Processes4Planet Success Story

REslag Project
Energy-Intensive Industries move one step closer to circularity

The REslag project (Full title: Turning waste from steel industry into a valuable low-cost feedstock for energy-intensive industry) was launched on the 1st of September 2015 and ended on the 31st of July 2019. It was funded by the Horizon 2020 Programme under the **SPIRE** contractual Public-Private Partnership (active between 2014 and 2020). The project was implemented by a consortia of 19 partners under the coordination of the **A.SPIRE** member, **CIC EnergiGUNE**.

Context

In 2010, the European steel industry generated, as waste, about **21.8 Mt of steel slag** (a by-product, part of the intrinsic process of steel production). 76% of the slag was recycled in applications such as aggregates for construction or road material, but these sectors were unable to absorb the total amount of produced residue. **The remaining 24% was landfilled (2.9 Mt) or self-stored (2.3 Mt)**. The landfilled slag represented an environmental concern.

Project goals

The REslag project - fully aligned with the **Processes4Planet Strategic Research and Innovation Agenda 2050** - aimed at making effective valorisation of the steel slag by reusing it as feedstock in four eco-innovative applications. The research team of the project focused on creating new ways of exploiting the waste for applications in **metal extraction**, **heat recovery**, **Concentrated Solar Power (CSP) plants** and **refractory sectors**.

Steel slag as raw material

Among the project's scientific and technical goals were developing new cost-competitive refractory materials (with slag as raw material) and creating innovative business models suitable for steel slag valorisation. Both aims were achieved.

Heat capture and storage systems

The traditional industrial processes generate heat. In Energy-Intensive Industries, 30-40% of the energy consumed is lost as waste heat and discharged into the atmosphere. As the discharged heat can be captured and reused, a storage system had to be developed, thus addressing the need for circular economic models. The main challenge in generating an economically feasible heat storage system is to find low-cost energy-dense materials. Steel slag is the ideal candidate as a cost-free waste compatible with heat storage.

Pilot plant. One step closer to market deployment

Reusing waste heat as a source of energy has great potential in carbon emission reduction. To demonstrate this, CIC energiGUNE developed the modelling, construction, design and prototype (1/10

scale) of an innovative system for heat capture and storage (more details **here**). The prototype demonstrator is up and running on **ArcelorMittal** facilities in the Basque Country (pictures below), showing the potential in flexibility and feasibility of the solution.

REslag proved that the industrial sectors can reuse the landfilled slag, with notable environmental benefits, if properly supported by the right technologies and that there is great potential in closing loop processes by turning waste from one industry into raw materials for another (industrial symbiosis). Moreover, the project demonstrated the potential of steel slag in creating refractory materials, developing thermal energy storage systems for industrial waste heat recovery applications and in the recovery of valuable metals. REslag brought the steel sector (with a cross-sectorial added value approach) one step closer to circularity and net-zero waste**.**

According to the data provided by CIC energyGUNE, the system is not yet running, but preliminary analysis indicates that, at current fossil fuel prices, there is a heat recovery potential of around **15% of the total waste heat**. The experts also stressed that although it may initially seem small, the 15% translates into **9.2 GWh/year/EAF** (a "significant figure"). Furthermore, the 1/10 scale prototype demonstrator already recovered **500 MWh/year** in energy. CIC energyGUNE also specified that "the pilot plant is also a demonstrator of a low-cost thermal energy storage system, reaching an incomparable system storage cost of **5€/kWh**".

A.SPIRE considers the REslag project (developed under the SPIRE Partnership) a success story and an inspiring example of circularity. A potentially valuable tool for climate mitigation was created by giving a second life to steelworks waste and employing it to build a solution which turns heat into a valuable low-cost feedstock.

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Contact:
CIC energiGUNE: **comunicacion@cicenergigune.com**
A.SPIRE: vpe@aspire2050.eu
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