



Maximise H2 Enrichment in Direct Reduction Shaft Furnaces

Fact Sheet

Project Information

MaxH2DR

Grant agreement ID: 101058429

DOI

[10.3030/101058429](https://doi.org/10.3030/101058429)

Start date

1 June 2022

End date

31 May 2026



Funded under

Digital, Industry and Space

Total cost

€ 4 476 585

EU contribution

€ 4 161 835,25

Coordinated by

SCUOLA SUPERIORE DI STUDI
UNIVERSITARI E DI
PERFEZIONAMENTO S' ANNA



Objective

H2-enriched direct reduction (DR) is the key decarbonisation technology for integrated steelworks mentioned in pathways of all major steel producers. Natural gas driven DR is established in industry mostly outside Europe but there are no experiences with high H2 enrichment > 80%.

H2 based reduction is no principal issue but endothermic and the influences on morphology, diffusion and effective kinetics are not known. Also properties and movement of particles in the reactor are not known and issues like sticking cannot be excluded. Probably, temperature distribution and flow of solids and gas will be clearly different. No reliable prognosis is possible yet, in particular with regard to local permeability, process stability and product quality of industrial size furnaces with higher loads on the particles and larger local differences. Many activities are initiated

for first industrial demonstration of H₂-enriched DR but they will not close many of these knowledge gaps.

MaxH2DR provides missing knowledge and data of reduction processes. A world-first test rig determines pellet properties at conditions of industrial H₂ enriched DR furnaces and a physical demonstrator shows the linked solid and gas flow in shaft furnaces. This will be combined with digital models including the key technology DEM-CFD to provide a hybrid demonstrator able to investigate scale-up and to optimise DR furnace design and operating point.

This sound basis will be used to optimise the process integration into existing process chains. Simulation tools will be combined to a toolkits that covers impacts of product properties on downstream processes as well as impacts on gas and energy cycles. Thus, promising process chains, sustainable and flexible, will be achieved for different steps along the road to decarbonisation. The digital toolkits will support industrial demonstration and implementation and strengthen digitisation and competitiveness of the European steel industry.

Fields of science

[engineering and technology](#) > [environmental engineering](#) > [energy and fuels](#) > [fossil energy](#) > **natural gas**
[natural sciences](#) > [computer and information sciences](#) > [software](#) > [software applications](#) > **simulation software**

Programme(s)

[HORIZON.2.4 - Digital, Industry and Space](#)

MAIN PROGRAMME

[HORIZON.2.4.1 - Manufacturing Technologies](#)

[HORIZON.2.4.8 - Circular Industries](#)

Topic(s)

[HORIZON-CL4-2021-TWIN-TRANSITION-01-18 - Carbon Direct Avoidance in steel: Electricity and hydrogen-based metallurgy \(Clean Steel Partnership\) \(IA\)](#)

Call for proposal

[HORIZON-CL4-2021-TWIN-TRANSITION-01](#)

[See other projects for this call](#)

Funding Scheme

Coordinator



SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA

Net EU contribution

€ 481 250,00

Address

Piazza Martiri Della Liberta 33

56127 Pisa

Italy

Region

Centro (IT) > Toscana > Pisa

Activity type

Higher or Secondary Education Establishments

Links

[Contact the organisation](#) [Website](#)

[Participation in EU R&I programmes](#)

[HORIZON collaboration network](#)

Non-EU contribution

€ 0,00

Participants (9)



RUHR-UNIVERSITAET BOCHUM

Germany

Net EU contribution

€ 396 793,00

Address

Universitaetsstrasse 150

44801 Bochum

Region

Nordrhein-Westfalen > Arnsberg > Bochum, Kreisfreie Stadt

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation [↗](#) Website [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 0,75



UNIVERSITE DE LORRAINE

France

Net EU contribution

€ 422 500,00

Address

Cours Leopold 34
54052 Nancy Cedex

Region

Grand Est > Lorraine > Meurthe-et-Moselle

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation [↗](#) Website [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 0,00



VDEH-BETRIEBSFORSCHUNGSGESELLSCHAFT GMBH

Germany

Net EU contribution

€ 1 188 681,25

Address

Sohnstrasse 69
40237 Dusseldorf

Region

Activity type

Research Organisations

Links

Contact the organisation [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 0,00



ABO AKADEMI

Finland

Net EU contribution

€ 457 955,00

Address

Domkyrkotorget 3

20500 Abo

Region

Manner-Suomi > Etelä-Suomi > Varsinais-Suomi

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation [↗](#) Website [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 0,00



TATA STEEL NEDERLAND TECHNOLOGY BV

Netherlands

Net EU contribution

€ 349 177,00

Address

Wenckebachstraat 1

1051 JZ Velsen Noord

Region

West-Nederland > Noord-Holland > IJmond

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation [↗](#) Website [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 232 785,50



UNIVERSITA DEGLI STUDI DI SALERNO

Italy

Net EU contribution

€ 423 386,00

Address

Via Giovanni Paolo II 132

84084 Fisciano Sa [M](#)

Region

Sud > Campania > Salerno

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation [↗](#) Website [↗](#)

Participation in EU R&I programmes [↗](#)

HORIZON collaboration network [↗](#)

Non-EU contribution

€ 0,25



SIEC BADAWCZA LUKASIEWICZ - INSTYTUTMETALURGII ZELAZA IM. STANISLAWASTASZICA

Poland

Net EU contribution

€ 266 250,00

Address

Ulica Karola Miarki 12-14

44101 Gliwice 

Region

Makroregion południowy > Śląskie > Gliwicki

Activity type

Research Organisations

Links

Contact the organisation 

Participation in EU R&I programmes 

HORIZON collaboration network 

Non-EU contribution

€ 0,00



CIAOTECH Srl

 Italy

Net EU contribution

€ 122 943,00

Address

Via Palestrina 25

00189 Roma 

Region

Centro (IT) > Lazio > Roma

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation  Website 

Participation in EU R&I programmes 

HORIZON collaboration network 

Non-EU contribution

€ 81 963,25



ESTEP PLATEFORME TECHNOLOGIQUE EUROPEENNE DE L'ACIER

 Belgium

Net EU contribution

€ 52 900,00

Address

Avenue De Cortenbergh 172
1000 Bruxelles 

Region

Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest > Région de Bruxelles-Capitale/ Brussels Hoofdstedelijk Gewest > Arr. de Bruxelles-Capitale/Arr. Brussel-Hoofdstad

Activity type

Research Organisations

Links

Contact the organisation 

Participation in EU R&I programmes 

HORIZON collaboration network 

Non-EU contribution

€ 0,00

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