

# ZEBAI Project Receives €3.8 Million for AI-Enhanced Zero-Emission Building Design under Horizon Programme

ZEBAI is an integrative project in which a broad range of interdisciplinary teams collaborate to develop **a new methodology** that aims to change the way that **zero-emission buildings are designed**. It aims to revolutionize zero-emission buildings design through a comprehensive methodology. This innovative approach incorporates analyses, decision-making processes and holistic evaluations considering energy performance, environmental impact, indoor environmental quality, and cost-effectiveness.

- The project, led by the Universidad Politécnica de Madrid, and comprising a consortium of 18 partners from 7 European countries, received a grant of €3,879,168.25 from the European Commission under the Horizon Programme.
- This financial support underscores the project's importance and potential for advancing sustainable building practices.

The project celebrated its **kick-off meeting** in January 2024 in Madrid. The event was marked by an introduction session where all partners shared their technical backgrounds and anticipated roles in the project. These three days meeting were followed by a coordination session and planning of upcoming activities. Project coordinator, Antonio LaTorre from the Universidad Politécnica de Madrid commented:

*"I am very excited and proud to coordinate this multidisciplinary effort that aspires to achieve major breakthroughs in the Zero Emission buildings, since ZEBAI addresses the challenge of achieving ZEB from the initial phases of the building design, and tests four representative demonstrators (located in Ukraine, Spain, United Kingdom, and Netherlands). ZEBAI relies on previously funded European research projects and aligns with several national initiatives in which the partners collaborate."*

At its core ZEBAI aims to transform the way buildings are designed by harnessing the power of artificial intelligence. By employing AI techniques, the project seeks to:

- Optimize material and system selection.
- Streamline the design process making it more efficient and user-friendly.
- Ensure that environmental and cost-effectiveness objectives are integrated.

This approach not only promises more efficient and user-friendly design processes but also holds the potential to significantly reduce the carbon footprint of buildings. To validate the effectiveness of the ZEBAI methodology, the project will implement four representative demonstrators located in Ukraine, Spain, the United Kingdom, and the Netherlands. These real-world applications will serve as test cases, allowing the project team to assess the methodology's performance across different climates, usages, and building patterns.

The project consortium is formed by **18 partners** from **7 different European countries**, coordinated by [Universidad Politécnica de Madrid](#) (ES). Additional partners include [The Chancellor, Masters And Scholars Of The University Of Oxford](#) (UK), [Egis Concept](#) (FR), [Lviv Polytechnic National University](#) (UA), [Smart Sustainable Social Innovations Single Member P.C.](#) (EL), [Deerns Nederland BV](#) (NL), [The University Of Birmingham](#) (UK), [Agencia Estatal Consejo Superior De Investigaciones Científicas](#) (ES), [European Institute for Innovation - Technology e.V.](#) (DE), [Neoeco Developpement](#) (FR), [Agencia de Vivienda y Rehabilitación de Andalucía](#) (ES), [Technische Universiteit Delft](#) (NL), [Lurtis Rules SL](#) (ES), [FI Group](#) (BE), [Stichting Amsterdam Institute For Advanced Metropolitan Solutions](#) (NL), [Architecture Meets Engineering SL](#) (ES), [Royal Institution of Chartered Surveyors](#) (UK), [Universidad de Alcalá](#) (ES).



## Achieving climate neutrality with the European Green Deal

With the European Green Deal, the European Union sets a goal of climate neutrality by 2050, thus transitioning from nearly zero-energy buildings (NZEB) to zero-emission buildings (ZEB). This ambitious deal is a package of policy initiatives aimed at transforming the EU into a fair, prosperous, and competitive society.

The European Commission underlines the need for a holistic and cross-sectoral approach where all various policy areas contribute to this climate-related goal, including climate, environment, energy, transport, industry, agriculture, and sustainable finance.

To support this transformative vision, the EU launched Horizon Europe, a key funding programme for research and innovation with a budget of €95.5 billion. Horizon Europe facilitates collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies. Specifically, Horizon Europe's Cluster 5 – under which ZEBAI Project falls – focuses on fighting climate change by understanding its causes, evolution, risks, impacts and opportunities. It also seeks to make the energy and transport sectors more environmentally friendly, efficient, competitive, smarter, safer, and resilient.

## ZEBAI, using artificial intelligence to make design processes more efficient while incorporating environmental objectives.

Aligned with the **Horizon Europe's Cluster 5 for Energy, Climate and Mobility** the ZEBAI project approach is set to streamline the development of scalable Zero Energy Building (ZEB) designs suited for diverse climates, purposes, and architectural styles. This initiative aims to pave the way for a zero-emission building inventory by 2050.

Furthermore, the project will develop a database of well-characterised materials and assess the discrepancies between predicted and actual building performance. Artificial intelligence techniques will play a pivotal role in optimizing the selection of materials and systems across various facets of building design. By integrating AI-assisted processes, the project aims to enhance the efficiency and users-friendliness of the design process, all while adhering to environmental quality and cost-effectiveness objectives.

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### About Horizon Europe

With a budget of €95.5 billion for the period 2021-2027, Horizon Europe is currently the main funding programme of the European Union for research and innovation projects.

While supporting R&D&I and strengthening the European Research Area, the programme also aims to prevent climate change, contribute to achieving the United Nations' Sustainable Development Goals (SDGs) and boost Europe's competitiveness and growth.

### About CSIC

CSIC is the largest public research organisation in Spain and one of the most important in the European Research Area (ERA). CSIC's mission is to promote, coordinate, develop and disseminate scientific and technological research in order to contribute to advancing knowledge and to economic, social and cultural development. Research at CSIC is organised in three core knowledge areas: Society, Life and Material, addressing various interdisciplinary research programmes and strategic research lines. This forms the framework for the activity of its 121 research institutes and its 3 national centres, spread throughout Spain. Within the institution, the Institute of Optics and the Institute of Construction Science Eduardo Torroja



collaborate in the characterization of construction materials and their interaction with solar radiation for the improvement of energy efficiency and sustainability of buildings.

The CSIC leads the Work Package on Materials Characterization and Catalogue. The CSIC team will compile, integrate and curate a catalogue with the materials and construction elements selected in the project for the correct simulation of the tentative building designs. The catalogue will contain information on the optical, thermal and mechanical properties, costs and sustainability aspects. The CSIC team will provide the optical and thermal characterization of the ZEB materials and will assess the optical response under different temperature and relative humidity conditions, as well as for different geometries at different incidence angles. The catalogue will be deployed as an open access database and the CSIC team will establish guidelines to involve the project collaborators in its future expansion.

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