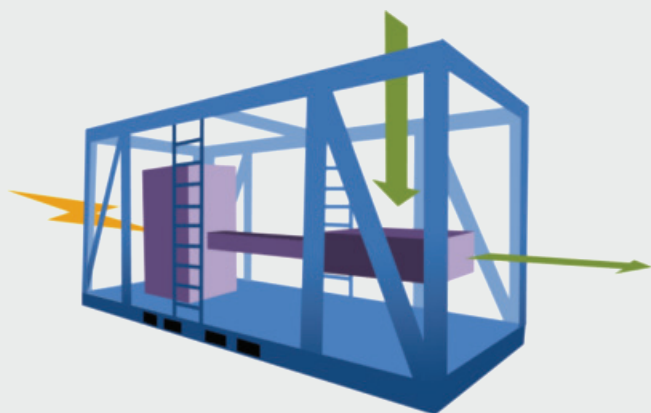


# TECHNOLOGY

The aim of DESTINY is applying non-conventional energy sources to energy intensive industrial processes. The use of systems based on electricity like the MW considered in the project is a true alternative to fossil energy sources (natural gas consumption) enabling the integration of renewable electricity and providing significant advantages in terms of resource/energy efficiency and operational flexibility. An extensive list of innovations regarding various system aspects will be put in place in order to demonstrate an operational prototype of the new process in industrial scale related to:

- **Reactor, feeding system and plant integration**
- **Microwave technology**
- **Concept of application**
- **Monitoring and control**
- **Industrial use**



# CONSORTIUM



## STAY IN TOUCH

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**COORDINATOR:** KERABEN GRUPO SAU

**PROJECT START DATE:** 1st October 2018

**DURATION:** 42 Months



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Development of an Efficient Microwave System for Material Transformation in energy INTensive processes for an improved Yield



## THE PROJECT

The DESTINY project aims to realize a functional, green and energy saving, scalable and replicable solution, employing microwave energy for continuous material processing in energy intensive industries. The target is to develop and demonstrate a new concept of firing for granular feedstock to realize material transformation using full microwave heating as alternative energy source and complement to the existing conventional production. The DESTINY system is conceived as cellular kilns in a mobile modular plant, with significant advantages in terms of resource and energy efficiency, flexibility, replicability, scalability and a reduced environmental footprint.

The influence of the DESTINY solutions in terms of stability, process efficiency and characteristics of raw materials, intermediate/sub/final products will be investigated to improve performance of the industrial processes within 3 industrial sectors (Cement, Ceramics and Steel). New heating technologies, monitoring systems and numerical simulation tools will be used to drive the design and to excel in the outcome.

## OBJECTIVES

The DESTINY project aspires to introduce a “first-of-a-kind” high temperature microwave processing system at industrial level offering a variety of vital benefits to energy intensive sectors: reduced energy consumption, lower lifetime operating costs and enhanced sustainability profile.

The DESTINY system is conceived as cellular kilns in a mobile modular plant designed to cover the “material feedstock-firing-product storage” process in a unique clean system with increased production flexibility. Working with throughputs ranging from 10% to 100% capacity should be enabled without any major loss of the overall process performance.

Objectives focus towards the improvement of efficiency ratios in the following areas:

- Flexibility of  $\pm 30\%$  to energy input within RES (Renewable Energy Sources) fluctuations time frames without significant losses in specific energy efficiency
- Improvement in energy efficiency of 40% (depending on different industry and product applications)
- Improvement in terms of resource (fuel) efficiency exceeding the value of 40%
- Decrease in CO<sub>2</sub> emissions by 45% (without considering the electricity generation at steady state)
- Decreased OPEX and CAPEX by 15%.

## EXPECTED IMPACTS

Manufacturing is the driving force behind Europe’s economy. Within a context of climate change legislation, volatile energy prices and increased environmental awareness, modern manufacturing must focus on the introduction of modern and renewable energy solutions as well as on sustainability and eco-efficiency.

In order to achieve further significant energy reductions, it is necessary to target the most energy intensive parts of the production chain such as the firing processes. In this sense, the new system proposed in DESTINY will be a clear opportunity to improve the current industrial heating processes.

The DESTINY concept is indeed a paradigm change: it enables new small-low cost solutions for new processes or to retrofit existing plants. The system is designed as a modular unit to create any production capacity required by clients on-site. Due to a reduced size, it offers a production on demand, delocalised and with high flexibility of production and portability, it gives the chance to develop new business strategies and allowing increased flexibility of the energy input. Thus, the DESTINY concept perfectly fits to energy efficiency policies for the performance of the next generation renewable based electricity grids.

Due to the novelty of DESTINY’s outcomes, it is expected to have a high potential for market application covering a real need and demand from energy intensive industries processing raw materials.