

New uses for demolition waste

- ★ Recycling and re-using the large quantities of concrete and demolition waste that are generated every year would bring both environmental and economic benefits. Researchers in the VEEP project are developing new technological solutions that could help increase the use of recycled materials in the construction sector, as **Anna Paraboschi** explains.

The building sector consumes large amounts of raw materials, with significant quantities of concrete and other materials used to construct new homes, offices and other buildings. Increasing the use of materials recovered from demolished buildings would help to reduce the sector's energy consumption, a topic at the heart of the VEEP project. "We aim to develop and demonstrate a series of technological solutions for the massive retrofitting of the built environment," says Anna Paraboschi, the coordinator of the project. One important part of this work involves developing novel pre-cast concrete elements (PCE), in which a high proportion of construction and demolition waste (C&DW) is embedded. "The objective is for C&DW to account for 75 percent by weight of the raw materials in our panels," continues Paraboschi.

VEEP project

This is not a simple task, as C&DW materials need to be treated in certain ways before they can be used in construction. Two technologies have been developed in the project, called Advanced Drying Recovery (ADR) and Heating Air System (HAS),

VEEP

Cost-Effective Recycling of Construction and Demolition Waste for Energy Efficient Building Retrofitting

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No: 723582

Project Partners

Anna Paraboschi
Project Manager
RINA Consulting S.p.A.
Via Cecchi, 6 – 16129 Genova, ITALY
T: + 0039 010 31961
E: anna.paraboschi@rina.org
W: www.rina.org



Anna Paraboschi is a Project manager for the RINA group, she is PMP® and Lean Six Sigma Management certified. She has over 10 years of experience in the development and management of R&D projects funded under the European Commission Research and Innovation Programmes, with a focus on energy efficiency and sustainability topics.



which address the treatment of both the coarse and fine fractions of demolition debris. "The coarse fraction of debris, from 4-12 millimetres in size, has to be effectively sieved using ADR, and then it can be 100 percent recycled in concrete," explains Paraboschi. The finest fraction of debris, below 4 millimetres, is treated using HAS. "The

durability" she says. Another dimension of the project is the development of new, green aerogels containing recycled C&DW materials, which hold rich potential in terms of insulation. "Silica from the C&DW is used in these green aerogels. This helps to reduce costs, which could encourage their wider adoption in the construction sector," continues Paraboschi.

This is one of the products which researchers hope to bring towards practical application, while Paraboschi and her colleagues are also looking to test the effectiveness of the PCEs at two demonstration sites in Spain and the Netherlands. The aim here is to test the thermal performance of the PCEs in very different climates, as well as to investigate their performance against several other criteria. "The panels developed during the project will go through acoustic and fire resistance testing,

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material goes into a hotter system, and the pollutants are then removed, in order to produce a fine fraction which is hardened into a cement paste," outlines Paraboschi. "This can be very useful, as it can partially replace a conventional concrete formulation."

These two technologies are both extremely mobile, and can be moved to a demolition site, which opens up wider possibilities in terms of producing recycled concrete particles and improving resource efficiency. These recycled materials still need to meet rigorous standards before they can be used of course, and Paraboschi says the results from the project so far are positive. "We developed a novel concrete formulation in the project, and it performs well in terms of mechanical properties, thermal conductivity and

while we'll also monitor them for any cracks," says Paraboschi. This is essential if these panels are to eventually be applied in the market, which Paraboschi says is an important objective in the project. "There are some manufacturers involved in the project, and they are interested in developing products to add to their portfolio," she explains.



VEEP Project Consortium visiting partner Nuova Tesi System's plant.

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