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Multi-agent-based approach for decreasing carbon footprint of future integrated steelworks: the AgiFlex overall concept

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The European Green Deal challenges the steel sector to implement breakthrough modifications to significantly decrease its carbon footprint, and European steel producers are planning consistent investments in this direction. Integrated steelworks are particularly affected since, besides production process changes, important modifications are envisaged also for gas and energy management. Injection of H2-rich gases in blast furnaces, and replacement of blast furnace-basic oxygen furnace route with direct reduction-electric arc furnace route will significantly affect the site-wide gas supply. The replacement of fossil sources implies challenges related to intermittent renewable energy and gases (e.g. green hydrogen) with consequent fluctuation in energy availability and prices. Therefore, current production and energy management schemes must be revised to enable gradual and sustainable integration of C-lean processes. The European project co-funded by the Horizon Europe programme and entitled "Agent-based models minimizing carbon usage in flexible and efficient future integrated steelworks" (AgiFlex, G.A. 101138813) develops a cutting-edge tool to fill the lack of ICT tools addressing the above-mentioned challenges. A multi-agent approach is applied for production and energy management, which is based on digital twins of production units and advanced optimized framework. Its aim is process monitoring and control and optimal process integration in terms of conditions, material and energetic resources along the whole production chain. Two industrial sites are involved for demonstration. The contribution focuses on the overall AgiFlex concept.

Primary author: Dr MATINO, Ismael (Scuola Superiore Sant'Anna - TeCIP Institute - ICT-COISP)

Co-authors: Dr NKWITCHOUA DJANGANG, Achille Fabien (VDEh Betriebsforschungsinstitut,); WOLFF, Andreas (VDEh-Betriebsforschungsinstitut); KLEIMT, Bernd (VDEh-Betriebsforschungsinstitut GmbH); Dr HAIKARAINEN, Carl (Åbo Akademi University); Dr ZHOU, Guanwei (Åbo Akademi University); BARTUSCH, Hauke; Dr BUSCH, Heike (Dillinger); SAXÉN, Henrik (Åbo Akademi University); VAN DER STEL, Jan (Tata Steel Nederland R&D); PRU-DENTE, Jonas (Dillinger); Dr KEMPPAINEN, Kati (Åbo Akademi University); Dr VANNINI, Lorenzo (Scuola Superiore Sant'Anna - TeCIP Institute - ICT-COISP); Dr BERNDS, Maximilian (VDEh Betriebsforschungsinstitut,); Dr LI, Meng (Åbo Akademi University); Dr VAN DEN BROEKE, Peter (Tata Steel Nederland); HAUCK, Thorsten (VDEh-Betriebsforschungsinstitut GmbH); Prof. COLLA, Valentina (Scuola Superiore Sant'Anna)

Presenter: Dr MATINO, Ismael (Scuola Superiore Sant'Anna - TeCIP Institute - ICT-COISP)

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