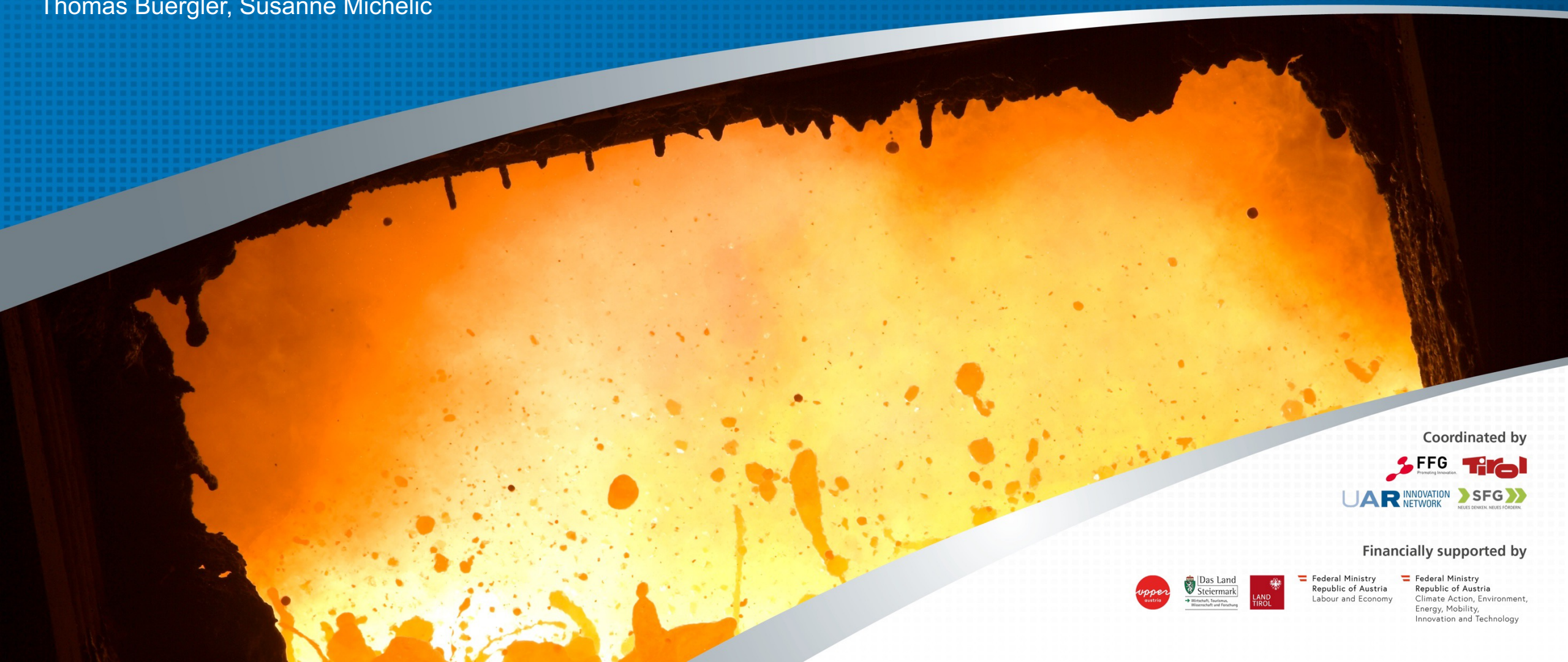


# K1-MET Overview

SusMet4Planet (2023 – 2027)

Linz, 1 July 2023

Thomas Buergler, Susanne Michelic



Coordinated by



Financially supported by



# 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



# K1-MET

and some partner locations

**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)



**VIENNA**  
Vienna University  
of Technology



**LINZ**  
Johannes Kepler  
University Linz

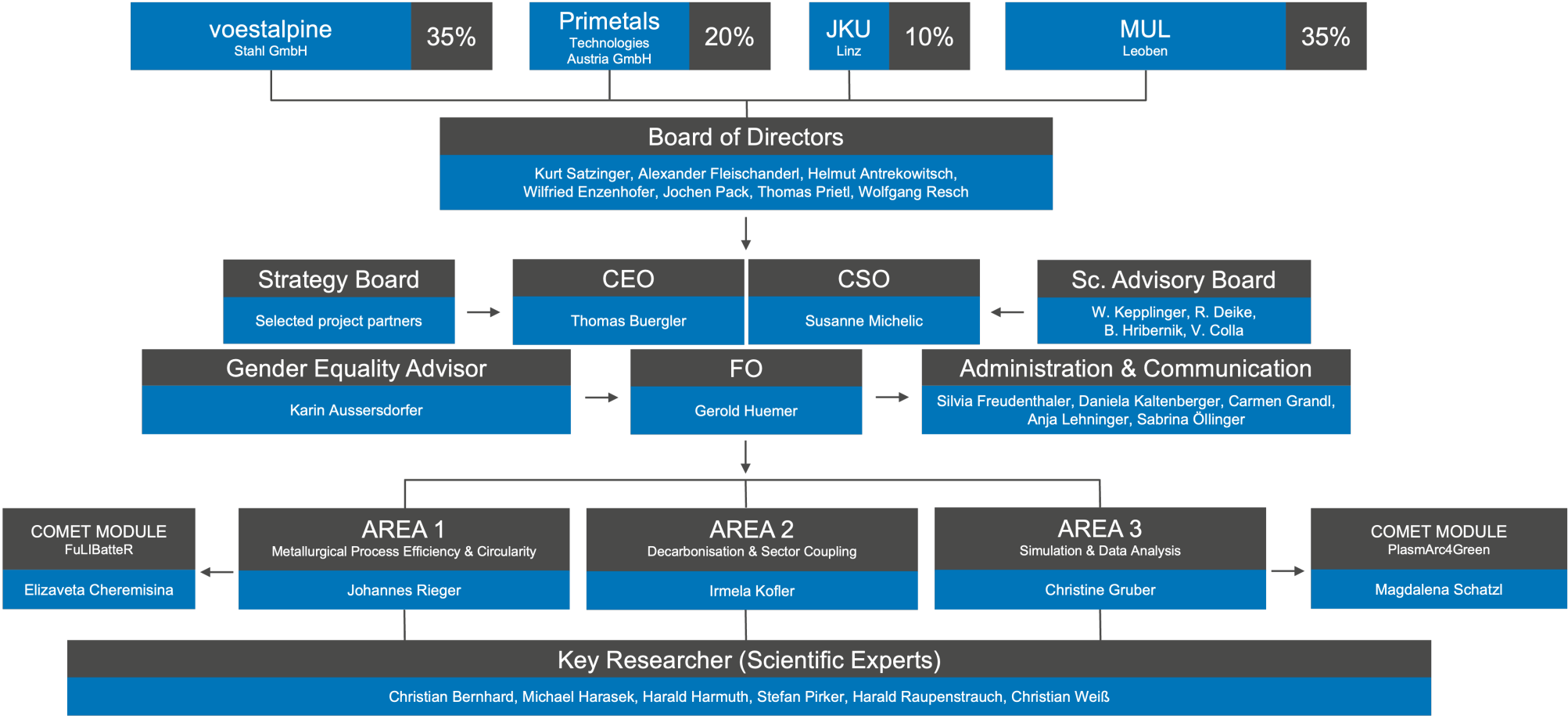


**LINZ**  
voestalpine Stahl GmbH



# Organizational structure

of K1-MET GmbH

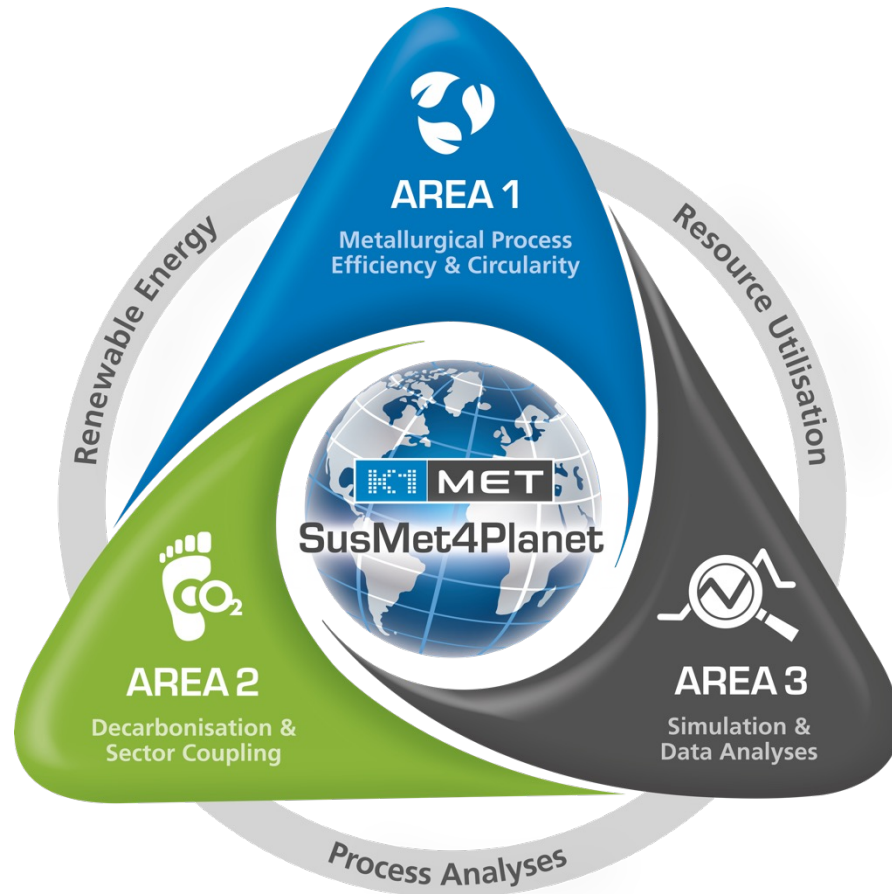


# Sustainable Development Goals (SDGs)

## 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<sub>2</sub> 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)





## “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

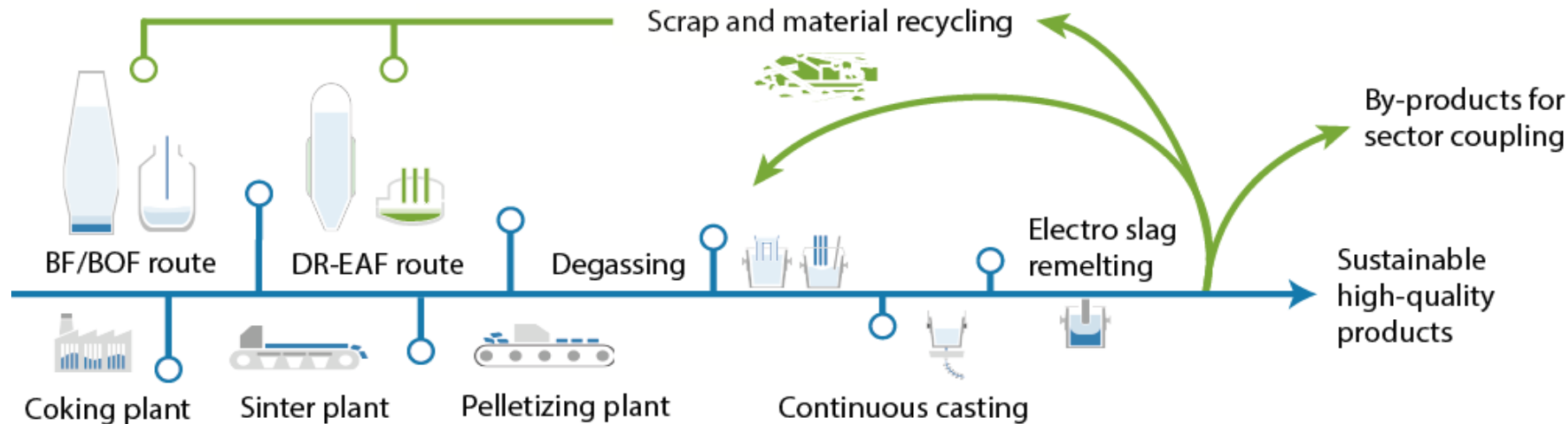
Solutions for CO<sub>2</sub>-lean metallurgical processes and metallurgy as a source of CO<sub>2</sub> for energy-intensive industries (sector coupling)

### Area 3: Simulation & Data Analyses

Application of modelling approaches to new processes and data analysis for an increase of process efficiency

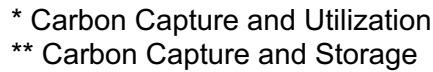
- cross-sectorial consortium of 42 excellent national and international company and scientific partners from all over the world
- contribution to sustainability, efficient processes and climate neutrality for all energy intensive industry sectors, supported with increasing digitalization and superior 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

- 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 cleanliness
- Sustainable processing of solid residue streams
- Valorisation of steelmaking slags
- Insights into metallurgical processes (experiments and thermodynamics)

- Continuous H<sub>2</sub> 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<sub>2</sub> reduction



- Application and implementation of insights for process optimization in metallurgical processes:
  - Development of simulations and simulation methodology and application to steelmaking
  - Extended process data analyses (big data and machine learning)
  - Connection to domain knowledge for industrial process optimization
- Multiphase fluid modelling and simulation
- Multi-scale and reactive granular flows
- Advancement of simulation acceleration for process applications
- Hybrid modelling



# Project structure

## Strategic share of the projects



### AREA 1

Metallurgical Process  
Efficiency & Circularity

N°	Project title
1.1	Advanced analytics of raw and recycling materials <sup>1</sup>
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 cleanliness
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 <sup>1</sup>

<sup>1</sup> 100 % strategic

# Project structure

## Strategic share of the projects



N°	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 <sub>2</sub> reduction



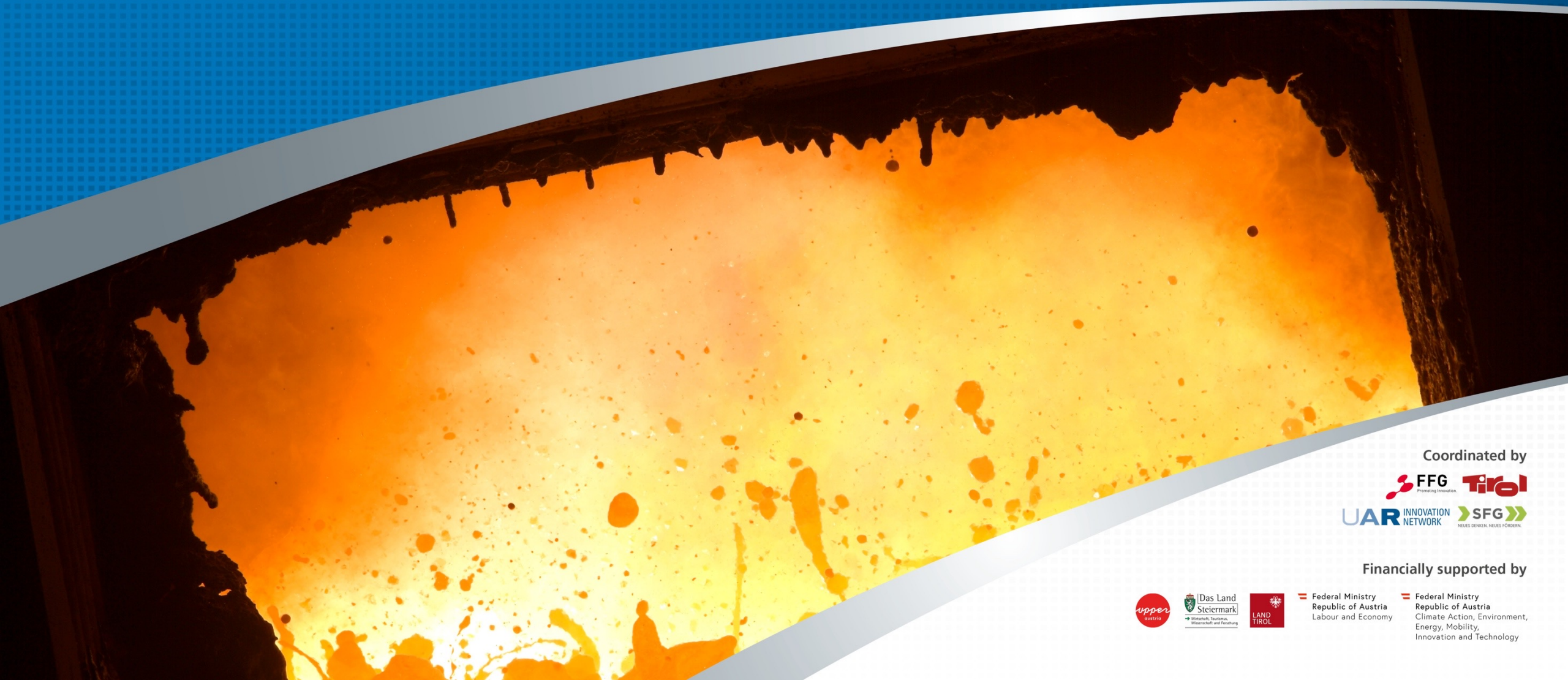
3.1	Metallurgy-driven multiphase fluid modelling and simulation
3.2	Multi scale and reactive granular flows
3.3	Advancement of simulation acceleration for process applications
3.4	Hybrid modelling <sup>1</sup>

<sup>1</sup> 100 % strategic

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