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BIOCARBON FOR FOSSIL-FREE METALLURGY

Technical feasibility
and pathways from
the HåBiMet
projects

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Background

Sweden's steel industry is transitioning toward fossil-free production, yet carbon remains essential for reduction, alloying, and slag foaming. Biocarbon from sustainably sourced biomass offers a renewable alternative to fossil coal. The HåBiMet-project explored the technical feasibility of integrating biocarbon into Swedish metallurgical processes to support industrial decarbonization.

Research objectives

- **Define** quality specifications and process requirements for biocarbon use in metallurgy
- **Evaluate** the technical feasibility of replacing fossil coal with biocarbon in metallurgical processes (EAF, TK, SAF)
- **Identify** key technical barriers and enablers for large-scale implementation
- **Assess** the alignment between Swedish biomass resources and metallurgical industry needs

The study assessed technical requirements, domestic biomass availability, and stakeholder perspectives through literature reviews, interviews, workshops, and a dedicated MSc thesis.

“What is the limits for S and P content in biocarbon?”

Definition

High fixed carbon and low sulfur levels can be achievable with Swedish biomass. However, phosphorus content remains a major barrier

“Is it feasible to replace fossil coal with biocarbon?”

Evaluation

It is technically feasible for certain biocarbon products to replace fossil coal in electric arc furnaces, tunnel kilns, and submerged arc furnaces without compromising process performance.

“What are the main barriers and enablers?”

Identification

Main barriers are high cost, variable quality, and missing standards.

Enablers include adaptable processes, pilot success, and collaboration.

“Is the available biomass sufficient?”

Assessment

Sweden’s steel industry would require 300–400 kt of biocarbon annually, requiring about 1–2 Mt of woody biomass. Sufficient resources exist, but high costs and lack of standards hinder scale-up.



Conclusions

Biocarbon offers a promising pathway for fossil-free metallurgy in Sweden. Realizing its potential will require continued research, policy development and harmonization, and coordinated cross-sectoral efforts to build a robust, sustainable, and scalable biocarbon value chain.

To accelerate adoption, the project recommends developing technical standards, certification schemes, and supportive policies, taking the metallurgical sector into account.

The HåBiMet projects

In parallel with the **technical study**, two complementary projects examined the **social** and **policy** dimensions to provide a holistic understanding of the challenges and opportunities for a fossil-free biocarbon value chain



Read more at: www.swerim.se/habimet

