

RE⁴ PROJECT: REuse and REcycling of CDW materials and structures in energy efficient pREfabricated elements for building REfurbishment and construction

Thirteen partners from nine European countries and one non-EU country (Taiwan) 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.

HOW IT WORKS

RE⁴ Project is built upon four main pillars. The first two are technical pillars and focus on the maximization of CDW recycling and reuse.

In terms of CDW recycling maximization, RE⁴ has developed advanced CDW sorting technologies to improve the overall quality of CDW-derived products, as one of the main constraints for a large use of these materials is the quality not good enough when compared to virgin materials. At this aim, the CDW recycling potential has been verified with the development of RE⁴ materials (normal-weight concretes, lightweight concretes and earthen building materials) and prefabricated elements incorporating high ratios of CDW-derived materials. RE⁴ aims at improving the state of the art recycling rate of CDW from 80% to 95% and to increase the degree of resource efficiency in terms of virgin material replacement of at least 65%.

When it comes to reuse, RE⁴ has developed new sustainable strategies for the disassembly and reuse of concrete and timber structures and building components at the end of their service life. Moreover, RE⁴ is developing innovative design concepts for a fully prefabricated, easy dismantlable RE⁴ building, with up to 90% of reusable structures. The concepts will be designed in such way that multiple applications for different building typologies, climatic and structural requirements will be easily implemented.



Examples of the RE⁴ components: 01 – Concrete building blocks made of CDW mineral aggregate; 02 – Insulation panels made of CDW wood fibers; 03 – Reconstituted roof tiles made of CDW bricks and tiles

However, just technical improvements are not sufficient to push the EU to the forefront in the area of the CDW management, because other non-technical barriers have to be tackled as well. The first one is related to the overall management of the CDW value chain. By tackling the CDW management at different levels (e.g. before, during and after the sorting phase) RE⁴ aims at contributing to reach the target of recovery/recycling CDW by 2020. The second one is related to the end-user awareness of CDW reuse and recycling potential and its acceptance. It is well known that people are sceptical of products and materials from waste, for this reason, RE⁴ proposes technical and non-technical activities in order to increase end-user acceptance of secondary raw materials as valid alternative to virgin materials.

DEMONSTRATION

Previously mentioned RE⁴ technology will be demonstrated in two specifically constructed mock-ups – one residential and second non-residential. In order to show that the technology is fitting for various climatic regions, two countries with

different climates were chosen to serve as demo-site locations. These are Spain and the United Kingdom.

To demonstrate that the RE⁴ solutions are not only suitable for new construction, but also for refurbishment, a building in Italy will be retrofitted with technology developed under RE⁴. As the project aims to enable disassembly and re-use of materials from dismantles building, a building in the ACCIONA demo park will be selected and used for this purpose. Demonstration of the high replication potential of the developed solutions outside EU will be achieved through the construction of an additional demo building in Taiwan. ●

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