

TODAY'S WASTE, TOMORROW MATERIAL!

Circular Economy in Construction

28th February 2019, Wels (Austria)

Contact: Dr. Adriana Bernardi
a.bernardi@isac.cnr.it
www.isac.cnr.it

Scope

InnoWEE is a R&I project funded by the European Commission and realized by 12 partners from 6 of the EU Member States. The main aim of InnoWEE is the development of an optimized reuse of Construction and Demolition Waste (CDW) materials to produce high added-value prefabricated insulating and radiating panels to be used in Energy-Efficient Buildings. InnoWEE project focuses on the development, production and field tests of new high performance eco-friendly prefabricated geopolymeric panels including different CDW for insulating facades (ETICS-like, ventilated façade panels) and for indoor radiating system (monolithic panel, assembled panel) with low environmental impact, low embodied energy, low CO₂ emissions and high thermal performance. InnoWEE project includes the installation of the different products in 4 demo sites to evaluate the energy performance of the project solutions in comparison with equivalent products.

InnoWEE panels installed in demo sites

Till the end of 2018 three types of panels were installed in the following demo sites:

- Pilot House in Padua (Italy) –ETICS-like panels, ventilated façade panels;
- Old city hall of Voula in Athens (Greece) – ETICS-like panels, ventilated façade panels, fire resistant indoor wood panels;
- Don Orione residential care center in Bucharest (Romania) – ETICS-like panels.



Italy



Romania



Greece

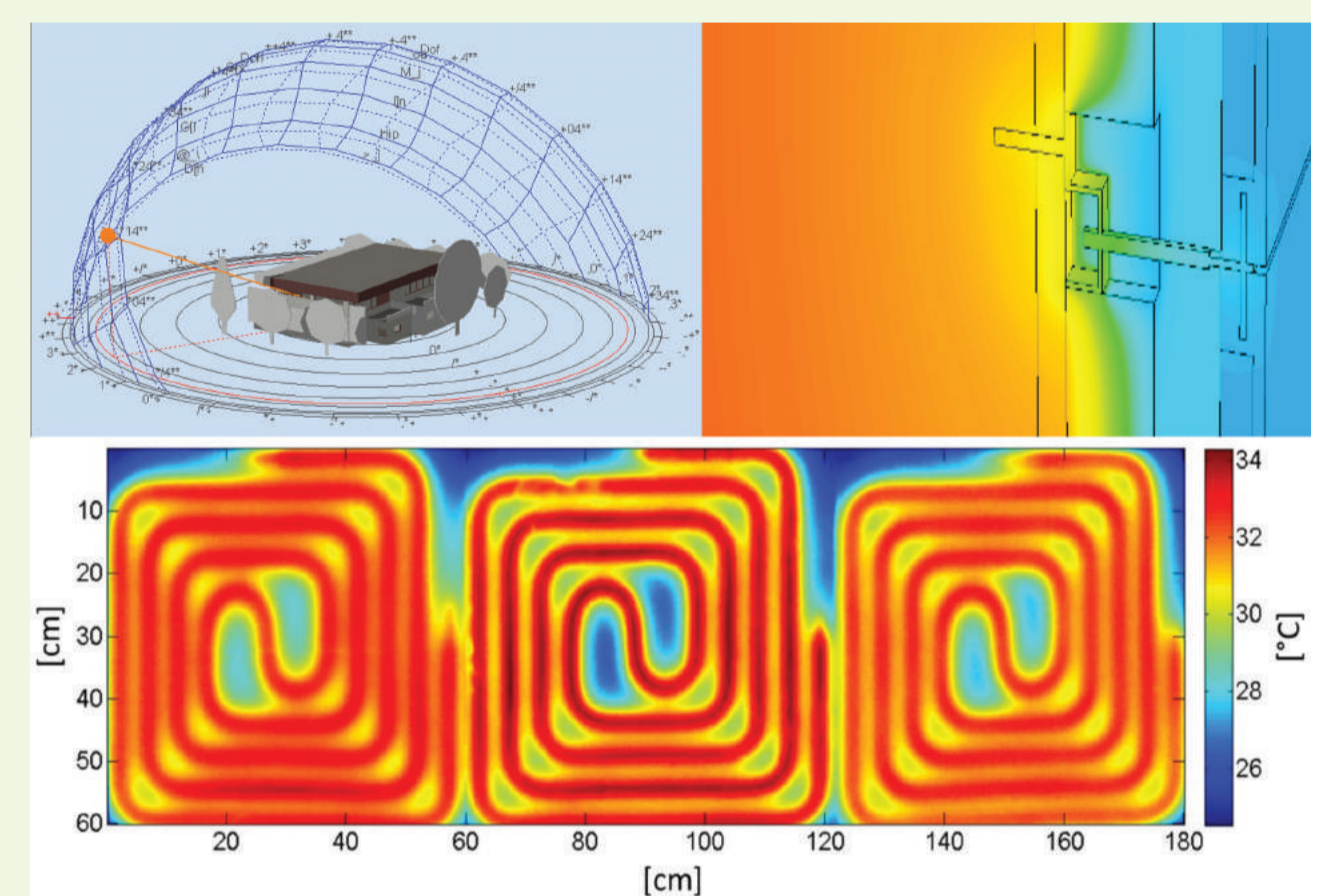
Energy performance simulation and thermal design of InnoWEE products

Simulation models are being developed by TECNALIA and RED to evaluate the energy performance of InnoWEE solutions under different parameters. Thus, optimized solutions are suggested based on economic feasibility studies. Calibrated simulation models allow:

- to evaluate the performance and quantify the savings according to the International Performance Measurement and Verification Protocol (IPMVP);
- to select and optimize the best technical solutions and project designs based on a cost-effective analysis;
- thermo-hygrometric, energy and economic assessment of the solutions;
- to analyse the replication potential under different climates.

Results indicate that the solutions proposed by InnoWEE consortium perform as competitive applications for construction sector. InnoWEE technologies would be suitable to achieve the EU goals in terms of energy efficiency and integration of renewable energies in buildings.

CNR-ITC performed the thermal design of InnoWEE radiant panels to obtain the best thermal performance while respecting the constraints on material thickness and piping geometry.



The design process was divided in three steps:

1. **Thermal characterization of materials** – Amongst thermal conductivity, specific heat, and density, the thermal conductivity is the key parameter as it could reach values higher than 1 W m⁻¹ K⁻¹;
2. **Numerical simulations of the alternative solutions** – More than 60 design alternatives have been investigated to define the best configuration of geopolymeric thickness, mixture, and piping geometry;
3. **Thermal testing on specimen in laboratory** – Performed in a climatic chamber, both in steady state and in transient regime. The enthalpy balance method is coupled with the thermographic measurement, that highlights the temperature distribution on the active surface.

Partners

