Rodjanee Chaisri 2011: Life Cycle Environmental Impact Assessment and Carbon Footprint Analysis of Kraft Envelope and Polypropylene Plastic File Folder. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Thumrongrut Mungcharoen, Ph.D. 171 pages.

This research is aimed to collect the life cycle inventory data and assess the life cycle environmental impact and carbon footprint of kraft envelope and polypropylene plastic file folder. The functional unit of this study is one time use of 500 envelopes of 125-gram KA kraft (10.655 kilogram) and 500 folders of polypropylene (PP) plastic file folder (10.725 kilogram). This work used SimaPro 7.1 with Impact 2002+ method for the life cycle assessment and IPCC 2007 GWP 100a method for carbon footprint analysis according to the Thai national guideline for carbon footprint.

The life cycle inventory data of kraft envelope and polypropylene plastic file folder were obtained from this study. For the life cycle environmental impact assessment, 3 waste management scenarios, i.e. recycling, landfill and incineration were used. The result showed that the life cycle environmental impact of kraft envelope with incineration, kraft envelope with landfill, kraft envelope with recycling, PP plastic file folder with incineration, PP plastic file folder with landfill and PP plastic file folder with recycling were 4.28E-02 Pt, 4.19E-02 Pt, 4.12E-02 Pt, 1.45E-02 Pt, 1.15E-02 Pt and 9.01E-03 Pt, respectively. Most of the environmental impact were from the raw material production, i.e. kraft paper and PP pellet.

The result of carbon footprint analysis showed that the carbon footprint of kraft envelope and PP plastic file folder were 47.3 and 50.9 kilogram carbon dioxide equivalent per 500 units, respectively. Most of the greenhouse gas emission were from the waste management by landfill.

The proposed methods to reduce the life cycle environmental impact and carbon footprint of kraft envelope and PP plastic file folder were the increase of recycled paper to 100% and the use of electricity from biomass for kraft envelope and the increase of recycled PP pellet to 100% and the decrease of PP plastic file folder weight for PP plastic file folder. It was found that the reuse of kraft envelope and PP plastic file folder were the most effective mean to reduce the life cycle environmental impact and carbon footprint.

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