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Direct Feed to Enhance Power Quality and EAF performance

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Decarbonizing steelmaking is one of the greatest challenges of the steel industry. Electrifying steel production—particularly through the deployment of Electric Arc Furnaces (EAF)—is a pivotal step in reducing CO₂ emissions. In the coming years, the installed base of high-power EAF is expected to expand significantly, notably as replacements for traditional blast furnaces. This rapid growth brings major challenges in terms of energy consumption, productivity, and operational expenditure (OPEX) to maintain or improve current performance levels. Because an EAF represents a large, highly dynamic electrical load, its expansion places additional stress on electrical networks. This situation is further amplified by the massive integration of renewable energy sources, whose variability increases the complexity of maintaining grid stability. As a result, ensuring both power quality and high EAF performance is becoming increasingly challenging.

To address these challenges, GE Vernova has developed an innovative solution: the Direct Feed system. This technology enables a strong decoupling between the EAF and the grid and enables precise, and provides precise, highly stable electrode-current regulation. The description of the technology and the last innovation is presented in a separate EEC 2026 conference paper titled “Next Generation Direct Feed MV Power Supply for Large Steelmaking EAFs”. This paper focuses on Direct Feed impact on both power quality and EAF performance. Results obtained from simulations and on-site measurements will be presented. Key outcomes—including significant improvements in flicker reduction and overall EAF operational performance—will be highlighted.

Speaker Country

France

Speaker Company/University

GE Vernova

Primary author: SANCHEZ, Mathieu (GE Vernova)

Co-authors: Mr BAVIERE, Cyrille (GE VERNOVA); Mr DJERBAL, Djafer (GE VERNOVA); Mr BASIC, Duro (GE VERNOVA); Mr DELSOL, Kevin (GE VERNOVA); Mr GARMIER, Pierre-Louis (GE VERNOVA); Mr AUJOULAT, Thierry (GE VERNOVA)

Presenter: SANCHEZ, Mathieu (GE Vernova)

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