

LCA/CFD Studies of Artisanal Brick Manufacture in Mexico

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Abstract : Environmental performance of artisanal brick manufacture was studied by Lifecycle Assessment (LCA) methodology and Computational Fluid Dynamics (CFD) analysis in Mexico. The main objective of this paper is to evaluate the environmental impact during artisanal brick manufacture. LCA cradle-to-gate approach was complemented with CFD analysis to carry out an Environmental Impact Assessment (EIA). The lifecycle includes the stages of extraction, baking and transportation to the gate. The functional unit of this study was the production of a single brick in Chihuahua, Mexico and the impact categories studied were carcinogens, respiratory organics and inorganics, climate change radiation, ozone layer depletion, ecotoxicity, acidification/ eutrophication, land use, mineral use and fossil fuels. Laboratory techniques for fuel characterization, gas measurements in situ, and AP42 emission factors were employed in order to calculate gas emissions for inventory data. The results revealed that the categories with greater impacts are ecotoxicity and carcinogens. The CFD analysis is helpful in predicting the thermal diffusion and contaminants from a defined source. LCA-CFD synergy complemented the EIA and allowed us to identify the problem of thermal efficiency within the system.

Keywords : LCA, CFD, brick, artisanal

Conference Title : ICMMAC 2016 : International Conference on Mathematical Modeling, Analysis and Computation

Conference Location : London, United Kingdom

Conference Dates : April 22-23, 2016