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Aan example of feasibility study of eco materials production chain and bio-based products for eco-construction/renovation in the named greater region (Belgium, France, Luxembourg)

Faiza Mnasri ^{a*}, Mohammed El Ganaoui ^a, Mourad Khelifa ^b, Slimane Gabsi ^c

^aLERMAB, Lorraine University, IUT de Longwy, 186 rue de Lorraine, 54400 Cosnes-et-Romain, FRANCE

^bLERMAB Lorraine University, ENSTIB, CS 60036, 27 Rue Philippe Séguin, 88026 Épinal, France

^cEnvironment Research Unit, Catalysis and Process Analysis, École nationale d'ingénieurs de Gabès, Avenue Omar Ibn El Khattab, Zrig Eddakhlania 6072, Tunisie

Abstract

The energy consumption of today and the concept of building thermal comfort, has created a critical issue that allows the development of eco materials, as a social, economical and environmental solution. In this context a methodology and an analysis process to identify a chain of eco-materials in the named Greater Region which is a delimiting three borders between Belgium, France and Luxembourg has been followed. Thus an European INTERREG project called ECOTRANFAIRE was lunched to resume the needs of cold regions.

This is an example of a joint investigation was conducted in three trans-boundary countries, in order to propose a practical solutions and environmentally friendly. Thus, a state of place of eco materials market in the sorting countries was studied and a different families of materials were examined according to various criteria to be proposed as a solution of energy efficiency of building in the cross border context. The analysis of these types of materials has led us to identify seven eco promising materials in this Region. The characteristics and the thermal performance of these materials will be described in this work as well their hygrothermal responses by the MBV test will be established.

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* Corresponding author.

E-mail address: faiza.mnasri@univ-lorraine.fr

1. Introduction

The notion of thermal comfort in the home has become a point of study and ambition for professionals and occupants. This notion often depends to the nature of the materials of the building envelope [1]. In cold regions, the need to keep the heat inside the house brought him to search the most pertinent materials that can limit the maximum contact surfaces of the envelope with its external environment.

In general, in eco-construction/renovation, a particular attention is given to the insulation composite based of vegetable fibers, essential for their thermal and ecological character [2,3]. The optimization of the thermal properties of such materials is a major industrial issue and requires methods for measuring properties and characterization of structure [4]. Indeed, the incorporation of vegetable fibers (wood, lin, hemp) in the thermoplastic or thermosetting material is an industrial and commercialized concept [5]. Cohesion and creating a good adhesion between the natural fiber and the matrix can be a complex problem for manufacturing of the composite [6]. Thus, it is necessary to know the intrinsic properties of vegetable fibers to ensure the reliability of composite structures based of these fibers.

Nomenclature

A	Exchange surface (m ²)
MBV	Moisture Buffer Value[-]
Δm	Mass variation during the absorption phase / desorption (g)
HR_{high}	High relative humidity (%)
HR_{low}	Low relative humidity (%)

The objective pursued in this work was to develop a methodology for characterizing a several eco-materials selected as candidates materials for the Greater Region in the context of the ECOTRANSFAIRE project [6]. This project is an Interreg project focused on eco-renovation and eco-building in the Lorraine region of France, the Walloon region of Belgium and the Grand Duchy of Luxembourg. Its aim is to identify materials of potential interest for actors (Belgian, French and Luxembourg) in the construction sector. And to develop a sustainable socio-economic chain of innovative materials on the Greater Region.

For this reason, a theoretical concept necessary for understanding of this study have been established in this work. It consists of the selection of eco-materials with interesting local development potential, and analyze precisely those products in the form of sheets of different materials selected for the "insulation category." The last part of this work will compare these cards made in order to bring out the most likely materials for the creation of a local chain.

2. Project ECOTRANSFAIRE

2.1. Objective and localization of project

This work involves the project "ECOTRANSFAIRE" Interreg IV A Greater Region, which has as its main objective the creation of a trans-boundary cooperation Pole in eco-renovation and sustainable building, in a part of the Greater Region, defined by the three municipalities annotated on map below (Figure 1):



Fig. 1. Geographical scope concerned by the project ECOTRANSFAIRE

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