IMPLEMENTING LCA IN THE DEVELOPMENT OF ENVIRONMENT FRIENDLY BINDERS FOR SOIL TREATMENT, WATERPROOFING AND ROADS APPLICATIONS IN THE WALLOON REGION (ECOLISER)

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ABSTRACT

The Building and construction sector plays a crucial role in our wellbeing, health and safety. However, construction consumes more than a third part of the global resources and is responsible for the generation of more than 40% of the total solid waste volume. By consequence, there is a growing concern over making this sector more sustainable, which is driving efforts to increase the initiatives for eco-design and finding ways to improve resource efficiency and management and waste valorization.

The ECOLISER project aims to develop environment friendly binder formulations based on secondary materials and industrial byproducts (slag, blast furnace ash, glass fines, fly ash from thermal power plant and biomass, etc.).

The main objective of this project is to minimize the impact of human activity on the environment in the Walloon region (Belgium), focusing on the industrial sector, to meet the needs of rehabilitation and development of brownfield sites into areas for new industries and to contribute to the sustainable management of natural resources simultaneously limiting the landfill of industrial byproducts.

There are three types of alternative environment friendly binders targeted: for the improvement and stabilization of soils, for soil sealing and tightness, and the installation of reactive waterproofing barriers to fix heavy metals and micropollutants from percolating water and the production of cohesive materials for road infrastructure.

The first phase of this project is the global validation stage (experimental pilot site) of the materials treated with environment friendly binders. Afterwards, a phase of continuous evaluation of the performance of the technological

solutions is implemented in terms of sustainable development. This is achieved through the use of life cycle assessment (LCA).

This LCA aims to study the potential environmental impacts produced by 1 km of road in Belgium. A road with hydrocarbon coating and a concrete road type are studied. These two cases were compared to a road using the best proportion of the environment friendly binders mentioned before. In addition, to analyze the stabilization of soils upstream of road construction, LCAs were carried out for the conventional pre-treatment of three types of soil: sandy, clayey and loamy. The system boundary includes the construction of the road, but the use, maintenance and end of life of the route are not considered.

The methods recommended by ILCD were chosen to evaluate the environmental impact of the road (European Commission JRC-IES, 2011). The modeling is performed in Simapro software (v9.4.0.2) using Ecoinvent 3.9 databases.

The management of industrial and construction waste has become a challenge, because of the environmental, economic and social consequences that could result when these byproducts are not correctly managed. This project promotes one of the promising solutions to preserve natural resources as well as limiting the landfill of this byproducts.

Key words: *LCA, soil treatment, waterproofing, road construction, binders*