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Decreasing the environmental impact of the electrical steel route through advanced modelling techniques

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Although EAF-based steelworks produce steel from recycled ferrous scrap and inherently implement the concept of circularity, they are challenged to reduce their overall environmental impact and take actions to reduce CO2 emissions and maximize energy and resource efficiency. Advanced digital technologies, including artificial intelligence-based techniques, can significantly contribute to making the necessary transition of the steel industry sustainable from an environmental, economic and social point of view.
In this context, the European project "Data and decentralized Artificial intelligence for a competitive and green European metallurgy industry" (ALCHIMIA–G.A.101070046) targets the optimization of the Electric Arc Furnace (EAF) charge mix and the entire production processes. The global idea of the project is to build a platform based on Federated Learning as a methodology for training Machine Learning models, with the main advantage of using data from different industrial plants with similar processes without sharing process data among different stakeholders. This platform will act as a Decision Support System to help the industrial staff in decision-making procedures by means of the prediction of energy consumption and other parameters affecting the environmental impact according to the input material mix.
The core of the ALCHIMIA platform is modelling: several modelling techniques have been applied to reproduce all the different stages of the production process (from the purchasing of input materials to the exit of secondary metallurgy processes). In the present paper, Machine Learning models are presented, which estimate the sterile content of the different types of scrap that arrive to the scrap yard and the chemical composition and temperature of the steel at the exit of the Ladle Furnace.

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Yes

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