

EUROPEAN CONSTRUCTION OBSERVATORY

Policy Fact Sheet



PAN-EUROPEAN

EBENTO - Energy efficiency Building Enhancement through performance guarantee Tools

Building Block C: Enabling framework

Overview

<b>What</b>	EBENTO is a pilot initiative that tests a digital One-Stop-Shop (OSS) designed to accelerate residential energy retrofits by providing tailored guidance, data-driven insights, and streamlined support to households.
<b>Who</b>	ETRA INVESTIGACION Y DESARROLLO SA (Lead implementing partner) together with nine partners
<b>For whom</b>	Households, building residents, technology providers, public actors, beneficiaries at the local level.
<b>When</b>	1 October 2022 – 30 June 2026
<b>How</b>	Total cost: € 5,605,687.50, with an EU Horizon Europe contribution of € 4,785,562.50

Innovation scale



Transferability



Summary

<b>Key Features</b>	<ul style="list-style-type: none"> <li>• <b>Innovative Energy Performance Contracting for energy retrofits</b> using an integrated OSS designed to guide households.</li> <li>• <b>Strong local partnerships</b> with pilot implementation in multiple EU municipalities, technical partners, and citizens ensuring collaboration between policy, technology, and community.</li> <li>• <b>Market stimulation</b> for the green transition, resilience, competitiveness, skills, and innovation in the construction ecosystem.</li> </ul>
<b>Strategic Goals</b>	<ul style="list-style-type: none"> <li>• Create an <b>integrated digital OSS</b> for building renovation and Energy Performance Contracting.</li> <li>• <b>Demonstrate and integrate new business models</b> and cutting-edge technologies for energy performance guarantees.</li> <li>• <b>Empower citizens</b> as key actors in the energy transition.</li> <li>• <b>Improve decision making</b> for EU's climate and energy goals through smarter, more efficient building data.</li> </ul>
<b>Broader Impact</b>	<ul style="list-style-type: none"> <li>• <b>Enhances energy efficiency</b> of the EU building stock.</li> <li>• Strengthens citizens' role in the energy transition.</li> <li>• <b>Reduces complexity</b> and <b>increases uptake</b> of retrofits and EPCs.</li> <li>• <b>Enhances comfort</b>, indoor environmental quality, and overall living conditions.</li> <li>• <b>Provides scalable, replicable models</b> tested across diverse European cities, enabling broader EU-wide application.</li> </ul>

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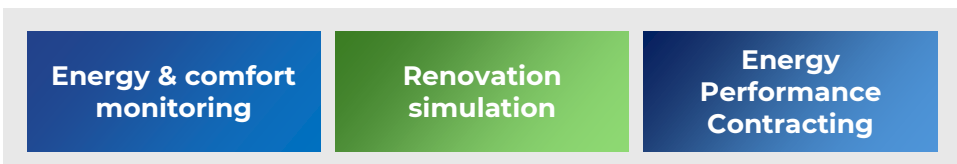
# Project Description

**EBENTO provides clear evidence that residential energy renovation becomes more attractive when technical tools, contracts, and performance data are brought together in one simple platform (One-Stop-Shop). The initiative shows that energy service renovation contracts can reduce financial risk, improve occupant comfort, and deliver measurable energy savings when linked to real monitoring data. This makes EBENTO a practical and replicable model for scaling up energy-efficient renovation across Europe.**

At its core, EBENTO develops a digital One-Stop-Shop (OSS) that supports households, public authorities, and market actors throughout the entire renovation process, from planning to monitoring results. Its aim is to offer energy efficiency building enhancement through performance guarantee tools. It is funded by Horizon Europe with EUR 4.7 million under the Built4People initiative.

EBENTO is implemented by 11 partners from 7 countries (Figure 2). The OSS offers three key functions (Figure 1): monitoring energy use and comfort through sensors, using Building Information Modelling (BIM) to simulate renovation options and impacts, and managing a novel model of Energy Performance Contracts and Guarantees (Box 1). By connecting these tools in one place, EBENTO reduces complexity, builds trust in performance outcomes, and helps homeowners to move more confidently from decision to renovation.

Figure 1: Key functions of the OSS



In addition to its technical contributions, EBENTO strengthens the wider construction value chain. It achieves this by creating dialogue between those involved in the renovation of buildings, including households and building owners, public authorities, Energy Service Companies (ESCOs) and construction firms, technical experts, technology providers, financial institutions, and energy communities. Operating across several EU municipalities, EBENTO enhances the coordination and management of household energy renovations with a public private partnership (PPP) model. In this model, municipalities and cities set the strategic framework for building renovation programmes, ensuring alignment with local climate objectives and citizen engagement. Private ESCOs are responsible for delivering renovation works and performance-based monitoring solutions. Technology providers support implementation by deploying sensors and digital tools to enable data collection, monitoring, and verification. By centralising contracts, monitoring data, and decision support, fragmentation and transaction costs are reduced. Moreover, centralisation enables more efficient management of renovation projects, and it increases trust and replicability across different local contexts. Through its four pilot projects, the project team mobilises an extensive network of stakeholders (Figure 2).

Figure 2: EBENTO's implementing partners and four pilots



Box 1: Energy Performance Contracting: Embedded in an OSS

**Deployment of a new, fully integrated Energy Performance Contracting (EnPC) model with comfort guarantees and demand-response features**

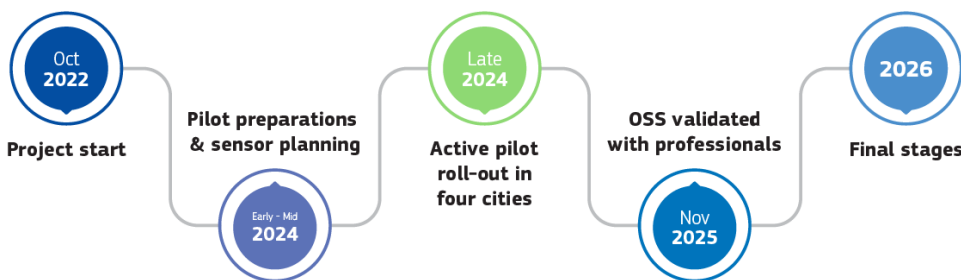
A central intervention of EBENTO is the development and deployment of a next-generation EnPC model. EnPC is fully embedded within its digital OSS. This intervention modernises renovation contracting by integrating comfort guarantees (e.g., indoor air quality, stable indoor temperatures, wellbeing-supportive lighting) directly into performance obligations. This transforms comfort into a measurable, contractually binding outcome. It also adds demand-response capabilities, enabling buildings to interact with the energy system by shifting consumption to times when electricity is cheaper and cleaner. This makes renovations smarter and more cost-efficient, while enhancing user experience and resilience. The new EnPC approach is paired with transparent monitoring, accountable verification processes, and clear role delineation. This clarity address a long-standing barrier in renovation markets: the lack of trust in promised savings. By combining this with digital monitoring, smart energy management, and tailored financing schemes, EBENTO introduces an intervention that reshapes how renovation projects are designed, procured, evaluated, and lived in.

# Progress Overview and Future Trajectory

## Current status

EBENTO began in October 2022, with pilot preparations and sensor planning carried out through early-mid 2024. Pilot roll-out took place in late 2024, followed by the validation of the OSS with professionals in November 2025. EBENTO is currently in its final stages, consolidating evidence from the pilots, finalising tools and frameworks, and preparing its outputs for wider replication and policy uptake.

Figure 3: EBENTO's timeline



## Outcomes

EBENTO has delivered a set of concrete outcomes that demonstrate the effectiveness of its **tools and approaches** across the four pilot municipalities. The results have also been reported by the HORIZON Europe program.

- **Four pilots** have been fully deployed and operational: Stakeholders were able to jointly test new renovation processes and tools in real conditions. This provides the consortium with data across different building typologies and local governance settings.
- **The OSS tool has been validated with energy renovation professionals:** 16 professionals participated in a [workshop](#) in Valencia to validate EBENTO's OSS platform. They confirmed high user acceptance, highlighting the interface's intuitive design and suitability for daily tasks, particularly for client management, project monitoring and BIM integration. Results have been documented in official Horizon Europe project [reports](#). This validation confirms the OSS as a functional, user-ready component for replication.
- **Long-term monitoring of energy and comfort in buildings has been established:** Pilot buildings were equipped with atmospheric sensors capturing temperature, humidity, and CO<sub>2</sub> levels. The resulting datasets (not yet published) will provide high-quality evidence on indoor conditions and building performance. These support more accurate modelling, better renovation planning, and future research on comfort and energy efficiency.
- **A next-generation EnPC framework** has been developed: Traditional performance contracts treat comfort (e.g., good indoor air quality, stable temperatures, healthy humidity levels) as a by-product. EBENTO includes comfort in the EnPC as a binding performance output. Integrated comfort guarantees and demand-response capabilities have been structured, tested, and refined through pilot activities.

## Impact

As the project is in its final stages, EBENTO's impacts on modernising the planning, financing and managing renovation projects can already be identified (Figure 4).

Figure 4: Key impacts



1. The innovative performance contracts enhance the overall maintenance of buildings and wellness of occupants. The introduction of proactive monitoring and predictive maintenance routines helps identify equipment faults early, reduce downtime, and extend the lifetime of key systems such as Heating, Ventilation, and Air Conditioning (HVAC) and lighting. This transforms renovation from a purely technical intervention into a **wellness-centred, high-performance service** that delivers measurable improvements in occupants' daily living conditions.
2. The OSS has **improved the amount of knowledge and quality of advice for citizens** on the actions that need to be carried out, linked to their EnPC. Citizens and end-users were involved in the entire tool development process, which increased acceptance and willingness to use the tool. It was highlighted by the stakeholders involved in the Valencia pilot project that the increased social awareness of energy efficiency and renovation benefits has increased among residents and local stakeholders due to the connection with comfort, energy performance and value of renovation.
3. Through the renovation measures, residential building projects were able to **participate in flexibility markets** that enabled them to generate additional revenues. These mechanisms enabled households and building owners to benefit financially from demand-response services and peak-shaving by curtailing their electricity consumption or optimising their energy use through the next-generation EnPC model. By integrating comfort guarantees and smart-control features into the renovation package, EBENTO created additional value streams, such as lower, long-term maintenance costs, making deep renovations more attractive and economically viable for residents.

## Next steps

The final steps of the project will focus on consolidating pilot datasets into a unified evidence base to extract robust conclusions. These efforts will equip municipalities and renovation actors with clear, validated insights to support replication and sustain momentum beyond EBENTO's lifetime.

# Challenges and Conclusions



## Challenges

EBENTO demonstrated strong progress across its pilots, yet several challenges have been identified in [reports](#) and from first-hand accounts of involved stakeholders.

Deploying long-term monitoring systems in homes requires technically demanding sensor installations, careful integration, and consistent data flows. These efforts revealed valuable lessons on improving the [reliability of monitoring infrastructure](#). Stakeholders involved in the modelling cited that the twin-building approach (insulated vs. non-insulated) generated meaningful comparative insights but also showed the need to expand monitored variables (such as occupancy) to strengthen the precision of future analyses.

[Financing](#) emerged as another key challenge during a HORIZON programme [workshop](#): outside of EBENTO's pilots, no dedicated EU funding is currently available to support such renovation models. EBENTO demonstrates the need for proactive creation of sustainable financing pathways that match the project's innovative potential.

Stakeholders from Valencia's pilot also underscored the importance of [building skills for new technologies and digital tools](#). This is an area with strong potential to boost local capacity, create jobs, improve implementation quality, and accelerate uptake by renovation actors.

Finally, [regulatory barriers](#) surfaced across municipalities and regions, as identified in the HORIZON workshop. Although regulatory sandboxes could help fast-track innovation, their purpose and benefits are not yet widely communicated or leveraged. Regulatory processes currently evolve much more slowly than technological and digital innovation, especially in the construction and renovation sectors. Addressing this gap represents an important opportunity to better align policy frameworks with the pace of market and technological progress.



## Conclusions

While OSS solutions remain relatively immature across the EU (and can be complex for end-users), EBENTO demonstrates that meaningful progress is possible when digital tools are co-developed with local actors and tested in real-world conditions.

The initiative created a practical, user-oriented OSS that architects, contractors, and homeowners can rely on. This reliability comes through features such as transparent monitoring, pre-renovation simulation, and the integration of renovation offers and suppliers. Stakeholders from the pilots also highlighted that digital OSS tools are useful, but many residents still need personalised support or an intermediary to guide them through the process.

Interviewees indicated that users are more likely to adopt digital solutions initially accompanied by a trusted agent, after which they can interact with the tools independently.

The EBENTO initiative demonstrates high innovativeness due to its integrated digital OSS, which combines EnPC preparation, BIM-based simulation, and real-time monitoring, features rarely unified in existing renovation support tools. This technological integration, along with its novel comfort-guarantee EnPC model, positions the project at the forefront of digital renovation services. Despite strong pilot performance, transferability is moderated by practical barriers that would need to be considered in the future: uneven municipal capacity, fragmented local renovation ecosystems, differing regulatory environments for EnPCs and comfort guarantees, limitations in digital readiness (BIM, data availability), interoperability challenges with existing municipal systems, and the need for sustained funding to operate digital and monitoring components.

Finally, the pilots showcased that the EnPC model works well for multi-unit buildings but remains harder to apply to single-family units or individual homes, where ESCOs struggle to see a viable business case.



## Recommendations

Similar initiatives can use the lessons learnt from EBENTO's implementation. Specifically, anonymising datasets from the project and making them openly available to the public could contribute greatly to further research on the topic. [Next steps for the OSS](#) could include expanding functionalities, validating the EnPC model in additional contexts, and strengthening collaborations with local authorities and community organisations to support broader market uptake.

[Bringing in a financing partner from the outset](#) would have been helpful to communicate with the financiers throughout the project. Further, convening various financing tools on the OSS could create long-standing impact.

Expanding the approach to additional municipalities could improve the quality and quantity of data, strengthen transferable lessons, and increase the potential for replication in other regions. This could help in creating a more supportive environment for energy-efficient buildings.

Stakeholders shared that knowledge and know-how around renovation, monitoring, and innovative contracting models remain "locked" among a small group of actors. Their experience shows that [broader communication, clearer guidance, and frequent sharing of good examples](#) are essential to scale uptake, particularly given the trust required from homeowners when sharing sensitive building and occupancy data.

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