STBA
SUSTAINABLE TRADITIONAL
BUILDINGS ALLIANCE

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CALECHE (Coherent, Acceptable, Low Emission Cultural Heritage Efficient renovation)

CALECHE
CARING FOR OUR BUILT HERITAGE SUSTAINABLY PRESERVED

Funded by the European Union

Summary

Background – Horizon Heritage

HORIZON-CL5-2022-D4-02-03 Call requests: Sustainable and resource-efficient solutions for an open, accessible, inclusive, resilient and low emission cultural heritage: prevention, monitoring, management, maintenance, and renovation. Projects should meet the objectives of the Built4People Partnership, to use open science to "accelerate people-centric innovation in the built environment [in] the transition towards a sustainable society and economy."

Heritage buildings demonstrate their sustainability through cultural value and by having lasted far longer than many more recently built ones. However, they are commonly perceived as falling short in operational energy and carbon performance, making retrofit to modern standards of insulation and air-tightness a priority. For new low- energy buildings, it makes sense to start "fabric first", not least because a building's fabric tends to be the most difficult thing to change later. In heritage buildings, the materials, details and finishes have also acquired cultural significance, while standard retrofits can threaten durability – for example increasing the occurrence of damp and subsequent fabric failure, and reducing resilience to the impacts of climate change. Measurements in heritage buildings also commonly reveal significantly lower energy use than predicted: perhaps because they follow patterns of construction that predate the easy availability of energy. The Horizon EU Call recognises the need for careful consideration when developing effective strategies for energy and carbon savings in heritage buildings, in order to maintain their character, and to prevent compromising their technical performance and future resilience.

People-centered "soft" renovations

Our people-centric innovation proposal will reverse the conventional perspective. Instead of working inwards from the building's envelope and fabric, it works outwards from the occupiers, considering:

- Comfort: To what extent are standards socially and culturally determined? What makes sense in the context of
  health, energy sufficiency and the climate emergency? Is there too much stress on controlling air temperature?
- Physiology and medicine: What do these tell us? Thermal variation is shown to improve fitness and health.

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- Original building elements: What measures have we lost that were commonly used in the past to make us more
comfortable? As well as shutters, blinds and awnings, sash windows and the like, people also screened against
draughts and radiant gains and losses, corresponding with what we understand of thermal physiology.

- Occupant involvement: Clothing and furniture (which may also be heated and cooled) can greatly improve
comfort at little or no energy cost. We also know occupants are more comfortable when they have direct agency.

- Reversible minor alterations to the building, its services and controls that can deliver significant energy
improvements with no risk and little input of energy and carbon.
We will consider how soft measures can be used individually or together, in order to empower occupiers to make significant improvements rapidly, cheaply and at little or no risk. Some have historical precedents predating the age of fossil fuels, and still in evidence in vernacular buildings and in the Global South. Others are exciting new and emerging technologies. In appropriate contexts, these can provide safe and healthy indoor environments, and allow renovation to be quicker, cheaper and less carbon-intensive than conventional solutions. This permits rapid scaling-up to the entire built environment beyond heritage and will reduce the capacity, cost and disruption of any required low-carbon technologies for any residual space conditioning requirements. While some modern heritage buildings may require more substantial alterations, they could also benefit from a people-first approach.

- **The outcomes**
In addition to the knowledge and insights gained, the principal outcome is a decision support system for building owners, occupiers and managers, including a user-friendly App. This will help people identify strategic options for soft renovation; point them to appropriate techniques, technologies and practices (including changed expectations and habits); and identify implications for health, comfort and life-cycle cost, energy and carbon. It will draw attention to technical risks (e.g. in relation to moisture management) and how these may be mitigated. It will also identify control and management measures required for the new items, and for the original building and systems.
This approach allows us to start with all types and periods of heritage building (including those valued for social or cultural reasons, but not necessarily having statutory protection) and narrow down to suit the particular context. Apart from any technical limitations, options available will depend on the opportunities and constraints of a particular setting. Our support system will ask such questions as:

  • What different ways are occupants using the space? What does that mean for their comfort needs?

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• Is there a dress code? The widest range of opportunities will tend to be available to owner-occupiers in their
own rooms in their own dwelling; the narrowest in, say, a museum. Are personal comfort systems practicable?

• What control do the occupants have over the changes they can make? There will be tighter constraints in
rented buildings, where there is third party management, and as the number of people in a space increases. • For heritage buildings, what constraints are imposed by statutory requirements? Are further constraints
imposed by the building's character, significance and values, together with its construction and materials?

Work programme and related field studies

In addition to desk and laboratory studies, the project's core is field studies where researchers collaborate closely with owners, occupiers and managers of suitable buildings, permitting knowledge transfer in both directions. An important study partner is Ukraine, where the acute energy crisis is encouraging rapid experimentation by local people in all types of building. The studies are loosely divided into 3 phases over three heating and cooling seasons: PHASE 1 – EXPLORATION, with committed people in their dwellings and offices. This will run alongside laboratory studies on the performance of promising options, both individually and combined, co-creating the solutions. PHASE 2 – TESTING. The prototype decision support system will be tested in a wider range of settings, with larger but committed organisations. The work will include training professionals and laypersons to support wider rollout. PHASE 3 – SCALING. The final decision support system would be applied and evaluated more widely, spreading out into more organisations and a wider range of building types.

Dissemination

Our initial consultations reveal considerable interest in this approach, no doubt heightened by the current energy cost crisis and wider appreciation of the climate emergency. If the outcomes prove effective (we strongly think they will) we believe the approach could spread virally between individuals and organisations (for example, membership organisations including community groups, property consortia, and heritage bodies). This will be carefully managed to involve a diverse range of players, sectors and climates across the EU and beyond.