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RE-SKIN project develops high energy efficiency and smart solutions for building retrofit

Climate change has a major impact on our energy consumption and its cost. The International Energy Agency (IEA) estimates that the price of consumer energy in the EU increased by 39% in 2022, leaving many citizens unable to pay their energy bills and around a quarter of households living in energy poverty. The Energy Performance of Buildings Directive shows that 75% of EU building stock is energy inefficient and in need of renovation. With European buildings responsible for 40% of the EU's energy consumption and 36% of energy-related greenhouse gas emissions, the urgent need for sustainable solutions to lessen the economic and environmental strain of our energy usage is evident.

Innovative technologies are playing a key role in the renovation wave in response to the energy and climate crises. Funding for research to advance sustainability in EU buildings is provided by the European Commission through programmes such as Horizon 2020 and Horizon Europe, which also funded the 2017 building retrofit project, HEART. Many of the partners who collaborated on HEART joined the consortium for its follow-up project, RE-SKIN: "Renewable and Environmental-Sustainable Kit for building Integration", which launched in January 2023. With its focus on technological without neglecting the culture of architectural design, the project fits into the broad framework of the New European Bauhaus initiative and will effectively contribute to the Green Deal target of reducing net greenhouse gas emissions by at least 55% by 2030.

Last week, the consortium met in Italy at the Politecnico di Milano to kick off the project and set a four-year plan in place. The RE-SKIN project aims to develop an integrated and multifunctional system for the energy retrofit of existing buildings' roofs, façades, and Heating, Ventilation, and Air Conditioning (HVAC) systems. The system has the ability to transform an existing energy-intensive building into a modern, efficient and, above all, extremely sustainable structure throughout its entire life cycle. Through the use of ICT (building energy control and management), renewable energy sources (solar, photovoltaic and thermal), sustainable materials and components (bio-based, recycled and recyclable), and high-efficiency systems (new generation heat pumps and fan coils), the system offers a holistic and systemic solution for energy retrofits and smart upgrades of residential, commercial and public buildings.

The core of RE-SKIN is a cloud-based platform, which **interconnects** and controls the subsystems, **interacts** with the climate context and the electricity grid, and **interfaces** with stakeholders such as users and energy managers in order to optimise the overall energy performance.



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The platform also integrates a **Decision Support System (DSS)**, a **Building Energy Management System (BEMS)** and a **Sustainability Dynamic Rating (SDR)** tool to support the whole building retrofit intervention, from decision-making, through design, to the operational phase.

Niccolò Aste, professor of the Architecture, Built Environment and Construction Engineering department of the **Politecnico di Milano** (Italy), explains that:

“The project picks up the baton from the previous HEART project, which proved able to reduce the consumption of existing buildings by up to 90%. Being an evolutionary step, even better performance is expected for RE-SKIN, with further cost optimisation. All this makes it an excellent tool for the EU's energy-environmental strategies. Moreover, the flexibility of the concept and the adaptability of its design allows it to be applied practically throughout the European Union.”

In order to prove its effectiveness on the field, to be developed in detail and refined to its full potential, the system will be installed within energy retrofit interventions in 4 different case study buildings: public administrative offices in Italy, public administrative offices and a kindergarten in Bulgaria, and social housing projects in France and Spain.

Keywords:

- Smart energy systems
- Green building
- Energy performance
- Climate adaptation
- Building retrofit
- Energy poverty
- Energy consumption
- Energy efficiency
- Bio-based construction material

About RE-SKIN

The RE-SKIN project will develop and demonstrate an integrated, multi-technological and low-impact **renovation package** for the energy retrofit and smart upgrade of residential, public and commercial buildings. During its course, some demonstrators, namely four pilot buildings in Italy, France, Spain and Bulgaria, will be implemented according to a sequential schedule that will allow for the gradual refinement of the system. The project started in January 2023 with a total budget of around 13 M€ and has received a total grant of over 9 M€ from the European Commission under the Horizon Europe research and innovation programme addressing the topic of “Green research and innovation” under agreement n° 101079957 — RE-SKIN — HORIZON-CL5-2021-D4-02.

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