Contribution ID: **65** Type: **Oral Presentation**

Sustainable Carbon Solutions for CO2 Mitigation in the Metallurgical Industry

Thursday 9 October 2025 09:50 (20 minutes)

The increasing need for steel has rised the consumption of metcoke where in Europe 45 million tons of metcoke are used annually in steelmaking processes. In the attempt for green transition, this growing need is accelerating the search for sustainable alternatives to fossil carbon products.

Pyrolysis of wood pellets from pine and spruce at temperatures above 500℃ has proven effective in producing biocarbon suitable for various metallurgical applications. This biocarbon can be further processed using several agglomeration techniques to produce briquettes and pellets, optimizing its integration into specific applications. However, as competition for biomass intensifies across multiple industrial sectors, there is growing interest in alternative feedstocks, such as end-of-life (EOL) tyres, recovering substantial amounts of carbon black.

Biocarbon has been successfully tested and implemented in several types of furnaces, including electric arc furnaces (EAF), submerged arc furnaces (SAF), cupola furnaces, and induction furnaces, as charge carbon, injection carbon, and recarburizers. The implementation typically begins with partial substitution of fossil carbon with biocarbon, and studies have shown that this substitution is feasible and, in some cases, enhances process efficiency. Pyrolyzed EOL tyre char has proven a high potential for slag foaming during carbon injection in EAFs, while simultaneously contributing to a circular economy by closing the loop in waste management.

Scaling up biocarbon production depends on factors such as pyrolysis yield, economic viability, energy requirements, and raw material costs. Utilizing pyrolysis by-products such as oil and gas is essential for ensuring the economic feasibility and market competitiveness of biocarbon in the metallurgical industry.

Primary author: RIGAS, Konstantinos

Co-authors: GEMVIK, Martin; BRINK, Tobias

Presenter: RIGAS, Konstantinos

Session Classification: Waste Utilization & Carbon Capture and Utilization

Track Classification: CO2 mitigation in iron and steelmaking