



Contribution ID: 266

Type: **Poster Presentation**

## How Biochar Drives the Transition to Sustainable Steel Production

*Tuesday 7 October 2025 19:38 (1 minute)*

Steel is a fundamental material in modern infrastructure, transportation, and industrial applications, valued for its strength, durability, and recyclability. However, conventional steel production remains a major source of CO<sub>2</sub> emissions due to the reliance on fossil-based coke as both a reducing agent and an energy source. To align with global climate objectives, the steel industry must transition towards environmentally sustainable and carbon-neutral manufacturing processes. The utilization of biochar instead of fossil coke in steel production represents an innovative and sustainable solution to this challenge.

Produced in SYNCRAFT's Reversepowerplants, biochar is derived from climate-neutral forest residues. In Reversepowerplants, forest residues are processed in a resource-efficient and sustainable way to generate bioenergy in the form of electricity, heat and gas. As an additional product, the plants produce biochar, which has the capacity to store 30% of the CO<sub>2</sub>, which is originally stored in the tree (which, if rotted, would be released back into the atmosphere).

In traditional blast furnace processes, biochar can replace fossil coke as a reducing agent, leading to a substantial decrease in CO<sub>2</sub> emissions. Additionally, in the Pulverized Coal Injection (PCI) process, biochar can substitute coke as a fuel, ensuring the necessary high temperatures for iron ore reduction while lowering the carbon footprint. Furthermore, biochar can support innovative direct reduction methods, in which iron ore is processed using natural gas or green hydrogen, further enhancing the environmental sustainability of steel manufacturing.

SYNCRAFT's biochar exhibits high homogeneity and a fixed carbon content comparable to anthracite, making it particularly suited for steel applications. By integrating biochar into the steel production process, the industry can significantly reduce its environmental impact while maintaining operational efficiency and material performance. The adoption of biochar as a carbon-neutral and non-fossil alternative marks a crucial step toward a more sustainable and environmentally responsible steel industry.

**Primary author:** Mr HUBER, Marcel (Syncraft GmbH)

**Presenter:** Mr HUBER, Marcel (Syncraft GmbH)

**Session Classification:** Poster Session

**Track Classification:** Environmental and energy aspects in iron and steelmaking