

Forecasting replacement demand of durable goods and the induced life cycle emissions: a dynamic waste input-output approach

Topic: LCA application

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In developed countries, replacement demand of durable goods such as automobile is not only an important driving force of economic growth but also a key factor in the reduction in environmental impacts such as emissions and waste. Considering that the future replacement demand largely depends on engineering scrappage reflecting physical wear and tear which increases with products age and/or use (Greenspan and Cohen, 1999), this study proposed a novel method to forecast the replacement demand of durable goods and the life cycle environmental impacts by incorporating product lifetime distributions reflecting the engineering scrappage (Kagawa et al., 2008) into the waste input-output analysis (Nakamura and Kondo, 2009). Using the forecasting method, we estimated industrial outputs, employments, and life cycle CO₂ emissions induced by future automobile replacement demand and secondary resource flows and landfill consumptions associated with scrapped automobiles for the period 2000-2025 in Japan. We finally argued how to manage CO₂ emissions and resource flows brought about by the future automobile replacement demand.