

Which is LIFE HI4S project approach?



Waste heat contained in exhaust gases is commonly the largest heat loss in manufacturing plants and it is the target of LIFE HI4S project. Most energy intensive industries use energy in form of heat and, when the process where it has been applied is finished, this heat is released to the atmosphere in form of exhaust gases, cooling fluids or hot products, among others.

Within the European steel industry, electric arc furnaces (EAFs) are the most common production route of molten steel from recycled scrap. Most of the industries that uses EAF, before releasing large quantities of hot gases to the atmosphere, process them through a cooling system (from 1500 to 100 °C) and

pollution removal (washing, bag filters, etc.). Therefore, not only off-gas heat gets wasted, but energy is also used to treat gases and lower their temperature before their release.

Waste heat recovery in industrial processes is a well-known topic, but currently only technical solutions at low/middle temperature in “clean” conditions can be considered mature and cost-effective to be widely deployed. Hot streams containing harmful chemicals or condensable particles present higher cost equipment, fouling, degradation, or pollution issues, and thus still require more research efforts and deployments to extract their total energy potential and be cost-effective.

In this context, LIFE HI4S project wants to optimize the energy efficiency of energy intensive industries with the final goal of reducing their energy bills while improving environmental sustainability.

LIFE HI4S takes advantage of the former European ReSlag project (2015-2020, H2020 GA n° 642067) where a new waste heat recovery technology was developed for the steel making industries. ReSlag project gave a second life to an abundant waste of the steel making industry (steel slag), as an energy storage material. Now, leveraging on this knowledge, LIFE HI4S partners will analyse the best way to valorise the recovered heat and study technology exploitation possibilities in other sectors/industries with complex waste heat streams.

The pillars of LIFE HI4S Technology



Following the state of the art of current heat recovery & use processes approach for energy intensive industries, those below are the pillars of LIFE HI4S technology concepts:

- High amounts of dust and high temperatures make the off-gas heat recovery especially difficult to manage. **A high temperature ceramic**

filtering system that avoids the common fouling problems of the traditional technology can guarantee a low-cost and reliable solution.

- **A TES system** may turn the intermittent and nonhomogeneous nature of the exhaust gases coming from the EAF, into a continuous and homogeneous source of useful energy that can be managed on demand. Through this approach, the performance of the system can be optimized at every moment depending on the energy needs, contributing to taking advantage of the whole temperature content of the waste heat.
- If the heat may be recovered, **scrap preheating** is the most attractive application because it is the previous step to the melting process and thus, it has been widely studied.
- **An innovative small ORC system** will be able to use heat waste for electricity production, mainly for plant self-power supply. A new vector fluid having a lower GWP than the fluorinated gases traditionally employed will be identified and tested to ensure its performance with the operating conditions.

Ambitious LIFE HI4S project Results!



According to the LIFE HI4S project approach and its technology pillars, those below are the expected results that the project's partners will reach through research and development, shared knowledge and complementary expertise.

The project aims **to build a pilot plant** that will validate in an industrial environment the technical, economic and environmental feasibility of LIFE HI4S technology for recovering waste heat from complex gas streams, reducing the energy consumption in the EAF within the steel making industry.

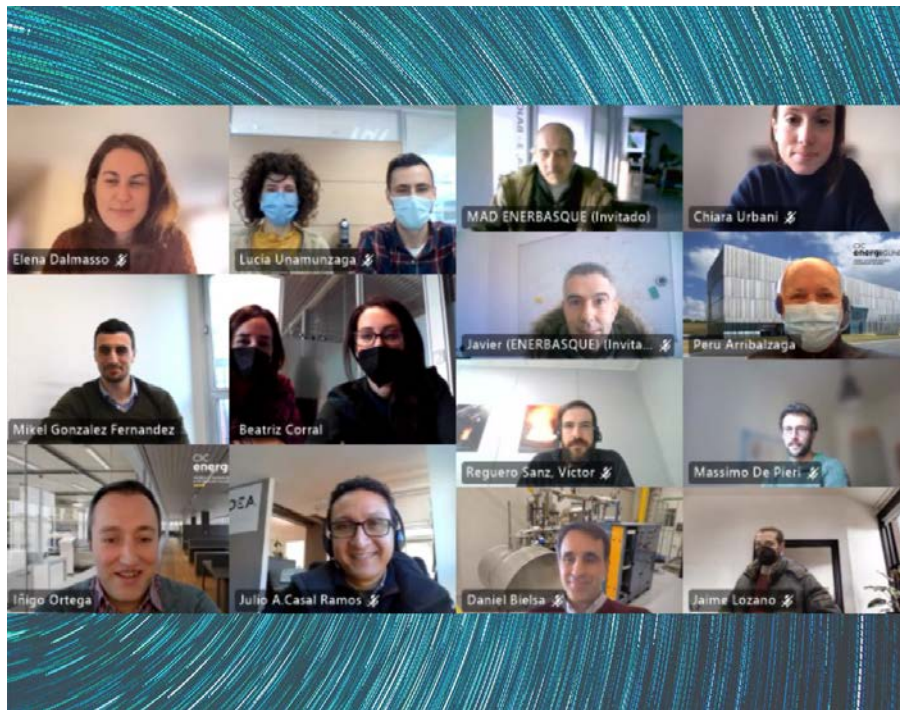
Besides, the project aims to provide **a decision-making tool** able to model the heat recovery and reuse processes so that the operation strategies can be optimised and the different operation modes appropriately selected depending on variable inputs to maximize the outputs.

Moreover, in order to support the technical results, a **sustainability assessment** and a **business and reproducibility plan** will both be

implemented to demonstrate the benefits of the technology in terms of environmental, economic and social impacts and to set the ground for future business exploitations.

Finally, a draft of LIFE HI4S technology as a Best Available Technology (BAT) for Reference Documents (BREF) will be delivered to the European IPPC Bureau for its consideration.

First Project Consortium Meeting



On the 24th of January 2022 all project partners joined the first Project Consortium Committee Meeting, six months after the official beginning of the project in July 2021.

The event, held online due to COVID restrictions, was a great occasion to get an overview of pilot plant specifications and create open discussions about stakeholders' requirements. Also, it has been a lovely opportunity for the partners to meet and strengthen collaborations among them while checking on project's progress.

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LIFE HI4S EU Project

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