



SPIRE-10-2017

## SIDERWIN

Full Title: Development of new methodologies for Industrial CO<sub>2</sub>-free steel production by electroWinning

Aim:

The SIDERWIN project aims at developing an **innovative electrochemical process to transform iron oxide into steel metal plates.**

This process, based on the ULCOWIN technology developed since 2004, produces steel by electrolysis **without direct CO<sub>2</sub> emissions.** In this operation, electrical energy and iron oxide are converted into chemical energy consisting of separated iron metal from oxygen gas. It is a disruptive innovation that entirely shifts the way steel is presently produced.

The new technology **will contribute to the achievement of the strategic goals defined by the European Commission for Europe 2020.**

Full deployment of such technology will deliver significant contributions to European Union objectives of CO<sub>2</sub> emission reduction, of energy efficiency improvement, of increased share of renewable energy and of material resource efficiency.

Concept:

The consortium has set five main objectives: 1. develop, build and demonstrate the production of iron metal from its oxide without direct involvement of carbon or fossil fuels and according to the simplest stoichiometry of the reaction of iron oxide decomposition:  $\frac{1}{2}\text{Fe}_2\text{O}_3 \rightarrow \text{Fe} + \frac{3}{4}\text{O}_2$  2. produce iron by electrowinning with a prototype cell equipped with the key components of the final version. 3. interface the electrowinning prototype cell with a communication system to operate it according to electric grid priorities in real time. 4. produce iron metal from iron oxide coming from low-grade iron ore incompatible with the conventional process

and from residues of non-ferrous metallurgies. 5. propose a profitable model that should facilitate the financial support of the next development steps of the ULCOWIN process. Thus, bridging the “valley of death” between TRL 6 and 8 where investment is too high for research programs and too risky for industrial participation.

Start date:

01/10/2017

End date:

30/09/2022