# LIGHTCOCE. BUILDING AN ECOSYSTEM FOR SCALING UP LIGHTWEIGHT MULTI-FUNCTIONAL CONCRETE AND CERAMIC MATERIALS

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## 1. INTRODUCTION

The last few decades have witnessed a trend towards the use of lightweight materials in constructions and infrastructures, as well as in the aerospace and automotive industry. Lightweight components are easy to transport, handle and install and demand less operational energy, substantially reducing their environmental footprint and relative costs. Among other materials, concrete and ceramics have drawn much interest due to their wide range of application and their durability.

Based on end applications, lightweight attributes must be coupled with enhanced properties and multifunctionalities, such as high mechanical strength, self-sensing, and self-cleaning properties, which can be achieved with the aid of nanomaterials.

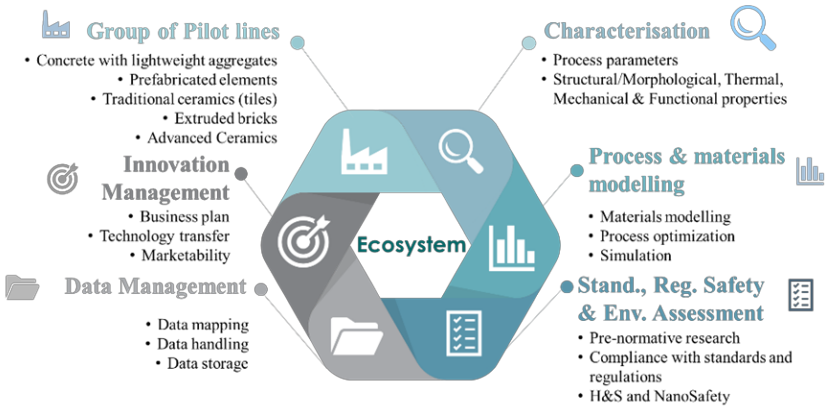
## 2. OBJECTIVE

The main objective of the LightCoce project is to cover the gap in scaling up and testing multifunctional lightweight concrete and ceramic materials by providing open access to SMEs or Industry to a single entry point ecosystem consisting of already developed Pilot Lines (PLs), processes and materials modelling, characterisation, standardisation, regulatory, safety & environmental assessment, data management and innovation management that will be accessible to the interested stakeholders under fair conditions.

## 3. CONCEPT OF THE LIGHTCOCE PROJECT

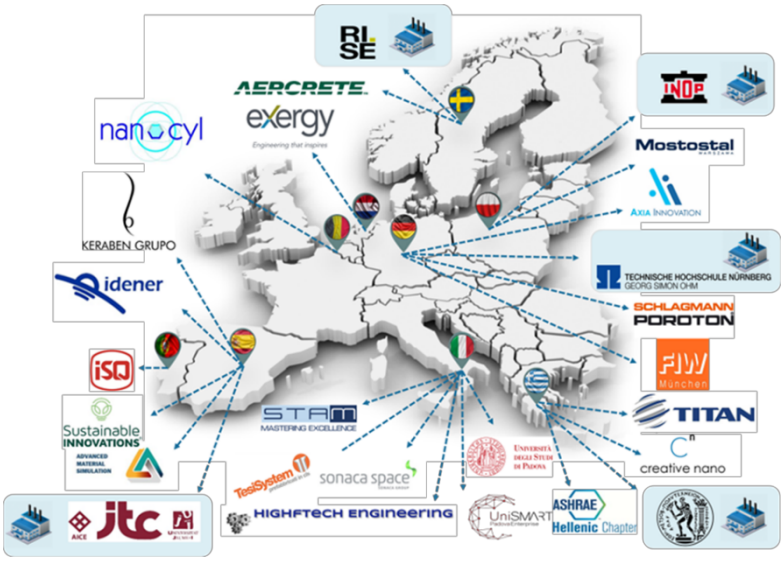
The ecosystem will support the scale-up activities of European SMEs and industry, covering a large range of end applications from constructions materials (bricks, ceramic tiles), infrastructures (ready-mix concrete, prefabricated components), to high tech applications in automotive & aerospace industry.

LightCoce focuses on the development of a sustainable open innovation test bed (OITB) consisting of 5 pilot plants spread across Europe dedicated to the development of lightweight, multifunctional concrete & ceramic materials and structures in the construction, infrastructure, automotive and aerospace sector. Characterisation will be performed, while modelling and optimisation of processes will be complemented by fast screening and verification of the materials. Standardisation, Regulatory, and Safety and Environmental (SRSE) aspects will be dealt with by an additional service-providing group. A Data Management Group (DMG) will also identify an appropriate archive for long-term preservation of data, so that data can be appropriately formatted, transformed, and documented to meet the requirements of the archive, through the developed platform. Moreover, the ecosystem will be built under the umbrella of an innovation management group ensuring proper operation of the test bed due to the established business plan and marketability strategy followed.



## 4. THE CONSORTIUM

The Consortium is well-balanced between academia and research institutions, providing established pilot lines and characterisation facilities, SMEs offering their high-level expertise in monitoring, modelling, optimisation of processes, energy systems and materials, technoeconomic analysis and innovation management, as well as industrial partners, these being the project's end users. It includes partners from nine different EU countries.




It should also be highlighted that each consortium member has unique expertise that will be offered in the ecosystem in the field of lightweight concrete and ceramic materials and components. The partners will offer their specific skills to fulfil their assigned project activities and bring together a broad range of knowledge and expertise to ensure technical and managerial excellence for the development of LightCoce Ecosystem.

## 5. THE TEST CASE

The test case to be conducted at the ITC PL will focus on the production of lightweight porcelain tiles for improving air quality. The strategy for obtaining the new product will be based on the use of foaming additives, leading to the formation of gas in the pyroplastic mass formed during firing. The foaming agents must be active at the usual porcelain tile sintering temperatures, i.e. between 1100 and 1200 °C, and should not cause any noticeable colouring of the tiles.

NOx degradation will be provided by spraying $TiO_2$ nanoparticles (NPs) onto the fired tile surface, followed by a curing stage at low temperature.

## 6. ACKNOWLEDGEMENTS:

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