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THERMALLY MODIFIED PINE BOARDS - AN ENVIRONMENTAL COMPARISON OF PORTUGUESE AND SPANISH CASE STUDIES

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EXTENDED ABSTRACT

Thermal modification is a well-known process to improve some of the most important wood properties by using heat in a low oxygen environment. The main changes are the reduction of equilibrium moisture content, increased dimensional stability and increased resistance against fungi [1]. As no chemical compounds or other extraneous constituents are added to wood in the process, it has a potential of being a green building material. At the moment, there are only two companies in Portugal [2] and one company in Spain producing modified wood by heat treatment [3].

The main aim of this study is to compare the environmental profile of thermally modified pine boards produced by a Portuguese and a Spanish company using the Life Cycle Assessment (LCA) methodology described in ISO 14040 [4] and ISO 14044 [5] standards and Product Category Rules for preparing an environmental product declaration (EPD) for Construction Products and Construction Services [6].

For an EPD that covers a "cradle to gate" the declared unit is applicable instead of functional unit and in this case is 1 m^3 of thermally modified pine boards.

The system boundary for the product system is represented in a simplified way in Fig.1.

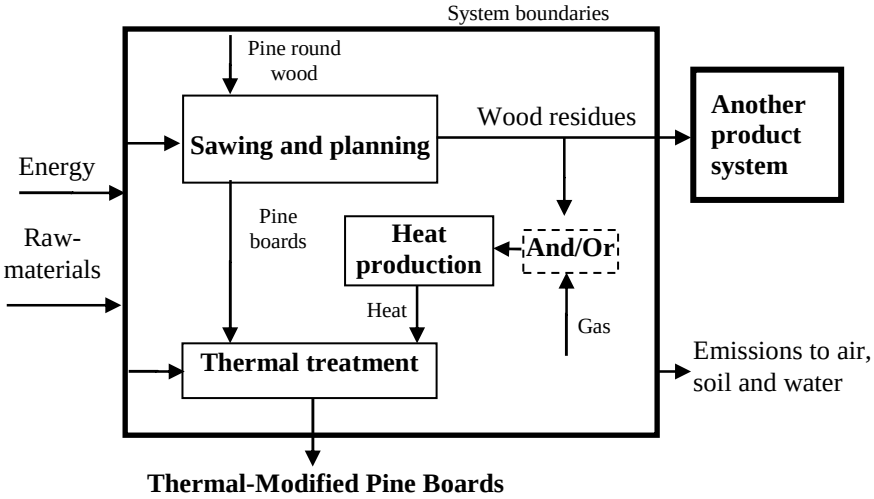

Fig. 1 The system boundaries of the study

As the sawing and planning processes of the product system delivers the products (pine boards) and co-products (wood residues – bark, sawdust and chips), that can be used as raw material for other product system, the environmental burdens of this process are allocated to product and co-products based in its economic value.

The datasets for the products and processes included in the system boundaries are companies' data and are related to the year 2014. The thermo-treatment used was Thermo I (intense treatment) to allow treated pine boards to be used in exterior decks or cladding.

The inventory analysis and, subsequently, the impact analysis have been performed using the LCA software SimaPro 8.1.0.60 [7] and associated databases and methods. The method chosen for impact assessment was EPD-2013 V1.01 [8]. The impact categories considered were: acidification (AC), eutrophication (EU), global warming (GWP 100a), photochemical oxidation (PO), ozone layer depletion (ODP) and abiotic depletion (AD).

Fig. 2 shows the result of comparative environmental profiles of the thermally modified pine boards produced by the companies in this study.

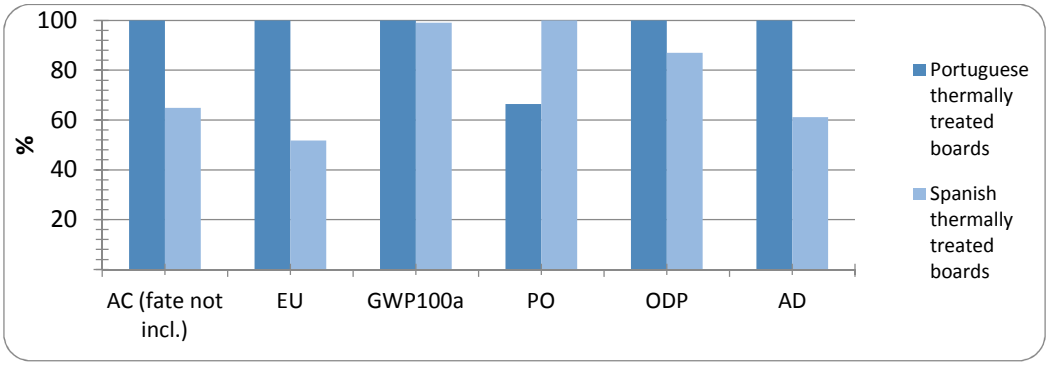

Figure 1: Comparative profiles of the thermally modified pine boards. Acronyms: AC (acidification); EU (eutrophication), GWP 100a (global warming), PO (photochemical oxidation), ODP (ozone layer depletion) and AD (abiotic depletion)

The contribution of Portuguese and Spanish treated boards to climate change (CC), is almost equal. The Spanish treated boards are better than Portuguese for acidification (65%), eutrophication (52%), ozone layer depletion (87%) and abiotic depletion (61%) and the opposite is true for photochemical oxidant formation (66%).

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