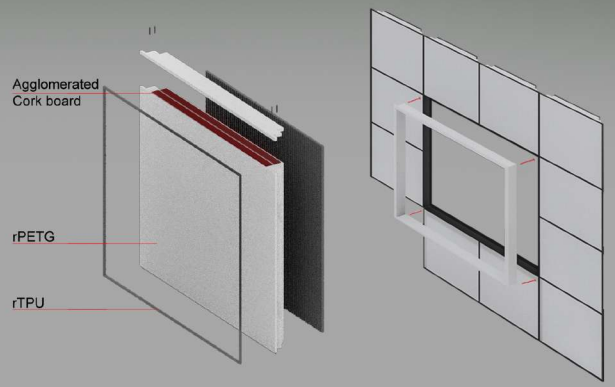
The project addresses **two** major issues:

Plastic waste **Renovation need**

We addressed these resolved this issue by finding a use for plastic waste in the building renovation. Therefore creating a demand for plastic waste while providing a low CO2 emissions alternative for traditional façade renovation solutions.

With that in mind, the **ZeroSkin+** project suggests a modular prefabricated façade renovation solution that is 3D printed with recycled plastics.



ZeroSkin+ uses 3D printing and recycled plastic to renovate building facades, aiming to cut energy use and CO2 emissions. By improving insulation and lowering operational costs, this project paves the way for a greener future. Explore our business model for cost-effectiveness, efficiency, and sustainability in building renovation. This booklet details the ZeroSkin+ project's organization, development, and results, emphasizing the project's commitment to a sustainable future.

civil.uminho.pt/zeroskin

isise Institute for Sustainability and Innovation in Structural Engineering

iPC INSTITUTE FOR POLYMERS AND COMPOSITES

UMINHO CMEMS CENTER FOR MICROELECTROMECHANICAL SYSTEMS

CENTROALGORITMI

Universidade do Minho

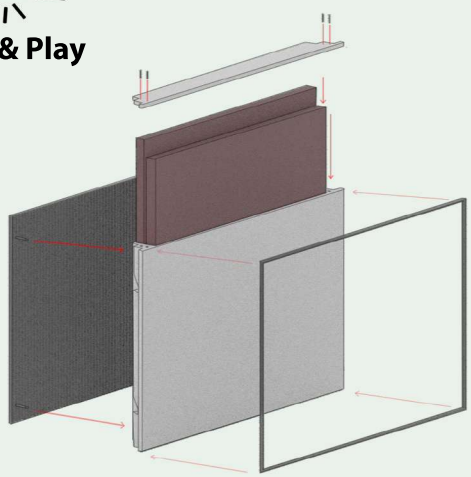
NORTE-01-0145-FEDER-000058
co-funded by the European Regional Development Fund (FEDER) through Norte Regional Operational Programme

NORTE2020
PROGRAMA OPERACIONAL REGIONAL DO NORTE

Zero Skin+

a building façade renovation solution for thermal and seismic performance solution integrated with renewable energy made primarily with recycled plastics

Plug & Play



Plug-&-play panel modules design **minimize manufacturing emissions**, while avoiding the use of of adhesives, ensuring **maximum recyclability** of the materials consumed.

Seismic resistant

The 3D-printed renovation panel is supported by steel profiles attached to the building's original façade. This support structure also serves the purpose of enhancing the building's seismic performance by acting as an exoskeleton for the building.

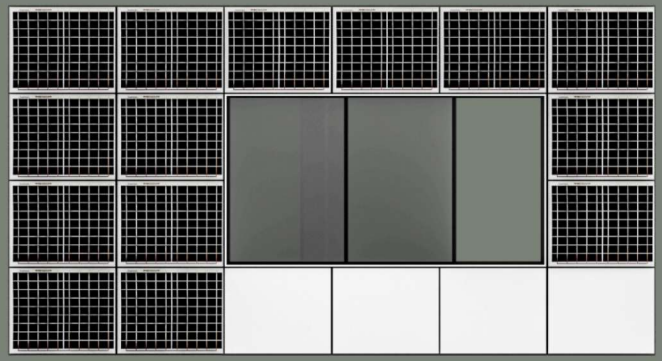
The project focuses on the need for renovating existing buildings to improve their structural integrity and energy efficiency. Traditional renovation methods often use non-eco-friendly materials and overlook seismic and thermal performance.

The project introduces a novel approach using polymer 3D-printed modular panels, supported by steel profiles, to enhance building energy performance and seismic resilience.

This approach is part of the ZeroSkin+ project, which aims to renovate residential building envelopes in Portugal, emphasising the recycling of thermoplastic materials and showcasing significant benefits in terms of energy efficiency, structural performance, and cost optimisation.

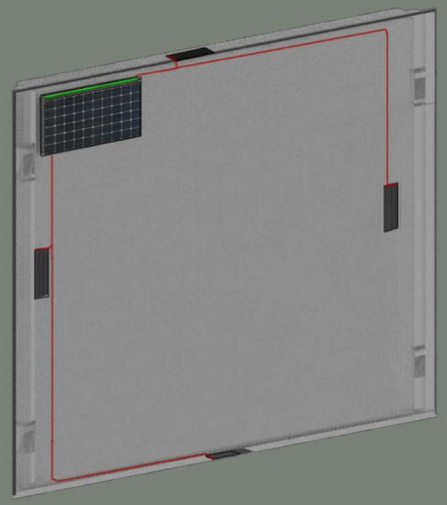
Prototype used to test panel's performance

Renewable Energy



Integration with photovoltaic panels to the building façade allows a cost-effective rehabilitation of the renovated building towards a sustainable future.

Sensor Integration



Sensors check the façade for water infiltration while monitoring temperature and luminosity to be used for optimising energy efficiency.