

ICEBERG project – Circular Economy of Building Materials



The CSS group (ICV-CSIC) participates in the European ICEBERG project for the innovative re-use of construction and demolition waste with 35 public and private organisations from ten countries

- The project, which will last for four years, has a budget of 15,667,498 euros, of which the European Union is contributing 12,997,935 euros



from the Horizon 2020 Research and Innovation Framework Programme.

- The aim is to offer innovative circular economy-based solutions for producing high-value materials from the most common construction and demolition waste (C&DW).

A total of 35 public and private organisations from ten European countries are taking part in the European ICEBERG project (the acronym for Innovative Circular Economy Based solutions demonstrating the Efficient recovery of valuable material Resources from the Generation of representative End-of-Life building materials), funded by the European Union as part of the Horizon 2020 Research and Innovation Framework Programme (contract 869336). It aims to tackle the recycling and recovery of some of the most common construction and demolition waste (C&DW).

The objective of the project is to design, develop and validate innovative recycling systems and technologies, to make it possible to **produce high-value recovered materials**, that have a low level of impurities (less than 8%) and are safe. Validation will be carried out on an industrial scale by means of six case studies in different locations in Europe, covering the **circularity of concrete, ceramics, wood, plaster, insulating foams** and **super-insulating materials**. It also seeks to **improve the reliability and acceptability of recycled materials** from construction waste.

In fact, while there has been great progress in the management of C&DW over the past two decades, barriers still need to be removed in order to achieve a circular economy in the construction and demolition sector. The goal is not only to avoid landfill as a destination for waste, but also to validate uses with greater added value. To this end, it is necessary to improve the selective separation of sub-streams on site, develop automatic sorting equipment, on-line classification, purification and recovery.

The project will last for four years and has a **budget of 15,667,498 euros**, of which the European Union is providing 12,997,935 euros. In the first half of the project, tools and technologies will be developed and adapted to improve the traceability, identification, separation, recycling and reuse of materials from C&DW. The second part of the project will be dedicated to demonstrating these solutions in six case studies, by analysing their economic and environmental impact and their impact on workers' health.

The ICEBERG Project has brought together 35 organisations - 14 large companies, ten SMEs, nine research centres and universities, and two public environmental companies - with a wide range of experience in the construction and environmental sector, from Germany, Belgium, Spain, Finland, France, Greece, Italy, the Netherlands, the United Kingdom and Turkey.

The project is coordinated by TECNALIA, which has a proven track record in leading this type of European programmes. Meanwhile, Ihobe, the Basque Government's public environmental management company will lead the project's communication, scientific dissemination and awareness-raising activities, in addition to promoting the recycling of these materials through developing policies and administrative tools.



The main objective of the project is to develop and implement both technological and non-technological solutions to achieve greater recovery of raw materials contained in C&DW and to incorporate circular economy concepts into the value chain of the construction sector; for example, the use of materials recovered from C&DW as secondary raw materials in new applications for the construction sector itself.

OBJECTIVES

The project will create and integrate **smart solutions that support the reverse logistics** involved in the recovery and recycling of construction materials. The plans include developing a **demolition support tool** to quickly and accurately create a virtual model of the building to be demolished. This will allow to obtain a reliable estimate of the type and quantities of waste that can be expected, and to know the environmental and economic impact of demolition and waste management tasks. In addition, a digital platform and an authentication system based on wireless technologies will be set up to improve the identification and traceability of materials and products.

With respect to **classification and recycling technologies**, ICEBERG is committed to improving the automatic separation of mixed waste. To this end, it will design and manufacture a **mobile separation unit** using hyperspectral sensors, including machine-learning software, robotic manipulators and blower nozzles to improve the efficiency of mixed waste separation.

On top of that, for each of the main construction materials used, various recycling and purification technologies will be enhanced, thus increasing their added value: on-line quality control, carbonation and purification of concrete waste, micro-milling of ceramic waste, rapid pyrolysis of wood waste and subsequent improvement in the quality of the fibres obtained, improvement in the quality of gypsum recycled from demolition or alternative sources, purification and solvolysis of polyurethane foams and processing of glass or high-silica waste by means of a hydrothermal and supercritical reactor to obtain aerogels.

Subsequently, **new construction products** with high levels of circularity **will be designed and manufactured**. They will be durable elements, which can be easily disassembled and will incorporate high quantities of recovered materials (between 30% and 100%). Among other things, the aim is to develop eco-cement and eco-concrete, ultra-lightweight concrete, prefabricated concrete blocks by carbonation, ceramic products with lower embodied energy (up to 40% less), wood fibre insulation boards, laminated gypsum boards with greater thermal insulation and up to 35% recycled gypsum and recycled polyurethane insulation boards. **All of these solutions will be validated at six case studies** in different locations throughout Europe.

According to the forecasts made by the partner organisations, the changes that the ICEBERG Project will bring about in the sector will result in a medium-term economic benefit of **1,758 million euros and 6,265 new jobs by 2030**.

Further information

www.iceberg-project.eu