

Accepted Manuscript

Life cycle assessment of a hemp concrete wall: impact of thickness and coating

Sylvie Pretot, Florence Collet, Charles Garnier



PII: S0360-1323(13)00324-7

DOI: [10.1016/j.buildenv.2013.11.010](https://doi.org/10.1016/j.buildenv.2013.11.010)

Reference: BAE 3561

To appear in: *Building and Environment*

Received Date: 19 July 2013

Revised Date: 6 November 2013

Accepted Date: 9 November 2013

Please cite this article as: Pretot S, Collet F, Garnier C, Life cycle assessment of a hemp concrete wall: impact of thickness and coating, *Building and Environment* (2013), doi: 10.1016/j.buildenv.2013.11.010.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

LIFE CYCLE ASSESSMENT OF A HEMP CONCRETE WALL: IMPACT OF THICKNESS AND COATING.

Sylvie PRETOT, Florence COLLET*, Charles GARNIER

Université Européenne de Bretagne - Laboratoire de Génie Civil et Génie Mécanique – Equipe Matériaux
Thermo Rhéologie

Postal address: IUT Génie Civil – 3, rue du Clos Courtel – BP 90422 – 35704 Rennes – France

sylvie.pretot@univ-rennes1.fr

florence.collet@univ-rennes1.fr

charles.garnier@limsi.fr

* Corresponding author: Tel: 33.2.23.23.40.56, Fax: 33.2.23.23.40.51.

Abstract

In a context of sustainable development and energy sparing, a life cycle assessment (LCA) may be useful to make good choices. Thus, this study concerns the LCA of an environmentally friendly material used for building construction, hemp concrete. The functional unit is first defined per square such that the wall may provide the function of bearing wall meter and its thermal performance is described by a thermal resistance of $2.78 \text{ m}^2\cdot\text{K}/\text{W}$. The results then showed that the production phase of raw materials is mainly responsible for the environmental impact of the wall, mostly due to the binder production. It was also shown that, compared to traditional construction materials, hemp concrete has a low impact on environment. Moreover, hemp concrete contributes to reduce climate change as photosynthesis-mediated carbon sequestration and carbonation serve to reduce atmospheric carbon dioxide. A sensitivity analysis is performed on three criteria: wall thickness, renewal of coatings and compounds of the indoor coating. Our results show that environmental indicators evolve with wall thickness, except for the climate change indicator. It improves with thickness due to carbon sequestration and carbonation. Moreover the increase in the wall's thermal resistance with wall thickness is not taken into account in such an LCA performed at the material level. The renewal of coating slightly impacts the environmental indicator for small numbers

Download English Version:

<https://daneshyari.com/en/article/6700607>

Download Persian Version:

<https://daneshyari.com/article/6700607>

[Daneshyari.com](https://daneshyari.com)