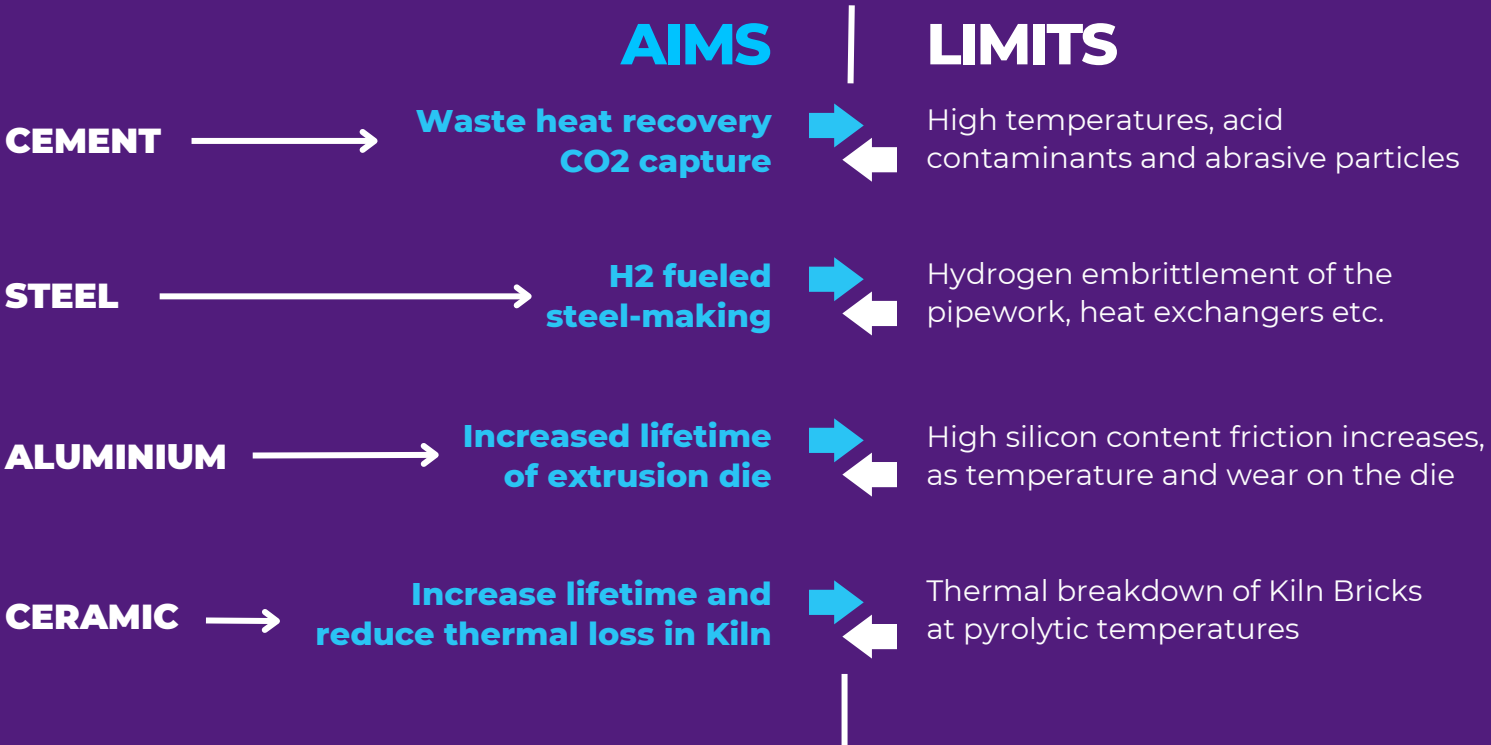# F●RGE

Development of novel and cost-effective coatings for high-energy processing applications

Overcome materials inherent limitations that hinders energy intensive industries to reach carbon neutrality by 2050

Design and develop highly innovative materials with improved properties, develop embedded sensors

Industrial challenges

|	AIMS	LIMITS
CEMENT →	**Waste heat recovery CO2 capture**	High temperatures, acid contaminants and abrasive particles
STEEL →	**H2 fueled steel-making**	Hydrogen embrittlement of the pipework, heat exchangers etc.
ALUMINIUM →	**Increased lifetime of extrusion die**	High silicon content friction increases, as temperature and wear on the die
CERAMIC →	**Increase lifetime and reduce thermal loss in Kiln**	Thermal breakdown of Kiln Bricks at pyrolytic temperatures

Technical objectives

1 KPI definition for coating performance under specified sets of corrosion, erosion and gas penetration challenges

2 Development of joined Machine Learning (ML) and CALPHAD approaches.

3 Investigation of coating microstructure/performance relationship.

4 Development of smart monitoring capability.

5 Coatings validation in service environment

Benefits

Development of innovative coatings for enhanced service life

Reduction in CO2 emission and resource utilisation

Improvement in energy efficiency

Impact

30% 20%
ENERGY EFFICIENCY

20% 40%
REDUCTION OF CO$_2$ EMISSIONS

20% 24%
INCREASED LIFETIME

Consortium

13 PARTNERS
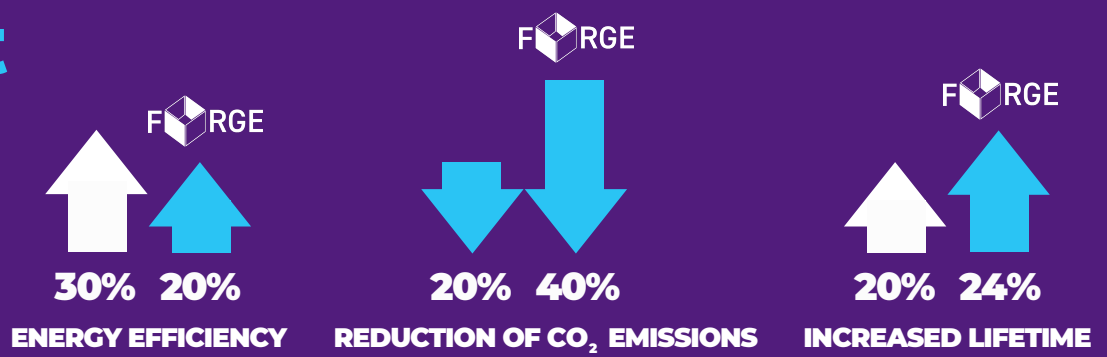
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