

Environmental analysis of the use of plant fiber blocks in building construction

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Abstract-

Construction is a sector which produces high greenhouse gas emissions, which cause global warming. As such, it is becoming increasingly important to use sustainable materials which reduce the environmental impacts. The properties of the plant fiber block make it one of the most adequate building materials for the construction of the building envelope. However, there is no in-depth research that encompasses the extraction of the raw material, the transport to the factory and the manufacturing process. The present research analyzes the environmental impact associated with the production of plant fiber blocks as a building material, using the Life Cycle Assessment methodology. In addition to looking at the sustainability of this material, it also compares it with other conventional building materials. The results show that the impact category which made the biggest contribution in the manufacturing of a plant fiber block for its use in construction was that of the total primary energy consumption (9.74 MJ/kg straw). With reference to the emission of the greenhouse gases produced during manufacturing, the main contributors are the nitrogen and urea-based fertilizers used in cereal cultivation (0.73 kg of the total 0.96 kg of CO₂ per kg of straw). However, the impacts caused by manufacturing a PFB are much lower than those produced from other insulating materials such as expanded polystyrene, extruded polystyrene or polyurethane foam (4.67E+03 kg CO₂ eq. for the PFB compared to 1.23E+04 kg CO₂ eq. for the fiberglass and 1.33E+04 kg CO₂ eq. for the polyurethane).

Index Terms- Plant fiber block; Life cycle; Sustainability; Carbon footprint; Environmental impact; Global warming

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