K1-MET Overview

SusMet4Planet (2023 – 2027)

Linz, 1 July 2023

Thomas Buergler, Susanne Michelic

metallurgical competence center

Coordinated by

FFG Promoting Innovation · Tirol · UAR Innovation Network · SFG Neues denken. Neues fördern.

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K1-MET at a glance

international metallurgical research competence center

- focus on ferrous and nonferrous metallurgy
- founded in July 2015 as a limited liability company
- 84 employees (as of 1 July 2023)
- partially funded by an Austrian competence center programme
- annual revenue of 10 million €
- 100 projects and associated partners from industry and science

Current research programme 2023 – 2027

AREA 1
Metallurgical Process Efficiency & Circularity

AREA 2
Decarbonisation & Sector Coupling

AREA 3
Simulation & Data Analyses

K1-MET

and some partner locations

metallurgical competence center

LEOBEN
Montanuniversitaet
Leoben (Branch office)

WELS
University of Applied
Sciences Upper Austria

GRAZ
Graz University
of Technology

LINZ
Primetals Technologies
Austria GmbH

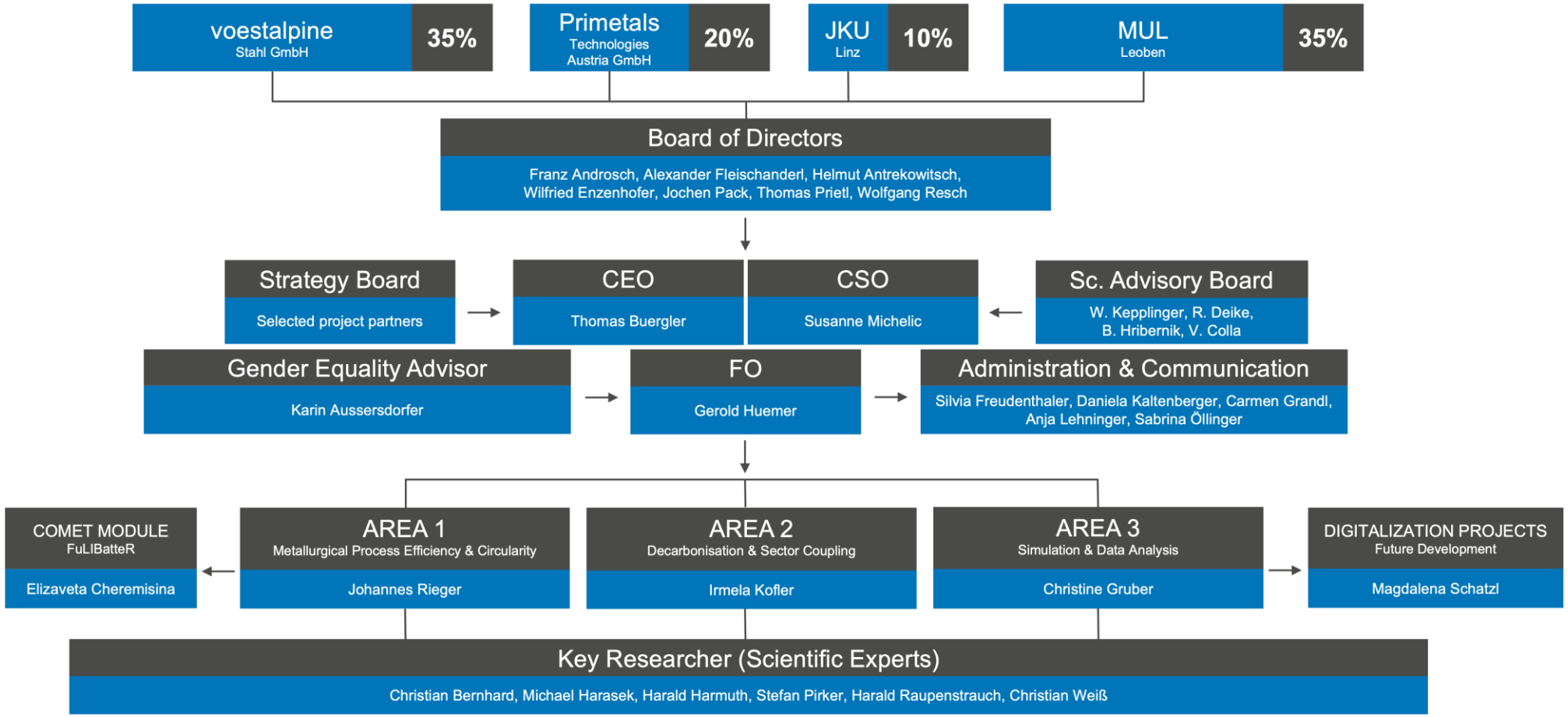
LINZ
K1-MET GmbH
(Headquarter)

LINZ
voestalpine Stahl GmbH

VIENNA
Vienna University
of Technology

LINZ
Johannes Kepler
University Linz

Organizational structure
of K1-MET GmbH



Sustainable Development Goals (SDGs)

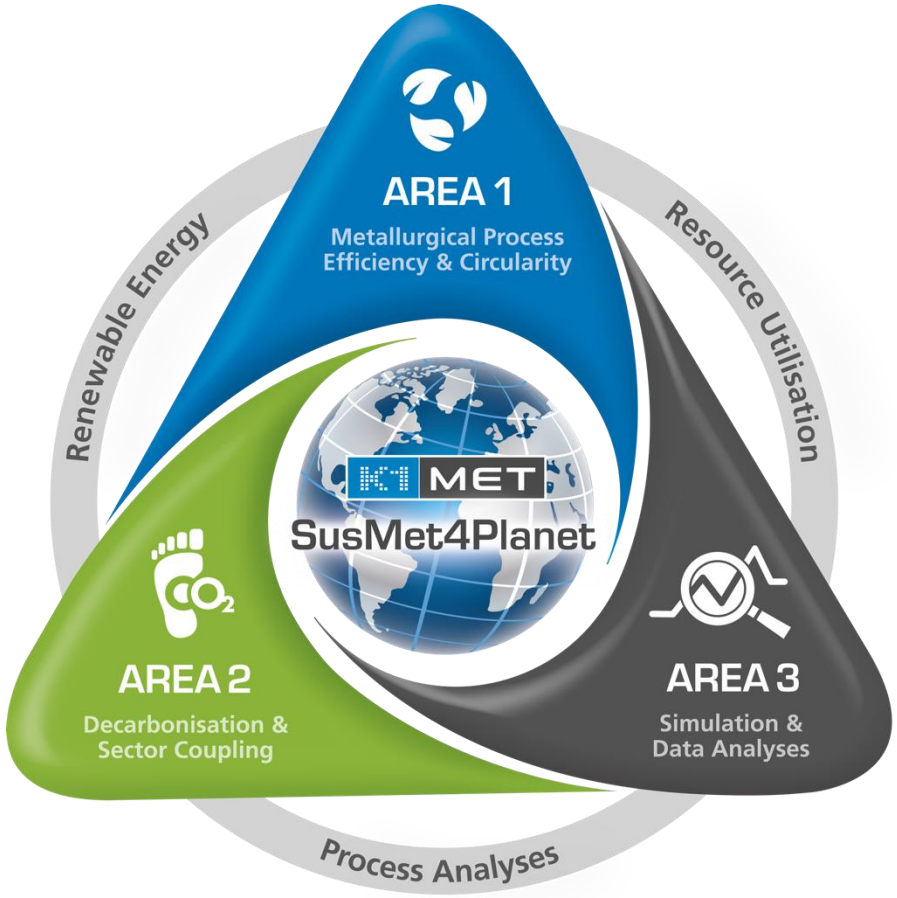
Contribution of K1-MET towards a sustainable economy & society

- K1-MET is in accordance with the SDGs
- SDGs related to environmental (climate) impact
  - Energy efficiency and clean energy technologies – SDG 7
  - Increase resource efficiency in metallurgical processes – SDGs 8 & 9
  - Enhance utilization and recycling of metallurgical residues – SDG 12
  - Reduce CO_2 emissions – SDG 13
- SDGs related to human resources
  - Gender equality – SDG 5
  - Female employees in all organizational levels and uniform salary scheme
  - Current female share of K1-MET staff: 40 %
- Decent work and economic growth – SDG 8
  - 80 full time equivalents (full configuration)
  - 18 PhD Researchers planned (20 in total)
  - 10 Master students planned (40 in total)

Source: https://sdgs.un.org/goals

Future research programme

SusMet4Planet (2023 – 2027)



“Sustainable digitalized Metallurgy for a climate neutral and resource efficient Planet”

K1-MET addresses the challenges of the metallurgical industry in staying competitive and reaching climate neutrality

Area 1: Metallurgical Process Efficiency & Circularity
Enhancement of process efficiency and product quality through analytics and treatment of raw and secondary materials

Area 2: Decarbonisation & Sector Coupling
Solutions for CO_2-lean metallurgical processes and metallurgy as a source of CO_2 for energy-intensive industries (sector coupling)

Area 3: Simulation & Data Analyses
Application of modelling approaches to new processes and data analysis for an increase of process efficiency

SusMet4Planet

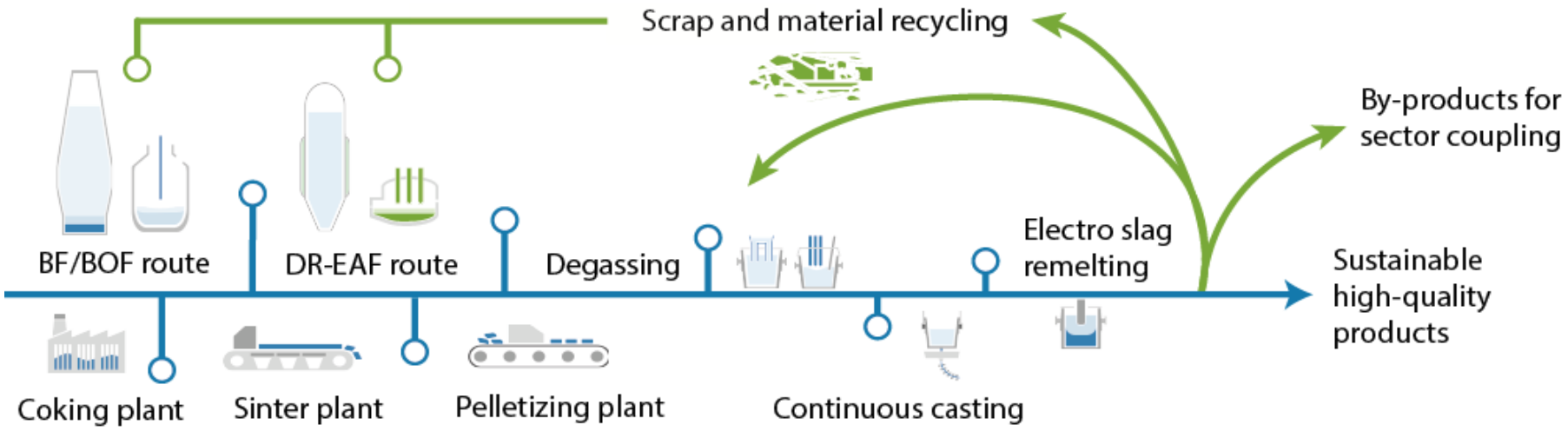
2023 – 2027

- cross-sectorial consortium of 42 excellent national and international company and scientific partners from all over the world
- contribution to sustainability, efficient processes and climate neutrality for all energy intensive industry sectors, supported with increasing digitalization and superior product qualities
- Objectives:
  - Strategic goal 1: Increase process efficiency and strengthen circularity in metallurgy
  - Strategic goal 2: Push forward the decarbonisation of the metallurgical industry and sector coupling
  - Strategic goal 3: Generate and use of metallurgical process knowledge through digital technologies

Area 1

Metallurgical Process Efficiency & Circularity

- Enhancement of resource and process efficiency for ferrous and nonferrous metal production/refining

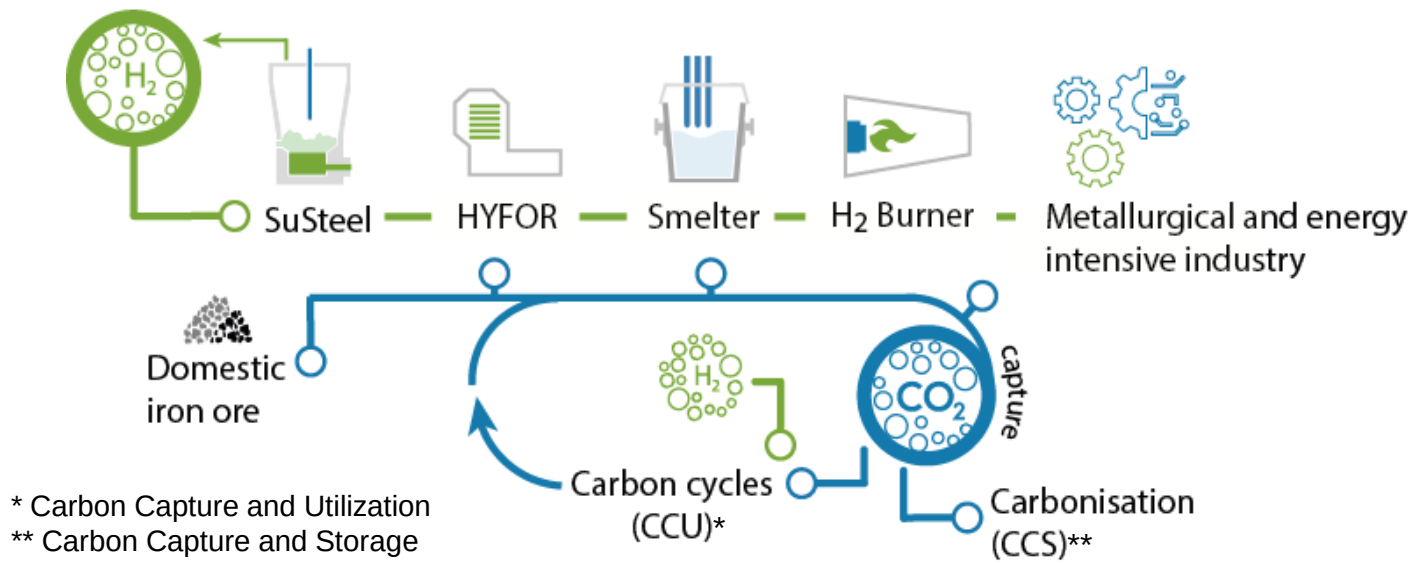


- Advanced analytics of raw and recycled materials
- Sustainable sinter and low-emission BF-process
- Resource efficient copper refining process
- Sustainable continuous casting process
- Inclusion removal and steel cleanness
- Sustainable processing of solid residue streams
- Valorisation of steelmaking slags
- Insights into metallurgical processes (experiments and thermodynamics)

Area 2

Decarbonisation & Sector Coupling

- Carbon direct avoidance (CDA) and carbon capture and utilisation/storage (CCU/S) processes for climate neutrality in 2050



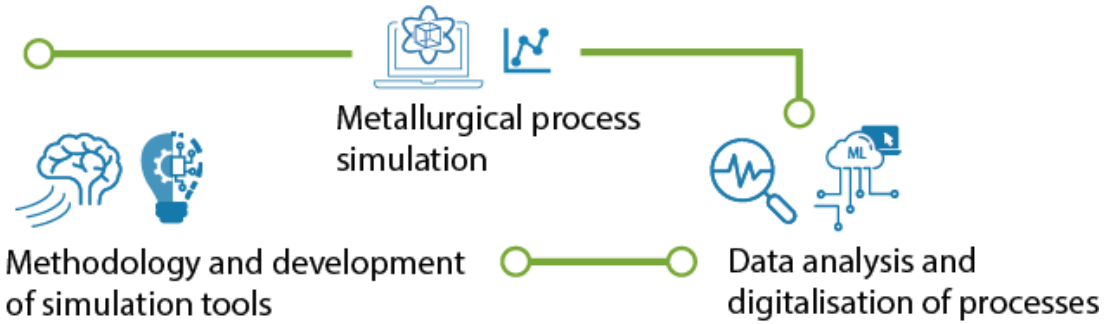
* Carbon Capture and Utilization
** Carbon Capture and Storage

- Continuous H_2 Plasma Smelting Reduction (HPSR) process development
- Domestic ore for green steel
- Carbonisation
- Energy efficient CCU process
- Green smart furnaces
- Smelter development for net zero-carbon steelmaking
- Flowsheet modelling for CO_2 reduction

Area 3

Simulation & Data Analyses

- Application and implementation of insights for process optimization in metallurgical processes



- Multiphase fluid modelling and simulation
- Multi-scale and reactive granular flows
- Magnetohydrodynamics simulations for the optimization of CC
- Advancement of simulation acceleration for process applications
- Hybrid modelling

Project structure

Strategic share of the projects

AREA 1
Metallurgical Process Efficiency & Circularity

Nº	Project title
1.1	Advanced analytics of raw and recycling materials[1]
1.2	Sustainable sinter and low-emission blast furnace process
1.3	Resource efficient copper refining process
1.4	Sustainable continuous casting process
1.5	Inclusion removal and steel cleanness
1.6	Sustainable processing of solid residue streams
1.7	Valorisation of steelmaking slags
1.8	Insights into metallurgical processes by means of experimental investigations and thermodynamic studies[1]

[1] 100 % strategic

Project structure

Strategic share of the projects

metallurgical competence center

AREA 2
Decarbonisation & Sector Coupling

Nº	Project title
2.1	Continuous hydrogen plasma smelting reduction (HPSR) process development
2.2	Domestic ore for green steel
2.3	Carbonisation
2.4	Energy efficient carbon capture and utilisation process
2.5	Green smart furnaces
2.6	Smelter development for net zero-carbon steelmaking
2.7	Flowsheet modelling for CO_2 reduction

AREA 3
Simulation & Data Analyses

3.1	Metallurgy-driven multiphase fluid modelling and simulation
3.2	Multi scale and reactive granular flows
3.3	Advancement of simulation acceleration for process applications
3.4	Hybrid modelling[1]

[1] 100 % strategic

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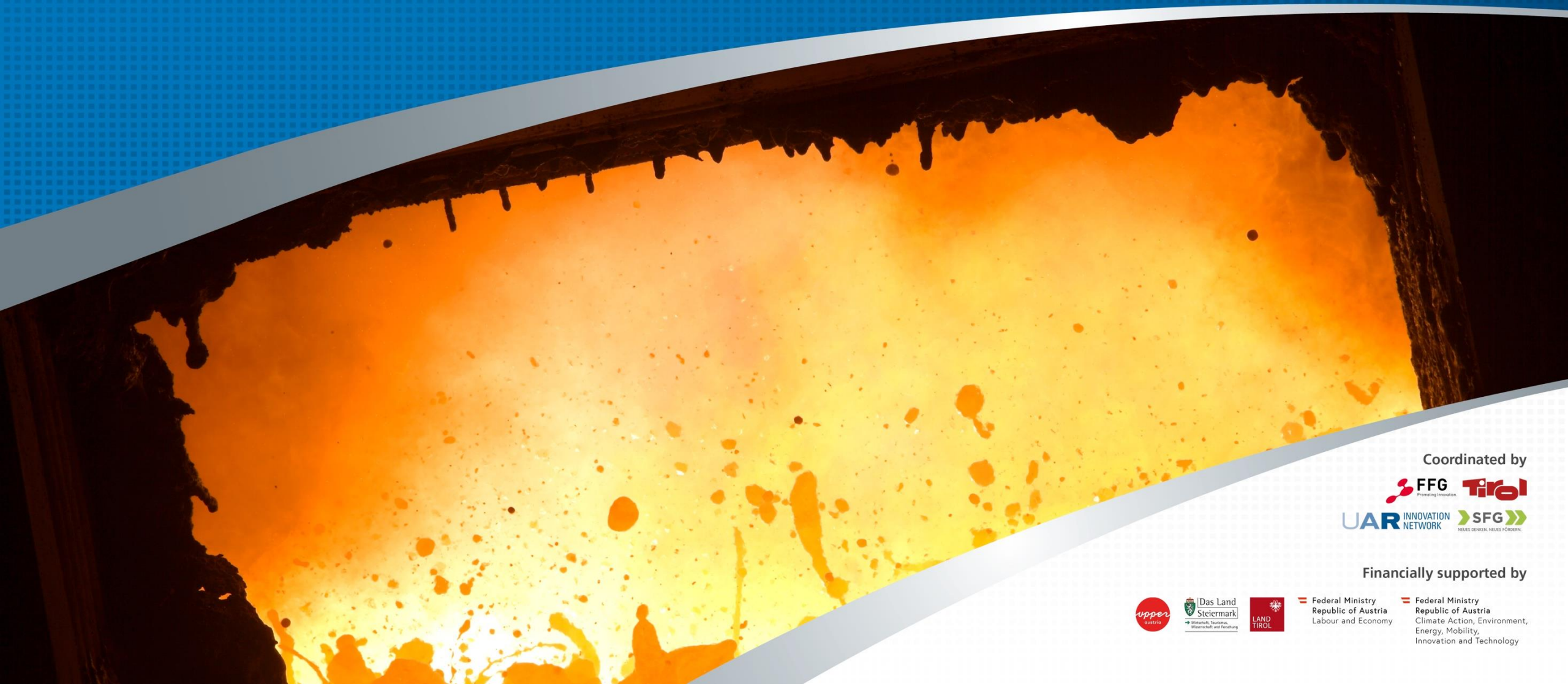

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