



Comparative Study of the Environmental Impacts of a Traditional Wall and an Hemp Wall in Belgium

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ABSTRACT

As conventional materials like concrete and terracotta bricks, used in traditional housing, produce a great amount of greenhouse gases (GHG) (Broun & Menzies, 2011), it is imperative to turn to eco-materials. For instance, hemp is a local material that can present an effective solution to reduce GHG. This research quantifies the environmental impact difference between a traditional Belgian wall and a hemp blocks wall supported by a wooden frame, both according to the passive house standards. To obtain the environmental impacts, both wall will follow a life cycle assessment analysis (LCA).

KEYWORDS

Life cycle assessment (LCA), CO₂ emissions, embodied energy, passive house, hemp blocs, bearing wall

PROBLEM

The PEB, Belgian energetic standard, is on its way to be equivalent to the Passive Standard by 2020. That involves an augmentation of materials to create better insulation system. Although, the traditional materials used are not environmentally efficient. Therefore, eco materials have to be environmentally evaluated and compared to the traditional wall of use.

OBJECTIVE/HYPOTHESIS

- Objectives:**
- Define what is the traditional Belgian wall
 - Realize an LCA for two usable walls
 - Establish comparison between both walls

Goal: Inform the construction sector professionals.

AUDIENCE

Construction professionals

RESEARCH QUESTION

What is the dichotomy between the environmental impacts of a traditional Belgian wall and an hemp wall?

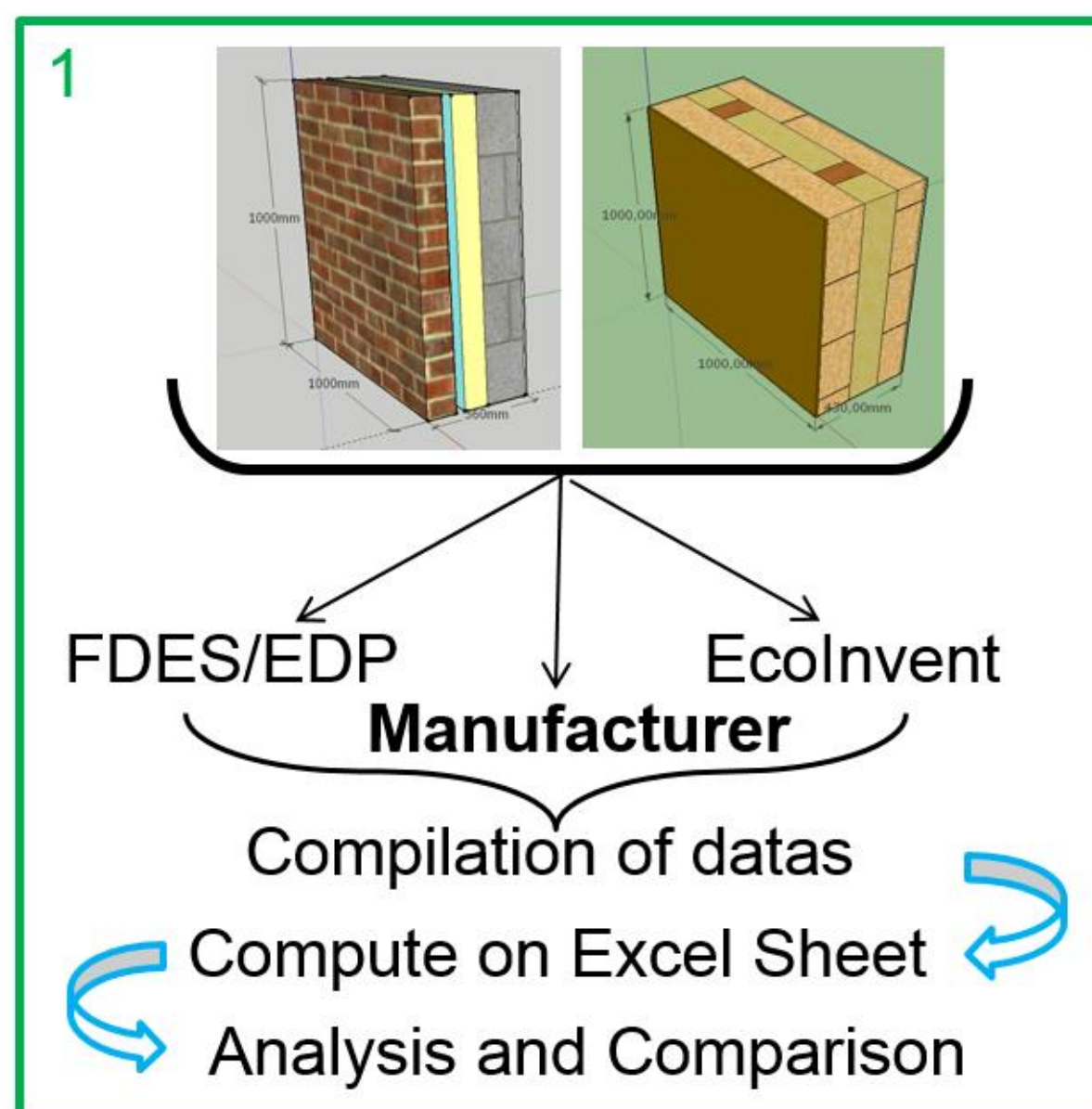
ORIGINALITY

	Life cycle assessment of a hemp concrete wall: Impact of thickness and coating (Pretot et al., 2014)	Life cycle greenhouse gas emissions of hemp-lime wall constructions in the UK (Ip & Miller, 2012)	Analyse de cycle de vie du mur en béton chaux-chaux réalisé à partir de granulats de la société wallonne ChanvrEco (Guévorts & Roiz, 2014)	Étude des caractéristiques environnementales du chanvre par son cycle de vie (Boutin et al., 2006)
Wall type	Bearing wall	Non-bearing wall	Bearing wall	Bearing wall
Section				
Wall surface (m ²)	1	1	1	1
Thickness (cm)	27	30	35	26
Construction method	Pulverised wall on wood frame wall. Hemp-lime coating inside and lime-sand coating outside.	Molding between temporary shuttering. No coatings.	Pulverised wall on wood frame wall. No coatings.	Pulverised wall on wood frame wall. No coatings.
Thermal transmission coefficient U (W/m ² .K)	0.36	0.19	0.20	0.42
Life span (years)	100	100	100	100
Source	France	UK	Belgium	France

- ❖ Do not include a comparison with other types of walls
- ❖ Are not made in accordance to a specific thermal resistance standard

METHODOLOGY

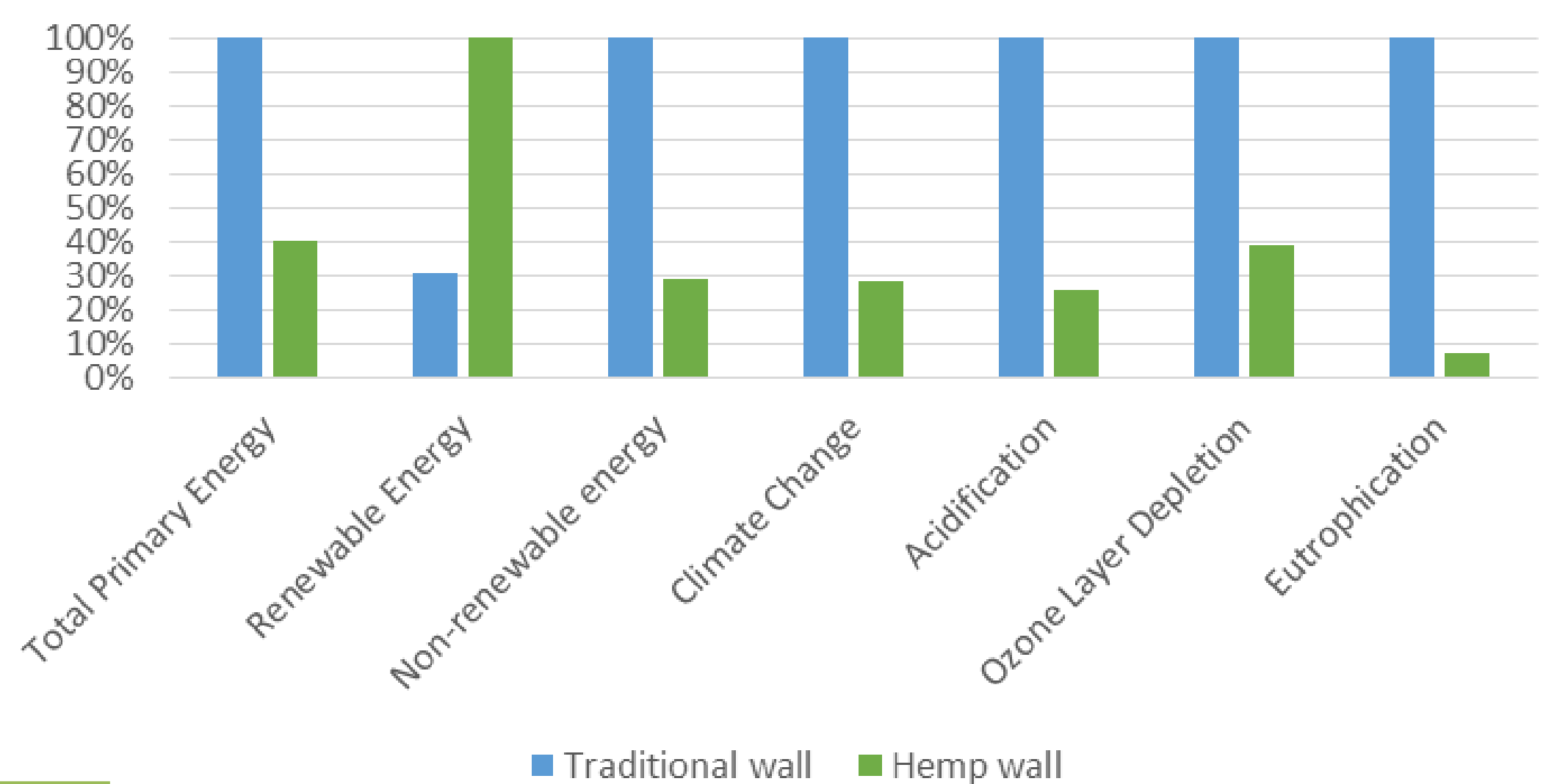
Functional Unit : 1 m² bearing wall with a thermal resistance coefficient (U) of 0,13 W/m²K and 100 years life span



1. Literature Review
2. Definition
 - Functional unit
 - Flows
 - System boundaries
3. Inventory
 - All materials involved
 - Properties, LCA scenario and results
 - Sources : FDES, Companies, EcolInvent
4. Analysis and comparison
5. Validation with previous studies

RESULTS

Environmental Impact Characterisation



CONCLUSION

This comparative study confirmed that an hemp wall has less harmful environmental impacts compared to traditional. The characterization clearly revealed and confirmed the environmental benefits of an hemp wall.

This study should be redone in a few years, when more Belgian data on life cycle analysis will be available to enhance the accuracy of the presented results.

RESOURCES

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