Development of new methodologieS for InDustrial CO2-freE steel pRoduction by electroWINning

March 2023 – Newsletter No. 8

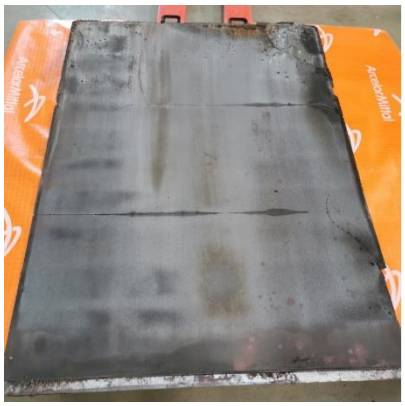
Welcome to the Final edition of ΣIDERWIN *e-Newsletter. People registered to the Special Interest Group have received periodically this email to be informed about the main highlights of the project.*

ΣIDERWIN Pilot Plant

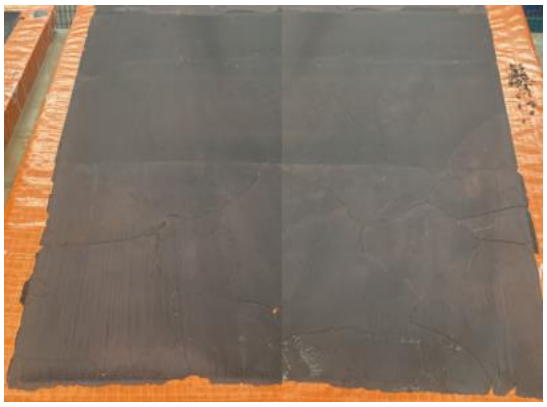
During last months, the activities on the site were focused on the pilot plant experimental trials conducted by ArcelorMittal to produce iron metal plates. Eleven trials were carried out throughout the year 2022.
As the trials progressed, the pilot plant was improved and updated to solve the problems that arose (brittle deposit, dendrites…).
After the fifth trial, the cathode configuration was changed, and a new series of trials was carried out. Homogeneous and not fragmented iron plates of nearly 15 kg were produced. They were easy to separate from the cathode and to handle.

April 2022 – Brittle Deposit

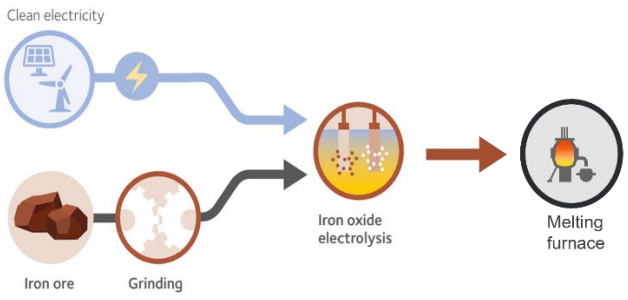
June 2022 – Less Fragmented Deposit



July 2022 – Iron plate of 1.25 m2



September 2022 – Iron plate



Scheme of ΣIDERWIN route

New Project Coordinator

Valentine Weber-Zollinger was appointed as ΣIDERWIN EU project coordinator at ArcelorMittal since June 2022.

Valentine holds a PhD in Materials Engineering. She joined ArcelorMittal Global R&D in 2008 where she became a recognised energy specialist with a background on projects related to energy optimisation at integrated steelmaking, CO_2 emissions assessment, etc. After some years of leading a transversal team dedicated to Physical Chemistry and Surface for Process Engineering, she took the lead of the Carbon Neutral Breakthrough Processes team which focuses on the development of the iron electrowinning technology.

A consortium physical meeting was organized by ArcelorMittal at its premises in Maizières-les-Metz to officially announce Valentine's appointment. The attendees had the opportunity to visit the pilot plant.

ΣIDERWIN meeting in May 2022

Executive and Steering Committees

The ΣIDERWIN Executive and Steering Committees of M54 and M60 were held on the 30th of June and 1st of July 2022 in Brussels (Belgium), and 17th – 18th of November 2022 in Lausanne (Switzerland).

The Project Officer Lucía Fernández Macía, and the Technical Expert Margarida Pinto attended the Brussel's meeting, that corresponded with the Third Technical Review.

During the Executive Committees, the milestones, deliverables, progress, and planning for the following months were reviewed. The Steering Committees were devoted to make a quick summary of the main achievements of the ongoing Work Packages. And the work developed during last semesters was shown to the whole consortium. Interesting results of the experimental trials conducted at the pilot plant were discussed during these meetings.

ΣIDERWIN Executive and Steering Committees M54

Dissertation at the Aveiro University

Francisco Duarte was a MSc student who joined the Aveiro University team (CICECO- Aveiro Institute of Materials, Portugal) for developing his Final Degree Project under the scope of the iron electrodeposition for steel production in alkaline media. Francisco's work explored the possibility of using an industrial iron-rich residue from a nickel producing industry as a feedstock for the iron electrodeposition as a CO_2-free steelmaking route. The MSc Thesis was well aligned with the ΣIDERWIN goals and was supervised by the Aveiro University members, and SIDERWIN partners Dr. Aleksey Lisenkov and Dr. Daniela V. Lopes.

The Dissertation "*Valorization of an industrial iron-rich residue by electroreduction for steel production*" was defended in March 2023.

Francisco Duarte with Dr. Daniela Lopes and Dr. Aleksey Lisenkov after his MSc Thesis Defense

New open access paper under review

Our partners from TECNALIA have written the paper *Simulation tool of an iron ore electrowinning cell,* that it is intended to be published in the Hydrometallurgy Journal. At this moment the paper is under review.

ΣIDERWIN Concluding Webinar

The concluding webinar ΣIDERWIN*: A breakthrough technology to decarbonize primary steel production through direct electrification* was held virtually on the 23rd of March 2023. There were 180 registrations, and 116 people attended to the webinar.

In view of the large number of questions submitted, it can be said that the webinar generated a lot of interest. Only a few of them could be answered during the event. Afterwards, a document is being prepared to answer to all the questions arisen.

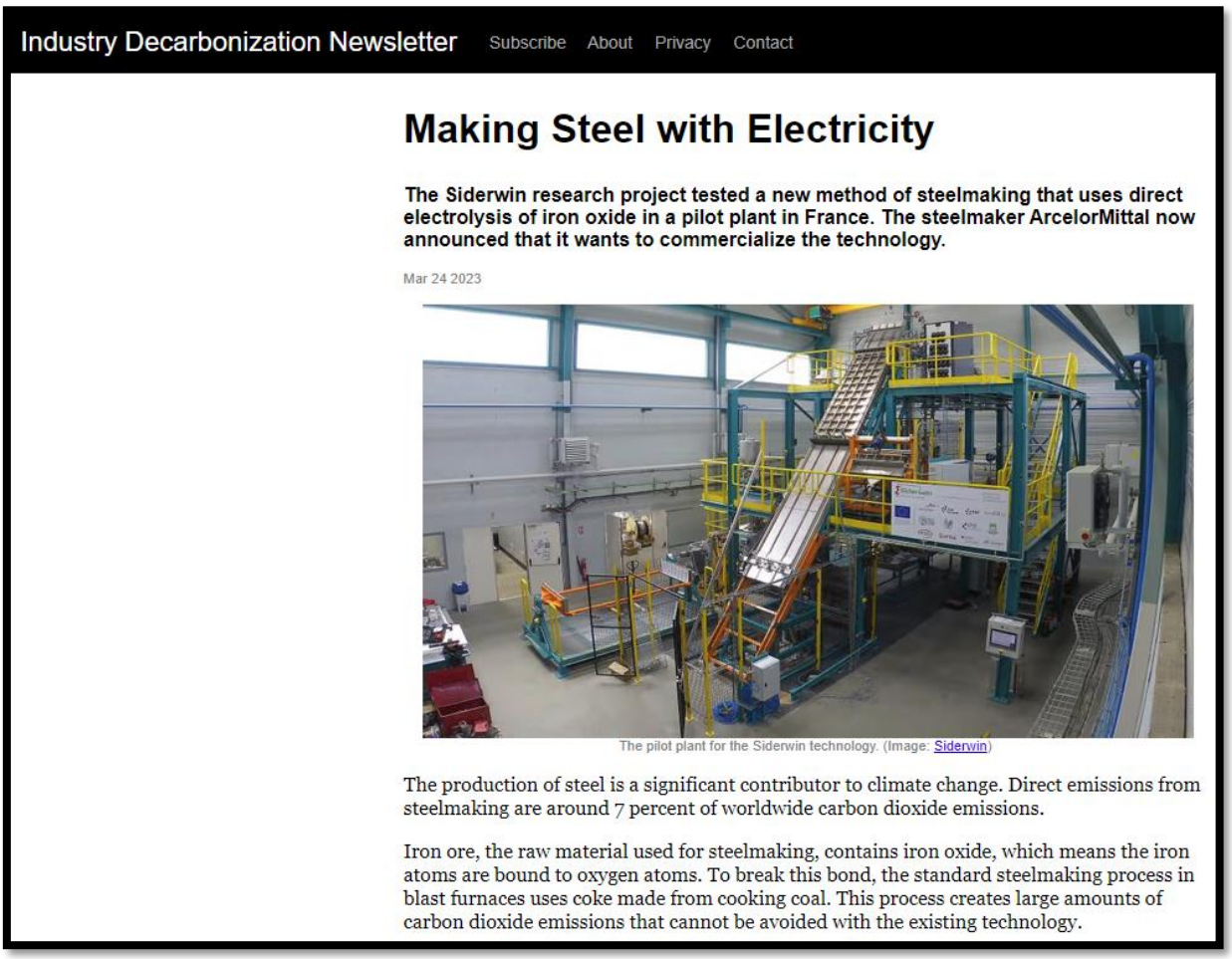
The video recording and slides are available through the website. The Q&A document will be soon available.

Concluding Webinar

ΣIDERWIN in the media

The Chemical Engineer Newsletter published in February 2023, Issue 980, the article Electrochemistry for greener steel by Amanda Jasi. This article provides an overview of the technology and the achievements developed under SIDERWIN.

In March 2023, the freelance journalist *Hanno Böck* attended the ΣIDERWIN concluding webinar, and published the article Making Steel with Electricity, that covers the main aspects of the iron ore electrowinning process.



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Making Steel with Electricity

The Siderwin research project tested a new method of steelmaking that uses direct electrolysis of iron oxide in a pilot plant in France. The steelmaker ArcelorMittal now announced that it wants to commercialize the technology.

Mar 24 2023

The pilot plant for the Siderwin technology. (Image: Siderwin)

The production of steel is a significant contributor to climate change. Direct emissions from steelmaking are around 7 percent of worldwide carbon dioxide emissions.

Iron ore, the raw material used for steelmaking, contains iron oxide, which means the iron atoms are bound to oxygen atoms. To break this bond, the standard steelmaking process in blast furnaces uses coke made from cooking coal. This process creates large amounts of carbon dioxide emissions that cannot be avoided with the existing technology.

Making steel with Electricity by Hanno Böck

International Women's Day

The 8th of March, ΣIDERWIN recognized in the social media the women participating in the project.

International Women's Day 2023

STEEL TECH 2023

After the success of the First Edition of the International Congress and Expo Steel Tech that took place in October 2021, and where our partners from Tecnalia participated and showed the dissemination material produced by ΣIDERWIN project, the second edition of Steel Tech 2023 will be held in Bilbao Exhibition Center, BEC (Spain) from 25th to 27th of November.

Tecnalia's stand at SteelTech 2021

Logo SteelTech Congress & Expo 2023

Acknowledgement

Mónica Serna-Ruiz as leader of the communication and dissemination WP of the ΣIDERWIN project, and editor of this newsletter, would like to take these last lines of the final edition of this publication to thank:

- The whole consortium for contributing to the success of the project,
- The EU commission for funding this project,
- The people who follow us through the media for their interest in the results of this breakthrough technology.

FIND OUT MORE AND FOLLOW US ON SOCIAL MEDIA

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