

When waste is turned into buildings



Prefabricated components easy to install, made with secondary raw materials from construction and demolition

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 RE⁴, a project financed by the H2020 program that ends next February, coordinated by CETMA. “The European Union’s request was to find new ways of reusing construction and demolition waste - explains the engineer Alessandro Largo, the project coordinator - 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 parti-

tions, insulation - all installed and validated in the demo buildings. The prefabricated RE⁴ 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. “We have designed a concept of a completely prefabricated building - continues the coordinator - that is easy to assemble and then disassemble at the end of its life: already during the design phase, we have tried to understand how to have little waste from the beginning, during the construction phases, and then during demolition. A type of building designed mainly for mobile or temporary applications, as in the case of earthquakes or other catastrophes or large exhibition/sporting events, but not only. The idea was to give a second life to the structure of the building when the first has ended.” The fact that the project has hit the target is demonstrated by the multitude of positive feedback and awards received in international competitions. However, the final purpose of RE⁴ is to transfer the results obtained in



CONSTRUCTION AND DEMOLITION WASTE (CDW)



LOAD BEARING PREFABRICATED RE⁴ PANEL WITH CDW

the laboratory to the industry. “It is fundamental to pass on two important messages that were pointed out by the project - stresses Largo -. 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.” ■



RE⁴ BUILDING (SPAIN)

ELEMENTI RE ⁴	TIPOLOGIA	MATERIALE DA CDW	RIFUSO
Finirelli a parete	Strutturale	Aggregato minerale (100%)	100%
Trave a L	Strutturale	Aggregato minerale (100%)	100%
Trave sovrano quadrata	Strutturale	Aggregato minerale (100%)	100%
Filastro	Strutturale	Aggregato minerale (100%)	100%
Piastra	Strutturale	Aggregato minerale (100%)	100%
Pannello sandwich	Non strutturale	Aggregato minerale (100%)	100%
Muro di mattoni	Non strutturale	Aggregato minerale (100%)	100%
Finirelli di facciata	Non strutturale	Assi di legno (100%)	100%
Partizione interna	Non strutturale	Assi di fibre di legno (100%)	100%
RECICLATI VERDEBILI			
Pannello isolante	Non strutturale	Fibre di legno (100%)	100%
Pannello inerte	Non strutturale	Aggregato minerale (100%)	100%