Life cycle assessment

IsoHemp hemp blocks

INTRODUCTION

This report presents the summary of the life cycle assessment (LCA) of IsoHemp hempcrete blocks carried out as part of Life Cycle in Practice project (LCiP) – GreenWin outsourcing.

The study was conducted by Liège Université – Faculté des Sciences Appliquées – Chemical Engineering et PEPs – Products, Environment and Processes.

DESCRIPTION OF THE PRODUCT

IsoHemp hempcrete blocks are made by mixing hemp shives and limes. They are great for numerous applications and recommended by professionals for both new builds and renovations, whether they are single-family projects, community buildings and commercial buildings.

The IsoHemp hempcrete blocks are particularly suitable for residential constructions, for adding a second wall to existing walls on the inside or from the outside, as wel as industrial partitioning and for apartments.

The major hempcrete block features are: thermal regulation, humidity regulation, acoustic insulation, protection and fire resistance, health and environmental qualities.

METHOD FOR ASSESSMENT

- Life cycle assessment (LCA) « cradle-to-grave » according to ISO standards 14040:2016 et 14044:2016. The characterisation of impacts is carried out according to the standard EN 15804.
- Impact assessment are evaluated with Simapro 8.5.0 software (2018) (Pre-Consultant, CH) and Ecoinvent 3.4 (Nov 2017) and ELCD 3.2 databases (Nov 2017)
- Resource use (primary energy use and water) and waste are evaluated with the method SBK Bepalingsmethode, 20 october 2017 (NMD 2.1).

GOALS AND SCOPE OF THE STUDY – LIFE CYCLE INVENTORY

1 FU = 1 m³ of IsoHemp hempcrete blocks palletized, packed for shipping

Dimension of the blocks :

- Thickness: 7.5, 9, 12, 15, 20, 25, 30 and 36 cm
- Length : 60 cm
- Height : 30 cm
- Thermal conductivity of one IsoHemp hempcrete block : λ_d < 0.07 [W/mK]

Raw materials : hemp – hydraulic and hydrated limes – water

System boundaries : 4 stages to obtain a complete cradle-to-grave : production stage (A1-A3), construction stage (A4-A5), use stage (B1-B5) and end-of-life stage (C1-C4).

LIFE CYCLE INVENTORY

The table summarizes the life cycle assessment results as usually asked for the creation of Environmental Product Declarations (EPDs).

Synthesis of des impact assessment of IsoHemp hempcrete blocks (1m³) without lifespan

IMPACT ASSESSMENT Agregation of modules to obtain a "Total life cycle"					
Impact [units]	**Production stage** A1-A3	**Construction stage** A4-A5	**Use stage** B1-B7	**End-of-life stage** C1-C4	**Total life cycle**
Acidification [kg SO2 eq]	2.12E-01	3.76E-02	0	1.87E-02	2.68E-01
Eutrophication [kg PO43-eq]	7.18E-02	5.84E-03	0	3.72E-03	8.13E-02
Global warming(GWP100a) [kg CO2 eq]	-9.63E+01	1.71E+01	0	3.81E+00	-7.54E+01
Photochemical ozone creation [kg C2H4 eq]	1.85E-02	2.77E-03	0	7.50E-04	2.21E-02
Ozone depletion [kg CFC-11 eq]	7.68E-06	1.82E-06	0	9.81E-07	1.05E-05
Depletion of abiotic resources [kg Sb eq]	1.28E-04	2.56E-05	0	6.43E-06	1.60E-04
Depletion of abiotic resources (fossil) [MJ]	1.08E+03	1.79E+02	0	8.14E+01	1.34E+03

Source : Liège Université

CONCLUSIONS

IsoHemp hempcrete blocks made of hemp shives as well as hydraulic and hydrated lime, have very interesting environmental performances due to the nature of their components and the simplicity of their manufacturing process.

They are of great interest especially in what concerns global warming by storing CO^2 (negative impact), due to its capture during the growth of hemp.

1m³ of IsoHemp hemp blocks save 75 kg of CO_2
equivalent to 100 kg of CO_2 per pallet of hemp blocks.