

Breakthrough solutions for adaptable envelopes in building refurbishment



BRESAER

BRESAER aims to develop and demonstrate an innovative envelop system that uses cost-effective, adaptable solutions for building refurbishment. It combines active and passive components, integrating them into a lightweight structural mesh. The envelop plays an active role within a building, and is equipped with a number of features which go beyond insulation. Moreover, the system enables the envelop to adjust to a changing environment and to the emerging needs of the occupants.

What impact will BRESAER have?

Project coordinator **Isabel Lacave Azpeitia** explains how BRESAER is expected to improve the efficient use of resources, comfort for residents and ROI.

“With the BRESAER technologies we hope to save as much as 60% in energy, and achieve a level below 60 kWh/m²: that’s a major impact we’re going to deliver through the adaptable envelope”, says Isabel. “Such energy savings will also be paired with an **improved indoor environment**, not just concerning temperature but also acoustics, lighting comfort and air quality”.

Talking about long term objectives, Isabel points out that “these improvements are more economic and strategic: we are confident that a **return on investment below seven years**, combined with significant benefits for the environment, will attract investors and public attention, **creating the basis for replicating BRESAER’s technologies in other building refurbishment projects**”.

Developing a cost-effective envelope system for building refurbishment



The BRESAER demo-site

The efficacy of the BRESAER system is being tested at the Kecioren public education centre in **Ankara, Turkey**. It is a 4-storey building with an overall area of around 1,500 m². To cover other climatic zones, the project will perform **four virtual demonstrations in as many buildings**, located in four European countries. These buildings were all constructed before the Energy Performance of Buildings Directive (EU) was enforced.



DEMO-SITE BUILDING FEATURES

Climate conditions:	Continental (dry and hot summer, cold and snowy winter)
Construction year:	1990
Building profile:	1 basement + 3 storeys
Occupancy profile:	Adult students
Overall Area:	1,500 m ²



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Technologies in detail



1 Structural metallic profiles

Structural metallic profiles ensure a lightweight standardised system that is configurable, easy to assemble and able to support all the different envelope components. The latter are fixed to the aluminium profiles in a standardised way so that they can be installed, maintained or replaced easily.



2 Multifunctional and multilayer insulation panels

Multifunctional and multilayer insulation panels made of Ultra High Performance Fibre Reinforced Concrete are used as rigid shells for building envelope applications. Thanks to an enhanced manufacturing process, these panels provide insulating capacity, lightness and ease of anchoring. They can be combined with several finishes for different results: integrated PV films, thermo-reflective and self-cleaning coating.



3 Solar thermal air envelope

The solar thermal air envelope provides indoor heating, ventilation, thermal insulation. The preheated air is delivered to an AHU (air handling unit) to be used for indoor heating and cooling. It can be combined with several finishes such as integrated PV films.



4 Multifunctional lightweight ventilated façade modules

These polymer concrete modules leave a ventilated chamber between the building's envelope and insulation. They are very efficient in eliminating the unwanted thermal bridges and condensation problems, thus achieving an excellent level of thermal-hydrimetric performance. The modules can be combined with several finishes: integrated PV films, thermo-reflective and self-cleaning coating.



5 Dynamic automated windows

Dynamic windows with automated and controlled air-tightness and insulated solar blinds guarantee both energy savings and occupants' visual comfort: solar blinds automatically adjust to the position of the sun and can be combined with several finishes such as a thermo-reflective coating.



6 Thermo-reflective, self-cleaning coating plus PV film

Thermo-reflective and self-cleaning coating covers the envelope components. Where the coating is not applied and the orientation is suitable, a PV film can be added for electricity generation.



7 Building Energy Management System

A cutting-edge Building Energy Management System measures and controls both the envelope and the energy use of the buildings.



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