

EUROSLAG'24

“SLAGS FOR THE FUTURE...
... THE FUTURE OF THE SLAGS”

2024

23RD - 25TH October

Bilbao Exhibition
Centre(BEC)
LUXUA Room



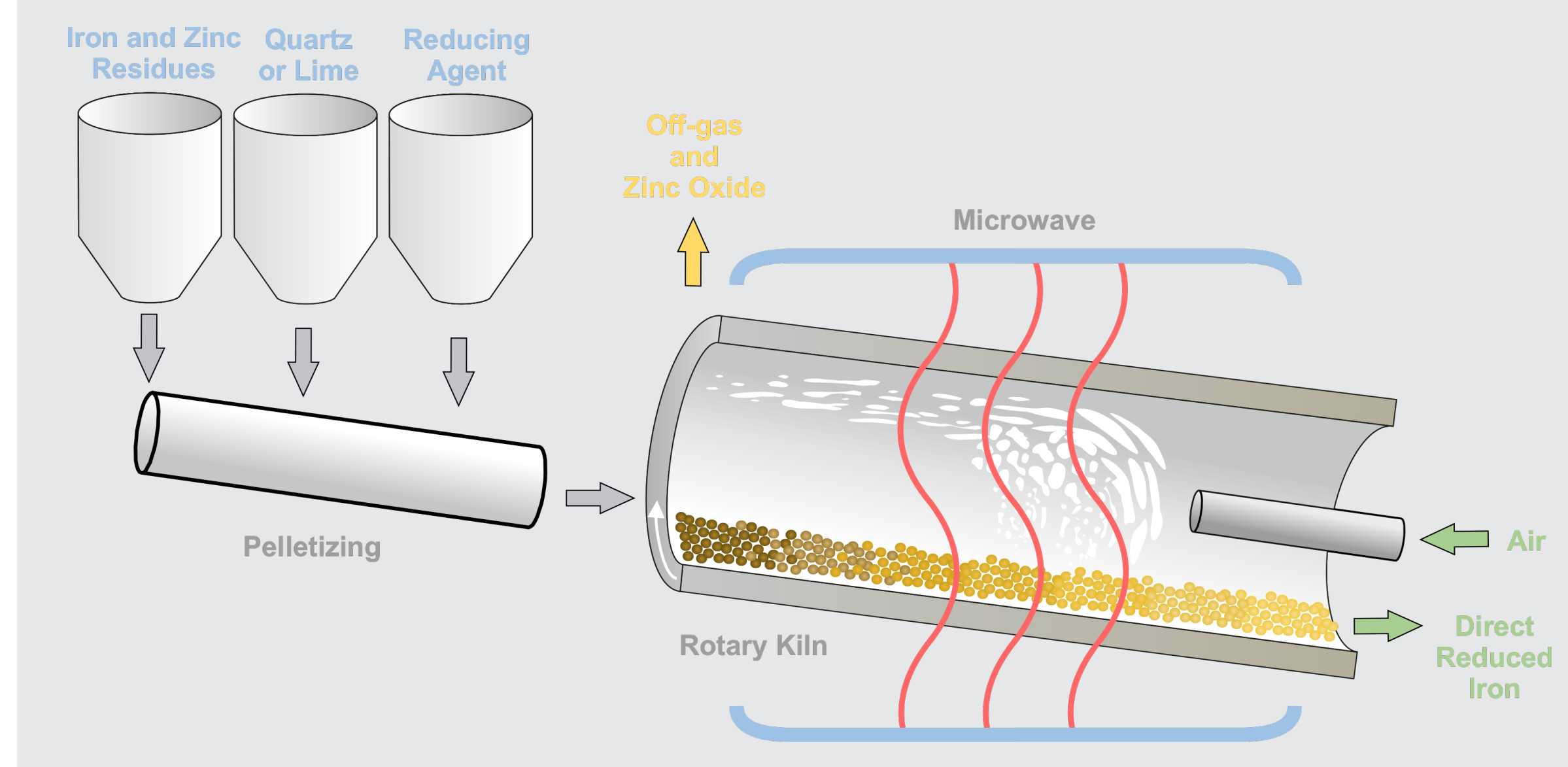
Upgrading of low-quality iron ores and mill scale Project start 12-2022

REASON WHY

Iron ore and scrap as raw materials are forming the base of iron and steel production. Due to the transition from carbon-based iron and steel production to green steel production with hydrogen (H₂), most current production units such as sinter plant, blast furnace (BF) and basic oxygen furnace (BOF) will be replaced by the direct reduction process (DR process) followed by an electric arc furnace (EAF) for DRI-use. As a result, the current recycling routes for iron-containing by-products (e.g. mill scale, dust, sludge) will be cut off and the demand for high-quality direct reduction pellets and high-quality scrap will rise, becoming a critical factor. New by-products from the gas treatment of the DR process and iron pellets sieving will emerge.



MICROWAVE PROCESS



OBJECTIVES



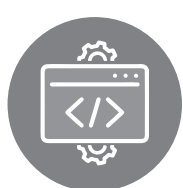
Upgrading of low-quality iron ores by combining it with iron-rich by-products.



Development of innovative techniques to produce high-quality pre-material for decarbonised future production routes.



Separation of disturbing components from by-products to replace scrap.



Development of the technological basis and digital tools supporting the transition towards zero waste in the European steel industry.

DESCRIPTION

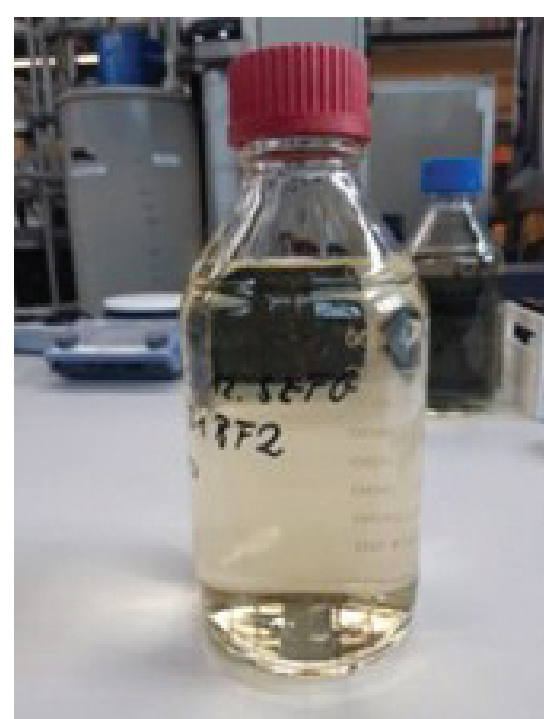
Alternative technologies are developed to higher TRL:

- ▶ **TransZeroWaste De-oiling by magnet-supported hydrometallurgy**
- ▶ **TransZeroWaste low CO₂-cold briquetting and pelletising**
- ▶ **TransZeroWaste hot microwave pelletising with reduction potential including pilot plants at industrial partners sites.**

Supported by digital tool development for transition including Material Flow Analysis, Life Cycle Assessment, circularity, environmental and economic indicators for higher sustainability.



Magnet loaded with oily scale



Cleaning agent after recovery

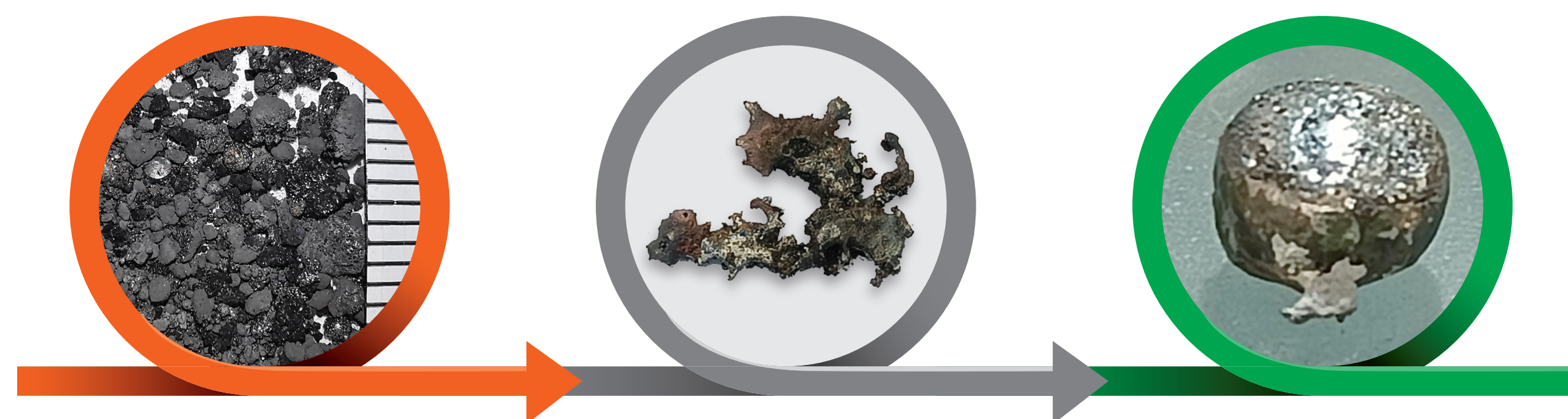


TransZeroWaste hot microwave pelletising with reduction potential



Agglomeration trials with tablet press

EXPECTED IMPACT



The developed TransZeroWaste technologies aim for the upgrade and use of low-quality iron ores and iron-containing by-products, for separation and reduction of impurities and potentials for the valorisation of low-quality scrap-equivalent and high recycling rate. Their further development will contribute to climate-neutral and circular industrial value chains supporting transition towards low- CO₂-DR-EAF and -EAF production routes, their recycling potential for lower use of critical raw materials and the implementation of energy-efficient processes.

The development of a decision-support platform modelling the sustainability performance of steel production pathways supports the understanding of the environmental, economic and circularity impact of the steel value chain. The project outcomes will thus aim to help decrease the environmental footprint and support the resilience and competitiveness of the steel sector in Europe. The transformation to low-CO₂-DR-EAF routes will lead to a shutdown of CO₂-intensive processes that currently provide a high recycling rate like the sinter plant, BF and BOF. With this, the recycling and useability of low-grade ore and scrap will equally be cut off. Therefore, the TransZeroWaste technologies aim to provide solutions on TRL 4-6 to fill the gaps for recycling and upgrading for ore- and scrap-based green steel production. Considering sinter plant operation generating between 161 and 368 kg CO₂/t sinter (BAT), the replacement of sinter plant with low-carbon-technologies for the addressed 27 Mt/a raw materials could save between 4.3 and 9.9 Mt CO₂/a. Replacement by TransZeroWaste technologies could provide the otherwise cut-off of recycling and upgrading as well as providing additional potential for low-CO₂-zinc recovery.

Research Partners



Contact Information

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