

Accepted Manuscript

Building-integrated solar thermal system with/without phase change material: Life cycle assessment based on ReCiPe, USEtox and ecological footprint

Chr. Lamnatou, F. Motte, G. Notton, D. Chemisana, C. Cristofari



PII: S0959-6526(18)31359-3

DOI: [10.1016/j.jclepro.2018.05.032](https://doi.org/10.1016/j.jclepro.2018.05.032)

Reference: JCLP 12889

To appear in: *Journal of Cleaner Production*

Received Date: 1 November 2017

Revised Date: 27 April 2018

Accepted Date: 3 May 2018

Please cite this article as: Lamnatou C, Motte F, Notton G, Chemisana D, Cristofari C, Building-integrated solar thermal system with/without phase change material: Life cycle assessment based on ReCiPe, USEtox and ecological footprint, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.05.032.

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.

Building-integrated solar thermal system with/without phase change material: Life cycle assessment based on ReCiPe, USEtox and Ecological footprint

Chr. Lamnatou^{1,*}, F. Motte², G. Notton², D. Chemisana¹, C. Cristofari²

¹ Applied Physics Section of the Environmental Science Department, University of Lleida, Jaume II 69, 25001 Lleida, Spain

² University of Corsica, UMR CNRS 6134, Research Centre George Peri, Route des Sanguinaires, F-20000 Ajaccio, France

*Corresponding author: lamnatou@macs.udl.cat

ABSTRACT

The present study assesses the environmental profile of a building-integrated solar thermal system that has been developed and tested in France. The investigation is based on life-cycle assessment according to ReCiPe, USEtox and Ecological footprint. Two configurations (for the solar collector) have been examined: 1) Without phase change material (using only rock wool as insulation) and 2) With phase change material (myristic acid) and rock wool. The main goal is the evaluation of the effect of the phase change material on the environmental profile of the solar thermal system. Both cases (with/without phase change material) have been studied based on the Mediterranean climatic conditions of Ajaccio (France). The results, according to ReCiPe midpoint (with characterization) demonstrate that the tubes (copper), the aluminium components (absorber, casing, gutter) and the phase change material are responsible for the highest impacts in terms of the material manufacturing phase of the collectors. With respect to ReCiPe/endpoint/single-score life-cycle results (scenarios: with/without PCM; with/without recycling; including the gutter), the values vary from 0.014 to 0.020 Pts/kWh. The configuration with phase change material presents 0.003 Pts/kWh higher impact (in comparison to the option without phase change material). Recycling offers an impact reduction of 0.003 Pts/kWh (for both configurations with/without phase change

Download English Version:

<https://daneshyari.com/en/article/8094629>

Download Persian Version:

<https://daneshyari.com/article/8094629>

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