POWERSKIN+

"Highly advanced modular integration of insulation, energizing and storage systems for non-residential buildings"

INSIGHT

Buildings consume around 40% of the total energy in the EU. A minimum of energy wastage will thus be crucial contributing towards the EC targets regarding saving potential, decreasing the final energy consumption and the Greenhouse gases (GHG) emissions reduction. EU is dedicated to reaching an 80-95% GHG cut by 2050, from 1990, in the framework to the low-carbon economy.

The EC objective is to realize a large deployment of Plus Energy Buildings (PEB) in the EU by 2050. Considering the age profile of buildings in the EU (35% of the EU's buildings are over 50 years old) and the slow pace of the current retrofit, the renovation potential of buildings in the EU is considerable – up to 110 million buildings potentially need renovation.

The annual rate of home and commercial building renovation is well under the 3% required to achieve EU climate and energy goals. So how can we achieve the required renovation rate? By ensuring that the retrofitting process is advanced, cost-effective and energy-efficient.

Given the facts mentioned above, there is no doubt that the EU building market is craving for the most innovative building renovation solutions. This is where POWERSKIN+ comes into the picture.

ABOUT POWERSKIN+

POWERSKIN+ is a collaborative project supported by the European Commission under the Horizon 2020 Programme for Research and Innovation (Call LC-EEB-01-2019), with a duration of 48 months.

The project consortium comprises of a value chain formed by renowned key partners across Europe, industrially focused and highly capable of generating knowledge and innovation. It is a diverse consortium consisting of 14 partners from 8 European countries. The partner's list includes material suppliers, prestigious manufacturers, installers and end-users along with acclaimed disruptive spin-offs.

"POWERSKIN+ aims to develop a truly innovative façade solution based on a smart integration of highly energy efficient components, including super-insulative elements, solar energy harvesting and active energy storage features, all in one single combined active/passive management system especially addressed for modern non-residential Curtain Wall retrofitting solutions." says Jorge Corker, the Project Coordinator from Portuguese Innovation and Technology Institute – Instituto Pedro Nunes.

POWERSKIN+ intends to be at the forefront of the first generation of off-site prefabricated, modular "ready-to-buy" and easy-to-install glazing and opaque elements, with sustainable eco-designed connecting framings, improved functional coatings, active and passive thermal energy storage (TES) solutions and integrated semi-transparent PV cells. The solar electric harvesting features will be matched and completed with a dedicated large capacity building electric storage system, in a true energy management turnkey package.

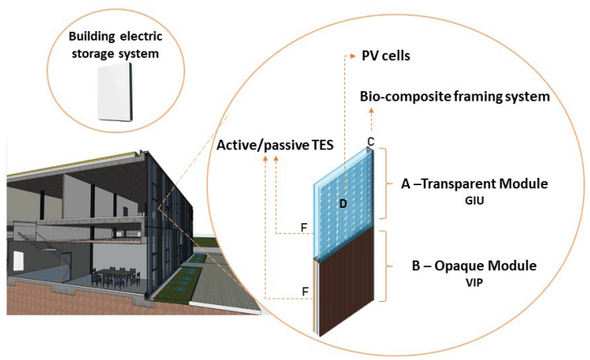
OBJECTIVES

- Insulation & climate control
- Easy module installation
- Energy harvesting
- Energy storage

CONCEPT

The concept proposed by POWERSKIN+ releases the untapped potential in the energy insulation/valorisation and energy generation of building façades by developing an integrated approach consisting of a number of innovations whose technologies, efficiencies and added value exceed the currently available alternatives on the market.

Figure 1: POWERSKIN+ Concept



POWERSKIN+ presents a radically new vision for the energy insulation and renewable generation, combining several breakthrough developments in highly energy-efficient materials and superinsulation elements, solar energy harvesting components and active energy storage features. Among them, it includes state-of-the-art Glass Insulation Units (GUI) combined with an active heat storage fluidic capillary system, advanced Vacuum Insulation Panels (VIP), Phase Change Materials (PCM), cutting-edge flexible perovskite solar cells and multi-functional nano-enabled coatings.

At the same time, each of these sub-technologies is designed for highest compatibility with standard manufacturing lines so that rapid implementation, adaption to various use-cases (e.g., dependent on building location) and market penetration can be ensured.

The vision is materialized in the development of modern lightweight Curtain Wall and DSF retrofitting systems for non-residential buildings, comprising of the first generation of off-site prefabricated glazing and opaque elements with eco-designed framings, multi-functional coatings with self-cleaning, light-reflective or absorbing, self-healing properties, active and passive thermal energy storage and integrated semi-transparent PV cells and in the implementation of three demonstration constructions.

POWERSKIN+ will create and demonstrate pilot nearly-Zero and Plus Energy Buildings (nZEB and PEB) that can also be affordable, provide a comfortable and healthy indoor environment and be stimuli-responsive to dynamic climatic conditions, occupant comfort and energy-efficiency requirements.

Taking advantage of its modular nature, different combinations of POWERSKIN+ modules and addons can be set to match any specific need and refurbishment budget. In its full package, branded as POWERSKIN+ Upgrade, the system targets the deep renovation market and accelerates the transition to plus energy ranks, while providing a unique all-in-one envelope retrofit solution.

Figure 2: POWERSKIN+ Demonstration sites

DEMONSTRATION SITES

POWERSKIN+ will prototype and demonstrate both premium and affordable solutions, for lightweight and non-load-bearing curtain wall and DSF systems, based on highly durable system components. POWERSKIN+ façade renovation system will be demonstrated and validated in an operational environment in 3 real-size non-residential buildings located in 3 different European countries (Portugal, Slovenia and the Czech Republic). The demo cases represent 2 different climates (Hot-summer Mediterranean and Oceanic), as well as different building practices (commercial, office, etc.), characterizing and demonstrating how the overall system will work in real conditions in the future.

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Project partners: IPN, Fraunhofer ICT, Friedrich-Schiller-Universität Jena, Brunel University London, FENIX TNT, Flachglas Sachsen, Politecnico di Torino, Oxford Brookes University, Czech Technical University, Navodnik, Saule Technologies, Warsaw University of Technology, AMSolutions, Saule Research Institute