Objectives

The main objective of the REVaMP project is to develop, adapt and apply novel retrofitting technologies to cope with the increasing variability and to ensure an efficient use of the feedstock in the metal making industry in terms of materials and energy. This will be exemplarily demonstrated within three different use cases from electric and oxygen steelmaking, aluminium refining and lead recycling. The performance of the different technologies will be assessed, and the benefits will be quantified.

Expected Results

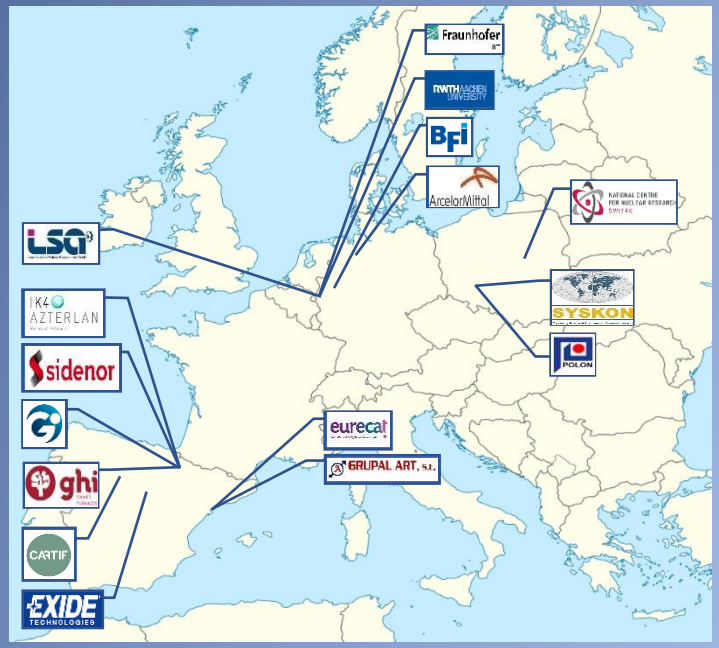
The development, adaptation and application of novel retrofitting technologies to cope with the increasing feedstock variability

- Novel sensors for characterisation of metal scrap regarding chemical composition
- Metal scrap preheating system operated with waste derived fuel
- Software tools to model the operational input conditions of the processes
- Monitoring and control systems to optimise the processes for metal production at varying feedstocks

will ensure an efficient use of the feedstock in terms of materials and energy, achieving reliable product quality at higher productivity and a lower carbon footprint.

REVaMP

- **H2020 Call:** CE-SPIRE-05-2019
- **Start date:** 2020-01-01
- **Duration:** 42 Months
- **Type:** Innovative Action
- **Budget:** 9,9 M€
- **Coordinator:** BFI
- **Contact:** bernd.kleimt@bfi.de



RETROFITTING EQUIPMENT FOR EFFICIENT USE OF VARIABLE FEEDSTOCK IN METAL MAKING PROCESSES

REVaMP

www.revamp-project.eu

European Commission

SPIRE

The Project

The REVaMP project

In the European process industries large amounts of energy and resources are used to produce millions of tonnes of materials each year. Especially in metal making processes, metallic scraps from end of life goods are recycled and used as secondary raw materials in the processes. Usage of scrap is both ecologically and commercially beneficial, since it reduces the depletion of natural resources like virgin ores and avoids landfill of wastes. Even more important, the energy consumption and the CO_2 emissions of the reduction processes of metal ores can be significantly lowered or even totally avoided when using recycled materials as feedstock.

However, the metal production facilities are facing nowadays an increasing variability in material and energy feedstock. To cope with this challenge, existing metal production plants need to be retrofitted with appropriate sensors for scrap analysis and furnace operation. The selection of the optimal feedstock in terms of material and energy efficiency has to be improved by application of appropriate process control and decision support tools. Also, solid scrap preheating systems can increase the energy efficiency of the melting processes. To monitor and control the process behaviour in an optimal way, model-based software tools have to be developed and applied.

Use Cases

Aluminium refining

In aluminium refining, different kinds of old aluminium scrap are melted to produce, mostly, casting alloys for foundries, supplied according to standards and/or customer specifications. In one of the refining plants novel sensors for analysis of the incoming scrap types will be applied. In the second plant a sensorised scrap preheating system will be installed. Both plants will be equipped with model predictive control and decision support systems to optimise melting processes, for varying charge mix and energy efficiency, respectively.

Liquid steelmaking

In liquid steelmaking, scrap is one of the most important metallic input materials. Novel sensors for characterisation of the composition of different scrap types will be applied, to enable the selection of the quality and cost optimal scrap mix. Decision support and model-based control tools will allow to operate the melting processes in oxygen and electric steelmaking in an energy and resource efficient way.

Lead production

The lead production process is based on the recycling of lead batteries and other lead containing scrap. Novel sensors will be applied for monitoring of the pyrometallurgical process and for scrap characterisation. Furthermore model-based monitoring and control tools will be applied to improve the process efficiency.

Consortium

Industries

Global players from the aluminium industry, the steel industry and the lead production industry provide their processes and infra-structure for validation of the retrofitting solutions in different industrial environments: Grupal Art and Refial in Spain (Aluminium); ArcelorMittal Bremen, Germany, and Sidenor, Spain (Steel); and Exide in Spain (Lead).

Research Institutes & Universities

The scientific project partners provide deep knowledge and expertise in the fields of sensor development as well as in modelling, control and optimisation of metal making and recycling processes: VDEh-Betriebsforschungsinstitut (BFI), Fraunhofer Institute for Laser Technology (ILT) and RWTH Aachen in Germany, National Centre for Nuclear Research (NCBJ) in Poland, and Azterlan, Eurecat and Cartif in Spain.

Technology providing companies

The retrofitting equipment developed in the project will be exploited by four companies (three of them SMEs) providing sensor technology and plant equipment: LSA in Germany will provide a novel laser-based sensor; SYSKON and POLON in Poland a neutron activation sensor for scrap characterisation. GHI Hornos in Spain will provide the equipment for Aluminium scrap preheating and smart furnace sensing.