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"Gheorghe Asachi" Technical University of Iasi, Romania

LIFE CYCLE THINKING IN SUSTAINABLE SUPPLY CHAINS: THE CASE OF RUBBERIZED ASPHALT PAVEMENT

Irene Bartolozzi[1*], Sofia Mavridou[2], Francesco Rizzi[1], Marco Frey[1]

[1]*Institute of Management, Sant'Anna School of Advanced Studies, Piazza Martiri della Libertà, 33, 56127 Pisa, Italy*
[2]*Laboratory of Building Materials, Department of Civil Engineering, Aristotle University of Thessaloniki, Post Code 54124, Thessaloniki, Greece*

Abstract

End of life tires require sound accounting of environmental performances to design sustainable procedures for material recovery. Their use in rubber modified asphalt provides could lead to the improvement of technical and environmental performances of asphalt roads, but the effectiveness of simplified procedures is to be proved. During LIFE+ project ROADTIRE, a rubber modified asphalt road prototype, with the upper surface layer containing 10% crumb rubber in the bituminous binder, was implemented in Lamia, Greece. The prototype was compared to a conventional asphalt road by Life Cycle Assessment to evaluate the environmental performances and the results were critically interpreted to highlight its benefits. The impact categories considered, assessed with the ReCiPe Midpoint (H) v1.06/Europe ReCiPe H method, were: Climate change, Ozone depletion, Human toxicity, Photochemical oxidant formation, Terrestrial acidification, Freshwater eutrophication, Freshwater ecotoxicity, Terrestrial ecotoxicity, Water depletion, Fossil depletion. Compared to the conventional asphalt road, the global environmental performances of the rubberized asphalt road are improved of 30-40%, depending on the impact category. For both scenarios, the road construction phase, with bitumen production, is the most impacting process, compared to maintenance and end-of-life. The global environmental advantages are proved to depend on the longer lifetime and the less maintenance required for the rubberized asphalt road, as indicated from laboratory tests. It is therefore important to monitor such parameters during the road lifecycle in order to validate this preliminary outcome. Based on these results, policy and management implications are discussed.

Key words: end of life tires (ELTs), industrial ecology, life cycle assessment (LCA), rubber modified asphalt

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[*] Author to whom all correspondence should be addressed: e-mail: irene.bartolozzi@sssup.it; Phone: +39 050882781; Fax: +39 050 883936