ENERGY AND ENVIRONMENTAL TECHNOLOGIES

DARWIN-PCM is a disruptive dynamic thermal system that allows building envelopes to modify their thermal properties

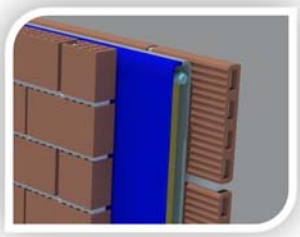

Figure. DARWIN-PCM System

BUSSINESS OPORTUNITY

Looking for a license agreement

IP RIGHTS

Spanish patent filed

PCT application submitted

TAGS

Building Architecture, Energy and Resources, Heating, Refrigeration, Thermal Structure

INTERESTING LINKS

Operating principle

https://youtu.be/IbSkvUKIaxs

Outdoors

https://youtu.be/ILS_yJkXpLU

Indoors

https://youtu.be/I9JlkbUpQLk

CONTACT

Valuation and Transfer Unit (UViT) of the University of Lleida

R&D Support Office

C/ Jaume II, 67 bis, 3rd floor

25001 – Lleida

Tel: +34 973 003 708

rdi.valoritzacio@udl.cat

MORE TECHNOLOGIES AT:

Technology portfolio

A DYNAMIC THERMAL SYSTEM FOR REDUCING ENERGY DEMANDS IN BUILDINGS

THE TECHNOLOGY

The invention DARWIN-PCM consists of a **dynamic thermal system to be used in buildings** to **minimize their energy consumption for space heating and cooling**.

The invention can be implemented in any sort of building envelope including walls, floors, roofs, fenestrations, and doors. It is composed of several layers of materials, one of them is mobile and contains a material with capacity to absorb and release high amount of heat - such as phase-change materials (PCM).

An example is the use of the DARWIN-PCM system as a façade structure. During the day, the PCM layer is exposed outdoors to capture and store solar radiation, whist by night it is placed indoors to release the absorbed energy to provide comfort to occupants. This system works cyclically and allows the building to optimize its bioclimatic behaviour.

THE MARKET NEED

The world's buildings accounted for 40% of global final energy use and 33% of all greenhouse gas (GHG) emissions. Under business-as-usual projections, use of energy in buildings globally could double or even triple by 2050.

In the Energy Roadmap 2050, the EU has set itself a long- term goal of reducing greenhouse gas emissions by 80- 95%, when compared to 1990 levels, by 2050.

ADVANTAGES

- **Significant energy savings**: When compared against conventional static systems with or without PCM, the DARWIN-PCM reduces dramatically the energy demand both on winter and summer.
- **Envelope as space heating and cooling supplier**: DARWIN-PCM changes the age-old concept that building envelopes have to be designed to act as a thermal barrier and protect indoor spaces from outdoor conditions.
- **Offers unique aesthetic and commercial options**: When implemented in glazed systems, the movable layers can be coloured and distinguished between parts with and without PCM.

APPLICATIONS

This structure is ideally a physical separator between the interior and exterior of the building. However, this building envelope structure could be used totally or partially in walls, floors, roofs, fenestrations, and doors.

LEVEL OF DEVELOPMENT

The technology has successfully achieved an experimental proof of concept (TRL 3).

The concept and potential of the dynamic PCM construction system has been tested and evaluated using an experimentally validated numerical model. The numerical proof of concept showed the high potential of this technology to reduce energy consumption for both space heating and cooling applications.