Clean Steel Partnership Infoday – MODIPLANT project

December, 13th 2023

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RFCS - Big Ticket 2022

Main aim

Support for projects to the transition towards a *climate-neutral Union economy by 2050*.

- To develop and demonstrate innovative clean steel breakthrough technologies leading to *near-zero-carbon steel making*.

Objectives

Starting point at *TRL 4-6* and reaching a final *TRL of 7-8.*

Process Integration (PI) in steel plants to reduce the use of fossil carbon and associated CO2 emissions.

- New processes to efficiently transfer heat to semi-finished product from unconventional energy sources.
- New or adapted digital tools for advanced continuous monitoring, process optimization or integrated control of emissions, and mass and energy flows.

Target 2030

TRL8 > 40% CO2 reduction compared with reference operation at TRL 6

Available budget

The available call budget was EUR 104 000 000

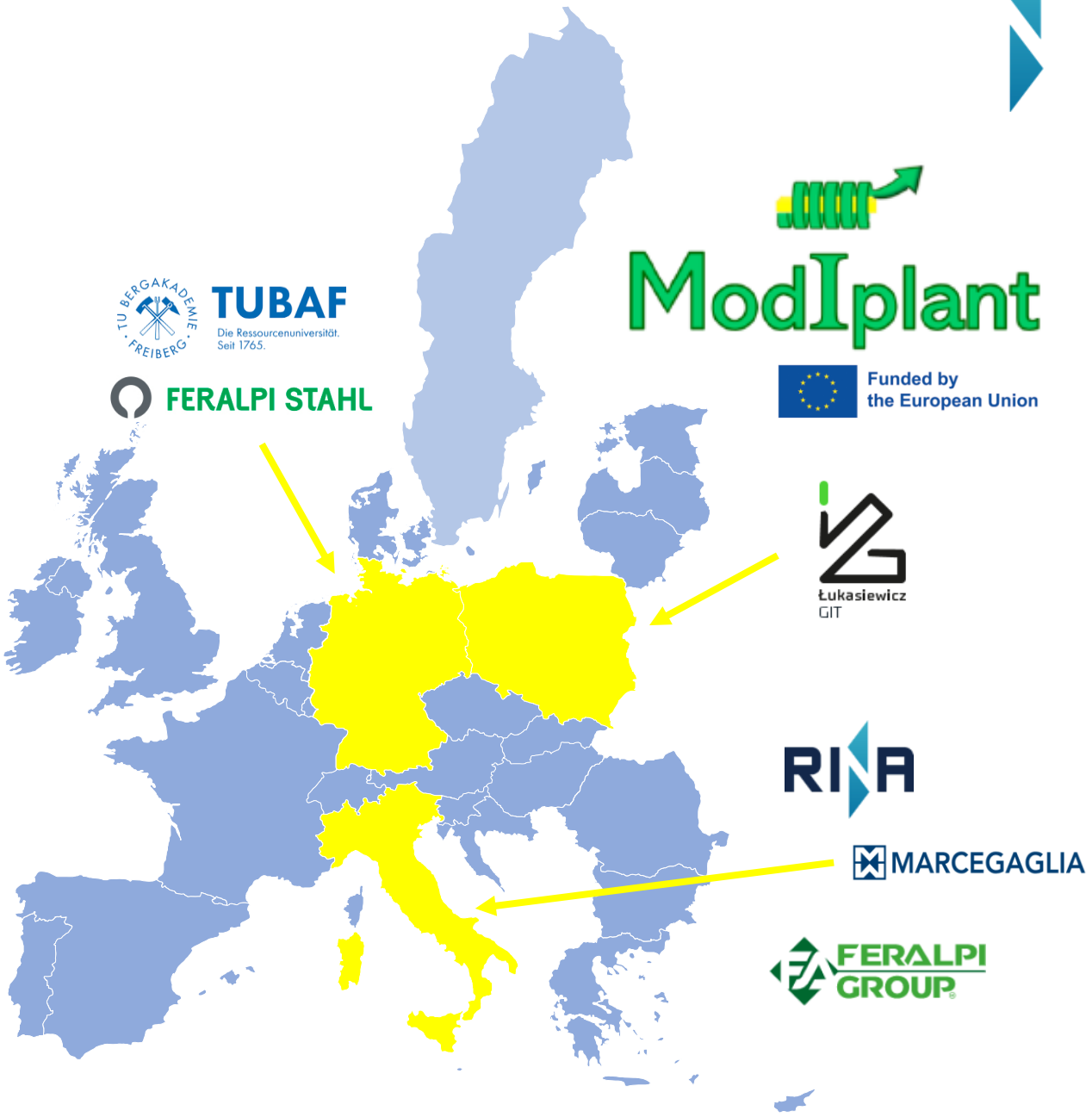
Overview of the project

Acronym: **MODIPLANT**

Project extended name: **Mod**ular hybr**i**d technology in the steel **plant** production.

Description: **Decarbonize** the reheating furnaces based on the introduction of **hybrid heating technology**, based on electrification and gas-burning properly combined. **Electrification** of the process will be possible by use of induction heating and alternative heating, designed for coils and billets, respectively.

Partners: RINA-CSM (Coordinator), Feralpi Siderurgica, Marcegaglia, University of Freiberg, Feralpi ESF and Lukasiewicz Upper Silesian Institute of Technology.



Activities and achievements

State-of-Art of **reheating furnaces**

- Industrial reheating plants based on CH4 burners. → High direct impact on CO2 emissions

- Induction heating is characterized by TRL9 with very **high efficiency.**
- Alternative heating applied only in research projects.

→ High-density power achievable.

Investigation of the heating technologies from industrial point of view (flat and long products).

Potential use of RES electricity which can bring to a higher process sustainability.

- MODIPLANT project started in March 2023
- **Steel grade selection** has been done and ready to be tested
- **Laboratory characterization** to setup process conditions
- **Pilot trials** will permit to test different process conditions

Activities and achievements

ModIplant

Supporting activities by partners in the design phase

- **Rina CSM** – development of mathematical model for microstructure control (to be validated to define operative conditions). Digital Management tool development.
- **IMZ** – Definition of expected mechanical properties model.
- **TUBAF** - Design of heating curves and operative parameters for alternative heating technology

Demosite 1 – Induction system	
Location	Marcegaglia site
Target Plant	Hot Dip Coating Line
Product	Coils

Induction furnace for flat product at industrial scale for coating process

Alternative Heating System for long product at industrial scale for rolling mill process

Demosite 2 – Alternative Heating	
Location	Feralpi site
Target Plant	Rolling Mills
Product	Billetts

DECARBONIZATION

Increase the use of electric energy to reduce the natural gas consumption

Expected outcomes

1. 60-80% CO_2 savings in hot dip metal coating process through the use of induction furnace
2. **60 – 100% Fossil Fuel Consumption Reduction** in rolling mills process through the use of Alternative Billets Heating
3. Introduction **new operative practices** specifically designed for electrical heating
4. **Business case** for fully electrification of targeted processes
5. **Digitalization of production** with focus on energy supply sources

Background: call and partnership establishment

"Objectives and goals foreseen"

- ❑ Reduce the consumption of fuel and substitute with *RES* electricity.
- ❑ To develop innovative heating technologies with the objective of the reduction of CO2 emissions.
- ❑ Process optimization (control model of microstructure and process layout optimization).

"***How we discovered the Big-ticket opportunity***"

- ❑ **BU** dedicated to funded research and study of calls.
- ❑ Information on **RFCS official website**.
- ❑ RINA-CSM and partners **experience in ECSC** (European for Coal & Steel Community) until 2002 and then RFCS.
- ❑ **Relationship** with other EU-level Bodies (ESTEP, EUROFER).

"***How we formed the project Consortium***"

- ❑ Previous and **consolidated partnerships** with industrial companies (experienced), on various activities and themes.
- ❑ Knowledge of needs and strategies of industrial partners.
- ❑ Check on final TRL requested by industries and TRL requested by the Call.
- ❑ Inclusion of other competences (research centers and academia) for the implementation of activities.

Meet Excellence/Impact and Q/E

"***How we prepared the proposal***"

- ❑ Faithfully following the **guidelines** suggested by the European Commission.
- ❑ Working in **synergy** with partners to establish the objectives of the proposal.
- ❑ Sharing of **methodologies**, **resources** and **competencies**.
- ❑ Focusing on the most influent **key points** that characterize the call (key role of industrial partners).
- ❑ Check the **added value** of the proposal: "..*does it go beyond the State-of-the-Art?"*
- ❑ Building the budget.

Conclusions

- RFCS 2022 – Big Tickets for Steel aims to develop and demonstrate innovative clean steel breakthrough technologies leading to near-zero-carbon steelmaking.
- MODIPLANT focuses on the objective about Process Integration of innovative technologies to reduce the use of fossil fuel and related CO_2 emissions.
- MODIPLANT introduces hybrid heating technologies in the industrial plants, substituting technologies with high CO_2 impact, with the objective of RES electricity use and processes optimization.
- The approach to the preliminary activities for the proposal significantly influenced the final outcomes.

Thank you for your attention

For any questions
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