

Akadate Juangthaworn 2008: Life Cycle Assessment for Environmental Performance Comparison of Cassava-Based and Polystyrene Foam Packages. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Thumrongrut Mungcharoen, Ph.D. 221 pages.

This research is aimed to use life cycle assessment technique to compare environmental performance of cassava starch based and polystyrene foam food package using the SimaPro 7.0's software, with the CML 2 Baseline 2000 method for environmental impact assessment. Functional unit was specified as 10,000 single-use lunchboxes; size: 5x7x1.5 inches. System boundary was considered from raw material extraction to disposal phases but excluded the package use phase. It is found that during the lunchboxes production and transportation to consumers, the environmental impact of cassava starch lunchboxes is 5.78 times more than the polystyrene foam lunchboxes. 78.68 percent of the total environmental impact from cassava starch lunchboxes occurred during the package production. The main environmental impacts are marine aquatic ecotoxicity, abiotic depletion and global warming, respectively. An essential factor which caused these impacts is the usage of electricity during production process. For polystyrene foam lunchboxes, 63.39 percent of the total environmental impact also occurred during the package production. The main environmental impacts are marine aquatic ecotoxicity, human toxicity and global warming, respectively. Also, the essential factor is the usage of the electricity during production process. For final disposal method of the cassava starch lunchboxes, the highest environmental impact is sanitary landfill followed by incineration and composting, respectively. Soil conditioner obtained from composting can help circulate carbon and replaced chemical fertilizer production. For the polystyrene foam lunchboxes, the highest environmental impact is sanitary landfill followed by incineration and recycling, respectively. Considering a whole life cycle, the environmental impact of cassava starch lunchboxes disposed by composting is less than the polystyrene foam lunchboxes disposed by incineration or sanitary landfill but it is higher than the polystyrene foam lunchboxes disposed by recycling.

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Thesis Advisor's signature

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