

Life cycle assessment of hot mix asphalt with recycled concrete aggregates for road pavements construction

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Abstract

In this study a comparative life cycle assessment (LCA) was conducted according to a 'cradle-to-laid' approach to evaluate the potential environmental impacts related to the use of recycled concrete aggregates (RCAs) as a partial replacement of coarse natural aggregates in the production of Hot Mix Asphalt (HMA). Specifically, three percentages of RCA replacements were analyzed: 15, 30 and 45%. Primary data collected mainly through surveys performed in Colombian contractors from the region of Barranquilla were used to model the foreground system. The SimaPro 8.4.0 software was used for modelling the processes analyzed in the case study and all the life cycle inputs and outputs related to the functional unit were characterised during life cycle impact assessment (LCIA) phase into potential impacts according to the TRACI v.2.1 impact assessment methodology. The results of the case study showed that the mixtures incorporating 15 and 30% of RCA can be considered as eco-friendly alternatives to the conventional mixture (i.e. no RCA content), as both allow reductions in all impact categories scores. On the contrary, the mixture that contains 45% of RCA denoted a lower environmental performance than that of the conventional mixture.

Palabras clave

Life cycle assessment (LCA), hot mix asphalt (HMA), recycled concrete aggregate (RCA), sustainable pavement construction and management.