Acronym – PRESTO

Title - Phase Change Materials for Energy Saving and Building Thermal Comfort

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Department – Department of Architecture and Arts

ERC sector – PE11

Principal Investigator – Simona Barison

Organization of PI – Consiglio Nazionale delle Ricerche (National Research Council)

Iuav role – partner

Duration – 24 months

Start – 28/09/2023

Closure – 27/09/2025

Project budget – € 320 180.00

Iuav budget – € 100 425.71

Funding to Iuav – € 66 425.71

Source of funding – MUR (Ministry of University and Research) - Call PRIN 2022

Description – The energy efficiency of building components can be enhanced by investigating the synergies among materials, such as among insulating materials (IMs), as standard polyurethane, building elements based on geopolymers (GP), and phase change materials (PCMs), which can store thermal energy. This would allow obtaining new composites capable of improving the thermal comfort in buildings and in general reducing the buildings energy consumption.

The idea of PRESTO project is based on developing and optimizing sustainable composite materials with PCM dispersed in both insulating and structural building elements to combine thermal insulation with thermal fluctuation reduction. The development of composites including carbon micro- or nanostructures will also be investigated to evaluate the possibility of obtaining materials capable of simultaneously absorbing infrared (IR) radiation and storing thermal energy.

Objectives – This project is aimed at increasing the thermal inertia of building components by proposing new composite materials. With this aim, the latent heat thermal energy storage (LHTES) is becoming increasingly attractive for space heating and cooling of buildings. By shifting the peak load away from the peak hours of electrical demand using PCMs, the peak load may be reduced and divided throughout the day, reducing the energetic costs

Relying on the foundations described, the idea of PRESTO project is based on two main objectives:

- to develop IM/PCM composites with polyurethane and GP/PCM composites with sustainable geopolymer and testing their chemico-physical properties and their capability to increase the thermal storage capacity of the building elements;

- to test some carbon micro- or nano-structures as additives to improve thermal inertia by increasing the effective thermal conductivity of the building components by absorption of radiative energy.