MaxH2DR newsletter

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Maximise H2 Enrichment in Direct Reduction Shaft furnaces

The project falls under the funding programme of Horizon Europe – Clean Steel Partnership.

The call topic is related to Carbon Direct Avoidance in steel: electricity and hydrogen-based metallurgy.

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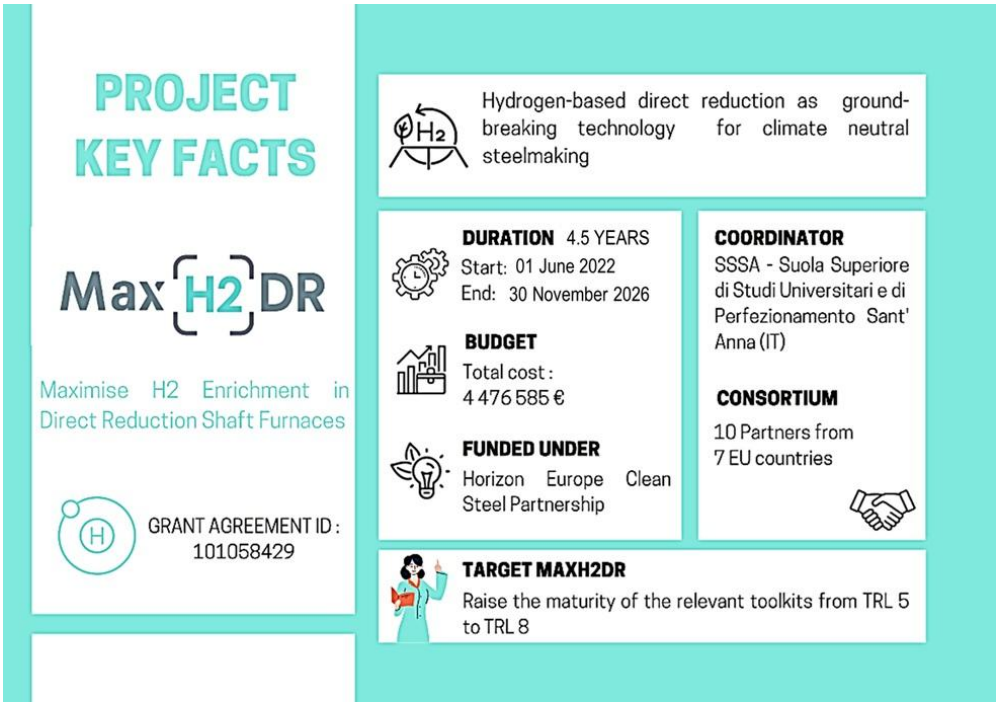
This project has received funding from the European Union under grant agreement n° 101058429



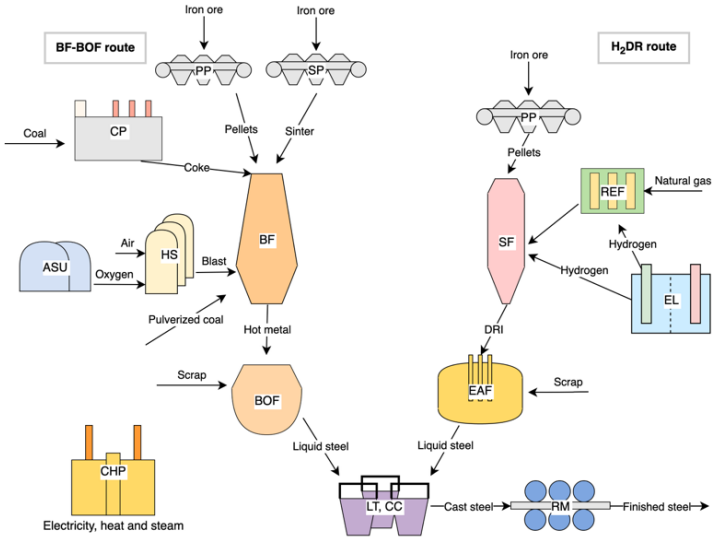
Transition pathway optimization of steel plants

The MaxH2DR project includes mathematical optimization modelling for simulating and analyzing different future scenarios for the development of steel plants. Innovative model formulations allow for investigation of a wide range of possible plant configurations over a time horizon, providing clues to questions such as:

- Which technologies could be combined to provide functioning plant configurations during and after a transition to low-emission steelmaking?
- What is a feasible timeframe for investing in new technologies?
- What are the long-term impacts on costs and emissions with different combinations of steelmaking technologies and operational parameters?

These questions are naturally interrelated, and their answers may vary depending on the internal and external conditions. The models are generalized to allow flexible analysis of different steel plants with different plant configurations and possible investments, with a wide range of selectable parameters, from production rates and process unit capacities to grid electricity costs and emission intensities, as well as

CO_2 emission penalties. This system model allows for an analysis of a wide range of possible future scenarios.



Optimization tools can be used to assess possible intermediate steps, timescales and impacts related to a planned steel plant transition

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The developed optimization model has been tested with analyses of effects of grid emission intensities, electricity costs and carbon permit costs on possible investment pathways when transitioning towards hydrogen-based steelmaking. Steel plants are complex integrated industrial systems, and numerous factors affect costs and emissions throughout the simulated timeframe. More detailed peer-reviewed accounts of the model and test case studies can be found in the articles:

"Mathematical optimization modeling for scenario analysis of integrated steelworks transitioning towards hydrogen-based reduction"

"Optimizing the transition pathway of a steel plant towards hydrogen-based steelmaking"

Further model development is aimed at extending the possible configurations in the optimized scenarios to make full use of the process integration potential to reduce emissions in intermediate stages and to find the best solutions for individual steel plants under their own unique operating conditions. Model capabilities are continuously enhanced as the different parts of the MaxH2DR project work together to produce new insights in the possibilities of low-carbon steelmaking.

Stay updated by following the MaxH2DR project on LinkedIn and Twitter

MaxH2DR
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