



icarus

Demo Case 3

Steelmaking slag Upcycling via CO₂ capture: From Slag to added-value materials



Challenge

In 2022, Europe produced 152.6 million tonnes of steel (EUROFER).

Domestic steel production yielded 19.6Mt of Granulated Blast Furnace (GBF) slag and 16.5Mt of Steel slag across the bloc in 2024 (Global Slag, 2025). However, their chemical and mineralogical behavior limits their use in some applications.

Steelmaking slags require new recycling pathways to prevent landfilling.

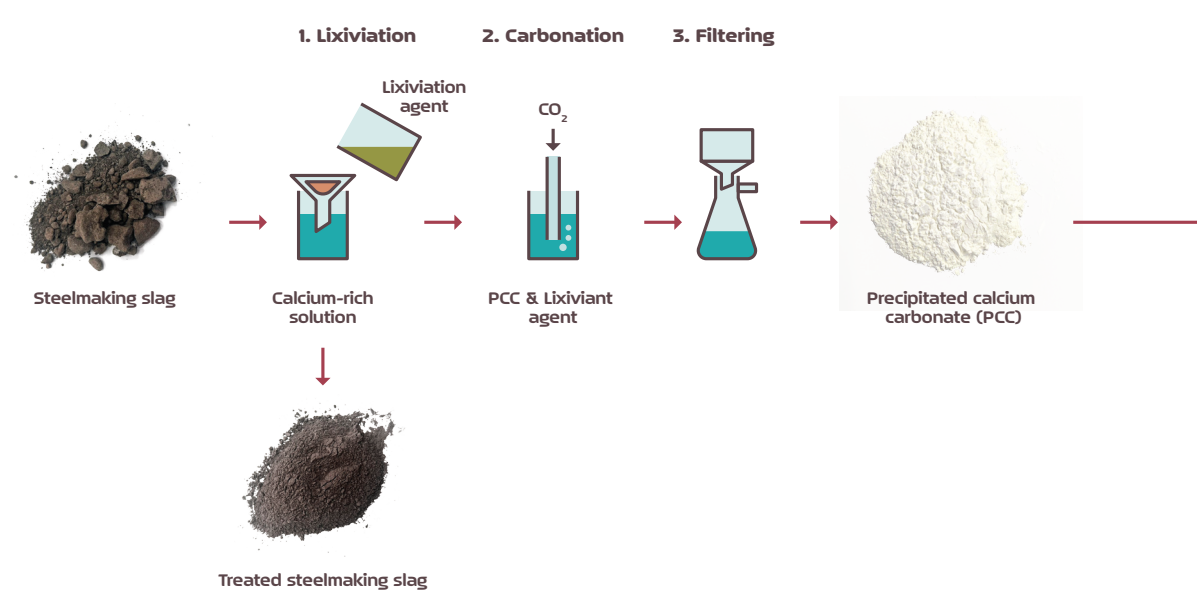
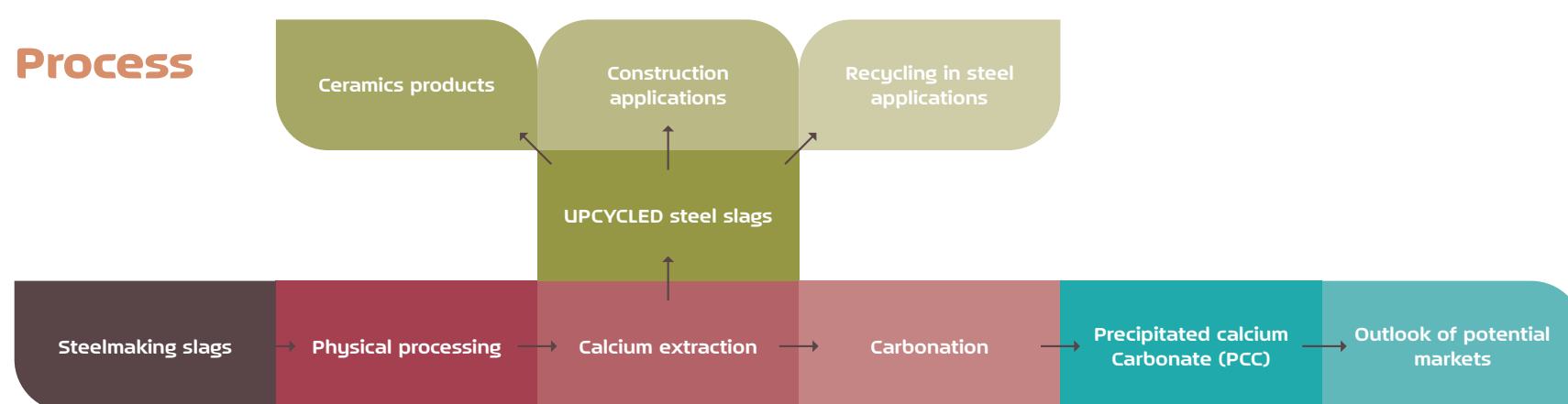
Within the ICARUS project, three slag types were selected for upcycling assessment, based on:

- low current valorisation rates
- expected future slag generation volumes

What we do

Demo Case 3 investigates the upcycling of steelmaking slags through Precipitated Calcium Carbonate (PCC) process to produce treated slags suitable for construction, ceramic, steel applications and sustainable PCC. The project aims to optimize upcycling processes by improving efficiency, product quality, CO₂ capture performance, and overall economic viability.

Process



Scanning Electron Micrographs of PCC polymorphs obtained by Lixiviation & Carbonation route (Spheroidal Vaterite and Rhombohedral Calcite)

Key results

Preliminary results indicate that was feasible to extract around 40 % of calcium content from the steelmaking slags.

PCC successfully produced using steelmaking slags as a calcium source, however the particle size are still being optimized.

Treated slags with increased iron content obtained as a by-product of the PCC production, although some the impurities could represent a challenge.

Final applications of PCC and treated slags are under evaluation based on technical requirements.

Replication potential and impact

To promote the circular economy by transforming steelmaking slags into valuable secondary raw materials through CO₂ capture processes.

To reduce in the exploitation and dependence on natural resources.

To prevent slags landfilling and the associated environmental impacts.

To develop new sustainable products technically and economically competitive with conventional products.



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Key partners

