

## Accepted Manuscript

Title: Phase change materials and thermal energy storage for buildings

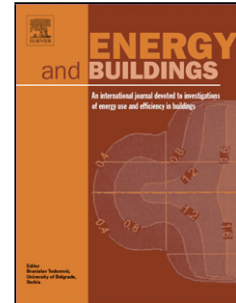
Author: Alvaro de Gracia Luisa F. Cabeza

PII: S0378-7788(15)00433-8

DOI: <http://dx.doi.org/doi:10.1016/j.enbuild.2015.06.007>

Reference: ENB 5912

To appear in: *ENB*



Please cite this article as: A. de Gracia, L.F. Cabeza, Phase change materials and thermal energy storage for buildings, *Energy and Buildings* (2015), <http://dx.doi.org/10.1016/j.enbuild.2015.06.007>

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.

## Phase Change Materials and Thermal Energy Storage for Buildings

Alvaro de Gracia<sup>1</sup>, Luisa F. Cabeza<sup>2,\*</sup>

<sup>1</sup> CELIMIN, Av. Universidad de Antofagasta 02800, Antofagasta, Chile

<sup>2</sup> GREA Innovació concurrent, University of Lleida, Pere de Cabrera s/n, 25001 Lleida, Spain

Tel.: +34-973003577, E-mail address: lcabeza@diei.udl.cat

### Abstract

It is well known that there is a need to develop technologies to achieve thermal comfort in buildings lowering the cooling and heating demand. Research has shown that thermal energy storage (TES) is a way to do so, but also other purposes can be pursued when using TES in buildings, such as peak shaving or increase of energy efficiency in HVAC systems. This paper reviews TES in buildings using sensible, latent heat and thermochemical energy storage. Sustainable heating and cooling with TES in buildings can be achieved through passive systems in building envelopes, Phase Change Materials (PCM) in active systems, sorption systems, and seasonal storage.

**Keywords:** thermal energy storage (TES); buildings; sensible heat storage; latent heat storage; passive; active.

### 1. Introduction

It is well known that the use of adequate thermal energy storage (TES) systems in the building and industrial sector presents high potential in energy conservation [1]. The use of TES can overcome the lack of coincidence between the energy supply and its demand; its application in active and passive systems allows the use of waste energy, peak load shifting strategies, and rational use of thermal energy [2]. Advantages of using TES in an energy system are the increase of the overall efficiency and better reliability, but it can also lead to better economics, reducing investment and running costs, and less pollution of the environment and less CO<sub>2</sub> emissions [3].

Storage concepts applied to the building sector have been classified as active or passive systems [4]. Passive TES systems can enhance effectively the naturally available heat energy sources in order to maintain the comfort conditions in buildings and minimize the use of

Download English Version:

<https://daneshyari.com/en/article/6731366>

Download Persian Version:

<https://daneshyari.com/article/6731366>

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