

Chularat Ponnak 2011: Comparative Study on Environmental Impacts of Plastic Film Production Process Using Life Cycle Assessment Technique. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging and Materials Technology. Thesis Advisor: Associate Professor Ngamtip Poovarodom, Ph.D. 88 pages.

The present study aims at assessing the environmental impact of plastic film production processes using life cycle assessment technique, particularly CML 2 Baseline 2000 and Cumulative Energy Demand with the help of SimaPro software version 7.2. The functional unit was plastic film 1 kg or 1 square meter. The boundary system covered the raw material extraction, the film making and the film converting processes, while transport at all stage was excluded. It was found that the global warming potential was the principal impact category and the major contributors were plastic resin and energy consumption. In addition, melting points of plastic resins determined the amount of energy consumption. Making film by blown or cast process and blown film orientation or cast film orientation process contributed similar extent to global warming. However, the comparison of the following processes; extrusion against co-extrusion, dry lamination against extrusion lamination, flexography against gravure printing, showed significant differences in global warming potential.

The global warming potential of film production was expressed in an equation to determine the extent constituted from flexible packaging made from polyolefins. The application of this equation to calculate the global warming potential could reduce an error of 20 to 50%, comparing with secondary data. The proposed equation was to initiate further studies which should cover many plastics. Moreover, it would assist a great deal the plastic film producers and users, especially SMEs, to assess the environmental impact of their products.

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