

VALUE PROPOSITION

Expression of interest for topic HORIZON-CL5-2026-09-D4-01

Researching the technical, social & economic factors impacting the energy performance of Smart Buildings

HORIZON-CL5-2026-09-D4-01

Type: Research & Innovation Action

Opening: 05 May 2026

Deadline: 15 September 2026



CREDENTIALS

CSTB is the French Scientific and Technical Center for Building. Its main mission is to ensure the quality and safety of buildings. It brings together multidisciplinary skills to develop and share essential scientific and technical knowledge covering construction products and buildings, and their integration into neighborhoods and cities. It guides stakeholders in the cycle of innovation from idea to market and supports the transformation of the construction sector in the context of the digital, environmental and energy transitions. The CSTB focuses on five key activities: research and expertise, evaluation, certification, testing and dissemination of knowledge.

CSTB's POTENTIAL CONTRIBUTION TO PROPOSAL

Acceptability evaluation

- CSTB can develop specific methodologies to assess the acceptability of energy-related smart building solutions, including:
 - State-of-the-art review on IEQ, user behaviour and acceptance models (e.g. Technology Acceptance Model)
 - Definition and operationalisation of acceptability dimensions
- CSTB can work on evaluating and quantifying acceptability by:
 - Collecting and harmonising multi-source data (perceptions, behaviours, IEQ, energy performance)
 - Developing a composite acceptability index for smart solutions
- CSTB can contribute to robust and scalable methodologies by:
 - Testing and comparing results across buildings and user groups
 - Supporting harmonised approaches at European level for energy transition

Appropriation of digital innovations

- Based on its multidisciplinary methodology (sociology, psychology, design) elaborated the last couple of years to foster adoption and appropriation of digital innovations in the construction industry, CSTB can design a specific methodology including:
 - Identifying and understanding users' goals independently of technological tools
 - Acknowledging real usage situations based on observation
 - Establishing organisational diagnostics
 - Identify barriers to adoption, including those over which stakeholders have no control.

Socio-economic impacts

- CSTB can bring its expertise to analyse the socio-economic impacts of energy-related smart solutions, including:
 - Impact on property value and potential gentrification processes
 - Identification of inequalities related to energy poverty
- CSTB can work on evaluating affordability and economic conditions by:
 - Estimating the cost of smart energy installations
 - Assessing their share in household energy budgets
- CSTB can provide insights on adoption dynamics by:
 - Identifying economic barriers and drivers through qualitative surveys
 - Analysing social acceptability across different household profiles

Socio-technical analysis

- CSTB can develop approaches to quantify socio-technical energy performance, including:
 - Measurement of the social performance gap between designed and actual energy performance
 - Linkage between energy data and user practices
- CSTB can analyse user diversity and behaviour by:
 - Studying interactions between socio-demographic groups and smart technologies
 - Developing socially differentiated models of technology use
- CSTB can identify key socio-technical mechanisms by:
 - Analysing barriers, trust, control and real usage practices
 - Revealing inequalities in access, control and benefits of smart solutions

Users' perceptions of built environments

The PULSE laboratory could be applied for several tasks:

- Characterization of perceptions of existing technical solutions
 - Structured on-site surveys.
 - Analysis of user experiences in relation to environmental conditions.
- Pre- and post-implementation evaluation of smart-building solutions
 - Comparative measurements over multiple time periods.
 - Analysis of solution effectiveness and evaluation of their performance in use
 - Simple and clear progress indicators.
- Longitudinal monitoring of performance over time
 - Measurement campaigns spanning several months or seasons.
 - Early detection of deviations (performance indicators).

Data Hub

Continium can serve as the essential **digital backbone enabler** for this topic by bridging the gap between raw building data and the complex socio-technical research required to understand user behavior. By functioning as a centralized data repository that harmonizes heterogeneous sources into a semantically coherent representation, Continium can integrate real-time data from IoT and sensors with qualitative social data (such as age, financial status, and educational background) through the power of linked data.

This unified environment allows researchers to move beyond isolated technical metrics and perform deep behavioral analytics, correlating energy use and building performance directly with the specific needs and interactions of diverse demographic groups. Furthermore, by acting as a digital twin that supports the generation of material passports and links to digital product databases, Continium can provide a transparent, traceable record across the whole-life cycle—from design and construction to circular re-use—ensuring that smart building solutions are not only technically optimized but also socio-economically sustainable and inclusive.

CSTB ASSETS FOR HORIZON-CL5-2026-09-D4-01's OBJECTIVES

Continium is a centralized data repository supporting building's lifecycle data, storing data from documents, engineering tools, and sensors/devices. It brings different input data, coming from heterogeneous sources and format to the same semantic coherent representation using linked-data. It functions as a digital twin for engineering tools and building exploitation providing necessary input data for calculations. Additionally, Continium assists in generating material passports, linking to digital product passport-based databases, enhancing material traceability and sustainability

The **PULSE laboratory** develops methodologies based on the analysis of users' perceptions of built environments through specific questionnaires, physiological measurements, and analyses combined with environmental data.

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