

WP3 Networking, peer-learning, cooperation and business-education partnerships

D3.2 Open innovation programme

Project No: **101194014**



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CALL FOR EXPRESSION OF INTEREST

Participation in the EXCEL4HOUSING4.0 Open Innovation Programme

Call Reference: E4H-T3.2-2026-OI

Project: EXCEL4HOUSING4.0 (Grant Agreement No: 101194014)

Programme: Erasmus+ Centres of Vocational Excellence (CoVE)

Lead Beneficiary: BGT Consulting Group (Belgium)

Description: This document compiles the Call for Interest published within the framework of the EXCEL4HOUSING4.0 project, with the aim of identifying, collecting and structuring ideas, proposals and potential areas of collaboration from different companies and stakeholders active in the construction, energy efficiency, digitalisation and sustainable housing sectors. The Call for Interest serves as a key instrument to engage external actors in the Open Innovation Programme, allowing the project to gather market-oriented inputs, detect innovative solutions and strengthen cooperation between business, education, research and vocational training providers.

In addition, the document includes a complementary needs analysis carried out prior to the launch of the Open Innovation Programme. This analysis examined the main challenges, skills gaps, market needs and innovation opportunities that shape the current framework for sustainable and energy-efficient housing. By integrating this previous assessment, the document provides a stronger basis for understanding the strategic relevance of the Open Innovation Programme and its connection with the wider objectives of EXCEL4HOUSING4.0, particularly in relation to the green and digital transition of the construction sector.

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1. CONTEXT AND OBJECTIVES

1.1 Rationale

The EXCEL4HOUSING4.0 project (Grant Agreement No. 101194014) is a four-year Erasmus+ Centres of Vocational Excellence (CoVE) initiative (February 2025 – January 2029; total budget: €3,997,862) that establishes a European network of Centres of Vocational Excellence to support the green and digital transition of the construction sector. The project brings together vocational education and training (VET) providers, universities, research centres, businesses, clusters, and public authorities across multiple European countries and Ukraine to co-develop skills, innovation, and partnerships for energy-efficient, digital, and circular housing (“Housing 4.0”).

The European construction sector plays a central role in achieving the European Union’s sustainability, climate, and digital transformation objectives. Buildings account for a significant share of energy consumption and greenhouse gas emissions in Europe, while construction activities generate large volumes of material use and waste. At the same time, the sector faces increasing demand for improved productivity, digitalisation of processes, and more sustainable building practices.

To address these challenges, innovation in areas such as digital construction technologies, circular economy solutions, and energy-efficient building systems is essential. However, many innovative solutions developed by start-ups and SMEs encounter barriers when attempting to reach the market, including limited access to industry partners, restricted opportunities for testing in real environments, and insufficient visibility among potential adopters.

Within this context, the Open Innovation Programme under the CoVE EXCEL4HOUSING4.0 aims to strengthen collaboration between innovation providers and organisations operating in the construction and housing sectors. The programme creates a structured framework to connect solution providers (start-ups and SMEs developing innovative technologies or services) with solution adopters (companies, public authorities, research organisations and universities seeking innovative solutions).

Through an open and transparent Call for Expression of Interest, the programme will identify promising innovations and provide selected applicants with opportunities to present their solutions, engage with potential adopters, and explore pathways for piloting and market uptake.

1.2 Objectives

The Open Innovation Call aims to:

- Encourage the identification and promotion of innovative solutions addressing key challenges in the construction sector.
- Facilitate collaboration between start-ups, SMEs, industry actors, research organisations, and public authorities.
- Support the exchange of knowledge and innovation between different regions and stakeholders within the European construction ecosystem.
- Create opportunities for innovators to present their solutions and explore pathways for real-world application and collaboration.
- Contribute to the broader transition of the construction sector towards digitalisation, circular

economy practices, and improved energy performance of buildings.

1.3 Structure of the Open Innovation Programme

The Open Innovation Programme is organised as a structured process aimed at identifying innovative solutions relevant to the construction and housing sectors and facilitating interaction between innovation providers and organisations interested in exploring such solutions based on validated innovation needs (Annex I).

Through this Call for Expression of Interest, start-ups and SMEs are invited to submit applications describing innovative products, services, or technologies addressing one of the programme's thematic challenge areas.

Following the evaluation procedure described in this document, up to 30 applicants will be selected to participate in the online Open Innovation Programme as Solution Providers.

The programme consists of the following main steps:

1. Open Call for Applications

Start-ups and SMEs submit their applications through the official project website, indicating the challenge area addressed by their proposed solution.

2. Evaluation and Selection

Applications are assessed according to the admissibility, eligibility, and evaluation criteria described in this call. Based on the evaluation results, up to 30 Solution Providers will be selected (maximum 10 per challenge area).

3. Participation in the online Open Innovation Programme Activities

Selected Solution Providers will be invited to participate in programme activities organised by the project consortium, including:

- presentation of their solution during an online transnational pitch event;
- participation in structured matchmaking sessions with organisations interested in exploring innovative solutions;
- opportunities to discuss potential collaboration pathways with organisations operating in the construction ecosystem.

4. Pitch Event and Award Recognition

During the transnational pitch event, the selected Solution Providers will present their solutions to a jury composed of experts and representatives from the project partnership. Following the evaluation of the presentations, one solution provider will receive an excellence award of €7,500 for the best pitch performance, in accordance with the criteria described in this call.

1.4 Expected Results

The Open Innovation Programme aims to generate tangible outcomes by facilitating connections between innovation providers and organisations in the construction and housing sectors, and by promoting the uptake of innovative solutions.

Expected results include:

- identification and selection of up to 30 innovative solutions (start-ups and SMEs) across the three thematic pillars;
- increased visibility of innovative solutions within a European ecosystem of potential adopters;
- establishment of new collaboration opportunities between solution providers and solution adopters;
- contribution to the adoption of digital, circular, and energy-efficient practices in the construction sector.

2. THEMATIC CHALLENGE AREAS

Applicants must submit a proposal addressing one (1) primary Pillar. Proposals must demonstrate a clear contribution to improving productivity, sustainability, transparency, or performance in the construction and housing sector.

Pillar A — Digitalisation in Construction

This pillar focuses on digital solutions that support improved coordination, productivity, transparency, and decision-making across the construction and building lifecycle.

Relevant solutions may include (non-exhaustive):

- BIM-based workflows and digital collaboration tools supporting design, construction, and asset management;
- digital twins, monitoring platforms, or data analytics solutions enabling performance tracking and evidence-based decision making;
- AI-enabled tools supporting design processes, project planning, site management, or project monitoring;
- IoT-based systems, sensing technologies, and digital tools supporting building performance monitoring or construction site operations;

- field-oriented digital tools that improve documentation, transparency, coordination, and access to project information;
- digital platforms or tools supporting interoperability, data exchange, and collaboration among different stakeholders in the construction value chain.

Solutions that also support the practical adoption of digital technologies within organisations, including tools facilitating training, knowledge transfer, or workforce upskilling, may also be considered relevant.

Pillar B — Circular Economy and Resource Efficiency

This pillar focuses on solutions that contribute to reducing material consumption, improving resource efficiency, and enabling circular practices within construction and renovation activities.

Relevant solutions may include (non-exhaustive):

- tools supporting lifecycle assessment, circular design strategies, and decision-making in sustainable construction;
- innovative circular construction materials and products, including modular, reusable, bio-based, or low-impact components designed to extend lifecycle, enable disassembly, and reduce environmental footprint;
- material traceability systems, material passports, and digital tools facilitating the reuse or recycling of construction materials;
- technologies or processes supporting selective deconstruction, material recovery, and reuse in renovation or demolition projects;
- solutions enabling improved waste management, recycling, or valorisation of construction and demolition waste;
- innovations supporting the use of low-carbon, recycled, or bio-based construction materials.

Solutions that facilitate the practical integration of circular practices into construction workflows, procurement processes, or supply chains are particularly relevant.

Pillar C — Energy Efficiency and Net-Zero Housing Solutions

This pillar focuses on solutions supporting improved energy performance of buildings and the transition towards low-carbon and energy-efficient housing.

Relevant solutions may include (non-exhaustive):

- technologies supporting building renovation and energy performance improvements, including

solutions related to building envelopes, insulation, or retrofit systems;

- building energy management systems (BMS), home energy management systems (HEMS), and monitoring tools supporting improved energy performance;
- integration of renewable energy technologies and energy storage systems in buildings;
- solutions supporting energy performance assessment, monitoring, or optimisation of building operations;
- technologies or tools contributing to the reduction of lifecycle carbon emissions associated with buildings.

Solutions supporting scalable renovation approaches, integrated energy systems, or improved monitoring of building performance are particularly relevant.

Cross-Cutting Considerations

While applications should address one primary Pillar, proposals may also demonstrate additional value where they contribute to factors that facilitate the practical adoption of innovative solutions in the construction ecosystem.

Examples include:

- solutions that support collaboration between industry, research organisations, and education or training providers;
- innovations that enable measurable performance improvements or provide evidence of environmental or operational benefits;
- tools or approaches that facilitate the implementation, replication, or scaling of solutions across different contexts;
- solutions that contribute to improving skills, knowledge transfer, or workforce capacity in the construction sector.

3. CALL CONDITIONS: ADMISSIBILITY, ELIGIBILITY & EXCLUSION CRITERIA

3.1 Admissibility Conditions

Applications will be considered admissible only if they meet all of the following conditions:

1. **Submission Method:** The application must be submitted through the online form available on the official project website. Applications submitted by email or through any other means will not be accepted.
2. **Language:** The application must be submitted in English.
3. **Completeness:** All mandatory sections of the application form must be completed and must respect the specified character limits.
4. **Submission Deadline for Open Innovation Proposals:** The completed application must be submitted before the deadline of 30 June 2026 at 17:00 (Brussels time).

3.2 Eligibility Conditions

Applicants must meet all of the following conditions:

a) Applicant type

The applicant must be a start-up or SME applying as a single legal entity.

b) Establishment in eligible countries

The applicant must be legally established in:

- an EU Member State
- Third countries associated with the Programme¹ or
- Ukraine

c) SME / start-up status

Applicants must qualify as an SME or start-up according to the EU definition (fewer than 250 employees and annual turnover ≤ €50 million or balance sheet total ≤ €43 million).

d) Sector relevance

Applicants must operate in fields relevant to construction, housing, or related value chains, and the selected programme Pillar.

e) Operational capacity

Applicants must demonstrate the capacity to participate in programme activities (including application, pitching, and matchmaking) and to engage in follow-up discussions with potential adopters if selected.

3.3 Exclusion Criteria

Applicants may be excluded if they:

- are bankrupt or subject to insolvency proceedings;
- have been convicted of fraud, corruption, or serious professional misconduct;
- submit false or misleading information.

¹ <https://erasmus-plus.ec.europa.eu/programme-guide/part-a/eligible-countries>

4. PARTICIPATION RULES

The following participation rules apply to all applicants submitting a proposal under this Call for Expression of Interest:

a) **Single Application per Organisation**

Each organisation may submit only one application under this call. Multiple submissions from the same organisation will not be considered.

b) **Single Challenge Area (Pillar)**

Each application must clearly indicate one programme Pillar to which the proposed solution is aligned. Applications addressing multiple Pillars will not be considered.

c) **Submission Deadline**

Applications must be submitted before the deadline indicated in this call. Applications submitted after the deadline will not be accepted or evaluated.

d) **Submission Channel**

Applications must be submitted exclusively through the official online application form available on the project website. Applications submitted by email or through any other channel will not be considered.

e) **Compliance with Call Requirements**

Applicants must ensure that their submission complies with all admissibility and eligibility conditions described in this document. Applications that do not meet these requirements may be excluded from the evaluation process.

f) **Equal Treatment and Transparency**

All admissible and eligible applications will be evaluated in accordance with the evaluation criteria published in this call and under the principles of equal treatment, transparency, and impartiality.

5. BENEFITS FOR SELECTED APPLICANTS

Organisations selected through this Call will participate in the Open Innovation Programme and benefit from a structured set of activities designed to increase visibility, facilitate connections with potential adopters, and explore opportunities for collaboration within the European construction ecosystem.

Access to a European Demand-Side Ecosystem

Selected Solution Providers will gain visibility within a network of **Solution Adopters** engaged through the Centres of Vocational Excellence partnership. These adopters include companies, public authorities, research organisations, and educational institutions operating in the construction and housing sectors across multiple European countries.

Participation in the programme will provide access to:

- a transnational innovation ecosystem connecting industry, research, and education actors;

- organisations that have expressed concrete interest in exploring innovative solutions aligned with the programme's thematic areas;
- opportunities to engage in dialogue with potential adopters seeking technologies, services, or tools relevant to their operational needs.

Opportunity to Present Solutions at an Online Transnational Pitch Event

Selected applicants will be invited to present their solutions during the Open Innovation Programme Pitch Event, organised at European level in an online format.

During this event, Solution Providers will:

- present their innovation to a European audience of sector stakeholders, including potential adopters and project partners;
- participate in a moderated session including questions and discussion with expert evaluators and industry representatives;
- be featured in event-related communication materials, such as a participant catalogue or programme booklet, where applicable.

This event aims to provide innovators with increased visibility and a platform to showcase their solutions to organisations that may be interested in adopting or testing them.

Excellence Award

During the transnational pitch event, an Award Jury composed of representatives from the evaluation committee will assess the presentations using the agreed evaluation criteria.

Based on the jury assessment, one solution provider will be recognised with an excellence award of €7,500 for the best pitch performance.

Important Notice

Participation in the Open Innovation Programme does not constitute a procurement procedure and does not guarantee the implementation of pilot projects, commercial agreements, or procurement contracts.

Any potential collaboration, pilot activity, or commercial engagement between a Solution Provider and a Solution Adopter will be subject to separate bilateral agreements between the respective organisations and must comply with the internal procedures and regulatory requirements of the adopting organisation.

6. EVALUATION PROCEDURE FOR THE SELECTION OF SOLUTION PROVIDERS

The evaluation process will be conducted in accordance with the governance structure of the Open Innovation Programme and will follow a **three-stage procedure** designed to ensure transparency, fairness, and consistency. Only applications that successfully pass each stage will proceed to the subsequent stage of evaluation.

Table 1. Selection Procedure and Evaluation Criteria

Stage	Description	Assessment Elements	Outcome
Stage 1 – Eligibility Check (Administrative Screening)	The eligibility check is carried out by the Evaluation Secretariat, to ensure that applications comply with all formal requirements of the call.	•Submission through the official application portal before the deadline •Completeness of the application and submission in English •Establishment of the applicant in an eligible country •Compliance with the SME/start-up definition (based on self-declaration and, where relevant, verification checks) •Selection of one eligible challenge area (pillar) and basic relevance of the proposal	Applications that fulfil all eligibility requirements proceed to Stage 2 – Expert Evaluation. Applications failing any eligibility criterion will not be further evaluated.
Stage 2 – Expert Evaluation	Eligible applications will be assessed by the Evaluation Committee, composed of representatives from project partners with expertise in industry, research, and innovation ecosystems.	•Relevance to the selected challenge area – 30% •Level of innovation and technological maturity – 25% •Impact, scalability, and market potential – 25% •Team capacity and implementation capability – 10% •Contribution to sustainability, circular economy, and EU priorities – 10%	Each criterion will be scored on a scale from 0 (poor) to 5 (excellent). Weighted scores will be applied to determine the final evaluation score for each proposal.
Stage 3 – Final Selection	Following the expert evaluation, applications will be ranked according to their final weighted score.	•Ranking based on the overall evaluation score •Maximum 30 applications selected in total •Maximum 10 applications per challenge area (pillar)	Selected applicants will be invited to participate in the Open Innovation Programme Pitch Event and Matchmaking Activities.

Tie-break rule:

In the event that two or more applications receive the same final score, priority will be given to the proposal with the higher score under **Impact, scalability and market potential**, reflecting the programme's objective to promote solutions with strong potential for real-world adoption.

Appeal Procedure:

Applicants may submit an appeal concerning the evaluation result within 5 calendar days from the date of notification. Appeals must be submitted in writing to the contact indicated in Section 15.

7. EVALUATION FOR THE PITCH EVENT AWARD

During the transnational pitch event, the selected Solution Providers will present their solutions to an **Award Jury** composed of members of the Evaluation Committee. The evaluation of the award will be based on the quality of the live presentation and the relevance of the proposed solution to the needs of the sector.

Table 2. Pitch Evaluation Criteria for the €7,500 Award

Evaluation Criterion	Weight
Clarity and persuasiveness of the pitch	20%
Relevance to adopter needs	25%
Level of innovation and differentiation	20%
Scalability and business potential	20%
Engagement and interaction during the discussion (including responsiveness during Q&A)	15%

The pitch receiving the highest overall score will be awarded the €7,500 excellence award.

Tie-break rule:

In the event of a tie, priority will be given to the solution obtaining the higher score under Relevance to adopter needs, reflecting the demand-driven orientation of the programme.

Award Jury and Decision-Making

- The Award Jury will consist of selected members of the Evaluation Committee.
- Jury deliberations and scoring will be documented to ensure transparency and traceability of the decision-making process.
- The disbursement of the award will be subject to final verification of eligibility and administrative compliance prior to payment.

8. TIMELINE OF THE PROGRAMME

The following timeline provides an overview of the main stages of the Open Innovation Programme and the selection process.

Milestone	Date
Launch of the Call	26 March 2026
Submission Deadline Open Innovation Programme	30 June 2026 – 17:00 (Brussels time)
Evaluation Period	July 2026
Notification of Selected Applicants	July 2026
Online Pitch Event	October 2026
Award Announcement	October 2026

The project consortium reserves the right to adjust the timeline if necessary. Any changes will be communicated through the official project communication channels.

9. HOW TO APPLY

Applications must be submitted through the official online application form available on the EXCEL4HOUSING4.0 project website:

<https://excel4housing.eu/news/join-the-excel4housing4-0-open-innovation-programme/>

Applicants must complete the application form and provide the required information.

Applications must be submitted before the deadline indicated in Section 8 of this call.

Only applications submitted through the official online form will be considered.

Applicants are responsible for ensuring that the application is complete and submitted before the deadline.

Composition of the Application Package

The application package consists of the online application form available on the EXCEL4HOUSING4.0 project website. The form includes the following sections: Applicant Information, Solution Description, Impact and Market Potential, Implementation Capacity, Ethics and Sustainability, and Declarations. Applicants must complete all mandatory fields marked with an asterisk (*).

10. RIGHTS AND OBLIGATIONS OF SELECTED APPLICANTS

Applicants selected through the evaluation procedure will participate in the activities of the Open

Innovation Programme as Solution Providers.

Selected applicants are expected to:

- participate in the activities organised under the Open Innovation Programme;
- present their proposed solution during the transnational pitch event;
- engage in matchmaking sessions with organisations interested in exploring innovative solutions;
- provide relevant information required for the organisation of programme activities and for communication and dissemination purposes.
- Selected applicants shall contribute to the dissemination and promotion of the EXCEL4HOUSING4.0 project and its results through their own communication channels (e.g. website, social media, events), where appropriate. They shall also ensure appropriate visibility of European Union funding in all relevant communication and dissemination activities related to their participation in the Open Innovation Programme, in line with the applicable EU communication and visibility requirements.

Participation in the Open Innovation Programme does not create any obligation for participating organisations or project partners to establish pilot projects, commercial partnerships, or procurement agreements.

Any potential collaboration between a Solution Provider and a Solution Adopter will be subject to separate bilateral agreements between the respective organisations and must comply with the internal procedures and legal requirements of the organisations involved.

11. INTELLECTUAL PROPERTY RIGHTS

All intellectual property rights (IPR) related to the solutions submitted and presented under this Call for Expression of Interest shall remain the sole property of the respective applicants.

Participation in the Open Innovation Programme does not imply any transfer of ownership, licensing, or granting of rights over the applicants' intellectual property to the project consortium or to other participating organisations.

Any results, developments, or innovations generated independently by third parties in the context of the programme shall remain the property of those parties. Any potential use, exchange, or commercial exploitation of solutions or results shall be subject to separate agreements between the concerned parties.

12. CONFIDENTIALITY AND DATA PROTECTION

All personal data provided in the context of this call will be processed in accordance with Regulation (EU)

2016/679 of the European Parliament and of the Council (General Data Protection Regulation – GDPR).

Personal data collected during the application and evaluation process will be used exclusively for the purposes of:

- administering and evaluating applications submitted under this call;
- organising the activities of the Open Innovation Programme;
- communicating with applicants regarding the status of their application and programme participation.

Access to the information provided in the applications will be limited to authorised persons involved in the management and evaluation of the call, including members of the Evaluation Secretariat, the Evaluation Committee, and the Award Jury, where applicable.

All submitted applications will be treated as confidential. Information contained in applications will not be disclosed to third parties outside the evaluation process without the consent of the applicant, unless required for administrative, audit, or legal purposes.

13. CONFLICT OF INTEREST

Members of the Evaluation Committee and the Award Jury must perform their duties impartially and independently.

All evaluators will be required to declare any actual or potential conflict of interest before participating in the evaluation process. A conflict of interest may arise, for example, where an evaluator has professional, financial, or personal connections with an applicant.

In cases where a conflict of interest is identified, the concerned evaluator will not participate in the evaluation of the relevant application.

The evaluation process will be conducted in accordance with the principles of transparency, fairness, and equal treatment.

14. DEFINITIONS

For the purposes of this Call for Expression of Interest, the following definitions apply:

Term	Definition
Solution Provider	A start-up or small or medium-sized enterprise (SME) that submits an application under this Call for Expression of Interest proposing an innovative product, service, or technology addressing one of the programme's thematic challenge areas. Applicants selected through the evaluation procedure participate in the Open Innovation Programme as Solution Providers.
Solution	An organisation operating within the construction or housing ecosystem (such as a company,

Adopter	public authority, research organisation, or educational institution) interested in exploring innovative solutions and engaging with Solution Providers through programme activities such as matchmaking and the pitch event.
Pillar	One of the three thematic challenge areas addressed by this call: Digitalisation in Construction, Circular Economy and Resource Efficiency, and Energy Efficiency and Net-Zero Housing Solutions. Each application must address one pillar only.
Open Innovation Programme	The structured process established under the EXCEL4HOUSING4.0 project to identify innovative solutions and facilitate interaction between Solution Providers and organisations interested in exploring such solutions.
Pitch Event	A transnational event organised by the project consortium during which selected Solution Providers present their solutions to a jury and to an audience of sector stakeholders. The event includes the evaluation of presentations and the selection of the recipient of the excellence award.
Award Jury	The group of evaluators responsible for assessing the presentations delivered during the pitch event and for determining the recipient of the €7,500 excellence award based on the evaluation criteria defined in this call.

15. CONTACT

For questions related to this Call for Expression of Interest, applicants may contact the **Open Innovation Programme Responsible**.

Eric Kota

Open Innovation Programme Responsible

BGT Consulting Group (Belgium)

EXCEL4HOUSING4.0 – Open Innovation Programme

Email: eric.kota@bgtconsultinggroup.com

Questions related to the Call for Expression of Interest may be submitted during the application period using the contact details provided above. Applicants are encouraged to consult the call document carefully before submitting enquiries.

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ANNEXES

ANNEX I – Validation of Innovation Needs: Consolidated Report

1. PURPOSE AND APPROACH

This report presents the consolidated results of the Needs Analysis Survey carried out by partners of the EXCEL4HOUSING4.0 project under WP3 – Task 3.2. The survey gathered input from stakeholders across the construction ecosystem, including SMEs, large companies, public authorities, VET providers, universities, research organisations, and sector associations, from 10 EU countries and Ukraine.

The objective of the analysis is to identify and validate innovation needs related to the green and digital transition of the construction sector, particularly in the areas of digitalisation, circular economy, and energy efficiency / net-zero buildings.

Based on 32 stakeholder responses, the report synthesises:

- Key innovation needs emerging across countries and stakeholder types
- Common barriers to adoption, such as financial constraints, skills gaps, regulatory complexity, and sector fragmentation
- Priority areas where innovation solutions are most needed

These findings are used to define three Challenge Areas that will guide the Open Innovation Programme of EXCEL4HOUSING4.0:

1. Digitalisation for productivity, transparency, and evidence-based construction delivery
2. Circular construction, material traceability, and resource efficiency
3. Deep renovation and net-zero buildings through integrated solutions

The report therefore provides the evidence base for launching the Call for Expression of Interest (Deliverable D3.2), which will invite European SMEs, start-ups, and innovators to propose solutions addressing these validated challenges. The ultimate aim is to connect innovation providers with real sector needs, strengthen business-education collaboration, and accelerate the adoption of sustainable and digital solutions in the construction sector.

2. DATA SOURCES AND COVERAGE

2.1 Sources used

The analysis is based on national inputs collected through the **Needs Analysis Survey** conducted within the EXCEL4HOUSING4.0 project. Contributions were gathered through project partner networks across participating countries and involved stakeholders active in the construction, housing, and skills ecosystem.

The survey covered the following countries:

- **Croatia** – 2 responses
- **Finland** – 1 response
- **Germany** – 2 responses
- **Greece** – 2 responses
- **Italy** – 2 responses
- **Poland** – 2 responses
- **Portugal** – 7 responses
- **Spain** – 7 responses
- **Sweden** – 3 responses
- **Ukraine** – 2 responses
- **Belgium** – 2 responses

Total responses included in this consolidated analysis: 32

The responses were obtained through targeted outreach to organisations involved in construction, housing, training, research, and public administration. The objective was to capture **relevant demand signals from actors directly engaged in the green and digital transition of the built environment**.

2.2 Stakeholder profile represented

The 32 responses reflect a diverse range of organisations operating across the construction value chain and the broader innovation and skills ecosystem. The stakeholder landscape includes:

SMEs, start-ups, and companies

Participants include construction SMEs, materials producers, engineering and design consultancies, and companies active in real estate, renovation, and construction services. Several respondents also represent emerging actors exploring digitalisation, circular materials, and energy-efficient construction solutions.

Large companies and major industry actors

The dataset also includes inputs from larger construction and engineering companies involved in large-scale building and infrastructure projects, contributing perspectives on industry-wide challenges and innovation needs.

Public authorities and municipalities

Responses from local and regional public authorities reflect the perspective of organisations responsible for building regulation, public procurement, urban development, and renovation of public building stock.

Vocational education and training providers, universities, and higher education institutions

Education and training organisations—including VET providers, universities, and technical institutes—are

represented through respondents involved in workforce development, curriculum design, and industry training initiatives related to sustainable construction and digital skills.

Research organisations, institutes, clusters, and professional associations

The survey also includes contributions from research centres, technology organisations, sector clusters, and professional associations that support innovation, knowledge transfer, and industry collaboration within the construction ecosystem.

3. SURVEY ADMINISTRATION OVERVIEW (CROSS-COUNTRY SYNTHESIS)

3.1 Dominant distribution method

Across participating countries, the survey was distributed primarily through targeted outreach within established professional and institutional networks. Project partners contacted stakeholders directly to ensure that responses reflected the perspectives of organisations actively involved in the construction, housing, and skills ecosystem.

The main distribution approaches included:

- Direct outreach and personal contacts with relevant stakeholders (e.g., industry actors, training organisations, and sector representatives).
- Email distribution combined with follow-up communication, such as phone calls or meetings, to encourage participation and clarify responses when necessary.
- Dissemination through existing stakeholder databases, including networks of municipalities, training institutions, and sector organisations.
- Formal invitations sent to selected stakeholders across the construction value chain, sometimes accompanied by explanatory materials about the survey objectives.
- Online survey forms shared through professional contacts and project networks.

These approaches were used in different combinations depending on national contexts and the structure of local stakeholder networks.

3.2 Key implication for data interpretation

The survey followed a targeted sampling approach, focusing on organisations that are directly engaged in construction, housing, innovation, or skills development. As a result, the findings should not be interpreted as statistically representative of the entire sector. The sample size was therefore defined according to the exploratory and needs-oriented purpose of the survey, prioritising the relevance and informed position of respondents over broad statistical coverage

Instead, the results provide qualitative insights and validated demand signals from relevant actors within the ecosystem. This approach is consistent with the objectives of the CoVEs model and the design of the project's open innovation programme, which prioritises actionable needs and practical opportunities for piloting and adoption.

By focusing on informed stakeholder perspectives, the survey contributes to identifying innovation challenges that are both relevant to industry needs and suitable for further development through

collaboration between businesses, education providers, and innovation actors.

4. CONSOLIDATED FINDINGS: VALIDATED INNOVATION NEEDS

This section presents the innovation needs that recur across multiple countries and stakeholder types. The needs are organised according to the three thematic pillars of the project. For each pillar, key demand signals identified in the survey responses are summarised, followed by the corresponding validated innovation need.

4.1. Pillar A — Digitalisation (validated needs)

A1) Interoperability and Integrated Data Environments

A recurring need across several countries is the development of integrated digital environments that connect the different stages of the building lifecycle, including design, construction, operation, and public asset management.

Survey responses highlight the absence of unified data environments capable of integrating tools such as Building Information Modelling (BIM), geographic information systems (GIS), building management systems (BMS), and IoT-based monitoring platforms. Respondents also pointed to challenges in managing document workflows, monitoring project progress and costs, and analysing building performance data.

Several stakeholders emphasised the gap between the availability of digital tools and their effective adoption in practice, calling for interoperable solutions supported by reliable and standardised data that enable better diagnostics and decision-making.

Validated need:

Solutions that enable interoperable digital workflows, standardised data environments, and end-to-end coordination across the building lifecycle, from design and construction to operation and asset management.

A2) Digital twins, monitoring and evidence of performance

Interest in digital twins and building performance monitoring emerged as a strong and recurring theme across the responses.

Stakeholders highlighted the need for digital platforms capable of monitoring energy performance, construction processes, and building conditions through sensors and connected systems. Several respondents emphasised the importance of data analytics and monitoring tools that can validate the impact of renovation measures and support evidence-based decision-making.

Additional needs include IoT-based monitoring of factors such as heat loss, humidity levels, and system efficiency, as well as digital documentation systems that record construction activities and hidden works in real time.

Validated need:

Digital twin and monitoring solutions capable of providing measurable performance evidence, technical, operational, and energy-related, to support project management, renovation planning, and decision-making.

A3) AI for productivity (design and project management)

Artificial intelligence (AI) is increasingly seen as a potential driver of productivity improvements in construction.

Survey responses point to the need for AI-enabled tools that support design workflows and construction project management, including planning, coordination, monitoring, and project control. AI applications were also mentioned in relation to design automation, particularly in BIM-based modelling and technical design processes.

In addition, stakeholders noted the need for training and support mechanisms to help organisations adopt AI-based tools effectively within existing workflows.

Validated need:

AI-enabled solutions that improve productivity, coordination, and quality in design and construction project management, combined with practical pathways for industry adoption.

A4) Field-ready digitalisation and transparency

Several responses highlight the need for digital solutions adapted to real construction site conditions, where access to digital tools remains limited.

Stakeholders pointed to the importance of tools that allow field workers to access and interact with digital models directly on site. Examples include mobile BIM viewers, digital documentation tools for recording construction progress, and platforms enabling the real-time capture of photos, videos, and site data.

There is also demand for systems that can integrate construction documentation with regulatory or administrative platforms, improving transparency and compliance.

Validated need:

Lightweight, field-ready digital tools that bridge BIM environments and on-site execution, enabling real-time documentation, transparency, and improved communication between project actors.

A5) Skills and training for digital adoption

Across multiple countries, stakeholders emphasised that skills development is a central component of digital transformation in construction.

Respondents highlighted the need to strengthen digital competencies among both workers and educators. This includes the alignment of education and training programmes with industry needs, the development of micro-credentials and flexible learning pathways, and the reinforcement of collaboration between training providers and companies.

A recurring issue is the shortage of educators and trainers with practical expertise in modern digital tools, which creates a “teach-the-teacher” gap. Stakeholders also stressed the importance of improved communication and knowledge exchange mechanisms within the sector.

Validated need:

Digital innovation solutions that incorporate capacity-building components, such as training modules, micro-credentials, and “teach-the-teacher” approaches, while strengthening alignment between industry needs and education and training systems.

4.2 Pillar B — Circular economy (validated needs)

B1) Practical methods, tools and standards for circularity

Across several countries, stakeholders highlighted the need for practical and operational tools that enable the implementation of circular economy principles in construction projects.

Respondents pointed to the lack of standardised methodologies that allow circularity to be integrated into project planning, design, procurement, and construction processes. Key needs include life-cycle assessment (LCA) tools, systems for material traceability, and practical methods for selective demolition, reuse, and recycling of construction materials.

Public sector stakeholders also emphasised the need for solutions that support the reuse of reclaimed materials in public renovation projects, including tools such as material passports, deconstruction catalogues, and decision-support systems for evaluating reuse options.

In addition, respondents noted that technical staff responsible for construction permitting and project evaluation often lack sufficient training on circular construction and resource efficiency practices, highlighting the need for capacity-building in this area.

Validated need:

Practical tools and standardised methodologies that support circular planning, decision-making, and procurement, enabling stakeholders to integrate circular economy practices into construction and renovation projects.

B2) Material traceability and “material passports”

Another recurring need concerns systems for tracking and assessing building materials throughout their lifecycle, particularly in renovation and demolition contexts.

Stakeholders emphasised the importance of tools that allow the identification, documentation, and evaluation of reusable materials, supporting more efficient reuse and reducing construction waste. Material passports and traceability platforms were frequently mentioned as key instruments for enabling circular renovation workflows.

Respondents also highlighted the need for solutions that help recover and valorise production waste and leftover materials, particularly in construction and manufacturing processes. These tools could support improved resource efficiency and create new opportunities for the reuse of secondary materials.

Validated need:

Material traceability and assessment systems that enable reuse, waste reduction, and circular renovation workflows, including tools such as material passports and digital tracking platforms.

B3) Circular materials adoption (bio-based and secondary materials)

Several responses highlighted the potential of bio-based materials and secondary raw materials as key enablers of circular construction. However, stakeholders also identified barriers that limit their broader adoption.

These barriers include regulatory uncertainty, particularly regarding the interpretation of safety standards for innovative materials, as well as limited market availability and shortages of skilled professionals capable of designing and building with alternative materials.

Respondents also expressed interest in technologies that enable the recycling and reuse of demolition waste, including mobile recycling solutions and innovative manufacturing approaches using secondary raw materials.

In addition, stakeholders noted the need for quality assurance and certification mechanisms that confirm the performance and safety of recycled materials, especially when used in structural applications.

Validated need:

Solutions that accelerate the adoption of circular materials by providing testing, quality assurance, certification, and regulatory guidance, while supporting the safe and reliable use of bio-based and secondary materials in construction.

4.3 Pillar C — Energy efficiency / net-zero (validated needs)

C1) Deep renovation scaling (envelope, retrofits, practicality)

Across several countries, stakeholders highlighted the need to scale up deep energy renovation of existing buildings, particularly through solutions that are practical, cost-effective, and adaptable to different building types.

Respondents emphasised the importance of easy-to-install retrofit solutions, including building envelope improvements such as façade systems, roof insulation, and high-performance windows. These technologies are seen as key enablers for achieving significant energy performance improvements in existing buildings.

Public-sector stakeholders also highlighted the need for solutions that facilitate the renovation of municipal and public buildings, including standardised energy audits, implementation frameworks, and financing models that can support large-scale renovation programmes.

In addition, respondents pointed to the need for clear information on return on investment (ROI), incentives, and financial benefits, as building owners and clients often face uncertainty when evaluating energy renovation projects.

Validated need:

Scalable deep renovation solutions, particularly building envelope and integrated retrofit packages, combined with decision-support tools and financial clarity that enable replication across different building contexts.

C2) Integration of renewables, storage and smart controls

Stakeholders across several countries emphasised the importance of integrated energy systems that combine energy efficiency measures with renewable energy generation, energy storage, and intelligent control technologies.

Examples highlighted include systems that integrate renewable energy sources (RES), battery storage, and smart building management systems, allowing buildings to optimise energy consumption, increase flexibility, and improve overall performance.

Respondents also noted the need for technologies that support monitoring and optimisation of heating systems, as well as solutions enabling the development of local energy systems, such as microgrids or energy clusters.

Validated need:

Integrated energy solutions that combine energy efficiency, renewable generation, energy storage, and smart control systems, designed for practical deployment in buildings and renovation projects.

C3) Carbon footprint and lifecycle performance

Another recurring need concerns tools that allow stakeholders to measure, monitor, and reduce carbon emissions across the building lifecycle.

Respondents highlighted the importance of solutions that assess both operational energy use and embodied carbon, enabling more informed decision-making during design, construction, and renovation processes.

Stakeholders also stressed the need to ensure that carbon reduction strategies are implemented while maintaining high standards of indoor environmental quality, including comfort, health, and air quality.

Validated need:

Tools and solutions that support the calculation, reduction, and verification of carbon emissions across the building lifecycle, addressing both embodied and operational carbon while ensuring building performance and occupant well-being.

5. CROSS-CUTTING ADOPTION BARRIERS (VALIDATED ACROSS COUNTRIES)

The survey responses also reveal several cross-cutting barriers that affect the adoption of innovative solutions across the construction sector. These barriers appear consistently across multiple countries and stakeholder types and should therefore inform the design of the open innovation programme, evaluation criteria, and post-selection support mechanisms.

5.1 Financial/resource constraints and investment uncertainty

Financial constraints and uncertainty regarding investment returns were repeatedly highlighted across several countries as key barriers to the adoption of innovative solutions.

Examples include limited organisational resources in **Croatia**, funding prerequisites and financing barriers in **Greece**, constrained public budgets in **Poland**, and limited human and financial resources for innovation adoption in **Portugal**. Respondents in **Ukraine** also noted the high cost of equipment and limited access to financing, partly influenced by broader economic and geopolitical conditions. In **Sweden**, financial constraints and investment prioritisation were mentioned as challenges, while stakeholders in **Belgium** highlighted financial risks and uncertainty when evaluating the expected performance outcomes of innovative technologies.

Implication for the programme:

The open innovation programme should prioritise solutions that demonstrate credible and practical pathways to adoption, including pilot implementations, transparent cost structures, clear ROI models, and viable financing or implementation mechanisms.

5.2 Skills gaps and training capacity (including “teach-the-teacher”)

Skills shortages and training capacity gaps were also identified as significant barriers across multiple countries.

In **Croatia**, respondents emphasised the continuous need to update staff and student competencies, as well as the importance of stronger collaboration between education providers and industry to ensure practical learning opportunities. Stakeholders in **Portugal** highlighted gaps in training for technical staff responsible for evaluating and licensing construction projects, as well as the overall pace of competence development.

In **Ukraine**, respondents reported shortages of specialised professionals in emerging fields such as advanced manufacturing and digital construction technologies, alongside a lack of educators trained in modern digital tools. In **Germany**, stakeholders pointed to the need for additional training related to digitalisation processes in the construction sector, while in **Spain** respondents noted limited technical capacity and training opportunities for professionals adopting new technologies.

Implication for the programme:

The selection and matchmaking process should prioritise solutions that incorporate capacity-building components, such as training modules, knowledge transfer mechanisms, and partnerships that support skills development among both industry professionals and educators.

5.3 Regulatory uncertainty, bureaucracy, procurement complexity

Regulatory and administrative barriers were identified as important factors affecting the implementation of innovative solutions.

In **Greece**, respondents highlighted the need for clearer regulatory frameworks and reported challenges related to bureaucracy and compliance procedures. In **Italy**, stakeholders stressed the need to simplify administrative processes, improve cooperation between companies and public authorities, and ensure that incentive schemes are effectively implemented.

In **Poland**, respondents emphasised the complexity of procurement procedures, legal risks, lengthy approval processes, and challenges related to supplier availability. In **Croatia**, difficulties in interpreting fire safety regulations were noted as a barrier to the adoption of innovative bio-based construction materials. Meanwhile, in **Ukraine**, respondents pointed to the lack of regulatory standards for emerging technologies such as additive manufacturing and the structural reuse of secondary materials. In **Belgium**, stakeholders highlighted complex permitting processes and regulatory uncertainty surrounding innovative construction solutions.

Implication for the programme:

Innovation challenges and evaluation criteria should take into account the regulatory readiness of proposed solutions, including their ability to operate within existing legal frameworks or provide clear pathways to compliance.

5.4 Sector fragmentation, culture, resistance to change, trust deficit

Several responses also highlighted structural and cultural barriers within the construction sector that slow down innovation adoption.

In **Finland**, industry culture and established practices were identified as factors that can hinder the uptake of new solutions. In **Spain**, respondents pointed to sector fragmentation and resistance to change among stakeholders. In **Sweden**, stakeholders noted slow decision-making processes, ambivalence towards innovation, and fragmented information flows that make it difficult to identify reliable and proven solutions. Concerns about greenwashing were also mentioned as a factor that can reduce trust in new technologies.

Similarly, respondents in **Greece** reported resistance to organisational and cultural change, alongside limited change-management capacity within some organisations.

Implication for the programme:

To address these challenges, the programme should emphasise demonstration projects, performance evidence, and trusted dissemination channels, while encouraging knowledge sharing, peer learning, and collaboration across the construction ecosystem.

6. VALIDATED INNOVATION NEEDS

Based on the analysis of survey responses across participating countries, three overarching innovation needs have been validated across the construction ecosystem:

1. Interoperable and field-ready digitalisation

There is a clear need for digital solutions that support interoperable workflows across the building lifecycle. This includes technologies such as BIM and BIM–GIS integration, digital twins, monitoring platforms, AI-supported productivity tools, and real-time site documentation systems. These solutions should be accompanied by skills development and practical adoption support, ensuring that organisations and workers can effectively implement digital tools in both office and on-site environments.

2. Operationalisation of circular construction practices

Stakeholders emphasised the need for practical tools that enable the implementation of circular economy principles in construction and renovation projects. This includes material passports, traceability systems, LCA tools, selective deconstruction methods, and reuse or recycling workflows. The adoption of bio-based and secondary materials also requires compliance mechanisms, quality assurance systems, and clear regulatory guidance.

3. Scaling deep renovation and net-zero building solutions

Respondents highlighted the importance of scalable solutions that support deep renovation and the transition to net-zero buildings. Priority areas include high-performance envelope solutions, integrated renewable energy systems with storage and smart controls, and tools for measuring and reducing lifecycle carbon emissions. Stakeholders also emphasised the need for standardised audits, financing and implementation models, and reliable performance monitoring to support large-scale deployment.

These needs strongly align with the objectives of Work Package 3, which aims to strengthen collaboration between industry, education, and innovation actors. They also reflect the logic of the open innovation programme, which focuses on demand-driven challenges, EU-wide scouting of solutions, and matchmaking to enable piloting and adoption.

7. DEFINITION OF THE 3 CHALLENGE AREAS

Based on the validated innovation needs, three **Challenge Areas** have been defined to guide the Open Innovation Programme. These areas are designed to:

- reflect the priority needs identified through the survey,
- be clearly understandable to SMEs, start-ups, and innovators across Europe,
- enable transparent evaluation and effective matchmaking between solution providers and

adopters, and

- remain sufficiently broad to attract diverse solutions while maintaining a strong focus on real-world adoption.

Challenge Area 1 — Digitalisation for Productivity, Transparency and Evidence-Based Delivery

Challenge statement

Enable construction and renovation actors to adopt **interoperable digital workflows and field-ready tools**, supported by AI, digital twins, and monitoring systems, in order to improve productivity, transparency, coordination, and measurable performance outcomes.

Priority sub-themes

- BIM-enabled coordination and interoperable data workflows (including BIM–GIS integration, document automation, and progress/cost monitoring)
- Digital twins and monitoring platforms supporting energy and performance analytics as well as decision-making
- AI-based tools for design processes (e.g. BIM and MEP modelling) and construction project management (planning, coordination, and control)
- Field-ready solutions such as mobile BIM viewers, real-time site documentation tools, and sensor-based monitoring
- Skills development tools, including training modules, micro-credentials, and “teach-the-teacher” approaches for digital adoption

Typical adopters identified through the survey

Municipalities and public authorities, construction SMEs, engineering and design consultancies, education and training providers, and real estate actors.

Challenge Area 2 — Circular Construction, Traceability and Resource Efficiency at Project Scale

Challenge statement

Accelerate the transition to circular construction by enabling **material traceability, standardised methods, and practical tools** that support reuse, selective deconstruction, and circular material flows, combined with quality assurance and compliance pathways that facilitate real-world adoption.

Priority sub-themes

- Material passports, traceability platforms, and life-cycle assessment tools supporting circular design and renovation
- Selective deconstruction methods and reuse workflows, including catalogues, procurement integration, and reuse planning
- Solutions for recovering and valorising production waste and demolition materials, including local or on-site recycling technologies
- Quality assurance and certification approaches enabling the safe reuse of secondary materials, including structural applications where relevant
- Support mechanisms for the adoption of bio-based materials, including evidence generation and

regulatory interpretation

Typical adopters identified through the survey

Architectural practices, municipalities, construction companies, material producers, research organisations, and sector clusters.

Challenge Area 3 — Deep Renovation and Net-Zero Buildings Through Integrated Solutions and Scalable Models

Challenge statement

Scale the adoption of **deep renovation and net-zero building solutions** through integrated technical packages, combining building envelope improvements, renewable energy systems, storage, and smart controls, supported by financing models, implementation frameworks, and performance verification.

Priority sub-themes

- Prefabricated or industrialised envelope retrofit solutions and easy-to-install renovation packages
- Integrated energy systems combining renewable energy sources, storage technologies, and smart building management systems (e.g. HEMS/BMS)
- Standardised audit and decision-support tools, including lifecycle carbon footprint calculation and reduction strategies
- Performance verification solutions, including monitoring technologies and evidence-based impact reporting
- Financing and adoption enablers, including clearer ROI models, integration with incentive schemes, and innovative implementation approaches such as ESCO or design–build–operate models

Typical adopters identified through the survey

Public authorities (particularly for municipal buildings), construction SMEs, real estate and financial actors, and engineering or HVAC companies.

8. Conclusions

The Needs Analysis Survey conducted under WP3 – Task 3.2 of the EXCEL4HOUSING4.0 project provides an evidence-based overview of the innovation needs emerging across the European construction ecosystem in relation to the green and digital transition of the built environment. Drawing on stakeholder input from 10 EU Member States and Ukraine, the analysis captures demand signals from a diverse range of actors including industry representatives, SMEs, public authorities, vocational education and training providers, universities, research organisations, and sector associations.

The findings reveal a strong convergence of priorities across countries and stakeholder groups. Three strategic areas of innovation demand consistently emerge:

1. Interoperable and field-ready digitalisation of construction processes, enabling improved coordination, transparency, and data-driven decision-making across the building lifecycle.
2. Operationalisation of circular construction practices, including material traceability, circular design tools, and the adoption of bio-based and secondary materials supported by quality assurance and

regulatory compliance mechanisms.

3. Scalable solutions for deep renovation and net-zero buildings, combining envelope improvements, renewable energy systems, storage technologies, smart controls, and lifecycle carbon assessment tools.

At the same time, the survey highlights structural barriers that continue to limit the adoption of innovative solutions within the construction sector. These include financial and investment constraints, skills shortages, regulatory and administrative complexity, and the fragmented nature of the sector's value chain. Addressing these barriers requires not only technological innovation but also strengthened cooperation between industry, education and training systems, public authorities, and innovation actors.

Based on these validated needs and systemic barriers, the report defines three Challenge Areas that form the foundation of the EXCEL4HOUSING4.0 Open Innovation Programme. These challenge areas translate sector needs into clear opportunity spaces for SMEs, start-ups, research organisations, and technology providers, enabling the identification of solutions with strong potential for piloting, demonstration, and market uptake.

The results of this report therefore constitute the analytical basis for the forthcoming Call for Expression of Interest (Deliverable D3.2), through which EXCEL4HOUSING4.0 will mobilise innovative solution providers across Europe. By connecting these innovators with real demand from industry, municipalities, and training ecosystems, the project aims to facilitate practical experimentation, knowledge transfer, and cross-border collaboration within the Housing 4.0 ecosystem.