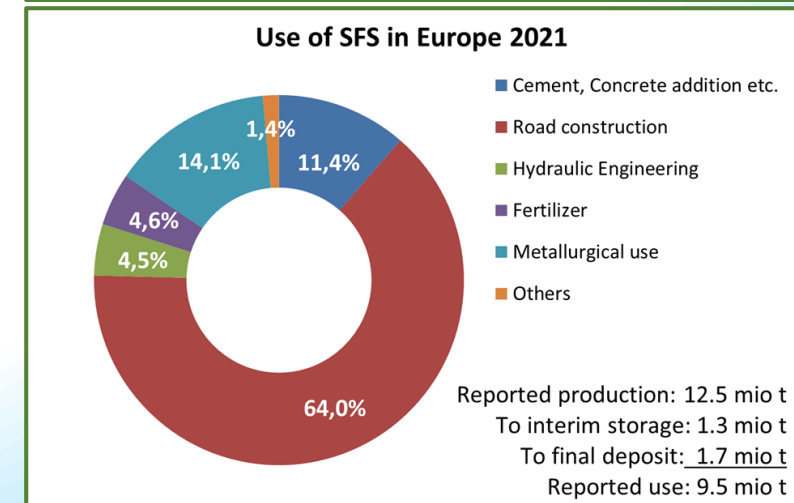
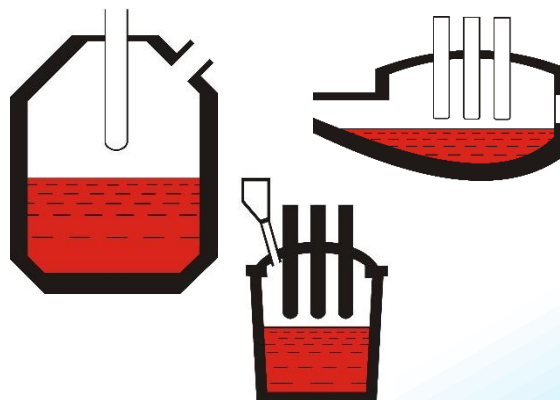
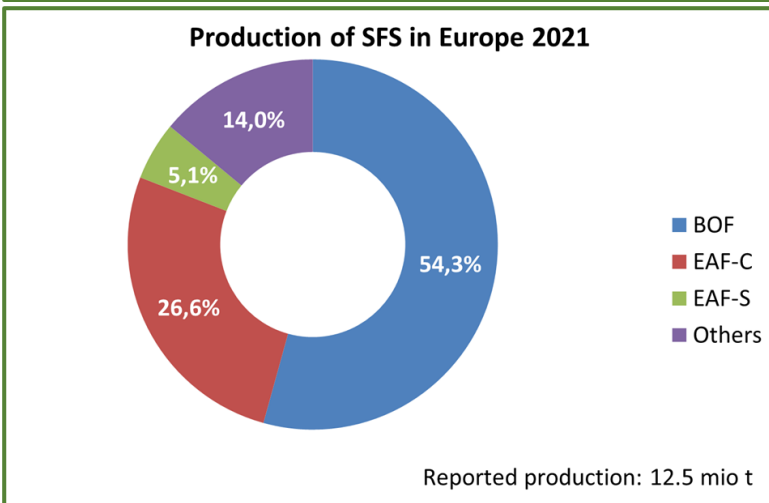
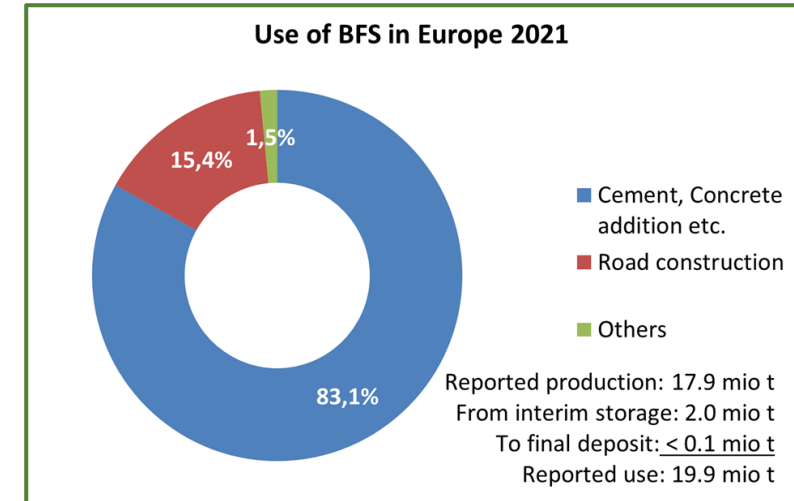
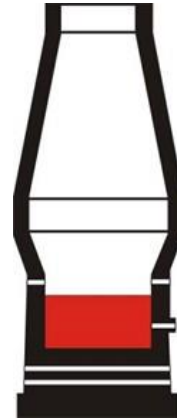
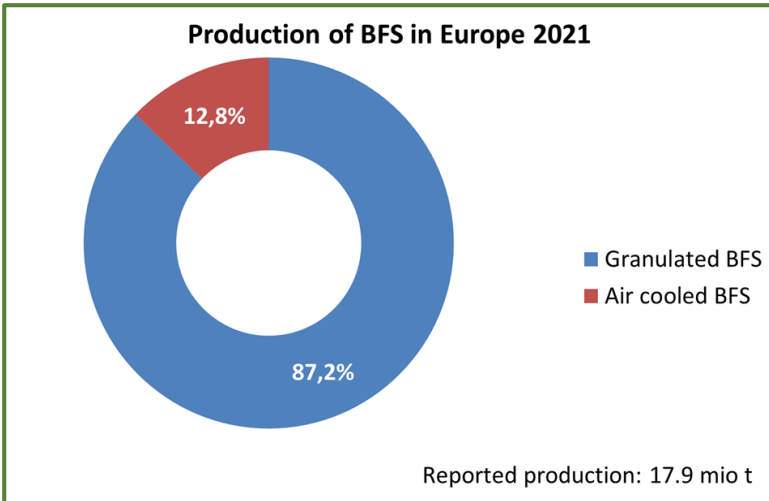


Challenges and opportunities for slags in a decarbonized steel industry

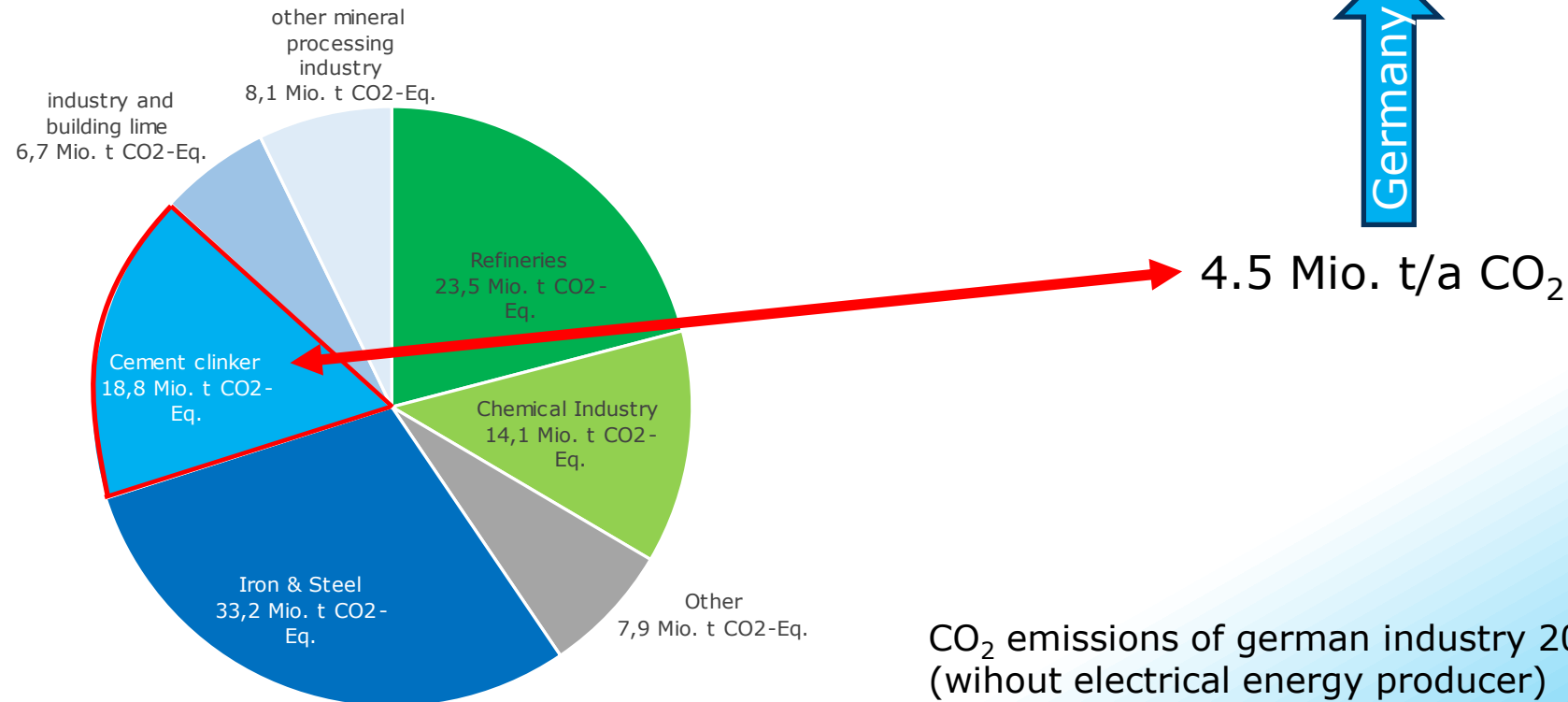
*Steel Tech Congress & Expo
Bilbao, 25.10.2023*

Status quo of slag utilization



Cement Industry

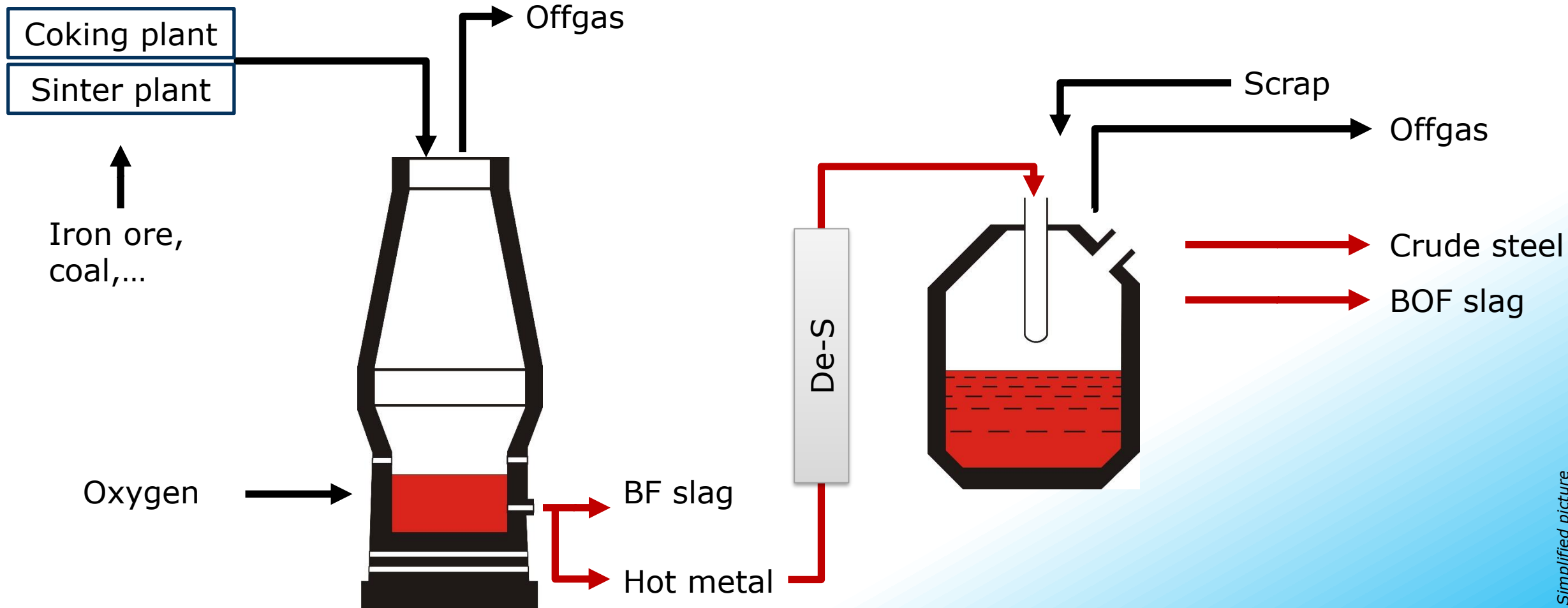
- Emmitting approx. 800 kg CO₂ per ton of clinker (60 % of this is due to raw materials)
- Using granulated blast furnace slag decreases carbon footprint by more than 10 Mio. t/a and saves 25 Mio. t/a of natural ressources in Europe *



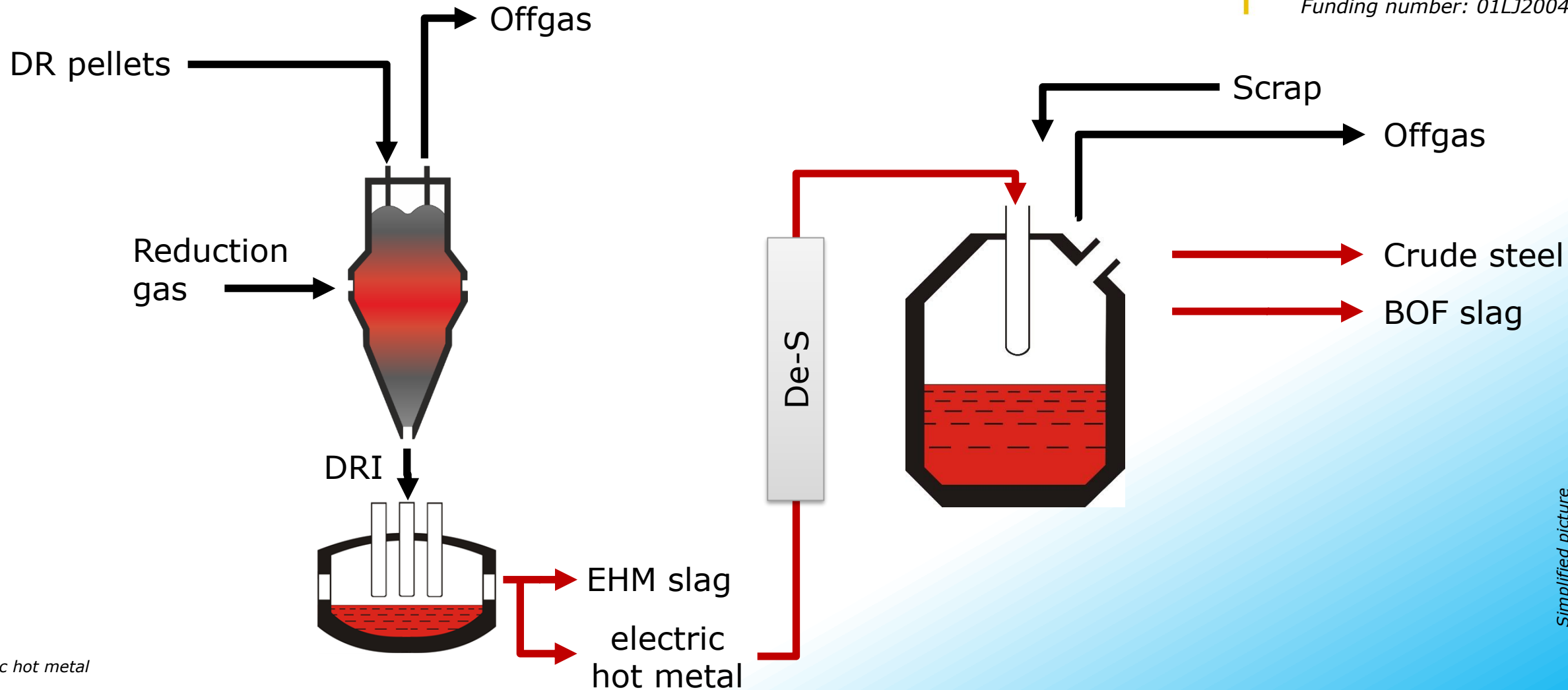
Ref.: based on German Federal Environmental Agency, DEHSt, 2022

* estimated, based on German data and EUROSILAG statistic

Crude steel production by BF + BOF



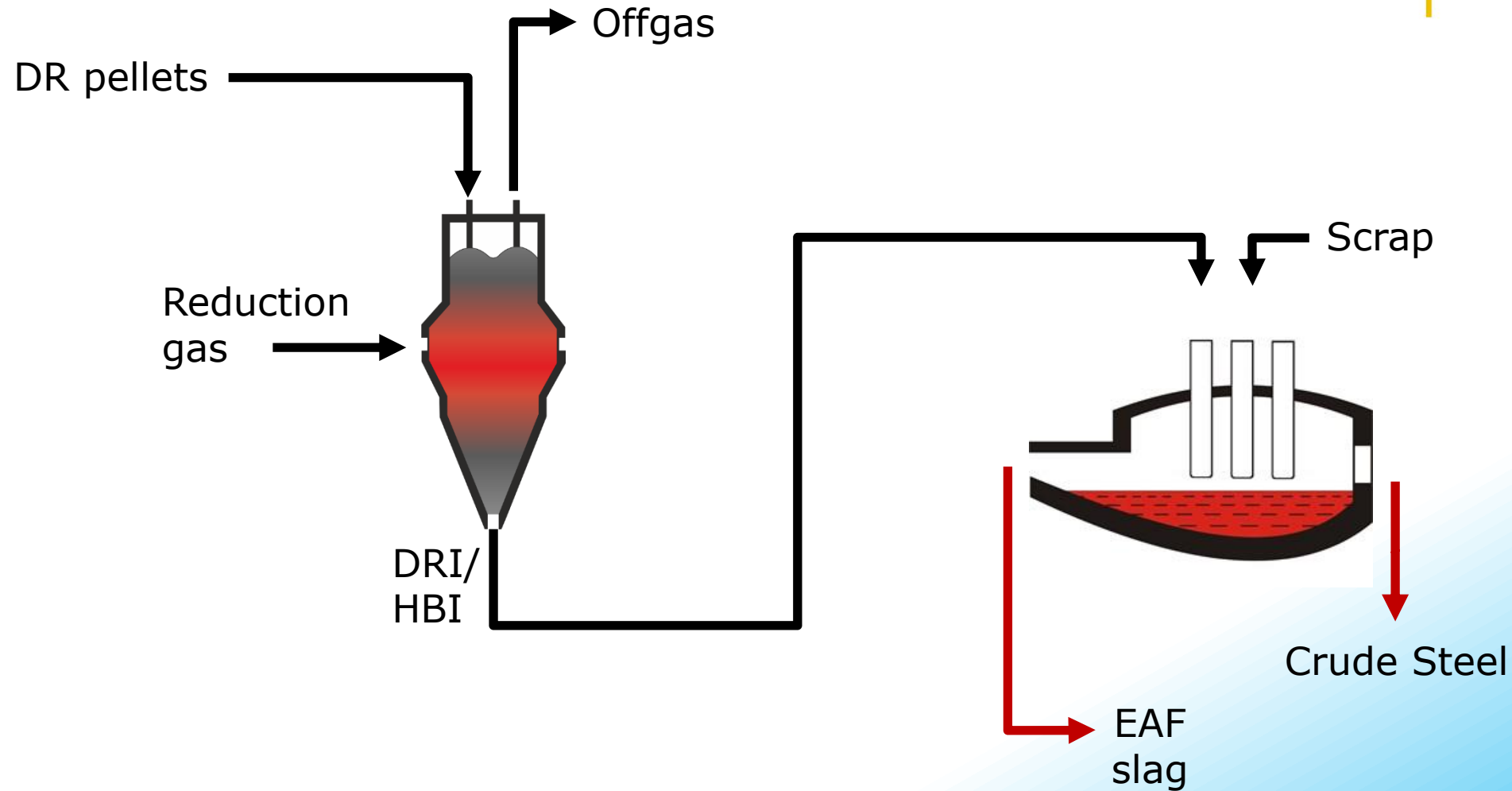
Crude steel production by DR + Smelter + BOF



EHM: electric hot metal

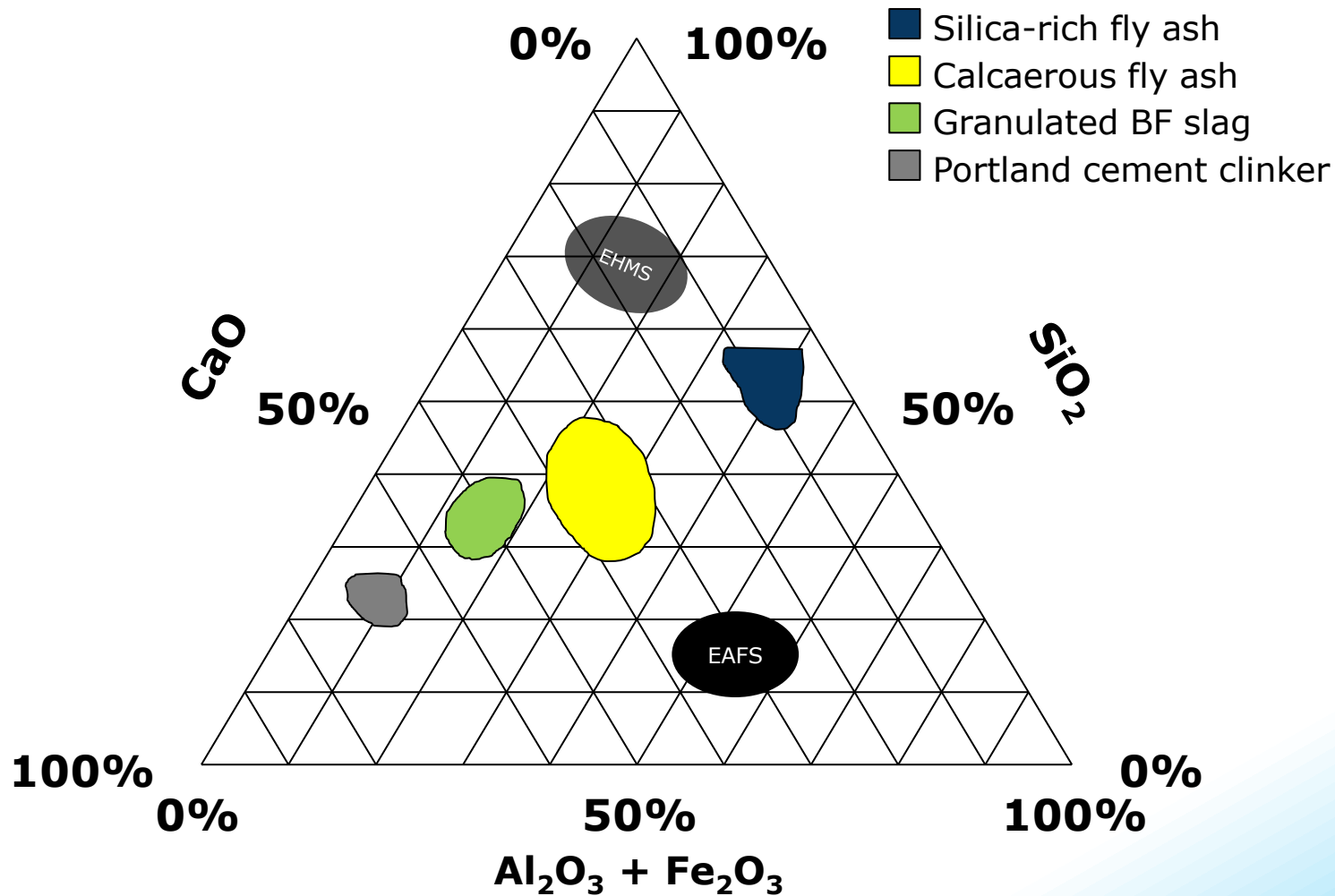


Crude steel production by DR + EAF



EHM: electric hot metal

The aim is a latent hydraulic material



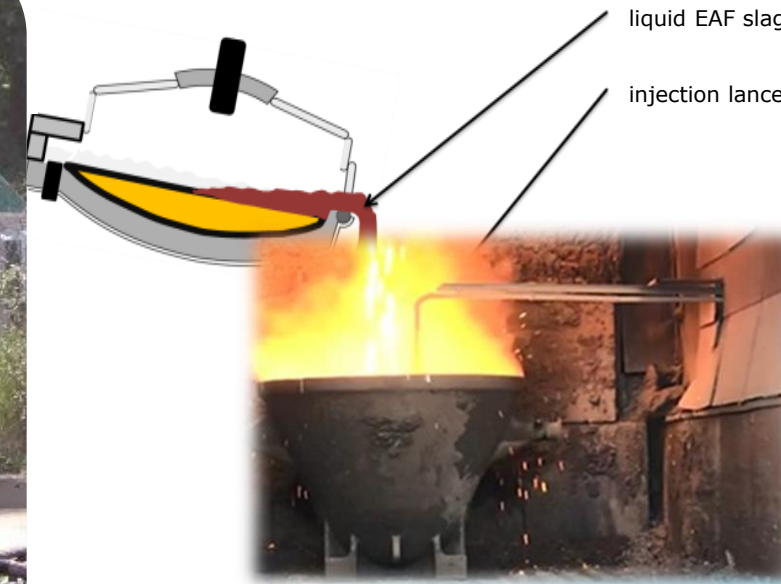
EHMS

- Smelter slightly reducing
- Lime addition necessary
- High amounts of TiO₂, V₂O₅, Alkalines can remain
- Negative or unknown impact as latent hydraulic material

EAFS

- SiO₂ addition necessary
- Reduction desired??

Possibilities...



Treating during tapping

Flexibility			
Chemical change			
Hot metal recovery			
Space requirement	-	+	+
Experience	-	o	+

Overview about *Next Generation Slags*



Grant agreement: 101112665

Duration: 48 months

1st July 2023 to 30th June 2027

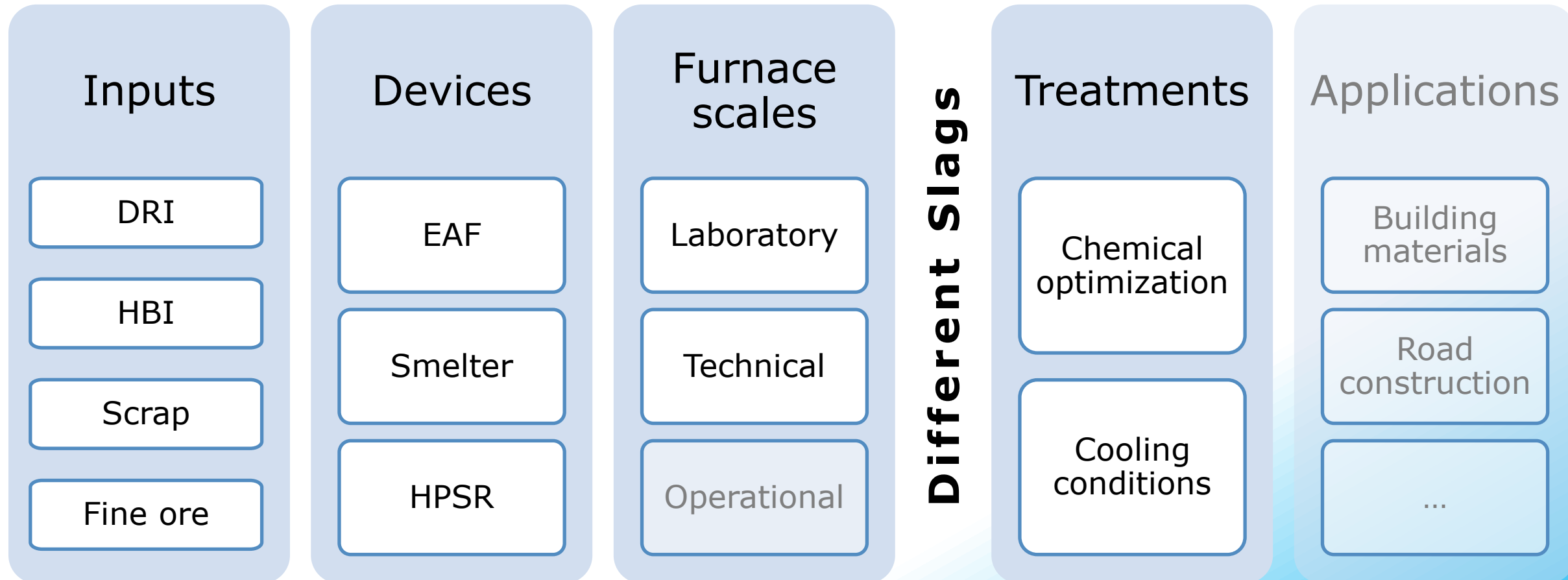
Web page: www.insgep.eu

LinkedIn: [InSGeP](https://www.linkedin.com/company/insgep)



The research leading to these results has received funding from the European Union's Research Fund for Coal and Steel research programme under grant agreement number: 101112665

Slag investigations



The research leading to these results has received funding from the European Union's Research Fund for Coal and Steel research programme under grant agreement number: 101112665

RFCS funding programme



- RFCS is an EU funding programme supporting research projects in the areas of coal and steel for universities, research centers and private companies.
- It contributes towards the funding of large clean steelmaking research and innovation breakthrough projects, leading to near zero-carbon steel making by 2030.
- The programme is managed by the European Research Executive Agency (REA) - Unit B.1. "Future Low Emission Industries".



CO2 neutral iron ore reduction

CSP-1



Developing technologies to reduce the specific energy required to produce steel

CSP-2



Circular economy and sector coupling solutions to meet the zero-waste goal for steelmaking

CSP-3



Preparation of steel CO/CO2 gases for Carbon Capture Use and Storage (CCUS)

CSP-4



Process Integration (PI) in steel plants to reduce the use of fossil carbon and associated CO2 emissions

CSP-5

- 29.120.000 € for steel sector
- Accompanying
- TRL 1-3 → TRL 4-5
- TRL 4-5 → TRL 7-8

Workshop in December 2023

How to draft a proposal



On December 13 (TBC), REA.B.1 is organising a workshop to provide tips on drafting proposals

The workshop will be in presence and via webex.

Further details will be available shortly on RFCS webpage!

IN SPRING 2024 RFCS Steel Big Ticket call

- Pilot and demonstration proposals for **Coal (Just Transition Mechanism) and Steel (Clean Steel Partnership)**

The BT Call will be launched in February 2024

- Expected high **TRL from 4-5 up to 7-8**
- Duration between **36 and 54 months**
- EU funding represents 50% of the total budget
- EU funding expected to range between **5-9 M€ per project (up to 18 M€)**



This does not however preclude the submission/selection of a proposal requesting other

amounts. The grant awarded may be lower than the amount requested.

Outlook



~~Sufficient~~ Time for R&D is running out!

ArcelorMittal, Bremen (XCarb)

- 2025-2027: 1st Blast furnace will be shut down, DRP + EAF start operation

Thyssenkrupp (tkH2Steel)

- 2026: 1st Blast furnace will be shut down, DRP + Smelter start operation

Salzgitter AG (SALCOS)

- 2025: 1st Blast furnace will be shut down, DRP + EAF start operation
- 2033: No Blast furnace in operation anymore, 2 DRP + 3 EAF in operation

Beside research of slag development, engineering and plant manufacturing, one more (time intensive) point is required!



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