

# Decarbonization of Steel: Challenges and Opportunities for Modern Steelmakers and Carmakers



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## Introduction

The European steel industry **must drastically reduce CO<sub>2</sub>** emissions to contribute to the EU's climate neutrality goals by **2050** [1].

**Low-emission steel** can be produced through:

- **Electric Arc Furnaces (EAF)** with 0.3 tCO<sub>2</sub>/tsteel.
- **Direct Reduced Iron (DRI)** using H<sub>2</sub>, producing < 1.5 tCO<sub>2</sub>/tsteel.

These technologies represent a **promising solution**, but their adoption faces **resistance** in the **automotive sector** due to high safety standards.

It is necessary to demonstrate that the new low-emission steels maintain reliable performance even under critical conditions, despite impurities derived from recycling.

The RFCS – Safe&Clean project was created to fill this gap, with the aim of:

- **Validating the safety** of low-CO<sub>2</sub> steels.
- Confirming their sustainability in **high-responsibility automotive applications**.

## STEEL MAKING INDUSTRY

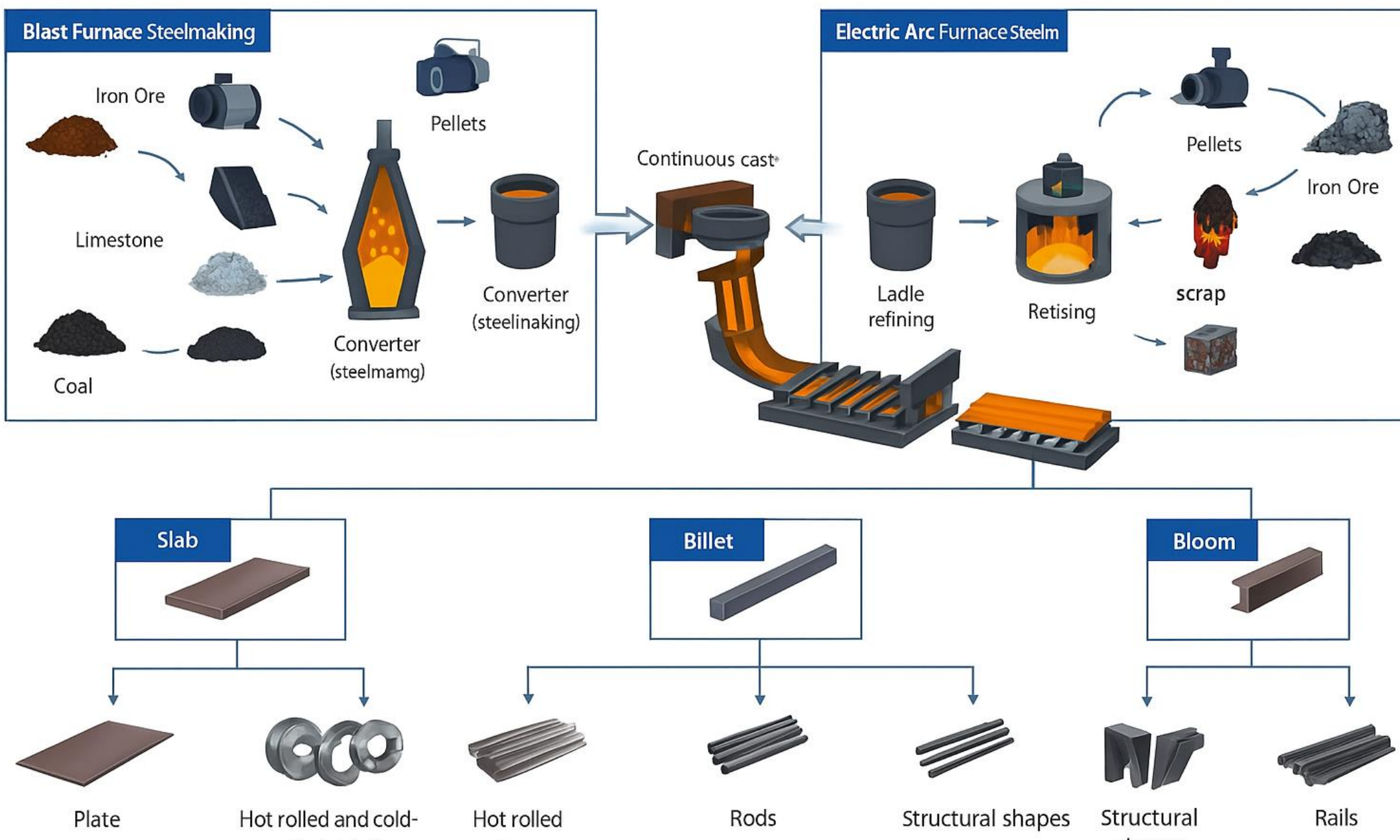


Figure 1. Comparison between BOF and EAF

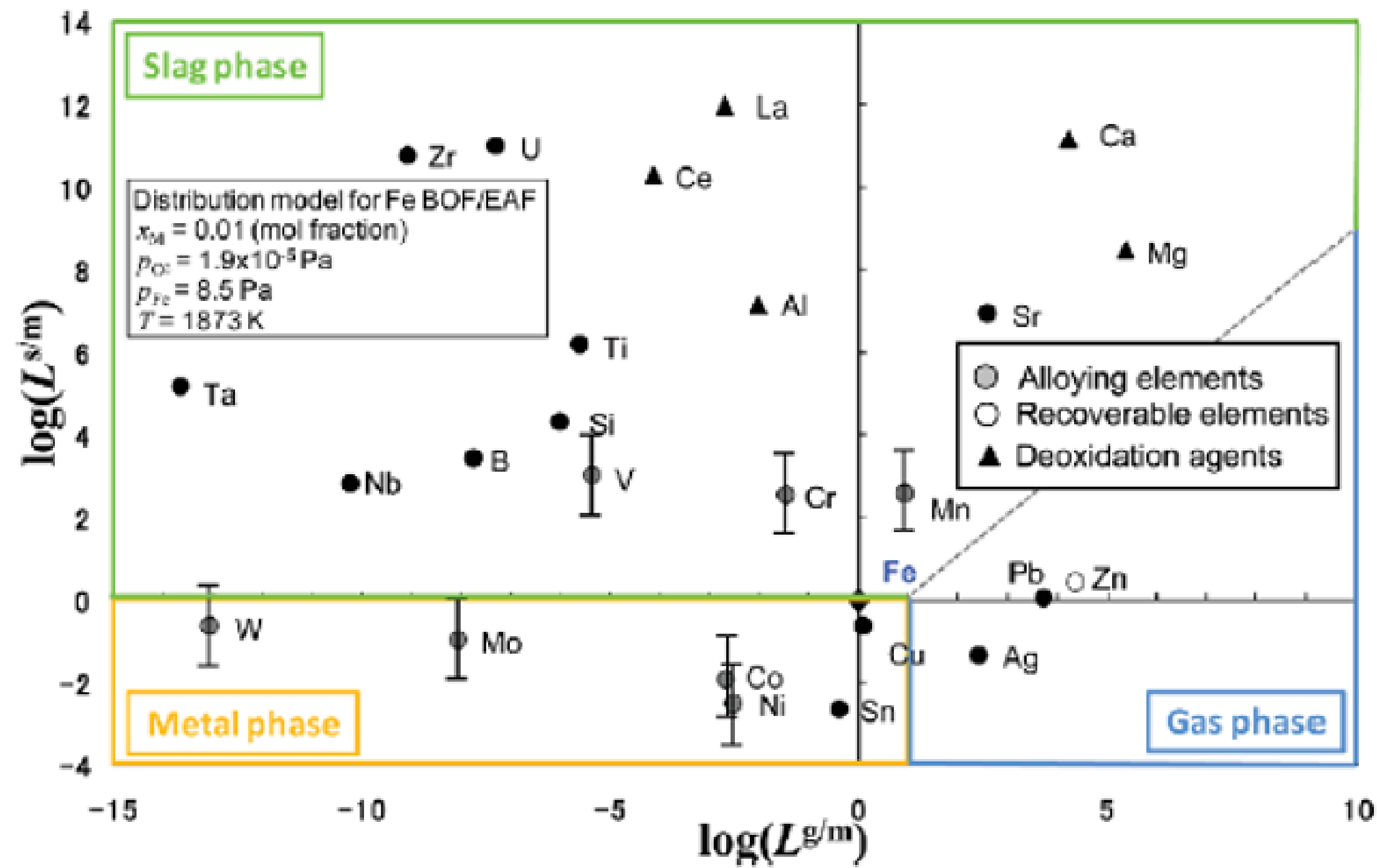


Figure 2. How different metals react to steelmaking [3]

## The Safe&Clean Consortium



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## Aim of the work

The aim of the work is to **select two real industrial cases** produced by two types of low CO<sub>2</sub> steels

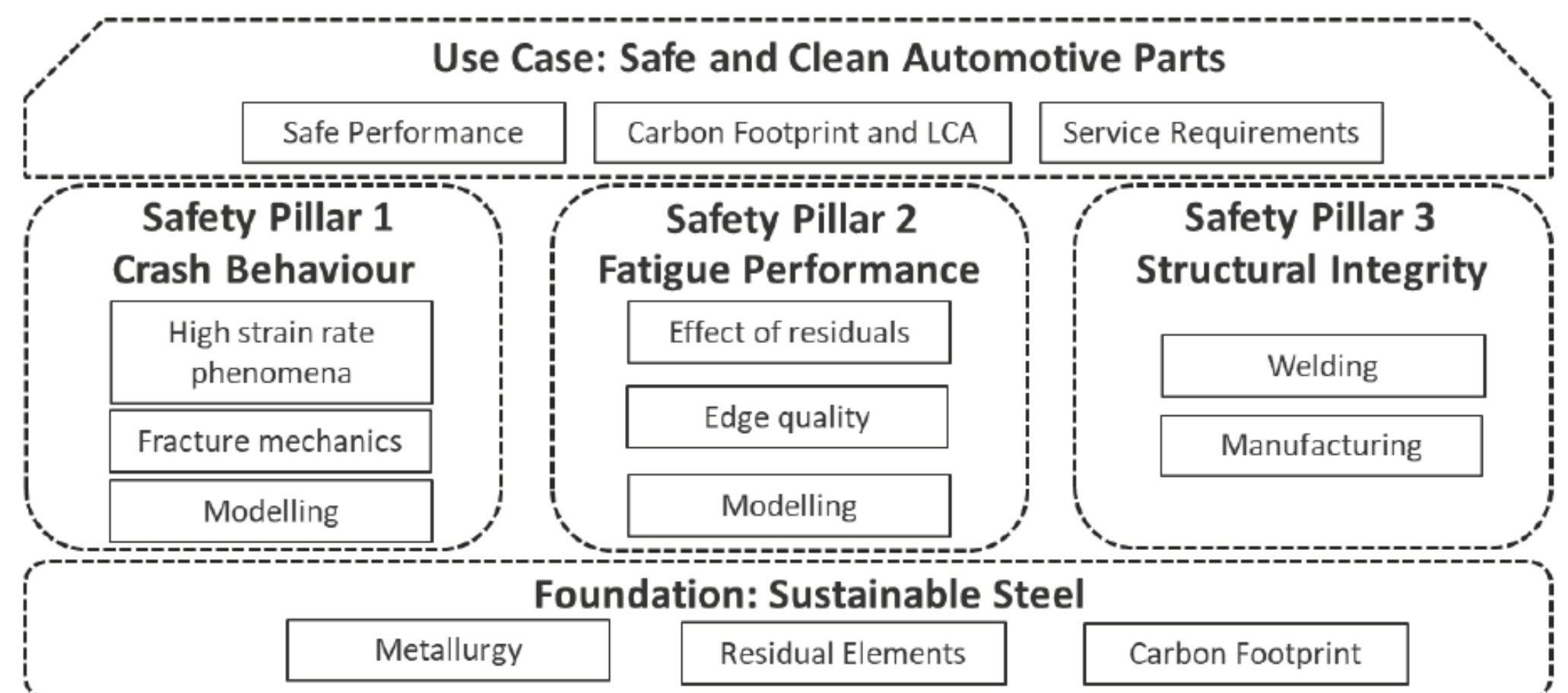
- **HR 550 LA** (SSAB) for chassis application (lower control arm)
- **DP 800 CR** (SZMF) for BiW application (side connector)



## Methodology

Following 7 Work Packages the consortium want to investigate the **production** of these new type of steel sheets, the **mechanical properties** and the **manufacturability**.

Furthermore, a **new prediction model** will be implemented and validated for the future studies in the sector.



## Future Steps

- The steelmakers (SSAB and SZMF) will produce the steel with 0.17% Cu for the CR and 0.20% Cu + add% Sn for the HR
- Chemical characterization, TTT and CCT curves will be studied comparing the BOF production with the simulated EAF steel grades
- Mechanical Characterization will be performed by EUT and CRF

## References:

<https://eurecat.org/portfolio-items/safeclean/>

[1] [https://climate.ec.europa.eu/eu-action/climate-strategies-targets/progress-climate-action\\_en](https://climate.ec.europa.eu/eu-action/climate-strategies-targets/progress-climate-action_en)

[2] Koolen, D. and Vidovic, D., Greenhouse gas intensities of the EU steel industry and its trading partners, EUR 31112 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53417-4, doi:10.2760/170198

[3] K. Nakajima and O. Takeda and T. Miki and K. Matsubae and T. Nagasaka. Thermodynamic analysis for the controllability of elements in the recycling process of metals. Environmental science & technology 45 (2011).