

## REDUCTION OF ENVIRONMENTAL IMPACT OF INDUSTRIAL AND MINING ACTIVITIES: VIABLE SOLUTIONS FOR ECO-SUSTAINABLE BUILDINGS

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Construction industry has a significant environmental impact, being responsible for energy consumption, CO<sub>2</sub> emissions and consuming about 50% of all materials extracted, thus depleting natural resources. The construction sector is currently required to become more sustainable and the use of secondary materials, such as wastes from both industries and construction/demolition activities, represents a viable and valuable solution for the reduction of its environmental impact. Waste generated from industrial activities (industrial by-products) are increasing substantially and such materials, for quantity, distribution, characteristics or low chances of re-use in more added-value applications, represent a serious environmental and socio-economic problem. In addition, waste resulting from construction and demolition activities (construction and demolition wastes – CDW) have been identified by the European Commission (EC) a priority target due to their large volumes and the potential for re-use and recycling. These waste materials are considered among the most significant waste streams in EU and are, therefore, available in quantities large enough for feeding the construction sector. Recycling or reutilization of industrial and construction/demolition wastes in the building sector contribute to reduce waste amounts sent to landfills or incinerators and prevent also consumption of natural resources.

This work presents the promising results of the *SUS-CON European project* (founded by 7<sup>th</sup> Framework Programme, grant agreement 285463, duration 2012-2015) [1], dealing with the valorisation of industrial wastes, and the ambitious challenges of the *RE<sup>4</sup> European project* (founded by Horizon 2020 Work Programme, grant agreement 723583, duration 2016-2020) [2], allowing the reduction in the use of materials from mining activities. *SUS-CON project* aimed at developing new technology routes to integrate waste materials (e.g. ashes from thermal-power plants or slags from metallurgical plants to replace cement, which production has an high environmental impact, and post-consuming plastics) in the production cycle of concretes, both for ready-mixed and pre-cast applications, resulting in an innovative lightweight, eco-compatible and cost-effective construction material, made by industrial waste materials (up to 100% by weight) and characterized by low embodied energy and CO<sub>2</sub> as well as thermal insulation performance. *RE<sup>4</sup> project* aims at radically modify the construction process by promoting new technological solutions for the design and development of structural and non-structural, eco-compatible and cost-effective pre-fabricated elements with high degree of recycled materials from construction and demolition waste (e.g. concretes, bricks, tiles, fine fractions or lightweight materials - plastic, wood - from residential, industrial or commercial buildings demolition activities) and reused structures from the partial or total demolition of buildings (up to 65% by weight). Both projects are intended for the development of building materials with reduced environmental impact; these solutions allow, respectively, reduction of industrial wastes disposal and consumption of not-renewable natural raw materials, with positive impacts for both industrial and mining activities.

[1] SUS-CON (SUStainable, innovative and energy-efficient CONcrete, based on the integration of all-waste materials) project web-site: [www.sus-con.eu](http://www.sus-con.eu).

[2] RE<sup>4</sup> (Reuse and Recycling of CDW materials and structures in energy efficient pREfabricated elements for building Refurbishment and construction) project web-site: [www.re4.eu](http://www.re4.eu).