Innovative prefabricated components including different construction and demolition waste materials reducing building energy consumption and minimizing environmental impacts.

PROJECT AIM
The main aim of InnowEE is the development of an optimized re-use of construction and demolition waste (CDW) materials producing high added-value prefabricated insulating and radiating panels to be used in energy-efficient buildings.

InnowEE is based on:
- Recovery, disassembly, selection and treatment of CDW.
- Development of new high performance prefabricated insulating geopolymeric and radiating geopolymer panels.
- Creation of practical and sustainable building solutions easy to integrate into buildings design.
- Manufacturing a product that is cost-effective, competitive, robust, reliable and low maintenance.

Evaluation of the new panel’s performance in demo-sites characterized by different climate conditions.

PRODUCTS

External Thermal Insulation Composite (ETICS like) panels:
- Cast prefabricated panels for faster installation
- Lower material costs compared to commercial ETICS
- Eco-friendly due to recycling of waste (50% weight brick, concrete and wood wastes) and industrial wastes (furnace slag)
- Lightweight due to incorporation of a wood/geopolymer layer
- Large variety of surface finishing/textures

Ventilated facade cladding panels:
- Ecological geopolymer panels made by recycling large amounts of CDW (50% weight brick, concrete and wood wastes) and industrial wastes (furnace slag)
- Lightweight due to incorporation of a wood/geopolymer layer
- Large variety of surface finishing/textures

Radiant panels:
- Higher efficiency compared to plasterboard radiant panels due to higher thermal conductivity of geopolymers
- Assembled panels for increased flexibility in the choice of insulation material and easier end of life recycling of components
- No need for skimming due to high quality, aesthetically attractive surface finishing/textures of cast geopolymer panels

DEMO SITES

REAL
- Pilot house, CNR Research Area, Padua (Italy)
- Residential Eco-House Pute, Mechelen (Belgium)
- Private house, Piazza sul Brenta, Padua (Italy)
- Two blocks in Turiandina neighborhood, Bilbao (Spain)

VIRTUAL
- Old City Hall of Municipality Varis-Voulas-Vouliagmenis, Athens (Greece)
- Don Orione Residential Care Center, Voluntari, Bucharest (Romania)
- House in the settlement of Parikia, Paros (Greece)

ACTIVITIES

WP1. Identification of the waste typologies and their use as construction material
Main objective of WP1 is the identification and categorization of the CDW typologies collected in Europe. Their performance will be analyzed in laboratory and a production line will be set up for treatment of CDW. Moreover, existing European and national standards, codes and guidelines will be identified and updated. Based on these assessments performance indicators for the efficiency evaluation of the new materials will be established and environmental performance analysis (LCA) will be conducted. Finally the first preliminary business model will be developed.

WP2. Development of the new materials including different construction waste and performance evaluation in laboratory
The activities will be focused on the design of the geopolymer binder, and on the development and assessment (physical/mechanical characteristics of the prototypes of new eco-friendly insulating façade and radiating panels.

WP3. Production definition and scale up of new panels
The technical plant design and production steps of geopolymeric components will be established in order to upscale eco-friendly insulating façade and radiating panels. Set up small scale production of panels for demo site applications and assess industrial production.

WP4. Selection of the best technical solutions, energy performance and project design
This WP will define the production and installation methods for a large scale application and capital costs of ownership. A final business plan with respective risk assessment and sensitivity analysis of data will be developed. Furthermore, the costs vs performance during the whole life cycle (LCCA) will be evaluated. Exploitation plans for different European markets centered on SME interests will be developed, and a Life Cycle Thinking (LCT) approach will be used for supporting environmentally sound decision for waste management.

WP5. Demonstration and validation in field, performance evaluation and scenarios
The selected solutions will be installed in 4 buildings: a pilot demo case, a new, an existing and a historical building. This will permit assessment of the performance and durability in field with respect to energy efficiency, durability and comfort. Results will be monitored in compliance with national/European standards, codes and guidelines for all demo sites. The innovative products will be also compared with the traditional ones in terms of installation time and costs. Moreover, their performance will be evaluated in a large European scenario.

WP6. Business models, market introduction plan and future impact
This WP will define the production and installation methods for a large scale application and capital costs of ownership. A final business plan with respective risk assessment and sensitivity analysis of data will be developed. Furthermore, the costs vs performance during the whole life cycle (LCCA) will be evaluated. Exploitation plans for different European markets centered on SME interests will be developed, and a Life Cycle Thinking (LCT) approach will be used for supporting environmentally sound decision for waste management.

COORDINATOR CNR-ISAC, Italy
CNR-ITC, CNR-ICMATE, Italy
Advanced Management Solutions, Slovenia
Tecnalia Research & Innovation, Spain
Guido Giuseppe - Eco. G. sel, Italy
S.C. Pietro Edf. S.R.L., Romania
INAR Spikia z Organizacije Odgovor- inzifikacije, Poland
Slovenian National Building and Civil Engineering Institute, Slovenia
S.C. MAGNETTI BUILDING S.R.L., Romania

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Contact: CNR-ISAC | Italy | Padua | infowee@isac.cnr.it