primary raw material and water use etc. Therefore, it is important to do research in regarding this sectors for future studies in order to choose the most effective strategies for sustainable development and especially for consumer awareness raising and promotion of waste sorting behaviour.