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Product-specific life cycle assessment of recycled gypsum as a replacement for natural gypsum in ordinary Portland cement: application to the Spanish context

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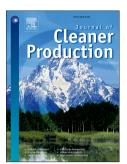
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10 Abstract

The construction industry consumes large quantities of natural resources and simultaneously generates a considerable amount of construction and demolition waste (CDW). This includes gypsum waste (GW), which must be managed correctly. Besides, the cement manufacturing process, which is part of the construction industry, has a high environmental impact. Therefore, the aim of this study was to recover GW and use it in the manufacture of ordinary Portland cement (OPC), to improve waste management and minimize environmental impacts. To achieve this, we evaluated and compared the environmental impacts of the gypsum production process (primary and secondary [recycling] production) and the environmental impact of the use of recycled gypsum (RG) in the production of OPC. We used the methodology of life cycle assessment, and selected the IMPACT 2002+ as impact assessment method.

Local data were used wherever possible to ensure that the life cycle inventory (LCI) was representative of Spain. The data were primarily sourced from interviews with organizations and building materials companies in Spain, and visits to CDW waste recycling plants in Catalonia. Data from primary sources were completed and/or compared with the Ecoinvent v2.0 database and updated with Spanish data where possible.

The results of this study confirm that RG had environmental benefits in all the environmental categories evaluated when the GW was transported to a recycling plant at a distance equal to or less than 30 km. The study shows that the process of recycling gypsum consumes less than 65% of the energy needed to obtain natural gypsum (NG), and emits less than 65% of the greenhouse gases produced in the process of obtaining NG. Greater savings of 35% were Download English Version:

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