STAR*track Webinar Innovative Solutions for Affordable Housing

Organised by:

Nobatek

ECTP INNOVATIVE BUILT ENVIRONMENT

WORLD GREEN BUILDING COUNCIL

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Featuring:

FORTESIE

DeCO2

sincere building stories

STAR*track
A Built4People Project

Agenda

- Welcome from STAR*track
- Affordable Housing Initiative
- Q&A
- DeCO2 project presentation
- SINCERE project presentation
- FORTESIE project presentation
- Q&A
- Closing

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B4PIC Built4People Innovation Cluster

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Built4People

B4PIC Built4People Innovation Cluster

Welcome from STAR*track

STAR*track short presentation

Claudia HUNZIKER KELLER,
Head of European Affairs

Lise RAYNAUD,
European Project Manager

Liza RANDRIANARIJAONA,
Assistant European Project Manager

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What is STAR*track ?

STAR*track : **S**upport and networks **T**o **A**ccelerate the construction and **R**enovation innovation **track** to market

STAR*track is a three years **Coordination and Support Action** (CSA) project funded by the European Union under Horizon Europe (HE) within the B4P Partnership running from May 2024 to April.

STAR*track aims at **expanding the Built4People Innovation Cluster** (B4PIC) network developed in the **HE project NEBULA** and at strengthening and supporting B4PICs & their members to deliver sustainable & people-centric innovation and accelerate their uptake by regional value and supply chains.

Coordinator: NOBATEK

Duration: 36 months, from May 2024 to April 2027

Website: https://built4people.eu/startrack-project/

Follow us on social medias: #STARtrackB4P

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A Built4People Project

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STAR*track Consortium

Led by : Nobatek

DTU

eurac research

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

R-NANO

ZAG

ZAVOD ZA GRADBENIŠTVO SLOVENIJE

SLOVENIAN NATIONAL BUILDING AND CIVIL ENGINEERING INSTITUTE

EBETAM IRTEC

Innovation experts

BUILD:INN
BASQUE CONSTRUCTION CLUSTER

ICONS. CLÚSTER DE LA INDUSTRIALIZACIÓN DE LA CONSTRUCCIÓN DE NAVARRA

odéys

Emerging B4PICs

WE BUILD DENMARK

e-CODOMH
Cluster for Efficient and sustainable Construction, buildings & infrastructure.

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metabuilding

Construction platforms/associations

WORLD GREEN BUILDING COUNCIL

ECTP
INNOVATIVE BUILT ENVIRONMENT

GATE 21

FEDERCOSTRUZIONI

CONSULTANTS & SMEs

Dowel innovation

ecowise

Public entities

EUROREGION EUROESKUALDEA EURORREGIÓN

RÉGION Nouvelle-Aquitaine

STAM
MASTERING EXCELLENCE

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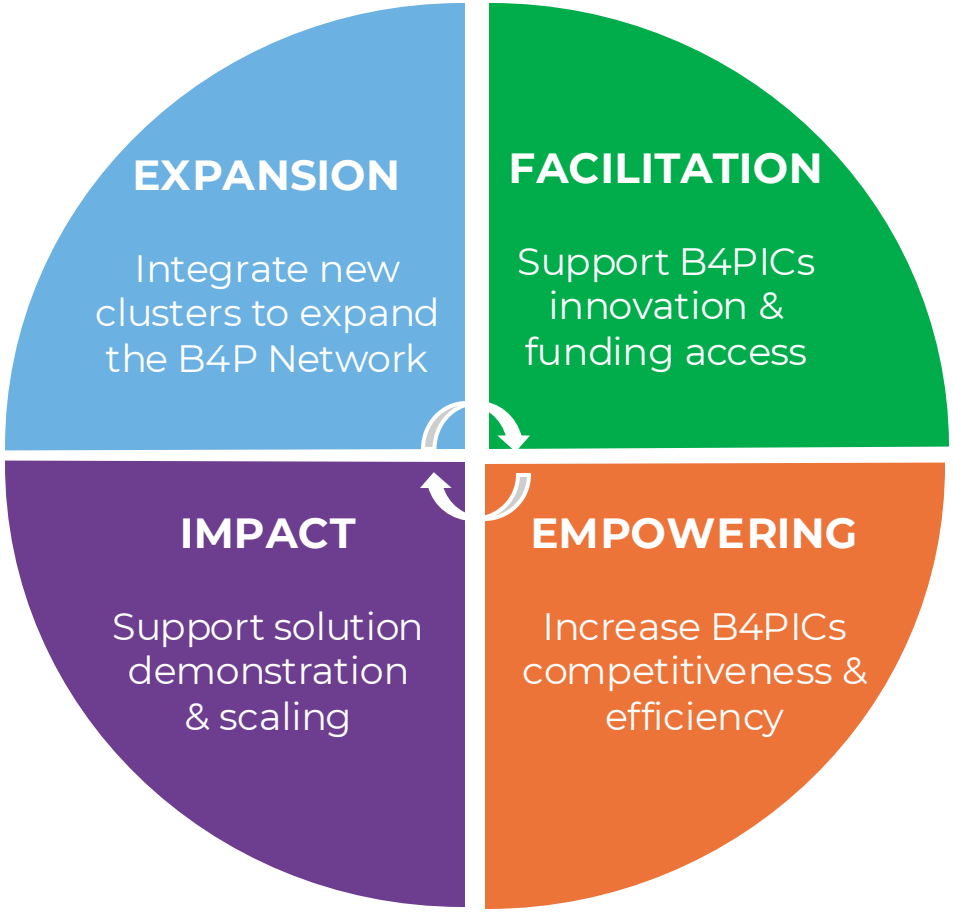
STAR*track impact & objectives

STAR*track aims to **accelerate the market uptake of innovation for the Build Environment sector** by following these development lines :



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B4PIC Network : ecosystem of innovation & best practice

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EXPANSION
Integrate new B4PICs to cover all EU member states

Develop regional ecosystems that support innovation and business growth

Foster, exchange & collaboration between B4PICs at regional & national levels

NEB Advisors group providing guidance on application of NEB concepts in the Build Environment

Collaborate with other sectors to build joint roadmaps to tackle climate issues

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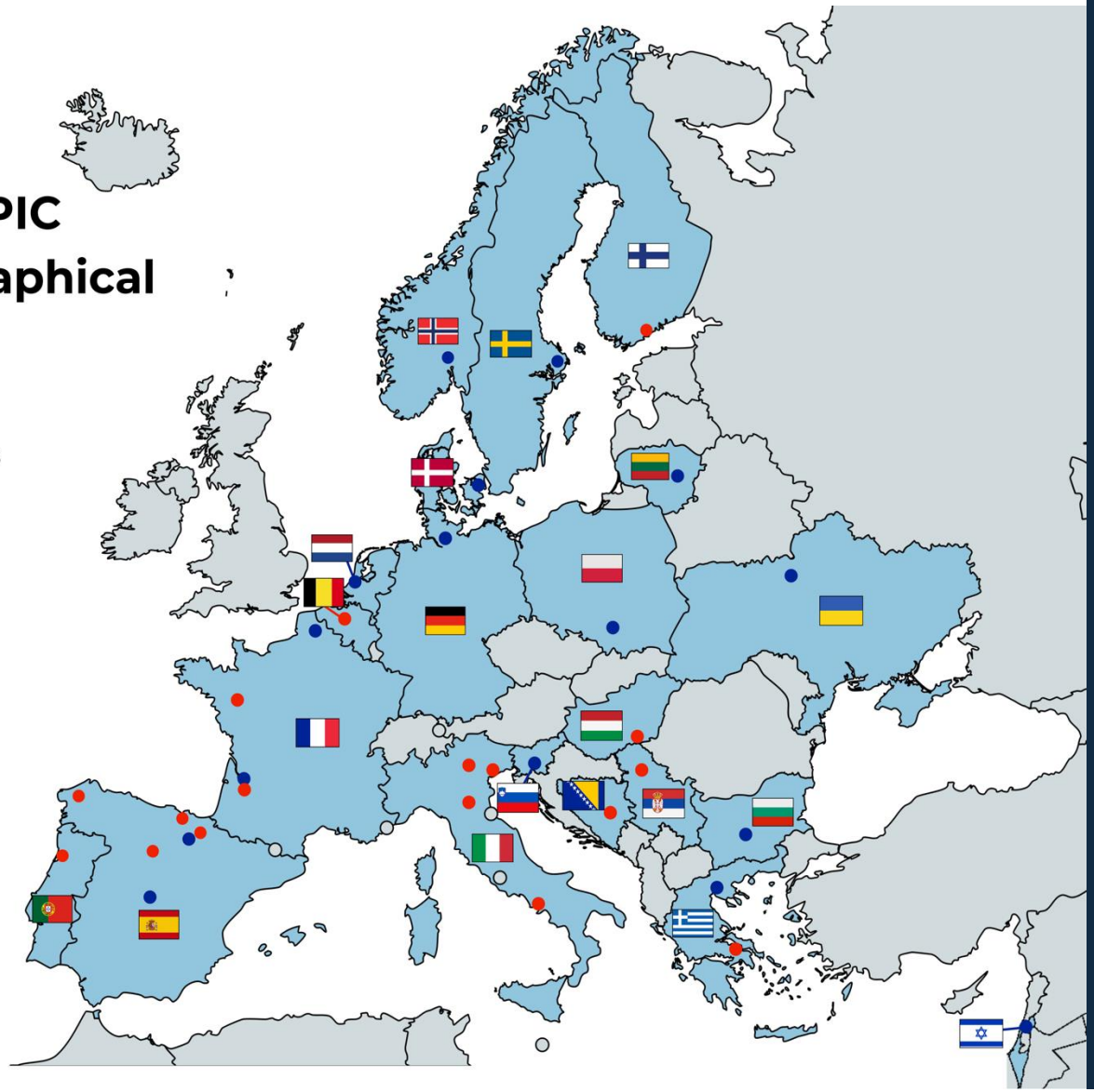
B4PIC network: state of play

The current B4PIC Network geographical coverage

- Prospective B4PICs
- Emerging B4PICs



B4PIC network is growing

21 European countries

34 B4PICs

- 18 Emerging B4PICs
- 16 Prospective B4PICs

as of 1st September 2025

[Learn about the B4PIC Network here !]

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Enabling Conditions : Digital platform & innovation training

FACILITATION
Support B4PICs innovation & funding access

Connection to EU-wide innovation ecosystem on Metabuilding platform.

Training for B4PIC managers/members on innovation process & available innovation support.

Visibility for R&D results coming from B4P projects to accelerate market adoption.

Provide guidelines and training on sustainable finance opportunities.

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Technology watch on innovative products & solutions on Metabuilding platform

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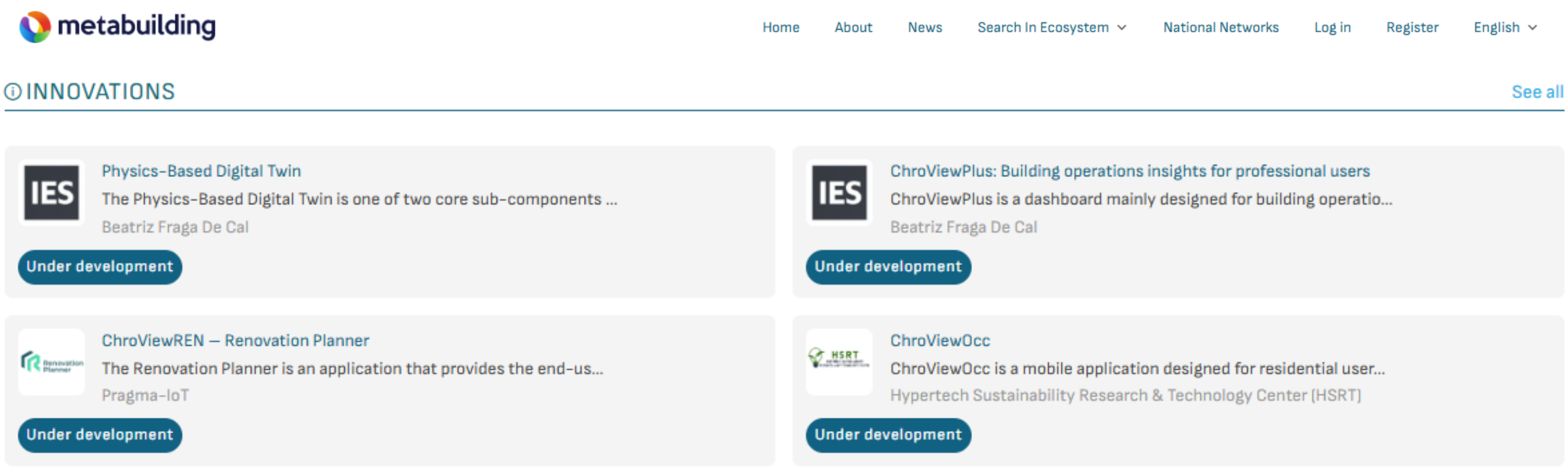

Learn more about innovative products & solutions on the metabuilding platform !

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Support to accelerate product development & market transfer

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EMPOWERING
Increase B4PICs competitiveness & efficiency

Tool to rapidly assess innovation maturity of products and solutions under development

Direct access to innovation and testing experts assisting with product development via Open Innovation Testbeds

Identification & access to demonstration sites to test innovations in real-life buildings

Knowledge on upcoming EU regulations and national requirements with respect to innovative products and solutions

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3 Open Innovation Testbeds (OITBs) engaged in the STAR*track project

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Access to services and experts to test materials & products in building envelopes

Demonstration site locator - Search buildings for piloting activities

metabuilding labs

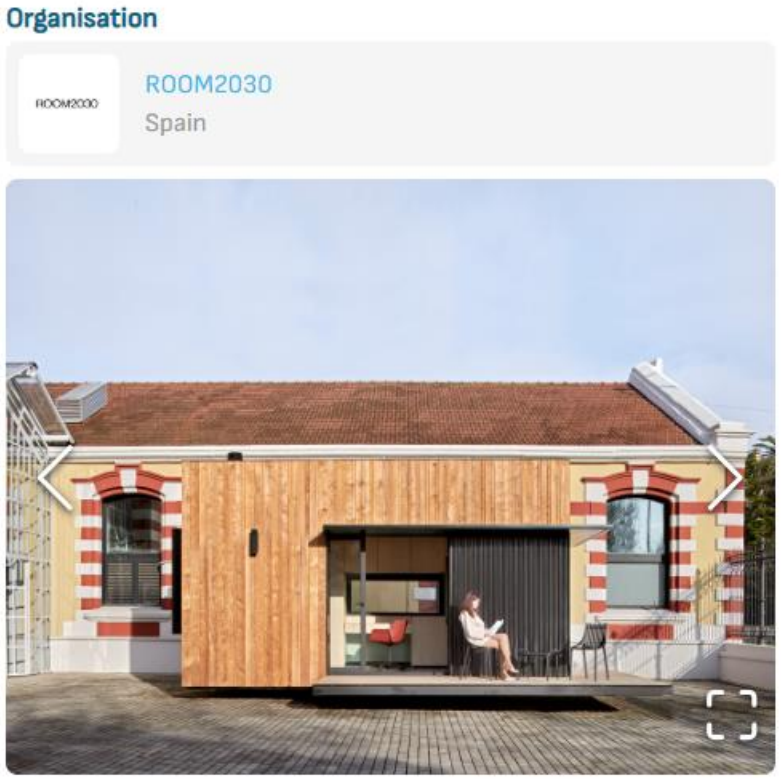
www.metabulding.com

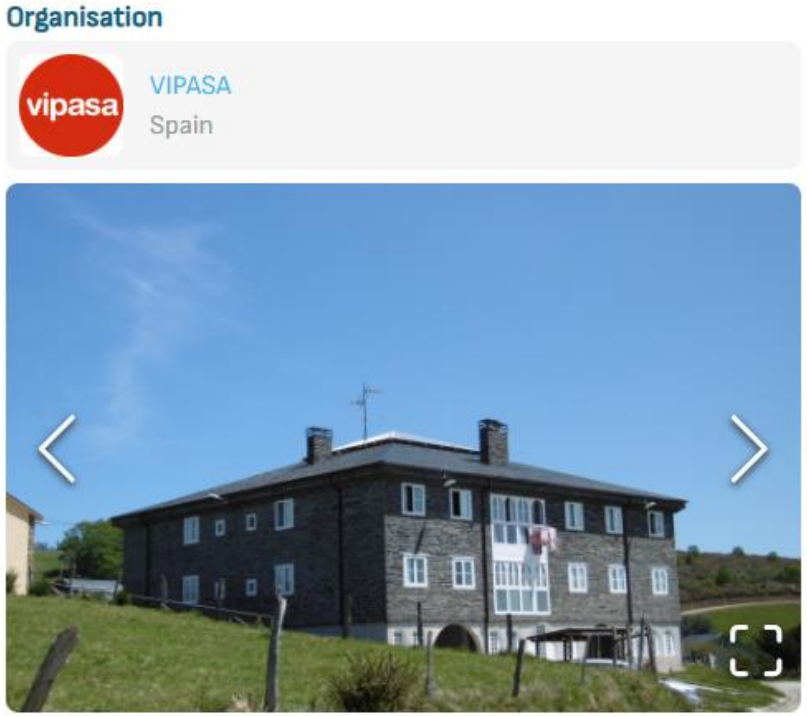
MEZEROE

www.mezeroe-platform.eu

iCLIMABUILT

www.iclimabuilt.eu





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Sustainable Investment & market development

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IMPACT
Support solution demonstration & scaling

EU Innovation Finance Forum and guidelines to reduce investment risks with respect to innovation

Training on EU Taxonomy & knowledge on private financing to lower barriers for product developers

Find distributors & promote uptake of innovative product & solutions in new EU-markets

Recommendations for policy makers on accelerated uptake of innovation through green public procurement

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Reduce investment risk and access to private financing

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EU INNOVATION FINANCE FORUM

Built4People

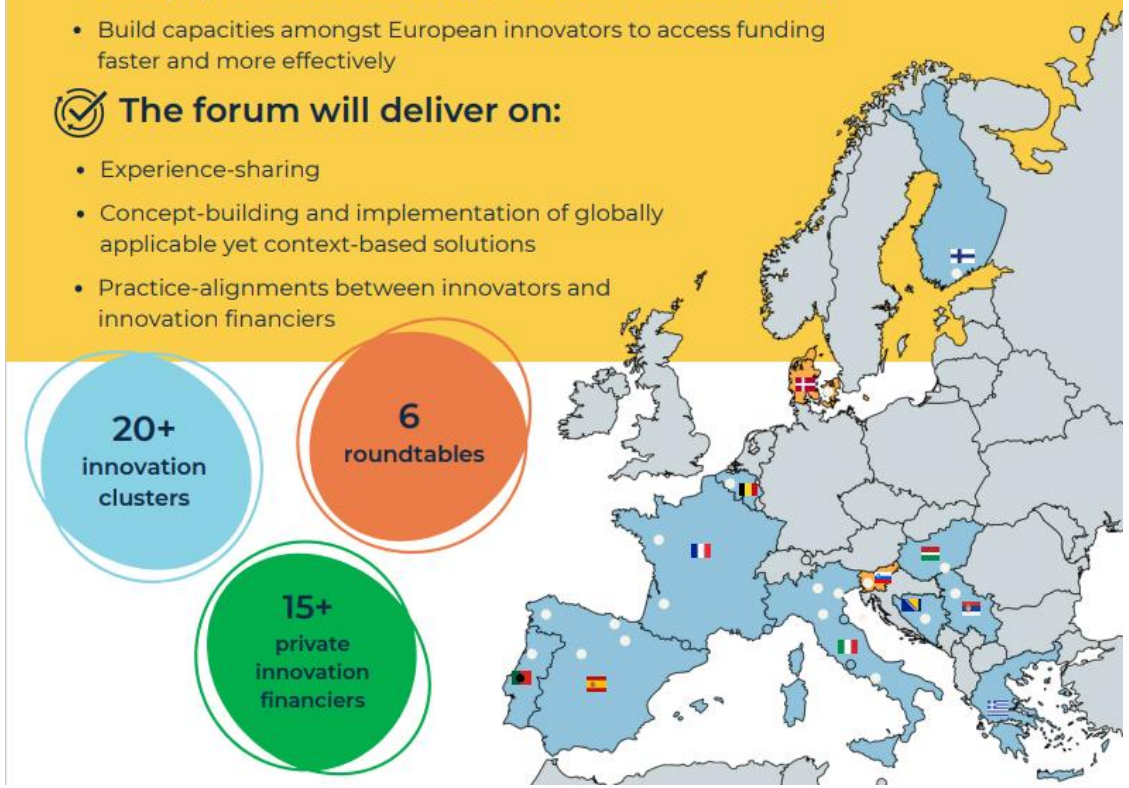
Unlocking private innovation finance in clean tech and new business models in our buildings to increase EU competitiveness.

The forum aims to:

- Reduce financing risks for innovation in green buildings, materials and services leveraging the Clean Industrial Deal, InnovationFund and InvestEU
- Build capacities amongst European innovators to access funding faster and more effectively

The forum will deliver on:

- Experience-sharing
- Concept-building and implementation of globally applicable yet context-based solutions
- Practice-alignments between innovators and innovation financiers



5 Roundtables planned with different topics :

- **November 2025** — **Data and digitalisation:** Solutions for smart, network-ready buildings
- **February 2026** — **Scalable modular green construction:** Prefabrication – modular construction - 3D printing – robotics & co-botics
- **May 2026** — **The retrofitting challenge:** new business models and solutions to retrofit the existing building stock into future-proofed resilient and decarbonised buildings
- **September 2026** — **Circular value chains:** Products and services for the re-use of building components and materials
- **November 2026** — **Green materials:** Financing innovation and the production of green cement, concrete, steel

Resilient buildings: Future-proofed buildings, climate risk assessment and reduced water consumption

Bio-based and nature-based solutions: Seeking and financing of products

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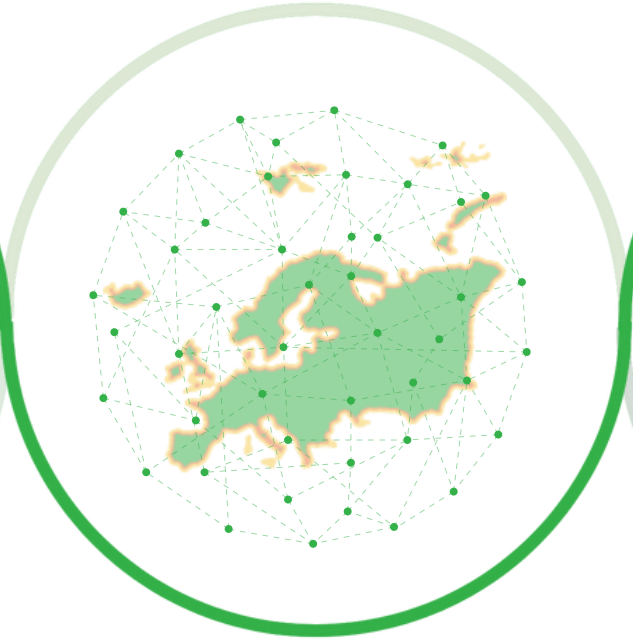
What does STAR*track offer to you and your members?

STAR*track → B4PIC managers

Better knowledge on **finance regulation** & **available funding**

Access to a **community of interest** and best practice



Trainings and tools to support **impactful innovation**

Skills and knowledge to **increase members competitiveness**

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What does STAR*track offer to you and your members?

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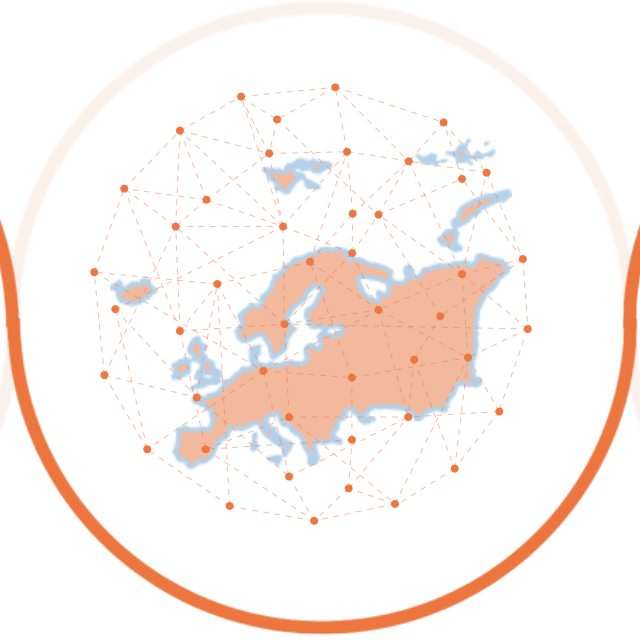
STAR*track/B4PIC Managers → B4PIC Members

Access to **additional funding** for product development & demonstration

International visibility for products & services and access to European markets



Knowledge on innovation process and **access to tools & innovation experts**

Knowledge on EU policies providing strategic advantage & improved competitiveness at EU level

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Learn more about STAR*track !

Visit the STAR*track website for more information

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Affordable Housing Initiative

Nerea Gómez Morán
Project & Policy Officer - ECTP

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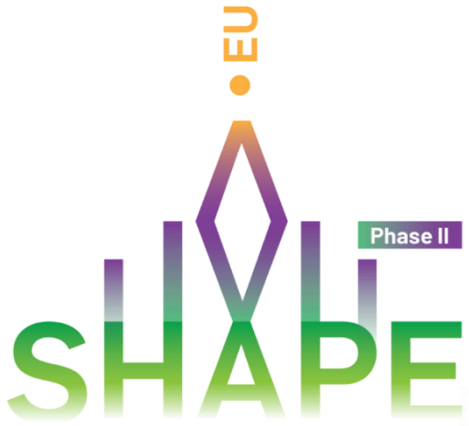
SHAPE European Affordable Housing Consortium

SHAPE Affordable Housing Initiative European Partnership

Affordable Housing Initiative

European Affordable Housing Consortium



Affordable Housing Initiative European Partnership

Co-funded by the European Union

Affordable Housing Initiative - Context

The renovation wave:

- *supports new investments over a sustained period, starting with public and less efficient buildings;*
- ***spurs digitalisation and creates employment and growth opportunities** across the renovation supply chain.*

As part of this strategy, the Affordable Housing Initiative:

- *works to make sure social and affordable housing facilities also benefit from the renovation wave;*
- *guarantee local social and affordable housing projects' access to necessary technical and innovation capacity and project support by:*

Piloting 100 lighthouse renovation and construction districts with a smart neighbourhood approach focused on energy efficiency, liveability and innovation, also providing blueprints for replication to support other projects across Europe;

Mobilising cross-sectoral project partnerships and linking them to local actors, such as social economy entities, SMEs active in the construction or renewable ecosystems, local authorities and bodies, housing associations, investors and civil society;

Promoting efficient access and use of innovative processes such as circular and modular building, production of renewable energy & engagement models to empower residents and local communities

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What happened in Phase I?

European Affordable Housing Consortium

Co-funded by the European Union

The European Affordable Housing Consortium, SHAPE-EU project has received funding from the European Union's Single Market Programme under Grant Agreement no. 101069909

European Affordable Housing Consortium (SHAPE-EU)

In 2022, ECTP and 9 committed partners were tasked by the European Commission with the **take-off of the European Affordable Housing Initiative** to:

- create a rich and diverse capacity-building programme providing a set of tools on **how to renovate homes for people and have a strong social impact on communities;**
- Invite peers with solid experience to meet and share in detail their renovation path.

The **European Affordable Housing Consortium** provided support to:

- meet the targets of the renovation wave aimed at affordable housing;
- deliver lighthouse renovation districts that include innovative features.

By providing **useful and reliable information** to:

- Housing providers;
- SMEs;
- Social enterprises;
- Public authorities;
- Suppliers.

HOUSING EUROPE

ECTP INNOVATIVE BUILT ENVIRONMENT

EUROCITIES

ENERGYCITIES

GNE FINANCE

TU Delft

legacoop ABITANTI

L'UNION SOCIALE POUR L'HABITAT

VVH Vereniging van Vlaamse Huisvestingsmaatschappijen

Co-funded by the European Union

The European Affordable Housing Consortium, SHAPE-EU project has received funding from the European Union's Single Market Programme under Grant Agreement no. 101069909

What happened in SHAPE-EU?

3 Blueprints with tried and tested approaches:

- answering questions on how to plan and implement innovative renovations that leave no one behind
- helping public, cooperative, social housing providers, SMEs, and cities to answer their questions on the following topics:
  - *Project implementation and financial feasibility*
  - *Technology and digital applications*
  - *Social inclusiveness and liveability*

22 Supported districts from different corners of Europe that received tailored support for their renovation project.

13 Mentors helped local actors improve their renovation projects in one-to-one sessions.

4 Study visits helped about 40 public, cooperative, social housing providers, cities, and SMEs to understand from peers how projects have come to life.

A Funding Simulator that provides a snapshot of existing public and private finance that can be used for renovation projects at the district level.

450+ engaged housing providers, cities, SMEs through conferences and trainings.

→ More information at **https://shape-affordablehousing.eu/**

Co-funded by the European Union

The European Affordable Housing Consortium, SHAPE-EU project has received funding from the European Union's Single Market Programme under Grant Agreement no. 101069909

What will happen in Phase II?

Affordable Housing Initiative
European Partnership

Co-funded by
the European Union

The Affordable Housing Initiative European Partnership, SHAPE II is receiving funding from the European Union's Single Market Programme under Grant Agreement no. 101191186.

Affordable Housing Initiative European Partnership (SHAPE II)

Composed of 6 partners from different sectors, and building on their previous experience and resources, the **Affordable Housing Initiative European Partnership will foster the new construction or regeneration of social and affordable neighbourhoods**, by supporting organisations across Europe through a tailored and comprehensive learning programme (**Accelerator Programme**), which encompasses:

- financial and technical advisory,
- mentorship,
- study visits,
- and joint capacity building events (online classes, workshops, seminars, and webinars).

Underpinned in peer-to-peer sharing, the programme is designed to empower organisations with the knowledge, skills, and resources **to develop holistic and sustainable approaches that:**

- address **energy poverty**,
- promote **social inclusion**,
- ensure newly built or renovated housing units remain **affordable, innovative and inclusive**,
- and **reduce residential building-related greenhouse gas emissions**.

Support Reference Points *

Co-funded by the European Union

The Affordable Housing Initiative European Partnership, SHAPE II is receiving funding from the European Union's Single Market Programme under Grant Agreement no. 101191186.

What will happen in SHAPE II?

Support 35 Lighthouse Districts across Europe to showcase innovative housing renovations, providing tangible examples of success.

Host practical workshops to enable direct exchanges of best practices and solutions.

Offer tailored seminars for public, cooperative, and social housing providers, SMEs, and local authorities, focusing on integrated housing strategies.

Organise study visits to EU neighbourhoods, demonstrating effective technologies and methodologies.

Deliver online classes and webinars on renovation techniques, financing, and energy efficiency for EU experts.

Engage the renovation community in-person and online to exchange knowledge.

More information at **https://shape-affordablehousing.eu/**

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The Affordable Housing Initiative European Partnership, SHAPE II is receiving funding from the European Union's Single Market Programme under Grant Agreement no. 101191186.

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Q&A

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DeCO$_2$

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Dynamic Decarbonisation Pathways Framework Integrating Technological, Social, and Policy Innovations for Sustainable Renovations in the Built Environment

Filippos Anagnostopoulos
IEECP

Co-funded by the European Union

Grant Agreement No: 101147781

DeCO2 envisions a circular and sustainable decarbonised future for the European built environment

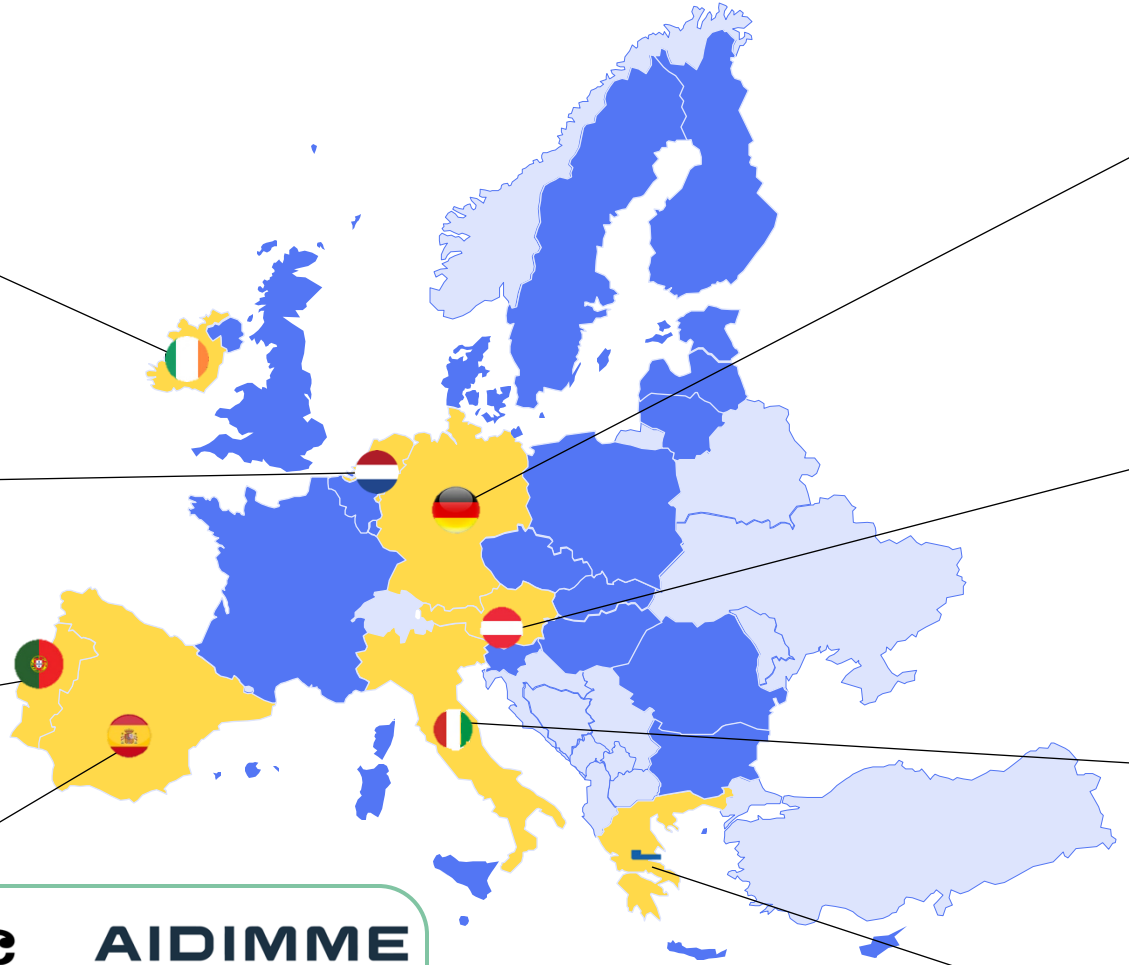
17
PARTNERS

7 EU
COUNTRIES

48
MONTHS

3
DEMOS

€7 M
FUNDING



TUS
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LUIMNIGH & AN CHLÁIR
LIMERICK & CLARE
Education & Training Board

IEECP
INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY

WSOLVE

NOVA IMS
Information Management School

cemosa
Ingeniería y Control

Iaac

AIDIMME
Technology Institute

IVE
Instituto Valenciano de la Edificación

CoCircular

Ajuntament de Castelló

3L

Fraunhofer
IBP

IG TERRASSENHAUS

Wegener Center

UNI GRAZ

wasp

pwc

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DeCO2 Project Scope

The project aims to improve the energy efficiency, circularity and sustainability of the built environment. DeCO2 will apply integrated approaches that demonstrate, in practice, achievable pathways for decarbonisation of the building stock.

Aim

*This **means developing and integrating***

*-new **design techniques** allowing for deconstruction and reuse;*

*-new products and **components** that can be **dismantled and reused**;*

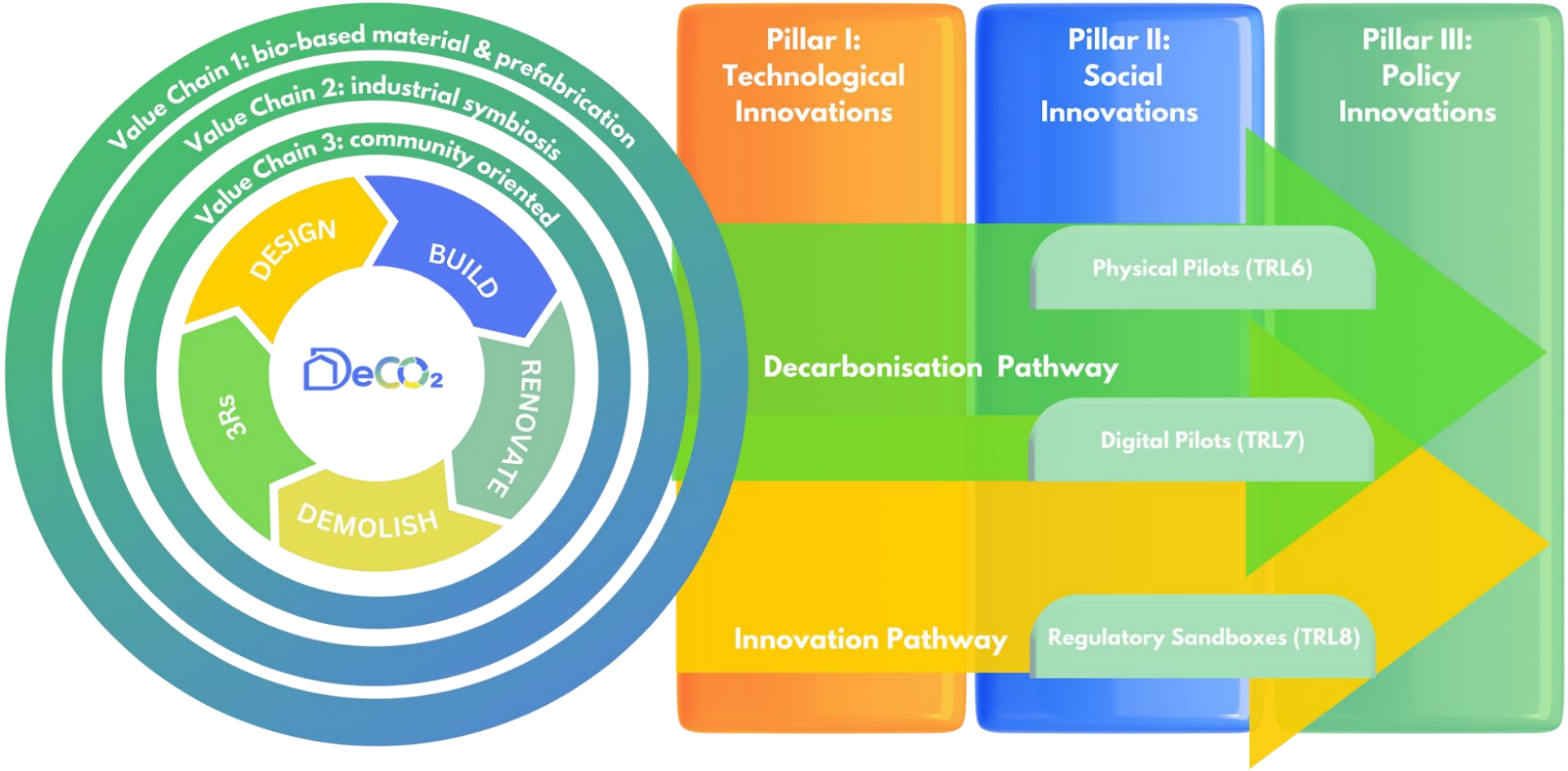
*-new **products** and components for construction works that **incorporate reused and recycled elements** and materials.*

Innovations

The demonstration sites deploy and test technologies and enabling conditions through a ***value chain approach*** in:
planning, design, budgeting, procurement, construction practice, insurance, and related administrative and regulatory processes.

Demos

DeCO2 Structure



DeCO2 Project objectives

The project aims to improve the energy efficiency, circularity and sustainability of the built environment.

O1: Implement circular and technological innovations towards the decarbonization of the built environment, integrating new eco-friendly and recyclable material, cutting-edge digital manufacturing techniques and novel data-driven pathways across the value chain in three large-scale demonstrators.

O2: Foster **social innovation by people-centred and inclusive participatory process activities** for the development, implementation and post-occupancy assessment of sustainable renovation solutions.

O3: Promote policy innovation by providing practical guidelines to public authorities and policy makers on how to implement decarbonisation pathways, highlighting the challenges and enabling conditions to overcome them.

O4: Demonstrate the effectiveness and viability of innovative digital solutions, low disruptive construction and retrofitting processes on three physical demo cases.

O5: Access the **scalability and replicability of the demonstrated built environment decarbonization pathways for wider adoption**, by deploying innovative solutions across three Living Labs.

DeCO2 Project innovations

Technological innovations

- New design techniques allowing for **deconstruction** and optimization of secondary **material reuse**, **3D printing** with recycled/excavated materials.
- New products and components for construction works made of **bio-based materials** (e.g., use of plant-based adhesives).
- **Material passport** and traceability.
- Construction **database** with LCA indicators construction price bank, evolution of the prices of materials and BIM catalogue of constructive elements.

Social innovation

- Living Labs (LLs) as a real-world testbed where fast-tracking sustainable renovation solutions are implemented, evaluated, and showcased, while also informing replication strategies, influencing policies, and fostering community engagement and learning.

Policy innovation

- **Reduce time to market** through the adoption of **regulatory sandboxes** and innovation testing and certification, ensuring compliance with industry standards and enabling a faster path to market.

Demo 1: Limerick City, Ireland (TUS)

- Bio-based fully recyclable composites
- Mycelium and breathable adhesives to sequester carbon
- Green roof testing integrating various waste products and green vegetation
- Circular and cost-effective way for scalability
- Practical retrofitting and circular guidelines for the construction industry and building owners (TUS & Fraunhofer IBP)

Demo 2: Castelló Municipal Library, Valencia, Spain (IVE)

- A circular ecosystem involving two buildings: a historical library in the city of Castellón under renovation as a material supplier, and an experimental building to be constructed on the UPV campus.
- Library for controlled dismantling
- Digital Twin
- Material Passport library
- Innovative recycled construction products
- Mosaic floor and 3D-printed walls made from ceramic
- Regulatory sandbox

Demo 3: Graz-St. Peter, Austria (UGR)

- Terrassenhaussiedlung (THS) in Graz, Austria represents participatory residential architecture of post-war modernism
- A multifaceted system with roof gardens and terraces provides 530 private owned apartments within four buildings situated around a car-free courtyard
- 4 buildings in exposed concrete construction 8-14 storeys
- 530 apartments of various sizes
- Multiple planted roof gardens and terraces
- Car-free inner courtyard with an underground car park
- Policy, regulatory and community-based piloting scenarios will be carried out

DeCO2 Regulatory sandboxes & satellites

Limerick Council City, Ireland
Improving regulatory sandboxes in the city of Limerick. Focus on all pillars.

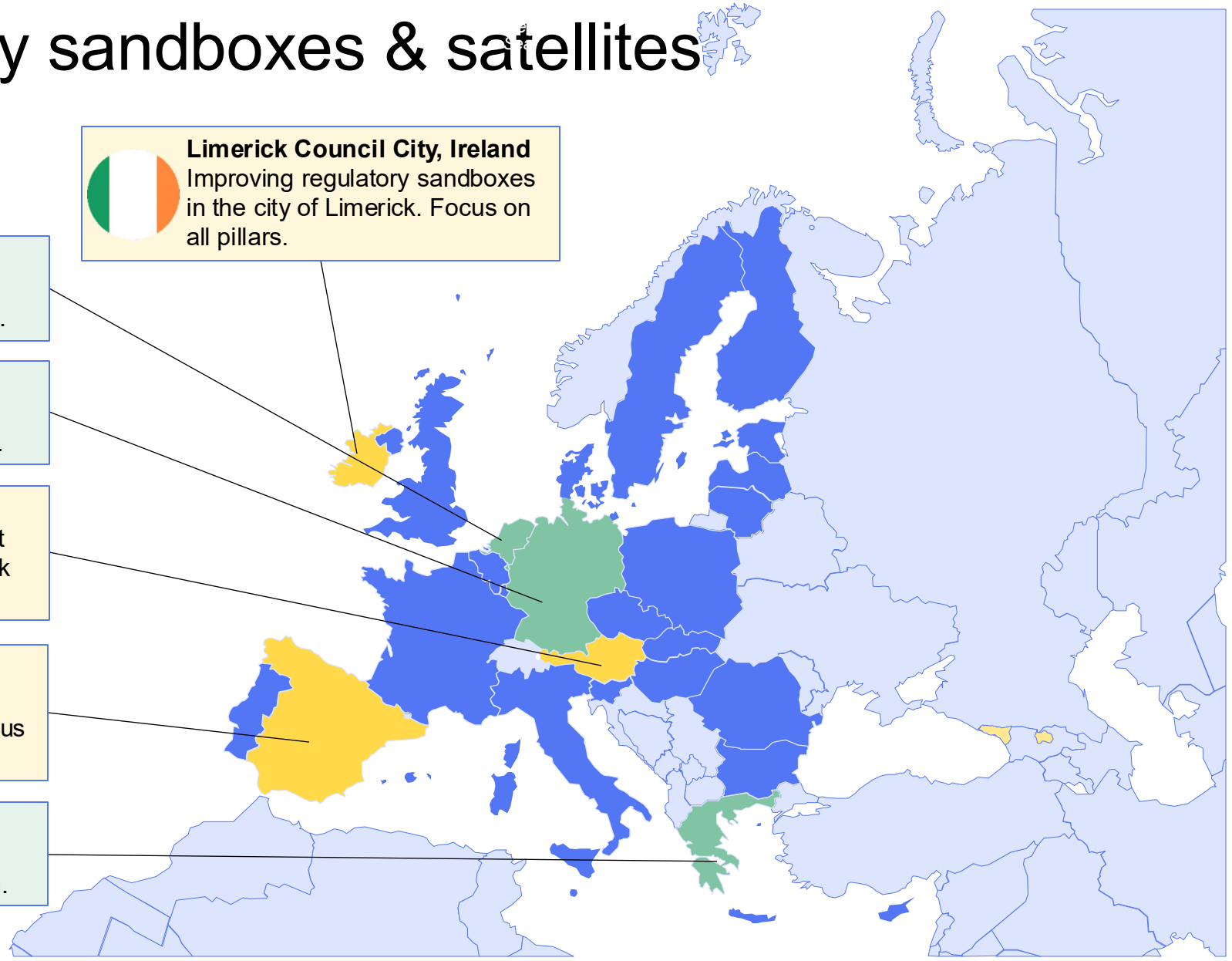
Satellite, The Netherlands
Circular materials mapping for DeCO2 potential dissemination.

Satellite, Germany
Circular materials mapping for DeCO2 potential dissemination.

Graz, Austria
Involves a social acceptance approach at the local community and residential block level. Focus on Pillars 2 & 3.

Castellon Municipality, Spain
Involves the set-up of the first regulatory sandbox in the Valencia Community. Focus on all pillars.

Satellite, Greece
Circular materials mapping for DeCO2 potential dissemination.



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DeCO2 selected KPIs

- **10 innovative solutions for the sustainability of the built environment value chain,** using circular materials and techniques will be demonstrated in demo cases: circular & bio-based prefabricated systems, ceramic robotic recycling, 3D printing with recycled materials, bio-based insulation materials and plant-based adhesives, SLA and FDM 3D printing of bio-based prefabricated products.
- **7 innovative services/technologies** developed and demonstrated in demo cases: material passports & traceability solutions, BIM-based building digital twins, toolbox of circular information access technologies, regulatory sandboxes, building scanning/analysis & material database, GOM 3D scanning survey methodology of existing building elements, and a dynamic ecosystem incubator to leverage stakeholders and resources.
- **3 Living Labs** (LLs) established within the built environment to create more sustainable, resilient, and people-centred renovation solutions: Limerick, Graz, and Valencia
- **Over 100 stakeholders** engaged in co-creation process, **over 100 households** engaged towards sustainability and **200 AEC professionals** (architectural, engineering and construction) trained and informed through workshops, webinars, regulatory sandboxes and LLs.

DeCO2 Project key results

- Increased number of options for built-environment **decarbonization pathways towards zero-emission buildings** considering the whole value chain at local or regional level.
- Increased **engagement and participation of the whole value chain in local and regional innovation clusters.**
- **Reduced time from first demonstration to market** of sustainable renovation solutions.
- **Increased awareness and improved access at a local or regional level** to information on construction products for reuse and circular businesses.
- Creation of **new business opportunities with reduced risk for investment in the circular economy.**

DeCO2 contribution to the build4 people objectives

A. Develop holistic solutions in a systemic approach
The Dynamic Decarbonization Pathways Framework integrates technology, policy, and social innovations using digital twins and collaborative design methods to address the built environment's full lifecycle.

B. Demonstrate overall performance in the life-cycle perspective
Life Cycle Assessment tools will assess environmental impacts in Living Labs in Limerick, Graz, and Valencia validating lifecycle improvements in energy and material efficiency for real-world application.

C. Demonstrate clean energy transition potential
Digital twins and energy efficiency technologies accelerate the shift to clean energy, supporting scalable renewable integration and optimising real-time building energy use.

D. Demonstrate sector decarbonization pathways
Sector-specific decarbonisation is demonstrated in urban Living Labs through tailored solutions, supported by policy-aligned innovation roadmaps and real-world decarbonisation strategies.

E. Demonstrate sustainable, circular business and value chain
The project promotes circularity (e.g. through Product-as-a-Service models) and engages value chain actors, aiming for reduced resource use and waste across sustainable renovations and products.

F. Demonstrate affordability and cost-effectiveness
Cost-benefit analyses within Living Labs and standardisation efforts ensure affordability, making scalable energy solutions more viable for widespread adoption.

G. Demonstrate no trade-offs on economy, comfort, health, functions, cultural heritage
Heritage-sensitive renovations in Graz maintain cultural integrity, while technology integration improves indoor health, comfort, and efficiency without compromising essential building functions.

Thank you

Filippos Anagnostopoulos - filippos@ieecp.org
IEECP – Institute for European Energy and Climate Policy

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SINCERE

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The Second Life of Modern Period Architecture

Resilient and adaptive renovation towards net-zero carbon heritage buildings

SINCERE's approach and technologies towards sustainable renovation, inclusive, and climate-resilient housing

Ioannis Karatasios, E. Tziviloglou

Institoute of Nanoscience and Nanotechnology
NCSR Demokritos - (Project Coordinator)

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Facts about EU buildings stock

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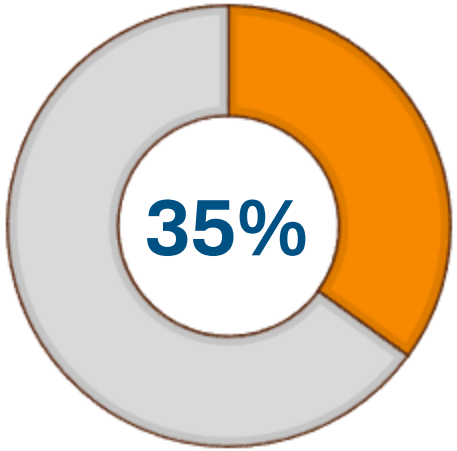
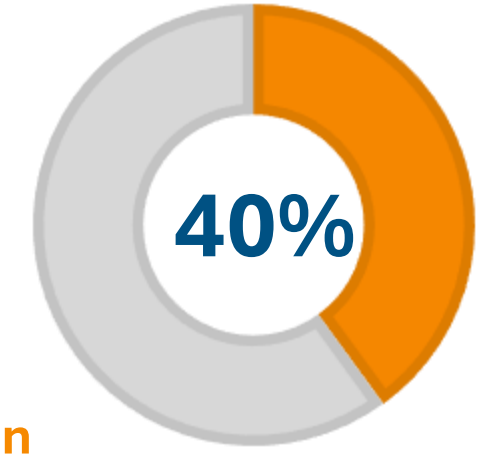
all existing buildings should be transformed into **zero-emission buildings** by 2050

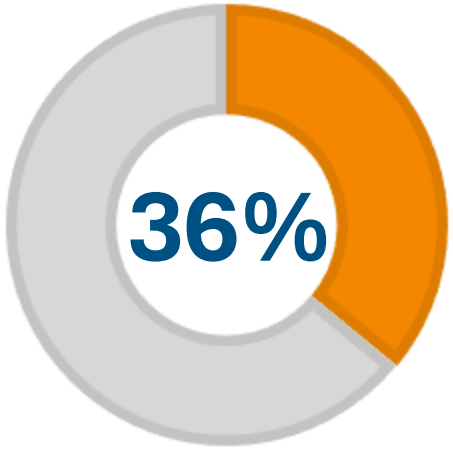
% over 50 years old



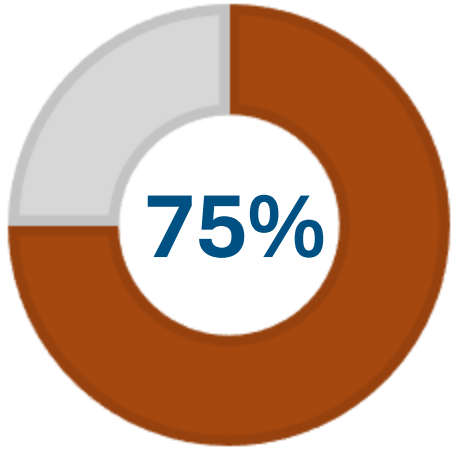
% of EU energy consumption



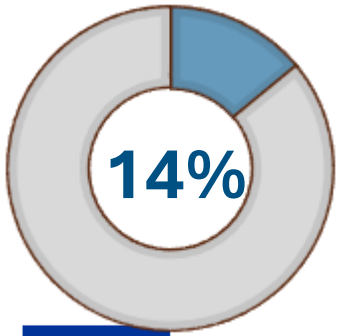
% of energy-related greenhouse gas emissions



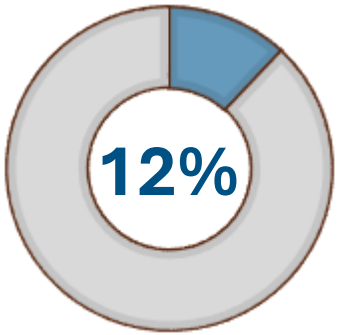
% of energy inefficient buildings



% before 1919



% between 1919-45



Sources: Energy Performance of Buildings Directive (EPBD)
A. Troi, International Conference Energy Management in Cultural Heritage, 2011
F. Ascione et al, Energy Procedia, 140 (2017), pp. 194-206

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SINCERE scales & phases

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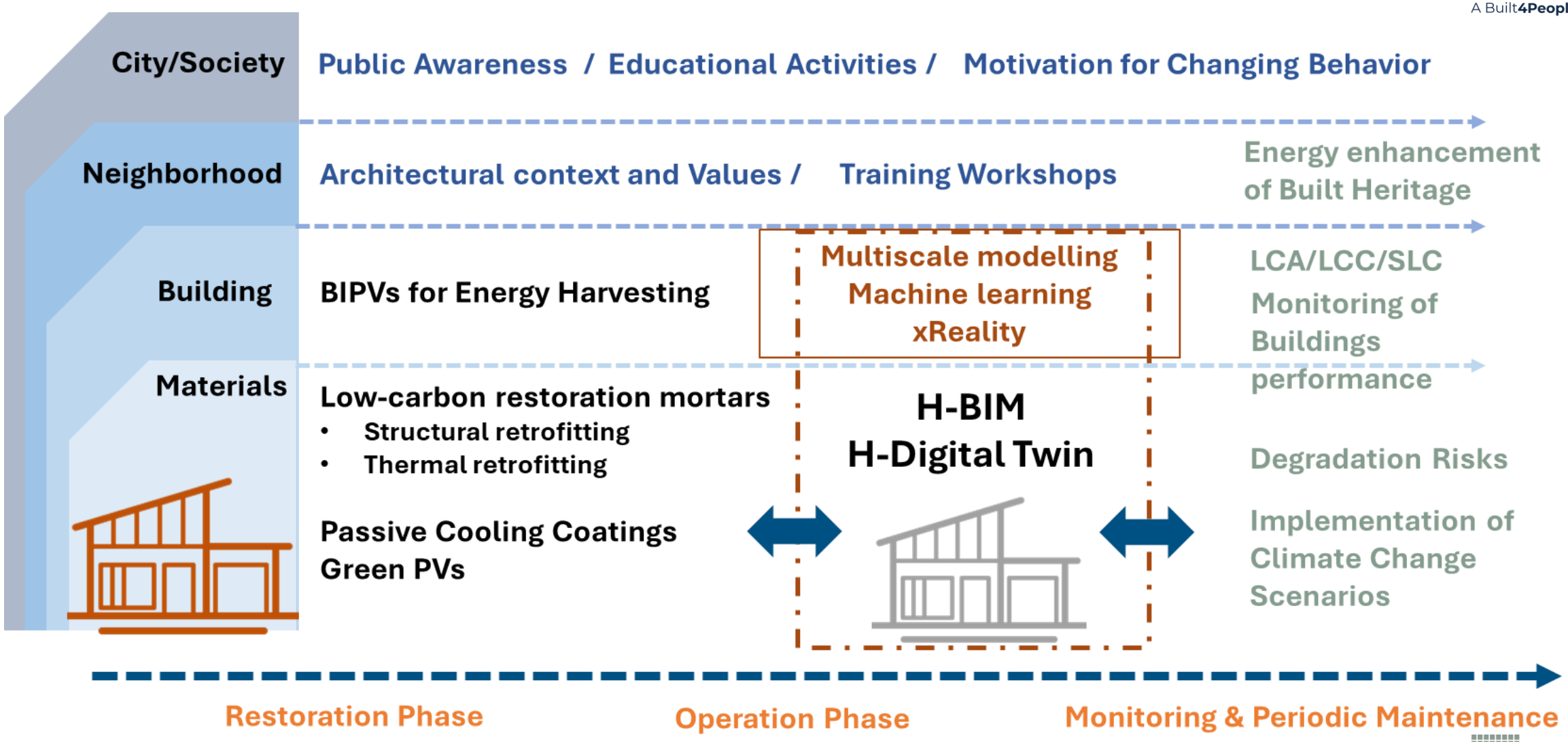

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Different scales of SINCERE project

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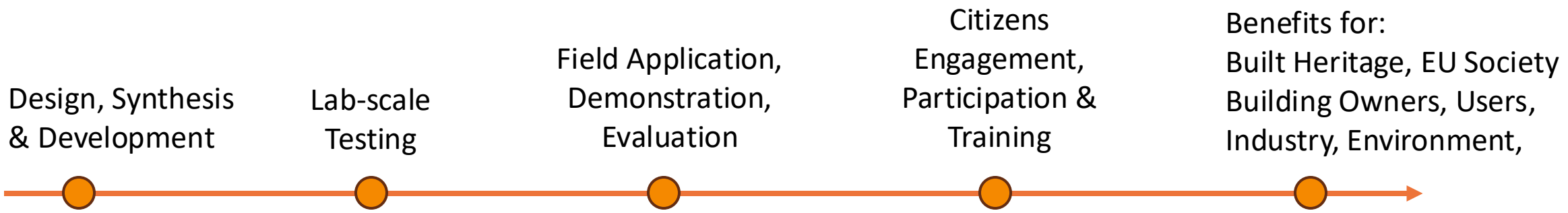
Materials' scale

Buildings' & neighborhood scale

EU/Society scale



Development & optimization of **functional conservation/renovation mortars** for **thermal** and **structural** retrofitting, with low-environmental footprint

Field demonstration, testing/evaluation, engagement of stakeholders, asking for feedback on renovation dilemmas, creating awareness

Developing & offering new products, contributing in TCs and Standardization bodies, enabling **transition to nZEB**

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SINCERE Objectives – Public engagement

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Objective 1	Transform CH buildings to a **key actor and main stage for raising stakeholders' and citizens' awareness** on renovation/reuse concept, as a circular economy element to tackle climate change.
Objective 7	**Validation of SINCERE technologies** at 4 demonstration sites - Pilots, in Spain, Greece, Israel and Czech Republic, and assessment of societal, economic, and scientific impact.

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SINCERE Objectives – Digital Tools

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Objective 2

Development of a smart interoperable platform integrating **H-BIM / H-DT and immersive XR technologies** to provide the digital tools for sustainable renovation and retrofitting of CH buildings.

Objective 6

Understanding the **multi-scale and multi-physics behaviour** of high-performance repair mortars and developing **fast-running numerical design tools** to achieve whole-life carbon savings.

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SINCERE Objectives – Materials for Sustainable Buildings

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Objective 3	Reduction of **environmental impact during restoration** and maintenance, by developing low-energy and low-carbon restoration mortars, with enhanced compatibility and service life.
Objective 4	Reduction of **energy demands during operation** of the restored CH buildings due to passive cooling, enhancement of building thermal performance and enhancement of the service life of repair mortars and of heritage building.
Objective 5	Enabling solar **energy harvesting during building operation**, with green, low-cost, large area fully sustainable building integrated photovoltaics (BIPVs.)

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Low-CO2/ environmentally friendly binders

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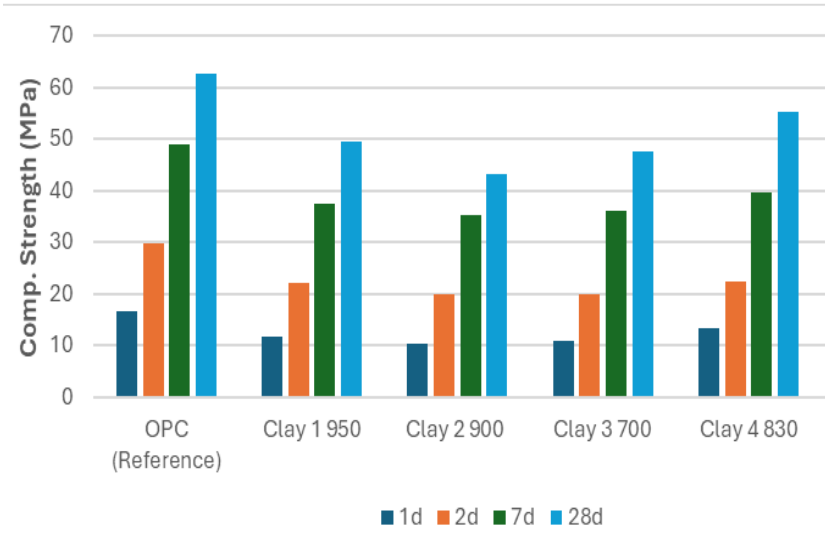
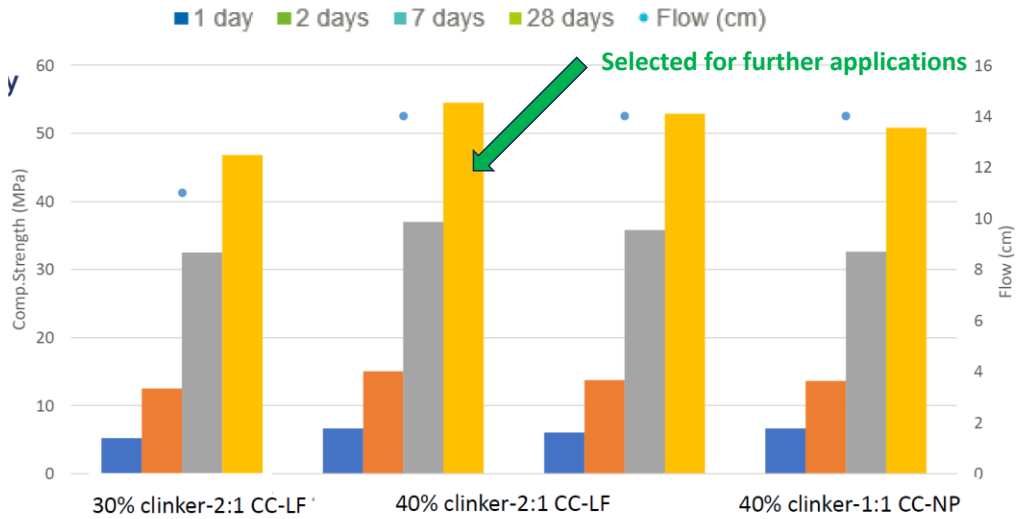
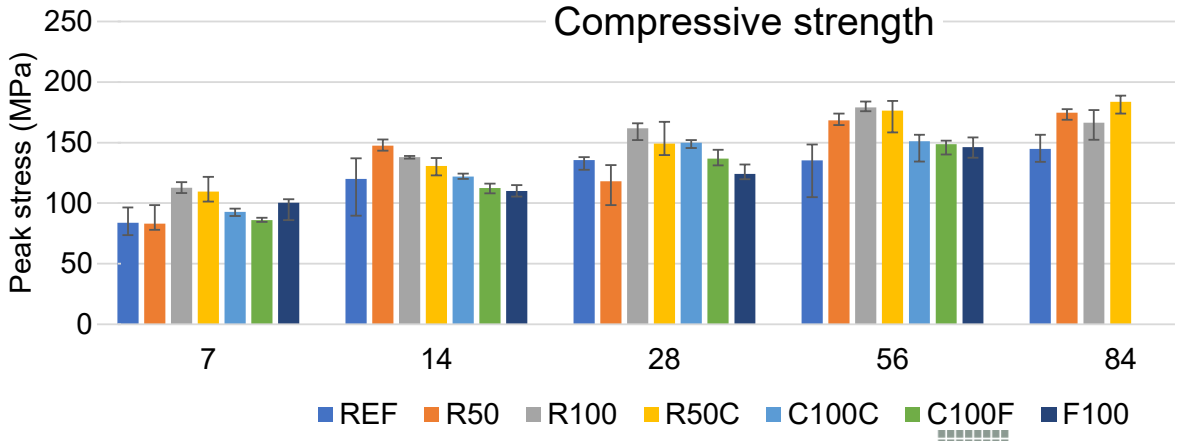
Lime Calcined Clay Cements (LC3)



High Pozzolan/ low Clinker binders



Recycled Concrete binders



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Structural retrofitting mortars (extended service life)

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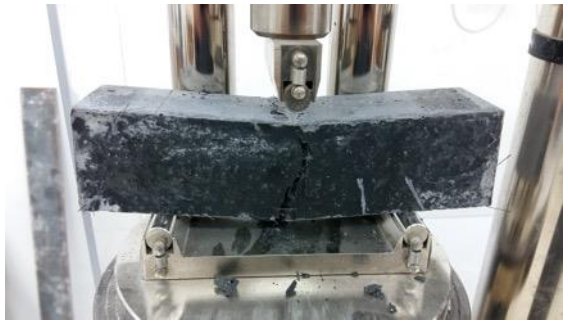
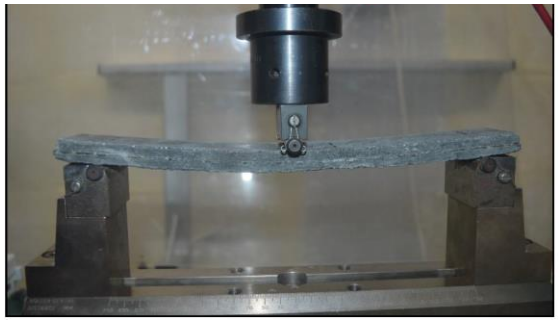
Ultra Hi Performance Concrete (UHPC)

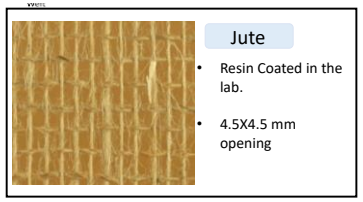
Textile Reinforced Mortars (TRM)

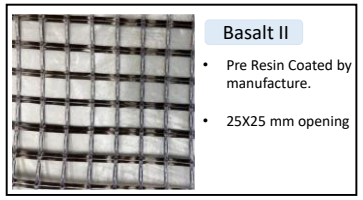
Self-healing Admixtures





Flexural test





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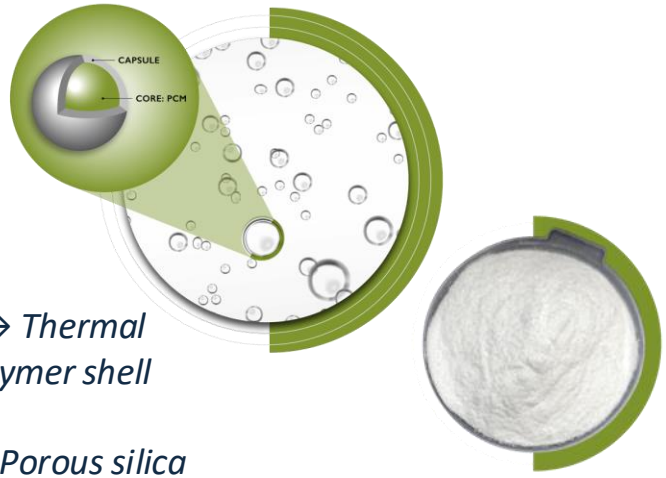
Thermal retrofitting mortars (energy savings)

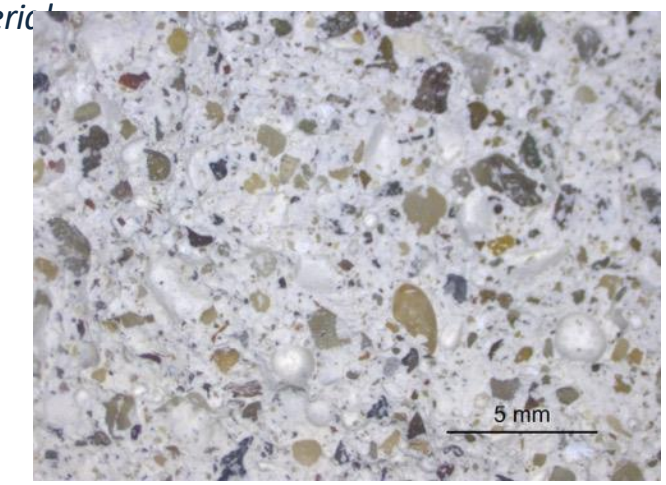
Phase Change Materials (PCMs)

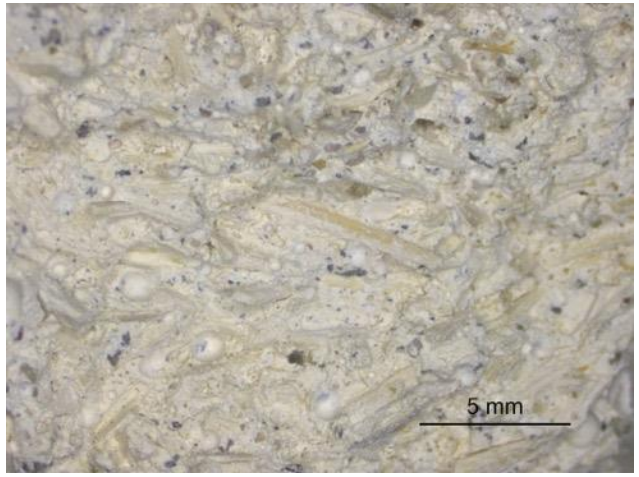


Top: Microencapsulated PCM → Thermal core (e.g., paraffin) inside a polymer shell

Right: Silica-supported PCM → Porous silica matrix holding phase-change materia

Hemp mortars





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Passive/ Radiative cooling coatings (energy saving)

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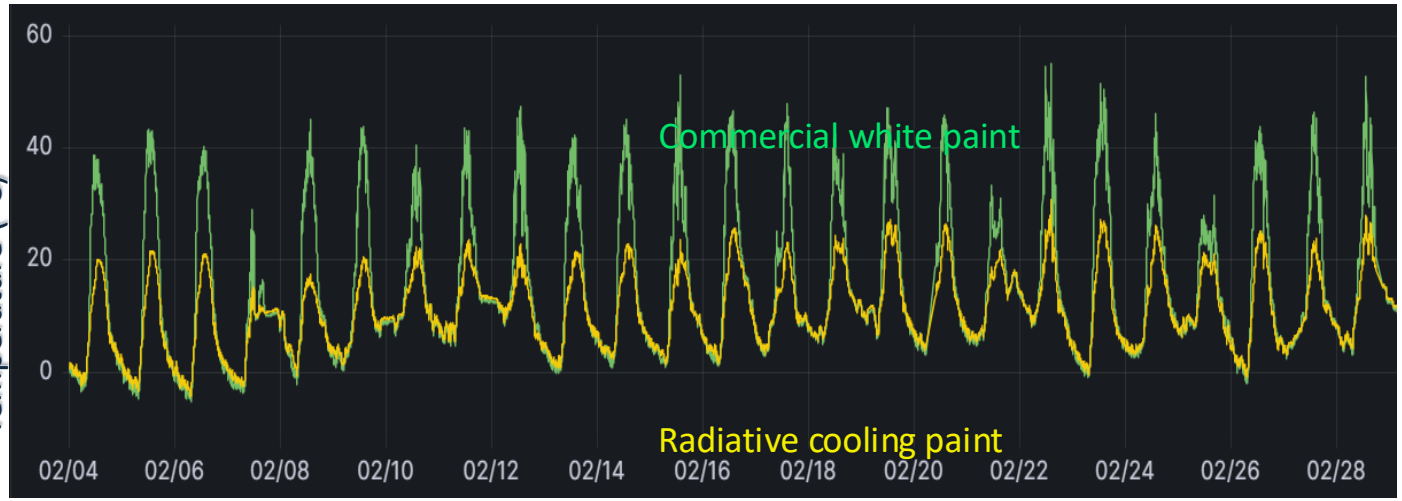
High emissivity/ High reflectivity coatings

PFAS*-free, highly durable, water-based primer-topcoat system for high solar reflectivity and thermal emissivity.

* Per- Polyfluoroalkyl substances



Sample name	Pigment (v%)	Thickness (µm)	Reflectivity (%)	Emissivity (%)
1	55%	200	90.1	94.1
2	55%	400	91.4	95.0
3	55%	600	92.7	96.3

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Energy Harvesting (reduction of energy demands)

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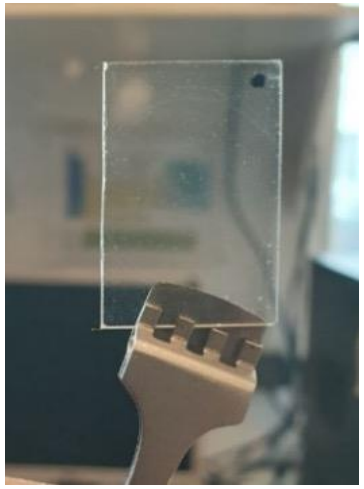
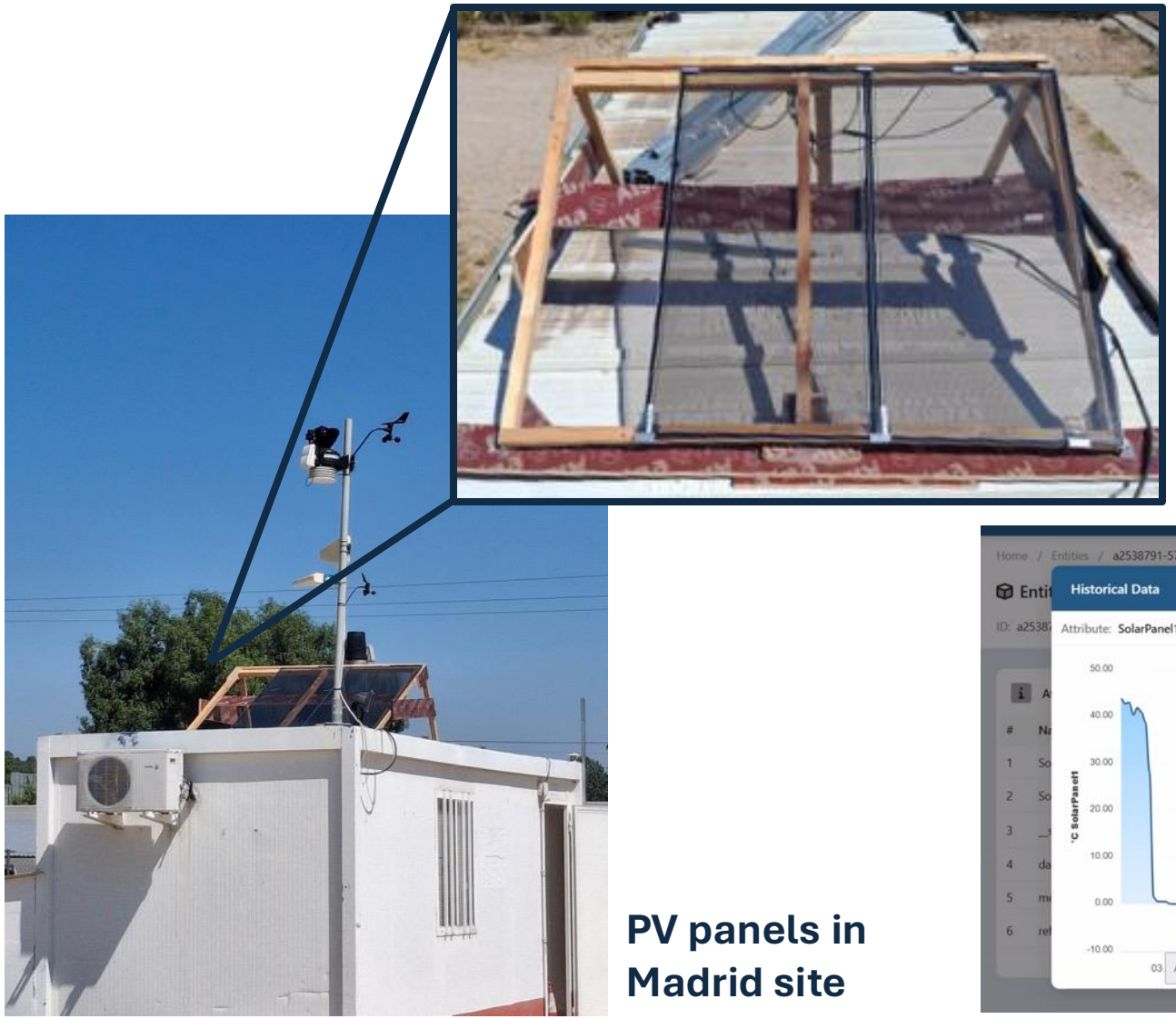
Sustainable & Transparent BIPVs

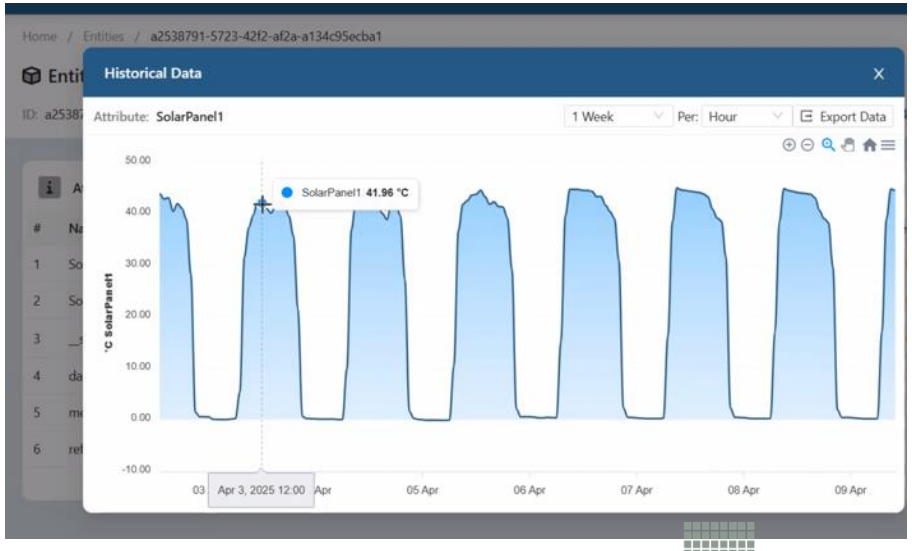


Cellulose-based electrodes



PV panels in Madrid site

23.3% power conversion efficiency achieved in Madrid site



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Digital Tools for Managing & Planning Renovations

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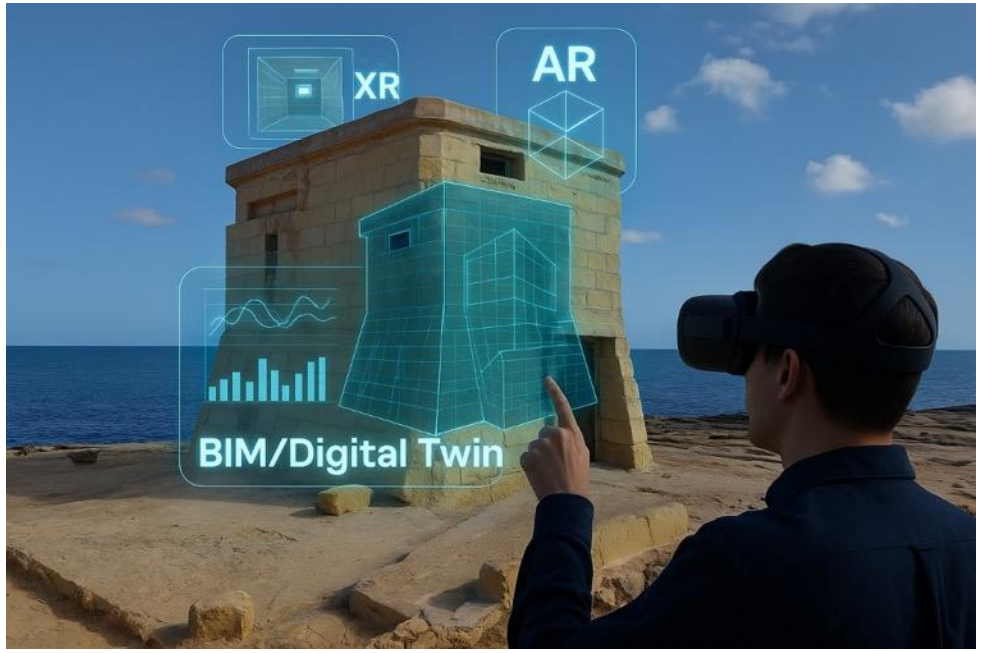
H-BIM / Digital Twin

XR tools



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Digital Tools for Informed Renovation Decisions

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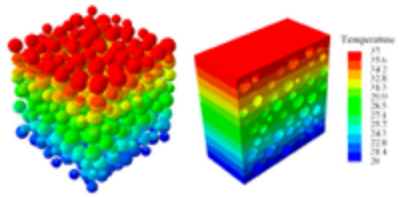
Finite Elements Models (FEM)

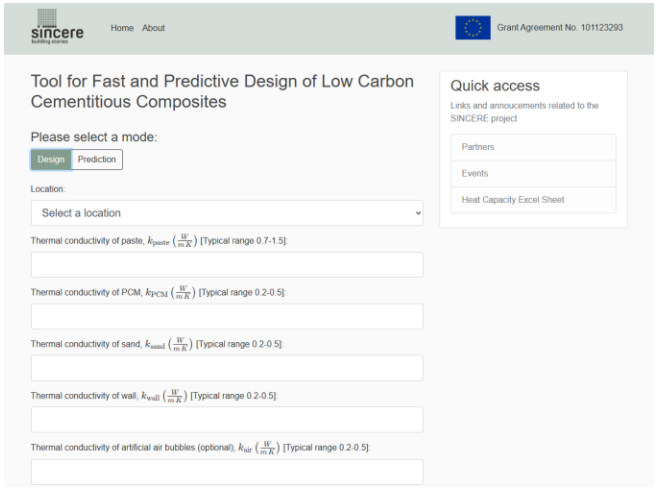
Fast prediction tools

High Resolution Future Climate Models & Risks

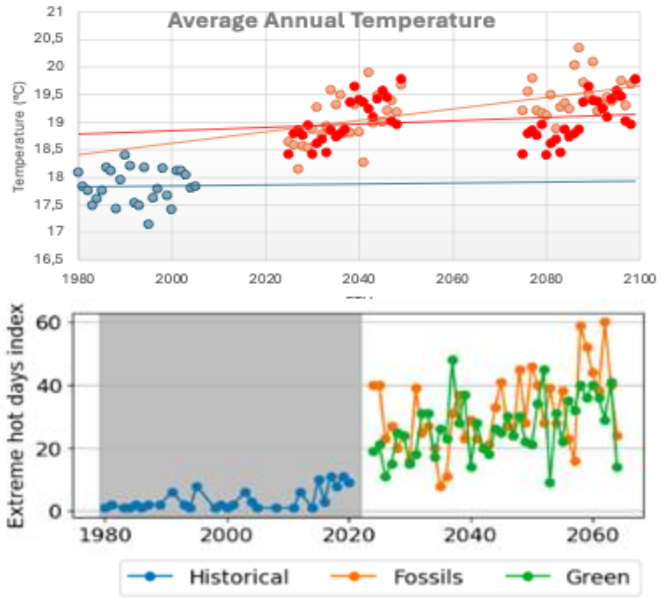
Building Energy Models (BEM)



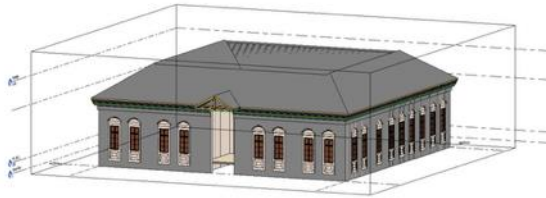
Optimization of Materials Properties

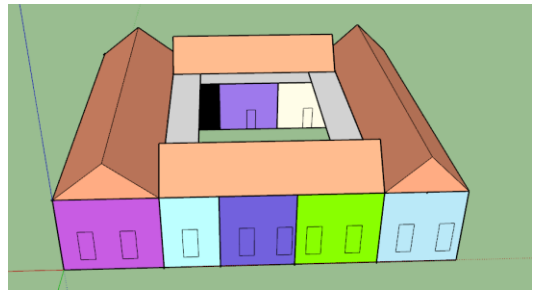


Optimization of Repair Mortars Mix Design



Microclimate & Building Environment





Energy Performance Scenarios

Funded by the European Union

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SINCERE approach on Buildings Renovation

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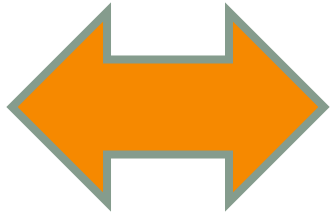
Repair Plan

- Architectural analysis
- Historic phases of building
- Technological data on building and decorative materials
- Types of building materials & mortars
- Weathering parameters and degradation mechanism
- Environmental setup & microclimate
- Technical requirements
- Performance requirements



Environmental footprint of Buildings

- Energy consumption during production of **raw materials**
- Service life of building materials/ **mortars**
- Thermal performance of **mortars/building**

- **Future climate scenarios & local conditions**
- **Energy consumprion/ harvesting of buildings**

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SINCERE methodology for informed decisions

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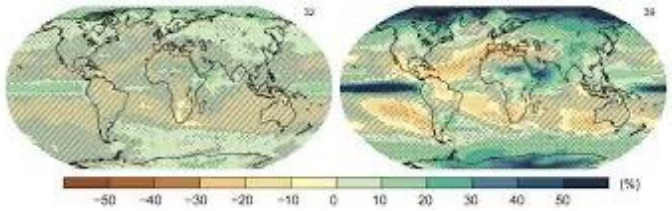

Future Climate Scenarios

Historic Buildings
Scan or CAD to BIM

BIM model
(Technical Data and User Requirements, at **appropriate Level Of Information (LOI)** *Building 3D geometry, Material properties, Thermal properties, Weather data, HVAC, Lighting*) **(Revit)**

IFC file
Digital file of Architectural, structural, technological, conservation, environmental, interventions data

Simulating Energy Consumption
(heating, cooling, ventilation, lighting and process loads)
(*Energy**Plus***)

Citizen's engagement & public awareness

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Example 01 - Energy savings in Rhodes/Greece

Scenario	Description	Annual Energy consumption (kWh)	kWh/m2	Savings
NMR S4	2cm Mortar+PCM in external walls	30069.47	39.78	**16.7%**
NMR S5	2cm Mortar+PCM in ceiling	30036.11	39.73	**16.8%**
NMR S6	2cm Mortar+PCM in external walls and ceiling	26586.11	35.17	**26.4%**

Rhodes - NMR Building Scenarios Annual Energy Consumption Results

Example 02 - Energy savings in Madrid/Spain

🌡️ **Cooling Paint Effect:**

- Estimated cooling load reduction: ~25%
- Total building energy savings:
  40% × 25% = **~10%**

🔋 **Solar Panel Output:**

- 5.5 kWh/m^2/day × 100 m^2 × 15%
  = 82.5 kWh/day ≈ 30,000 kWh/year
- Offsets **~30%** of energy use

➡️ **Total Estimated Reduction: ~ 40%**

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Citizen's engagement and adaptation of new technologies

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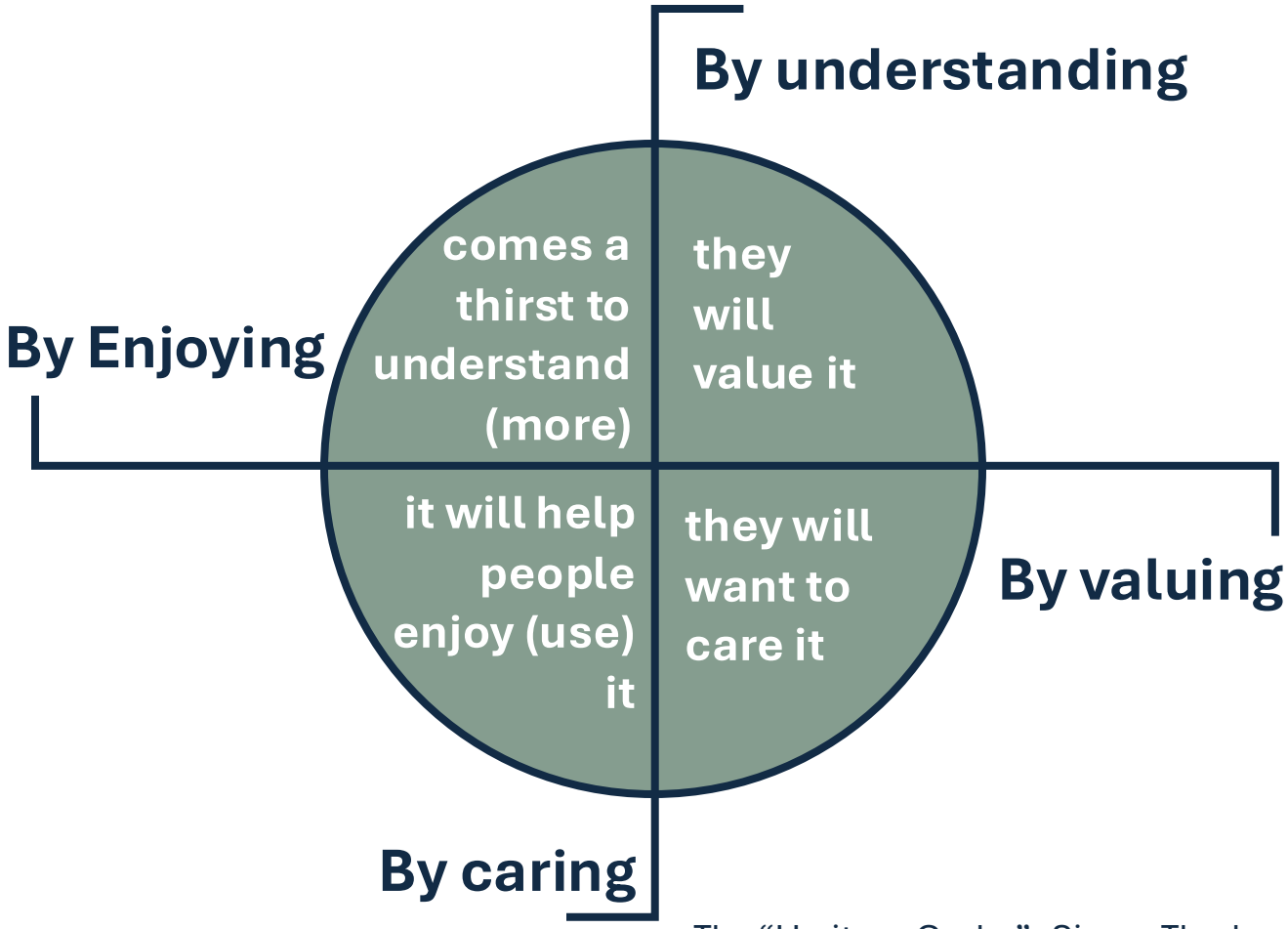

The “Heritage Cycle,” Simon Thurley

Informing, training, creating awareness on:

- New types of Building and Restoration Materials
- Climate change scenarios and impact
- Digital tools that can support informed decisions
- Social, environmental and ecomomic impact

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Inform, demonstrate, train/educate, engage, call for action

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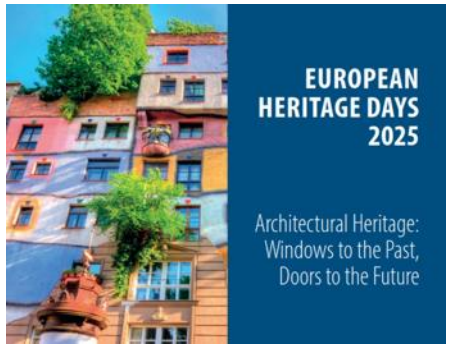
Citizen's engagement activities

Public Awareness actions

Technical & Educations Workshops

Scientific Publications



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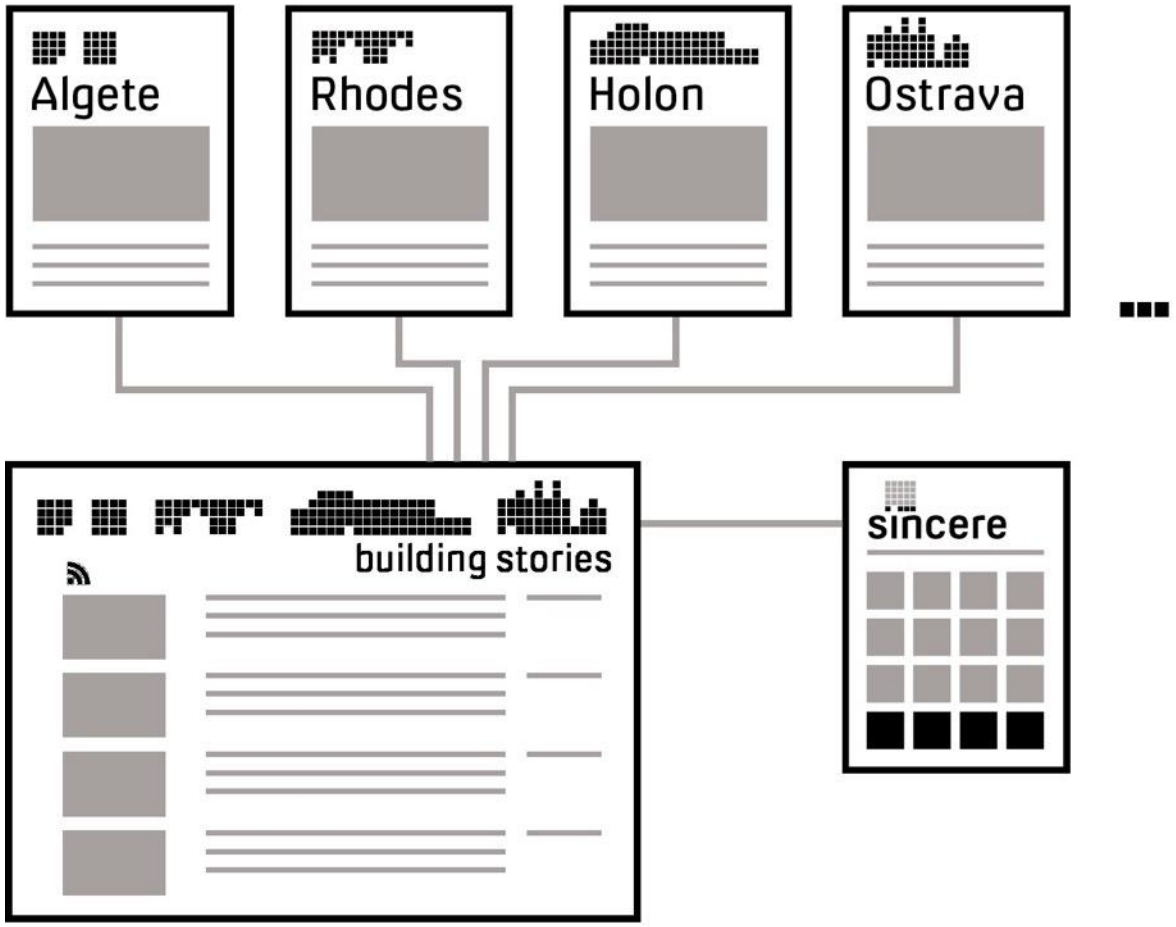
Public engagement Activities - Building stories



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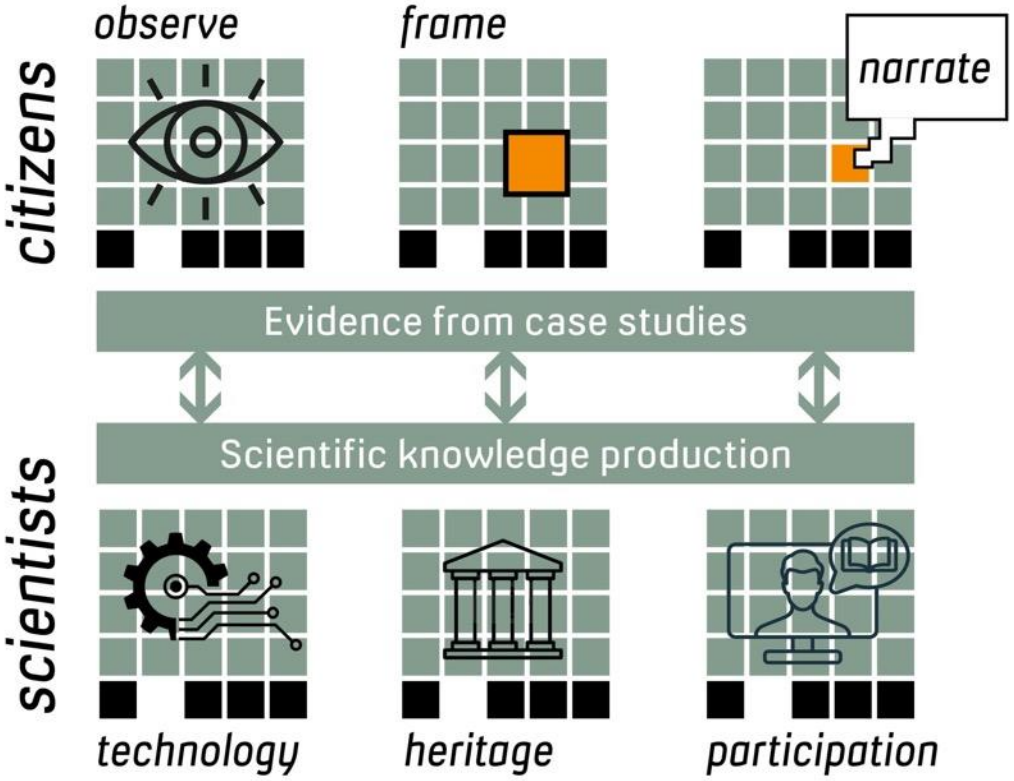
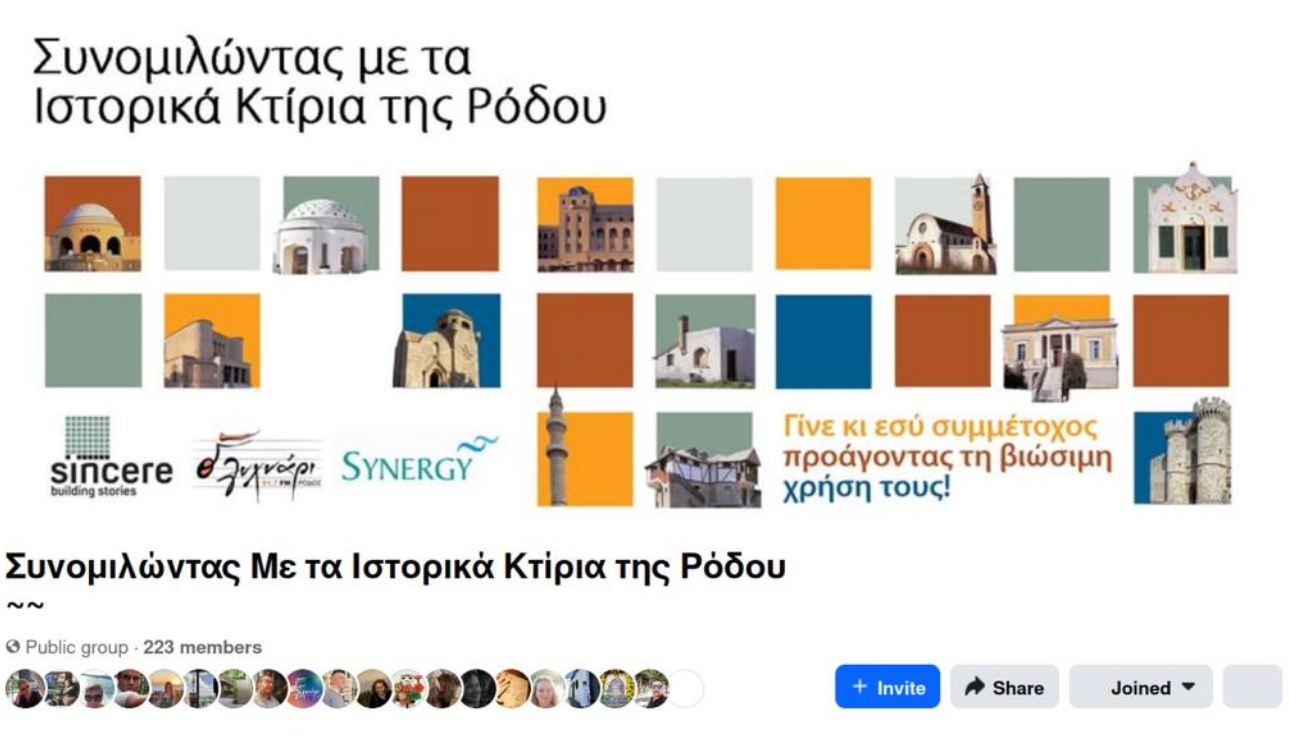
Public engagement Activities - Building stories





Funded by the European Union

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Participation/ organization of Conference sessions

#SINCERE **Sessions**

Join the SINCERE partners in a variety of events and workshops

DIGITAL HORIZONS: EMBRACING HERITAGE IN AN EVOLVING WORLD
CAA 2025 5-9 MAY
UNIVERSITY OF WEST ATTICA, ATHENS, GREECE

05.05.2025
Athens, Greece

CHNT 30
on Cultural Heritage and New Technologies
3 - 05 2025 | Vienna, Austria
30 Years of Visions for the Future
Impacts of Technology on Cultural Heritage

05.11.2025
Vienna, Austria

7TH HISTORIC MORTARS CONFERENCE

03.09.2025
Padova, Italy

+ Cluster event

+ Exhibition

Funded by the European Union

The STAR*track [illegible] m the Euro [illegible] e research and innovation programme under grant agreement No 101147509.

International design workshops (Xanthi)

Funded by sincere

Advanced Materials workshop (Athens)

16-18.07.2025 @ Athens, Greece

SINCERE conference & advanced workshop 2025

A 3-day international conference and advanced workshop for conservation, architecture and engineering professionals titled "Innovative & Sustainable Mortars for Structural and Thermal Retrofitting of 20th Century Buildings".

Funded by the European Union

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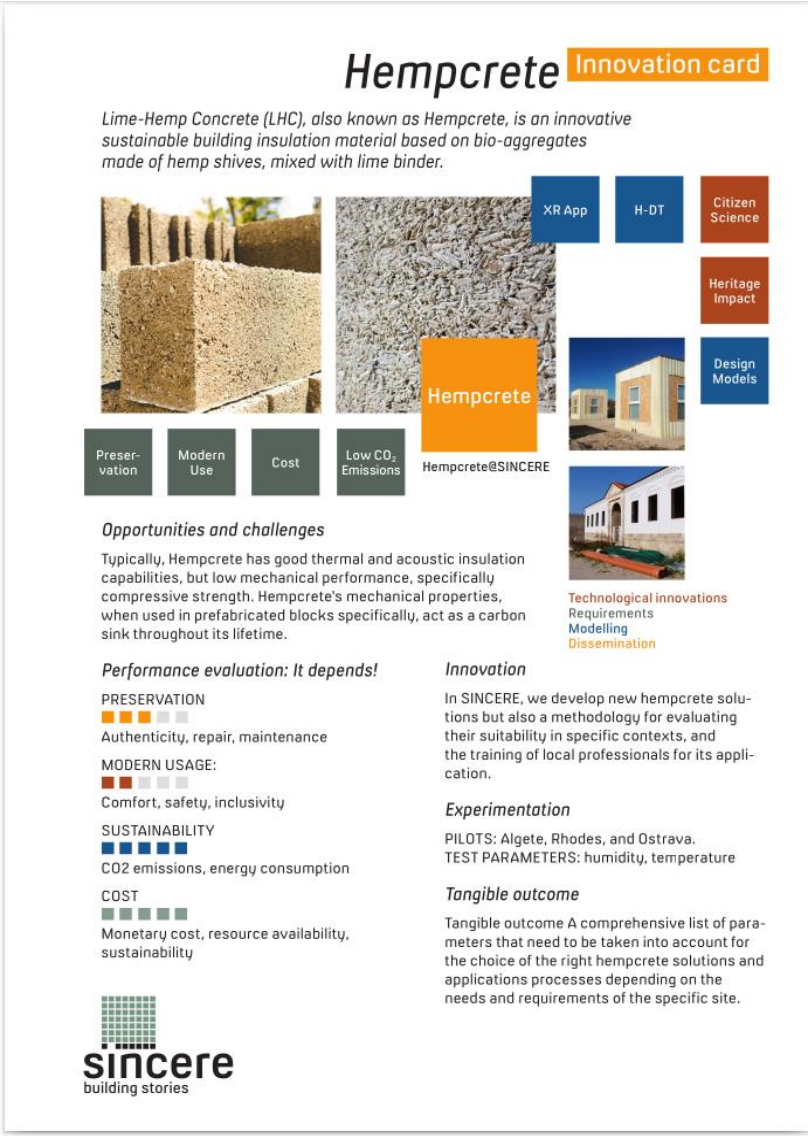
Innovation booklet (professional guide)

- For each SINCERE innovation:
  - Short description
  - **Performance evaluation metrics**
  - Innovation
  - Experimentation
  - Tangible outcomes
    - Who should care, and why?



Hempcrete Innovation card

Lime-Hemp Concrete (LHC), also known as Hempcrete, is an innovative sustainable building insulation material based on bio-aggregates made of hemp shives, mixed with lime binder.

XR App | H-DT | Citizen Science | Heritage Impact | Design Models

Hempcrete

Preser-vation | Modern Use | Cost | Low CO_2 Emissions

Hempcrete@SINCERE

Opportunities and challenges

Typically, Hempcrete has good thermal and acoustic insulation capabilities, but low mechanical performance, specifically compressive strength. Hempcrete's mechanical properties, when used in prefabricated blocks specifically, act as a carbon sink throughout its lifetime.

Technological innovations
Requirements
Modelling
Dissemination

Performance evaluation: It depends!

PRESERVATION
Authenticity, repair, maintenance

MODERN USAGE:
Comfort, safety, inclusivity

SUSTAINABILITY
CO2 emissions, energy consumption

COST
Monetary cost, resource availability, sustainability

Innovation

In SINCERE, we develop new hempcrete solutions but also a methodology for evaluating their suitability in specific contexts, and the training of local professionals for its application.

Experimentation

PILOTS: Algete, Rhodes, and Ostrava.
TEST PARAMETERS: humidity, temperature

Tangible outcome

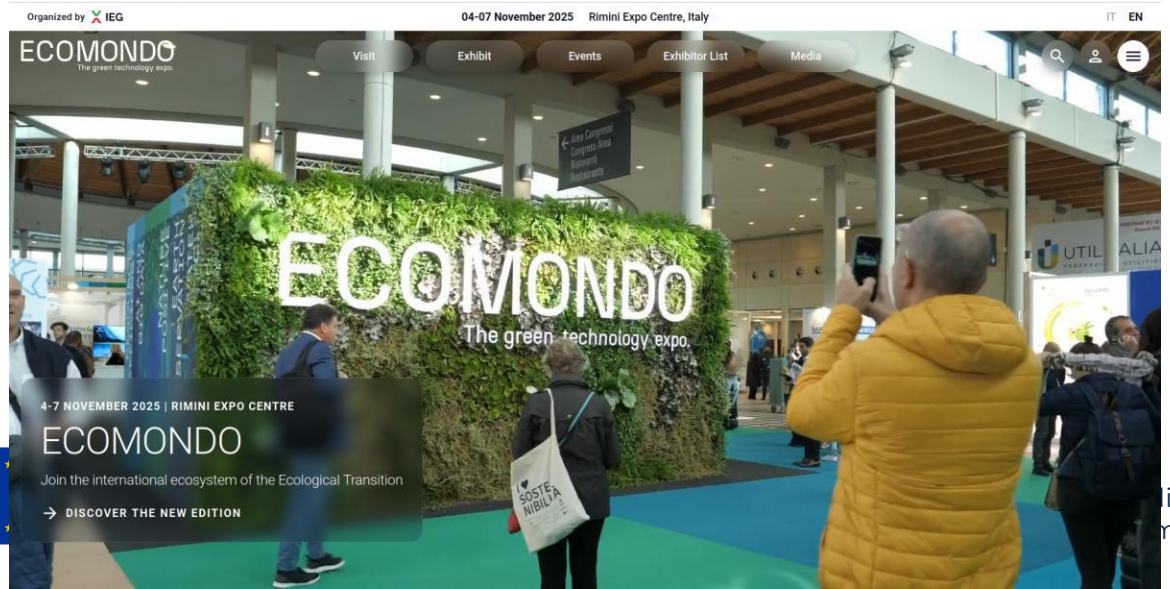
Tangible outcome A comprehensive list of parameters that need to be taken into account for the choice of the right hempcrete solutions and applications processes depending on the needs and requirements of the specific site.

sincere building stories

Funded by sincere building stories

R*track project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101147509.

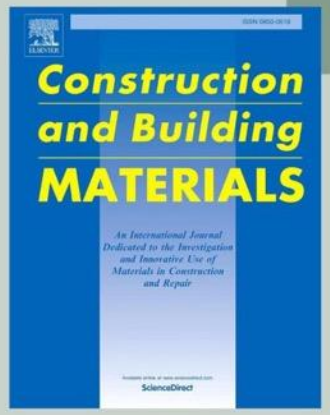
Participation in Exhibitions/Fairs



Scientific papers

#SINCERE publications

Effect of shell composition on watertightness and mechanical performance of cement-based capsules used as **self-healing additives of cement**.



Air lime renders with **micro-encapsulated phase change materials**: assessment of microstructural and thermal properties.

Cements and concretes **materials characterisation** using machine-learning-based reconstruction and 3D quantitative mineralogy via X-ray microscopy.

sincere

more publications at
sincere-project.eu/publications/

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Thank you!

up2metric

RIMOND

POLITECNICO DI MILANO

Universidad de Navarra

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

TITAN

Ben-Gurion University of the Negev

NUROGAMES

acciona

ΥΠΟΥΡΓΕΙΟ ΠΟΛΙΤΙΣΜΟΥ
HELLENIC MINISTRY OF CULTURE

LINKÖPING UNIVERSITY

MUSEum+

L-Università ta' Malta

University of Sheffield

UCL

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sincere
building stories

STAR*track
A Built4People Project

FORTESIE

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FORTESIE

Central Bank Digital Currency (CBDC) powered Smart PerFORmance contracTs for Efficiency, Sustainable, Inclusive, Energy use

Christina Sianidou
INCLUSINN

Co-funded by the European Union

Grant Agreement No: 101080029

FORTESIE in a nutshell

Overall Goal

- ✓ Accelerate the **Renovation Wave**
- ✓ Make renovations **easier, less complex & impactful**

What We Do

Pre-designed renovation packages → tested & validated

Digital Tools:

- Homogenised data platform
- Data analytics & behavioural recommendation tool
- Measurement & Verification (M&V) module
- Smart contracts for EPC models
- Gamified Mobile app for users
- Marketplace / OSS hub (building owners ↔ providers)

Pilots & Impact

7 pilots / 6 countries:
🏠 Houses | 🏢 Apartments | 🏛️ Museum | 🏫 School | 🏊 Pool | 🏢 Public buildings

Impact:

- Energy use reduction
- CO_2 emissions cut
- Better comfort & indoor air quality
- Easier renovation pathways

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Key Innovations

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Comfort Price – Mobile App
- ✓ Raise awareness of the cost of comfort
- ✓ Users engagement and decision making

Demonstrations-
Measured impact of renovation on building performance

M&V and EPC in smart contracts (ESCOs)

Renovation packages for replication

Financing opportunities
- ✓ Alternative financing-green loans-green Euro
- ✓ Crowdfounding

One Stop Shop- European Renovation marketplace

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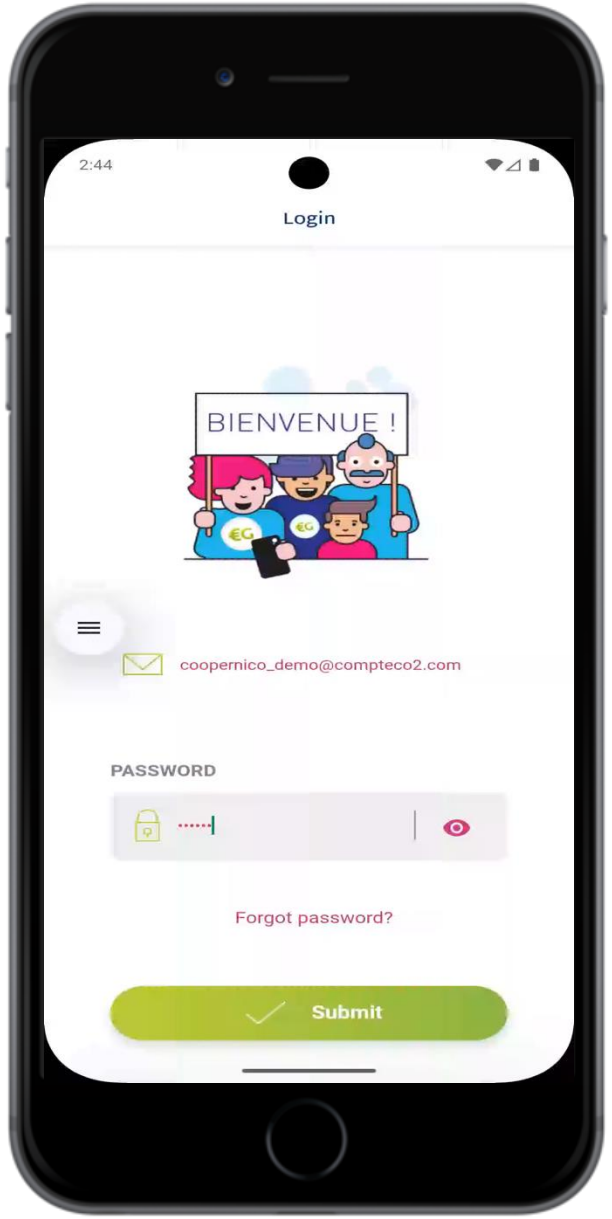
Gamified App for Building Performance Improvements

- Online Visualization of the consumption and reporting for energy savings
- Challenges, Recommendations and Notifications Visualization
- Badges and Green Euro Rewards
- Comfort price concept to engage the users



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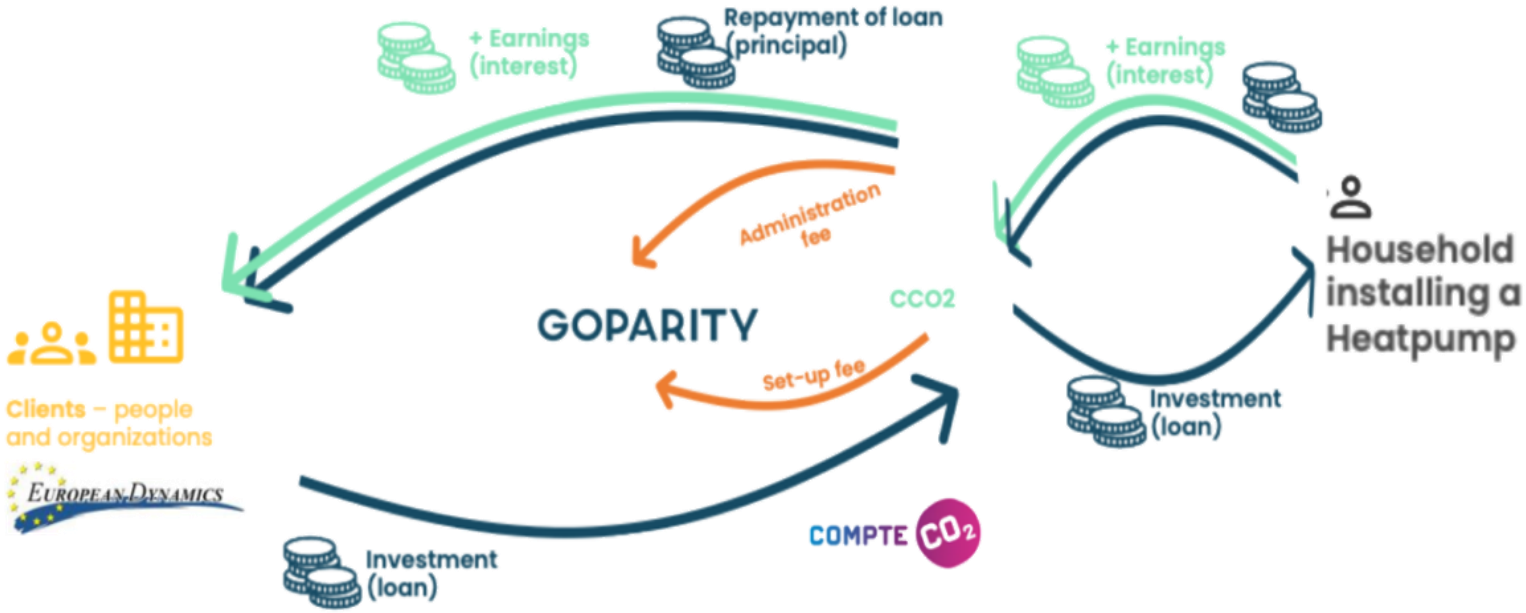
Alternative Financing



Amount of Loan in €	10 000 €
Duration	60
Monthly rate	0.45%
APR	5.50%
Installment	190.37 €
Total amount paid	11 422.41 €
Cost of loan	**1 422.41 €**

Amount of Loan in Green-Eur	10 000 €	10 000 €
Duration	60	60
Monthly rate	0.45%	0.45%
APR	5.50%	5.50%
Installment	190.37 €	190.37 €
Total amount paid	11 422.41 €	11 422.41 €
Green earnings		**1 422.41 €**
Cost of loan	**1 422.41 €**	**0.00 €**

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Renovation packages & Tailored business models

STAR*track
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Customised Renovation Package

Building Type	Single-family home	Country	Portugal	Pilot 4 
Square meters	224	Budget Range	12126,12	
Current Energy Efficiency Rating	0	Energy Rating Goal		

Selected Renovations Technologies

Renovation Technology	Description	Benefits	Cost (€)	Impact Summary	Suitability Conditions (e.g., climate, building type)
Ventilation system	Systems that enhance air exchange, providing fresh air while reducing energy losses and improving indoor air quality	Ensures fresh air while minimizing energy losses	[illegible]	Enhances indoor air quality and efficiency	Applicable to all climates, especially in airtight or densely populated buildings such as offices, schools, and hospitals
Roof Insulation	Enhances thermal resistance of the roof to minimize heat loss in winter and heat gain in summer	Prevents heat loss through the roof	[illegible]	Key for energy savings in winter months	Suitable for all climates, especially cold and temperate zones; ideal for houses and buildings with large roof surfaces
Windows ("doors" retrofit	Upgrading windows and doors to improve insulation, reduce drafts, and enhance energy efficiency	Improves insulation and reduces drafts	[illegible]	Enhances thermal comfort and energy efficiency	Ideal for older buildings in all climates, particularly those with outdated or inefficient windows and doors
	tbd/D	tbd/D		tbd/D	tbd/D
	tbd/D	tbd/D		tbd/D	tbd/D
	tbd/D	tbd/D		tbd/D	tbd/D

Selected Digital Technologies

Digital Technology	Description	Benefits	Sensors Requirements	Integration Requirements
FORTESIE Mobile Application	The main user interface of the FORTESIE platform, allowing users to input energy consumption data, receive recommendations, access energy measurements, and manage green-cess credits. It integrates with the mobile app backend for data retrieval and submission	Green-cess credit system for incentivizing sustainability Real-time notifications and recommendations	Energy meters for consumption tracking IoT sensors for temperature, humidity, air quality	API for backend communication Connection to smart contracts and the green-cess wallet Data retrieval from analytics and recommendation engines
Sensing Components (IoT Devices)	IoT sensors installed in buildings to measure energy consumption and environmental conditions (temperature, humidity, air quality)	Real-time monitoring of energy and environmental parameters Data-driven decision-making for efficiency improvements Supports energy performance evaluation	Smart meters for energy consumption Temperature, humidity, air quality sensors	Connectivity to FORTESIE gateway Data transmission via standard protocols (MQTT, HTTP, etc.)
Data Sovereignty Module	A cloud-based multi-service platform that handles data collection, storage, and management for building gateways and sensors	Ensures data security and ownership Facilitates interoperability via standards and formats Scalable for multi-building integration	Receives data from IoT devices and external systems	Integration with FIWARE for standards-based data exchange Secure API connectivity with gateways and analytics tools

Total Cost	€ -

Selected Financial Initiative	Description	Coverage	Remaining Cost (€)	Payback Period	Annual Savings (€)	CO_2 Reduction (kg/year)

KPIs	Before Renovations	After Renovations
Overall air quality improvement	[illegible]	[illegible]
Humidity	[illegible]	[illegible]
Energy consumption [kWh]	[illegible]	[illegible]
Estimate PV power production [kWh]		
Improvement of comfort	[illegible]	[illegible]
CO2 Emissions from energy consumption	[illegible]	[illegible]
Time for deployment	1 month	3 months
Energy Efficiency Rating	[illegible]	[illegible]

- ✓ **Portfolio of innovative renovation technologies** delivering measurable energy savings, CO_2 reduction, and improved comfort.
- ✓ **Integrated solutions** combining prefabricated façades, BIPV, heat pumps, smart windows, insulation, etc.
- ✓ **Digital enablers** for performance guarantees: data analytics, M&V module, smart contracts.
- ✓ **Business & financing models** that make energy efficiency investments more attractive and less complex.

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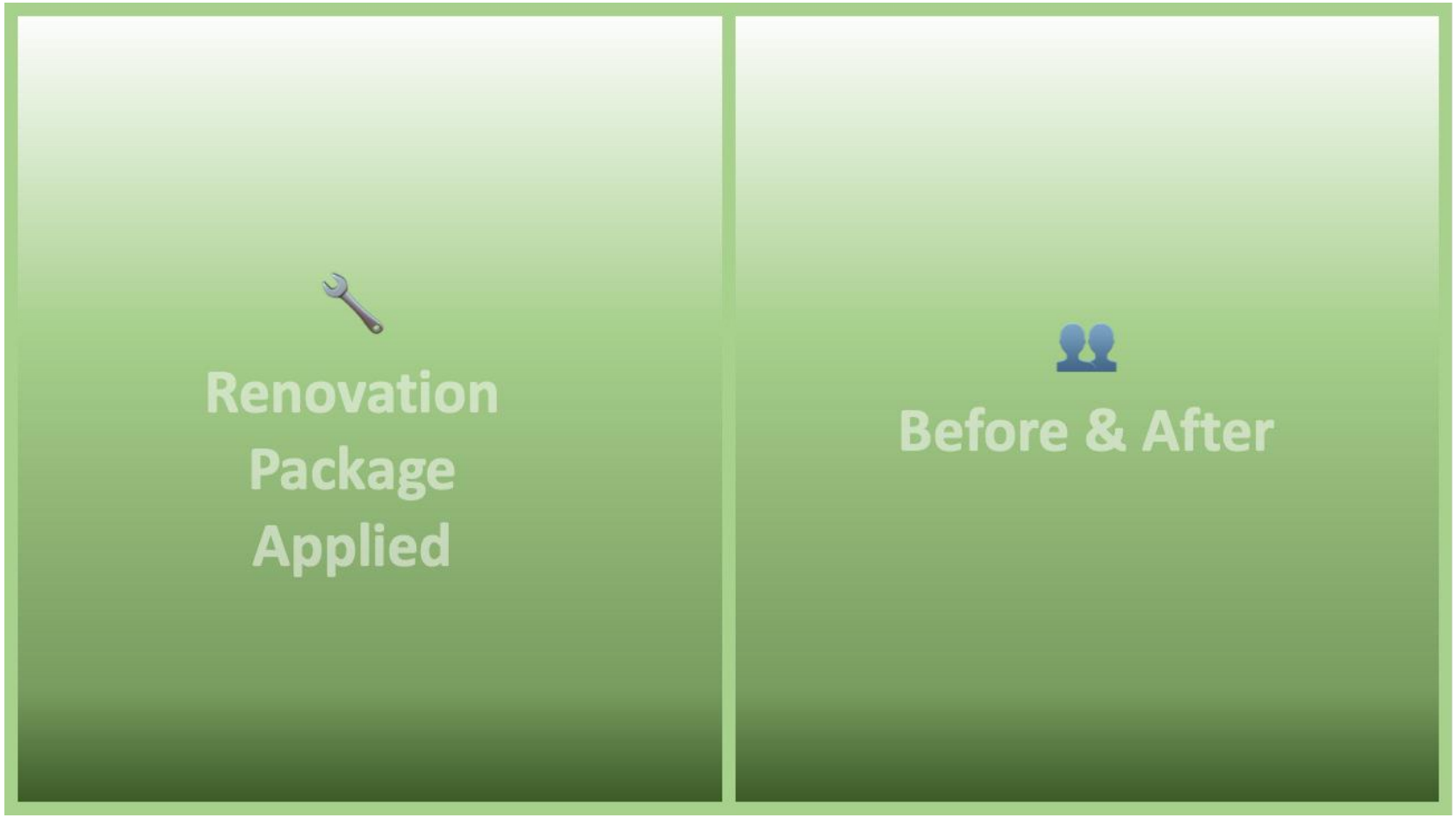
Pilot 1 – Success Story

🏛️ Building type: Museum dedicated to Philhellenism
📍 Location: Athens, **Greece**



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Pilot 1 – Success Story

🏛️ Building type: Museum dedicated to Philhellenism
📍 Location: Athens, **Greece**

🔧

Renovation Package Applied

👥

Before & After

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Pilot 1 – Success Story

STAR*track
A Built4People Project

🏛️ Building type: Museum dedicated to Philhellenism
📍 Location: Athens, **Greece**

🔧 **Renovation Package Applied**

Renovations

- External thermal insulation (north façade completed initially, full façade implementation ongoing);
- PV-integrated smart windows, installed on upper floors with optimal solar exposure (approx. 42 m²);
- An advanced mechanical ventilation system with integrated heat recovery;
- A green roof incorporating shading pergolas and a rooftop café terrace;
- Conventional rooftop photovoltaic (PV) panels, scheduled for grid connection

👥 Before & After

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FORTESIE

Pilot 1 – Success Story

🏛️ Building type: Museum dedicated to Philhellenism
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🔧
Renovation Package Applied

👥
Before & After

Funded by the European Union

Pilot 1 – Success Story

🏢 Building type: Museum dedicated to Philhellenism

📍 Location: Athens, **Greece**

🔧 Renovation Package Applied

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Pilot 4 – Success Story

STAR*track
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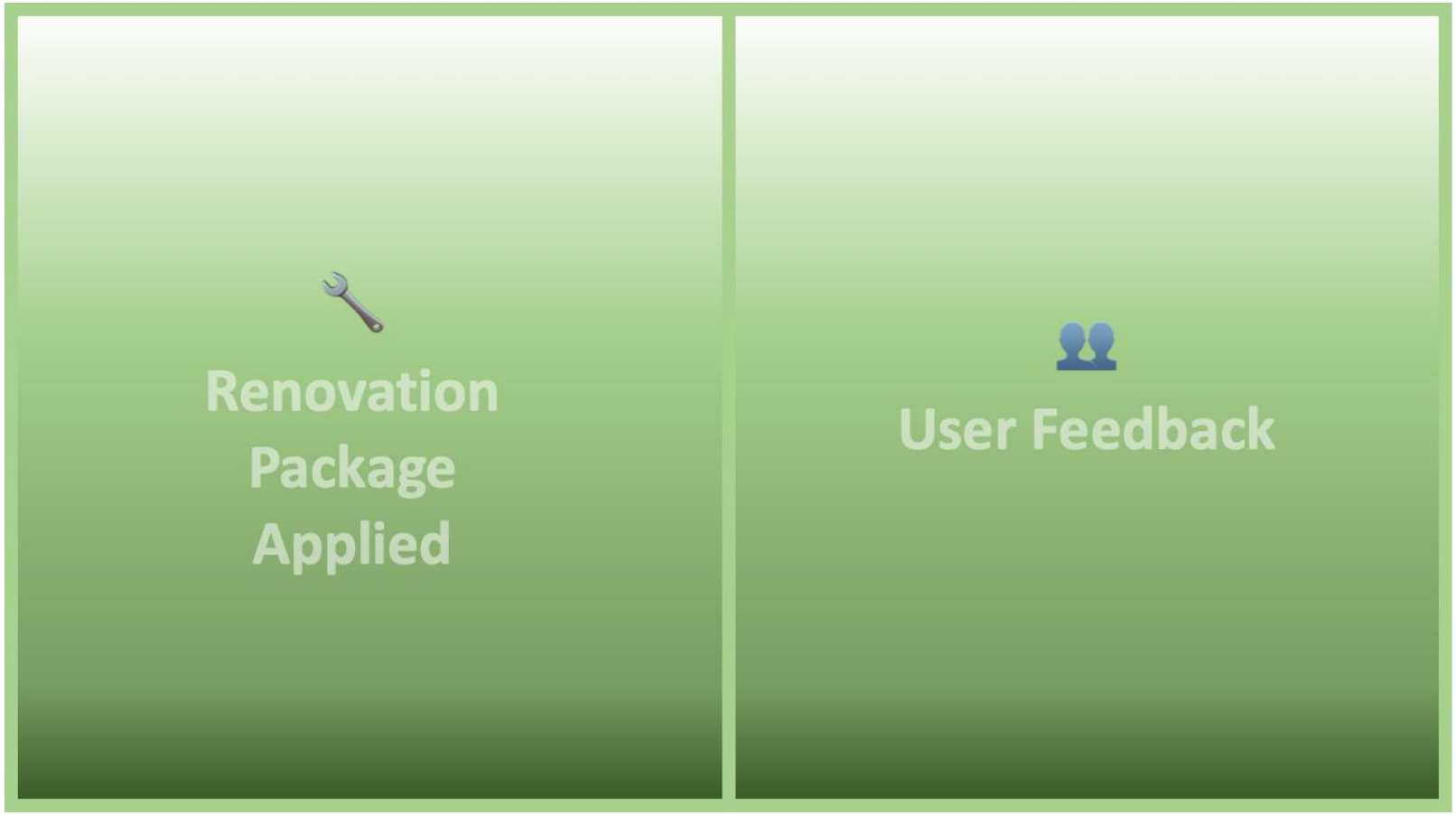
🏢 Building type: 10 single-family homes

📍 Location: Canas de Senhorim, Silveira, Sobreira, Maia, Cacia, Canha, Lavegadas, Póvoa do Varzim, Mira, and Escalos de Baixo, **Portugal**



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FORTESIE

Pilot 4 – Success Story

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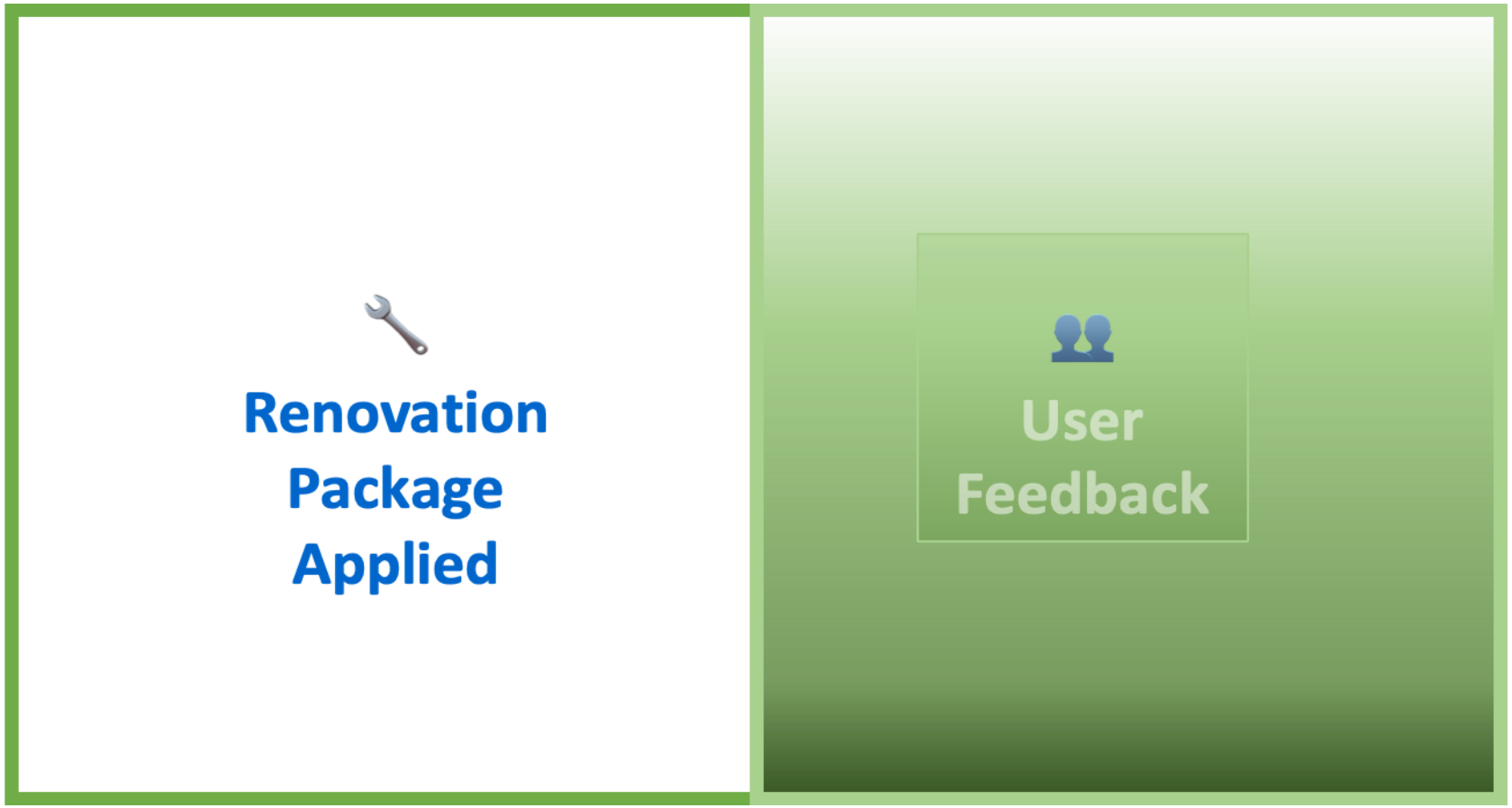

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Pilot 4 – Success Story

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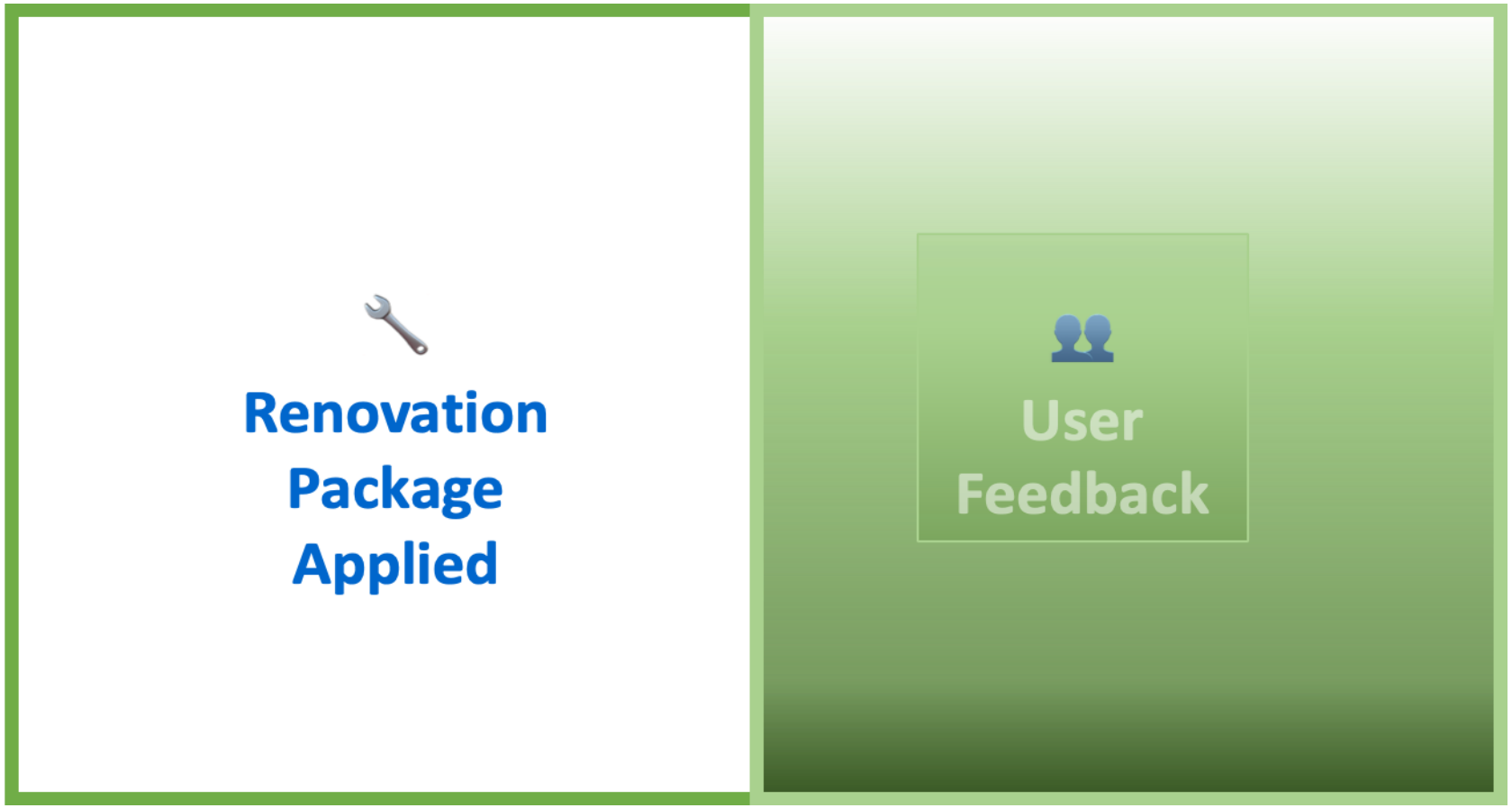

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Pilot 4 – Success Story

STAR*track
A Built4People Project

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🔧 **Renovation Package Applied**

Renovations

- Efficient windows;
- Self-regulating or manual trickle vents in window frames;
- Self-regulating air vent with sound attenuator for external walls;
- Bathrooms extractors fans (active measure);
- Thermal insulation in the attic/roof;
- Thermal insulation in shutter boxes;
- External Thermal Insulation Composite System (ETICS);
- External Thermal Insulation under floor;
- Double-flow mechanical ventilation system (active measure).

👥 **User Feedback**

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Pilot 4 – Success Story

STAR*track
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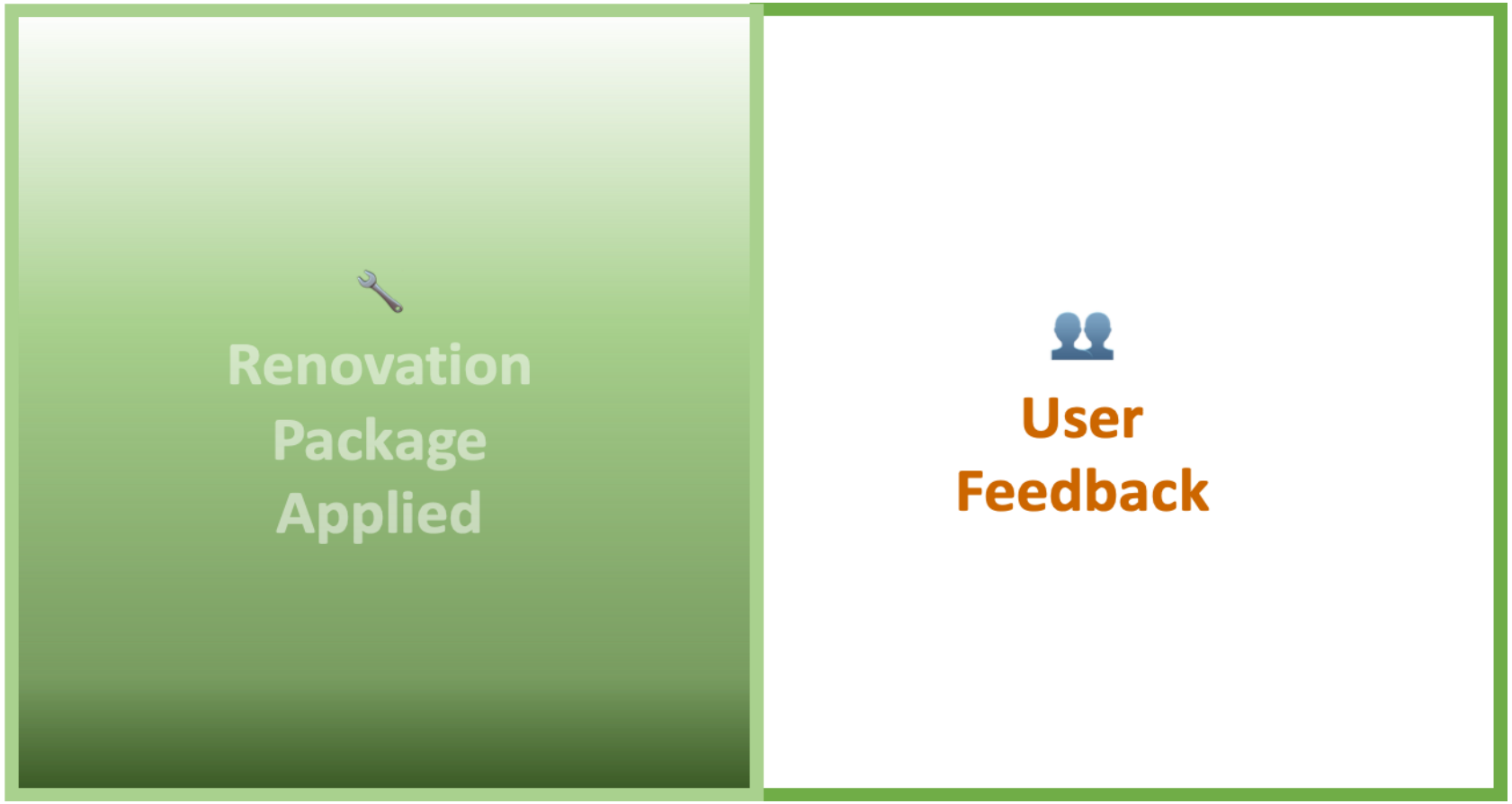

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Pilot 4 – Success Story

STAR*track
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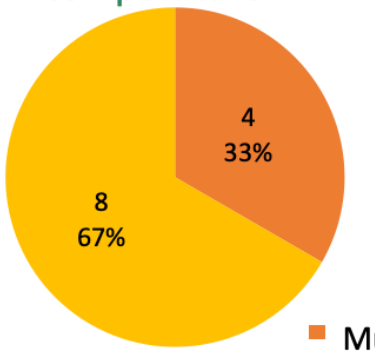
Building type: 10 single-family homes
Location: Canas de Senhorim, Silveira, Sobreira, Maia, Cacia, Canha, Lavegadas, Póvoa do Varzim, Mira, and Escalos de Baixo, **Portugal**

Renovation Package Applied

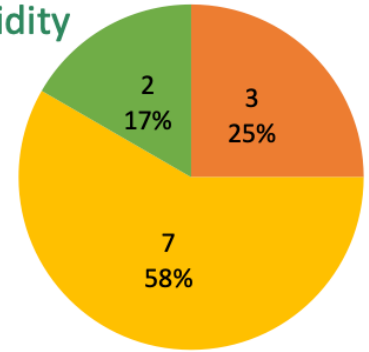
User Feedback

- Improved comfort & well-being
- More stable indoor temperature
- Lower energy bills

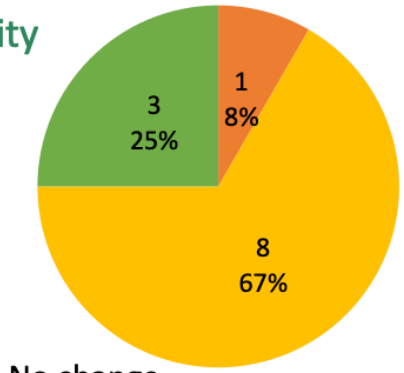
Comfort in terms of temperature



Comfort in terms of humidity



Comfort in terms of air quality



Much more comfortable
More comfortable
No change
Less comfortable
Much less comfortable

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One-Stop-Shop Marketplace

STAR*track
A Built4People Project

The Challenge

- Buildings = 40% of EU energy use & 36% of GHG emissions
- Renovations are fragmented, complex, costly → low uptake by building owners

FORTESIE Marketplace

A digital One-Stop-Shop accelerating energy renovations through collaboration, transparency & data-driven guidance.

FORTESIE MARKETPLACE

The Benefits

- **Collaboration hub** that connects building owners, contractors, financiers, policymakers, and designers
- **Knowledge hub** offering best practices, case studies, technologies, and guides
- **Actors inventory** with renovation providers, experts, and services across regions
- **Transparency** that enables comparison of renovation packages and providers
- **Financing access** through integrated green and innovative schemes
- **Scalable** and **evolving** platform that adapts to new services, policies, and user needs

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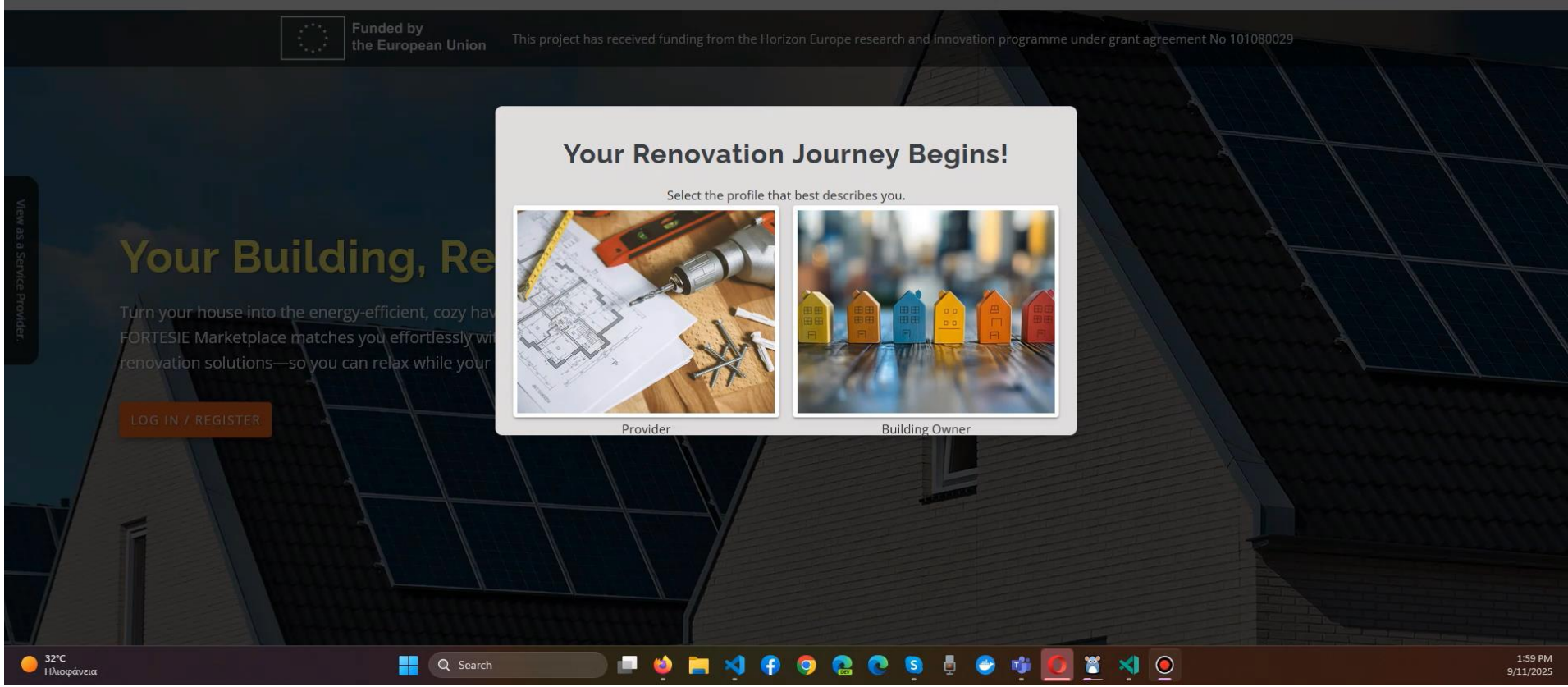

Marketplace Functions

- Owners publish renovation requests → providers respond with offers
- Renovation actors publish collaboration/team-up requests
- Knowledge hub + actors inventory integrated in the platform
- Access to alternative financing

Impact

- ✓ Boosts renovation demand & awareness
- ✓ Reduces project costs & complexity
- ✓ Enhances quality, scalability, and trust in renovations
- ✓ Supports EU's Renovation Wave & Green Deal targets

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Register and grow your business!

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Stay Connected!

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Q&A

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Closing

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Thank you!

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