

12 partners from 7 European countries (France, Belgium, Switzerland, Greece, Norway, Portugal and Spain) covering the entire value chain to develop the ULCOWIN technology: from the raw material (iron ore) to the demonstration (production of steel) through the development of the process and pilot.



General details

Project Start Date: 1st October 2017
Project End Date: 30th September 2022
Project duration: 60 months
Grant Agreement n.: 768788
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www.siderwin-spire.eu

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Development of new methodologies for industrial CO₂-free steel production by electrowinning

SPIRE
PROJECT



The vision

A breakthrough innovation for a CO₂-free steel production process with a significant reduction of energy use by decomposing electrochemically iron oxide into iron metal and gaseous oxygen.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768788



The need

The atmospheric concentration of carbon dioxide has increased to levels unprecedented in at least the last 800,000 years. Steel production represents 4% of Europe(27) CO₂ emissions. A breakthrough is needed to reduce it and electrification of steel production is a good candidate to achieve a radical reduction of CO₂ emissions

The objective

To develop a **breakthrough innovation** compared to the conventional steel production route by electrowinning iron from its naturally occurring oxides at low temperature in an aqueous based electrolyte.

The main beneficiaries

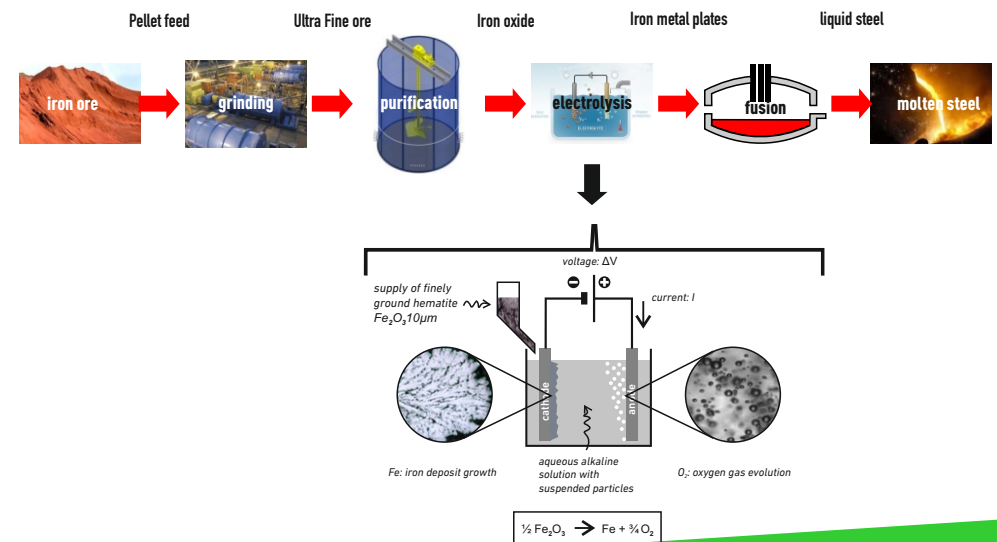
- All the sectors of the **value chain**: minerals, steel, non-ferrous, power and engineering.
- Converging interests for **steel**, non-ferrous and power industries.

The benefits

- Reduction by 31% of the direct energy consumption
- Reduction of the direct GHG emissions by 87%
- Strengthening the global position of European process industry
- Network integration of steel production in European single market for economic growth
- Creation of jobs from new Businesses

The approach

An **electrolytic** process, flexible enough to be supplied by **renewable energies**, will **transform iron oxides**, including those inside the byproducts from other metallurgies, **into steel plate** with a significant reduction of energy use. This process decomposes under mild conditions but at intense reaction rates naturally occurring iron oxides, such as hematite, into iron metal and oxygen gas.



In the SIDERWIN project five activities are combined to produce the necessary results to achieve the objectives:

- Science based knowledge to limit risks,
- Advanced simulation from detail 3D modelling of the cell to overall balances of the pilot,
- Design, engineering and operation of a pilot equipment at TRL5,
- Operation of a steel production pilot in a relevant environment at TRL6,
- Environmental evaluation and predictive economical study to evaluate the relevance in a context of low carbon and high share of RES.