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Modular hybrid technology in the steel plant production

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The steel industry is a cornerstone of the European economy, contributing 6.7% of global crude steel production (126.3 Mt in 2023). However, it is also a major source of greenhouse gas emissions, accounting for 4% of total EU emissions and 23% of those from manufacturing industries. Achieving carbon neutrality in this high-energy-intensity sector requires innovative solutions to reduce dependency on fossil fuels.
The MODIPLANT project addresses this challenge by proposing renewable energy source (RES) based electrification of key downstream steel production processes. Specifically, the project focuses on decarbonizing reheating processes while maintaining high product quality, productivity, and economic viability. Two advanced technologies are being developed and tested. RES induction heating: an hybrid heating system will replace natural gas burners in hot dip galvanizing lines for steel coils at Marcegaglia's industrial plant. A novel electrical heating system for billets will be prototyped at Feralpi Siderurgica.
Both technologies are supported by comprehensive metallurgical studies to ensure product quality is maintained or improved. These studies encompassed tests performed on a magnetic induction pilot line, conduction heating pilot line, and Gleeble simulations. Furthermore, advanced simulations were conducted to model heating processes and predict metallurgical outcomes, and these were validated through experimental tests. This combined approach of simulation and experimental validation enhances the reliability of the proposed methodologies.
These innovations aim to demonstrate the feasibility of decarbonizing energy-intensive steel production processes, creating a pathway for industrial-scale adoption of RES technologies. The results will provide a critical step toward the EU's transition to a carbon-neutral economy, aligning with the New Industrial Strategy for Europe and addressing the pressing need for green steel production.

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