

# RE<sup>4</sup>

## Recycling demolition waste to create energy-efficient prefabricated buildings

Sonia Saracino  
CETMA

A prefabricated building, easy to assemble and disassemble, made with elements that integrate—with high percentages—construction and demolition waste. This is the goal, finally attained, of RE<sup>4</sup>, a project financed by the H2020 program that ended in February 2020, coordinated by CETMA. Project Coordinator Alessandro Largo states: “We have proceeded with intermediate steps: a robotised waste selection system has allowed us to maximise the quality of the recycled aggregate, then a testing campaign in the laboratory, finally the development of new materials (self-compacting and vibrated concretes) used to produce the prefabricated structural elements for the demo buildings.” In parallel, also non-structural prefabricated elements have been developed, always using materials derived from recycled concrete or reused wood—façade panels, internal partitions, insulation - all installed and validated in the demo buildings.

The prefabricated RE<sup>4</sup> elements have been designed to be standardised and easily adapted to the needs in different territories (e.g. from a climatic or earthquake resistance point of view). For the demo

phase, four pilot buildings have been built: one in Madrid, one in Toomebridge, one in Benevento and one in Taiwan. Largo states:

*“We have designed a concept of a completely prefabricated building that is easy to assemble and then disassemble at the end of its life.”*

The fact that the project has hit the target is demonstrated by the amount of positive feedback and awards received in international competitions. However, the final purpose of RE<sup>4</sup> is to transfer the results obtained in the laboratory to the industry. Largo stresses: “It is fundamental to pass on two important messages that were pointed out by the project. On the one hand, it is possible to create these prefabricated structures and create quality products, also structural, using recycled material, which in turn can be 100% reused. On the other hand, the industrialisation of these technologies is sustainable not only from an environmental but also from an economic point of view, because companies that want to introduce it into their production processes do not have to make expensive investments.”



Figure 1: RE<sup>4</sup> project demonstration sites



### SUMMARY

**RE<sup>4</sup> Project:** “REuse and REcycling of CDW materials and structures in energy-efficient pREfabricated elements for building REfurbishment and construction”

Thirteen partners have joined together to develop a prefabricated energy-efficient building concept that can be easily assembled and disassembled for future reuse, containing up to 65% in weight of recycled materials from CDW.

### PROJECT LEAD PROFILES

CETMA, Technologies Design and Materials European Research Centre, is a research and technology organisation (RTO) based in Brindisi which has, for over 20 years, carried out applied research, experimental development and technology transfer in the field of advanced materials (composites, polymers, bio-based and recycled ), ICT (development of specialised software for engineering, manufacturing and services) and product development.

### PROJECT PARTNERS

The RE<sup>4</sup> project is based on the cooperation of 13 partners from seven European countries and Taiwan. The project consortium consists of industry leaders, SMEs, universities and other research institutions.

### CONTACT DETAILS

Sonia Saracino  
CETMA  
☎ +39 08 3144 9410  
✉ sonia.saracino@cetma.it  
🌐 <http://www.re4.eu/>



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