

Application of the circular economy to cement-based materials: life cycle assessment of the introduction of recycled aggregates in the national industry

Summary

The incorporation of construction and demolition waste, in this case recycled aggregates, in concrete, not only reduces the extraction of natural aggregates, but also minimizes the deposition of construction and demolition waste in landfills.

Several laboratory-scale studies have already been carried out to prove the feasibility of incorporating recycled aggregates into concrete. However, this project studies the incorporation of recycled aggregates at an industrial scale, defining mortar and concrete formulations in line with the practices of national industries.

Additionally, due to the presence of contaminants in construction and demolition waste, an approach to contaminant content is made, referring the different types of contaminants and the respective legal limits. After fulfilling all the requirements and recommendations, recycled aggregates can be used in mortars and concretes, thus replacing natural aggregates.

Therefore, economic and environmental life cycle assessment studies will be carried out, in order to compare the economic and environmental impacts of the production of mortars and concrete with natural and recycled aggregates.

The study is based on two urban centers and, for each one, it will be considered a quarry, for natural aggregate extraction, a construction and demolition waste plant, for recycled aggregates production, a mortar plant, for mortar production, and a concrete plant, for concrete production.

Finally, the economic and environmental impacts of mortars and concretes industrially developed with recycled aggregates will be compared with the impacts of current products.

Keywords

Concrete, economic impacts, environmental impacts, life cycle assessment, mortar, natural aggregates, recycled aggregates.



Recycled aggregates produced by a construction and demolition waste operator.



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