January 2026

GreenHeatEAF newsletter #4

Gradual integration of renewable non-fossil energy sources and modular heating technologies in EAF for progressive CO_2 decrease

The project falls under the funding programme of Horizon Europe – Clean Steel Partnership.

The call topic is related to modular and hybrid heating technologies in steel production.

—

This project has received funding from the European Union under Grant Agreement n° 101092328

The year 2025 has been a cornerstone for GreenHeatEAF. It was very challenging from different perspectives, but, despite the numerous difficulties the European Steel sector is facing, several activities were carried out to demonstrate the integration of non-fossil fuels and renewable C-sources in Electric Arc Furnace (EAF) processes to decrease CO_2 emissions and dependence from fossil energy and C-sources markets by combining pilot, on field and simulation investigations.

Our challenging 2025

An overview of the progresses of the project during the past year is here provided.

Trials at Swerim's 10-ton pilot EAF have been completed to demonstrate the use of different fuels and carbon-sources. In particular, Hydrogen use with Linde CoJet-burner was tested and injection of bio-carbon to investigate slag foaming and slag reduction. During the trials, different iron carriers have been used. The tests showed that hydrogen can be used to replace up to 100% natural gas with no significant final negative effects. This was also confirmed by process simulations carried out via a flowsheet model developed by SSSA and covering the whole process chain up to the initial stage of the continuous casting.

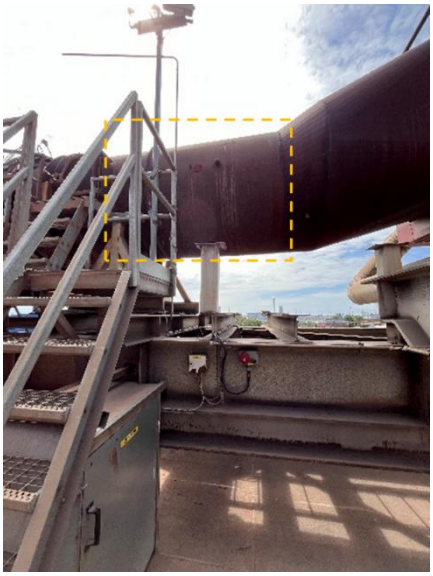
The Acoustic Gas Measurement (AGAM) system to monitor gas heat was installed and adapted in the duct of the Höganäs Electric Arc Furnace (EAF). This device showed first results of offline and online off-gas temperatures values and exploitation of indirectly derived metrics (see Figure 1).

A CFD model of Höganäs EAF was created by considering the volume flow and CO generation from C-injection and slag during a reference heat. The off-gas composition was validated by external off-gas measurements during a measuring campaign and Swerim pilot trail values. One major outcome was that the false air intake had to be forced to reach the nitrogen (N_2) of the measuring values. In addition, the monitoring position could be adjusted to obtain representative values at the location of the external measurements. The validated CFD model is now ready to be adapted to Hydrogen-Enhanced Combustion (HEC) burner profile.

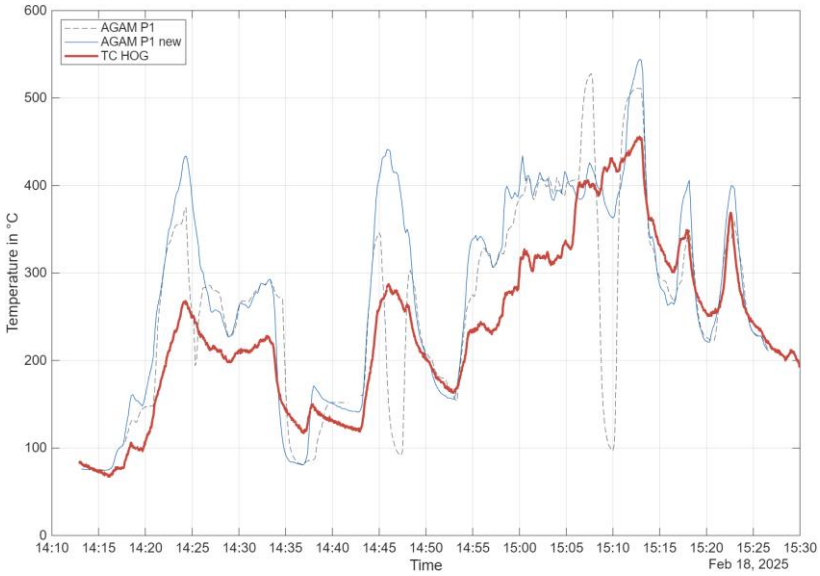
The industrial tests with alternative non-fossil C-bearing materials were concluded at Höganäs and 7Steel. Furthermore, SSSA carried out complementary simulation studies using its process flowsheet models. Experimental and simulation investigations allowed assessing the suitability of most materials but allowed also to identify limitations for use. Some of the considered materials (e.g. shredded tires) can only partially replace fossil C sources, as they provide poor foaming performances and can also lead to generation of excessive fumes. Other ones proved to require adaptation of the feeding system to avoid self-ignition phenomena. However, many alternative material provided comparable performance and proved to be generally suitable to use in the EAF.

"GreenHeatEAF contributes to gradual replacement of fossil fuels and fossil carbon materials with non-fossil gases and renewable C-sources. Therefore, GreenHeatEAF contributes to lowering NG, anthracite and coal exploitation, by decreasing GHG emissions through the use of sustainable gases (i.e., green Hydrogen, preferably internally produced) and materials (zero-impacting biomass)."

GreenHeatEAF



(a)



(b)

Figure 1. a) Final installation location of the AGAM system in HOG EAF duct; b) Temperature output of AGAM device taken with initial and improved AGAM parameter.

Life Cycle Analysis investigations also progressed, by establishing a suitable reference baseline to assess the environmental benefits of the GreenHeatEAF solutions at the end of the project.

Dissemination activities

Figure 2. Presentations held by partners of the project within relevant scientific events and GreenHeatEAF booth at ESTAD 2025.

The GreenHeatEAF Consortium is very committed to disseminating project results and raising interest and commitment towards them in the European steel sector. To this aim, 10 presentations were held in 7 important international scientific conferences, namely the *AISTech - Iron and Steel Technology 2025*, the *7th Conference on Clean Technologies in the Steel Industry (CTSI 2025)*, the *9th International Congress on the Science and Technology of Steelmaking (ICS 2025)*, the *12th International Conference on Life Cycle Management (LCM 2025)*, the *20th International Symposium on Waste Management, Resource Recovery and Sustainable Landfilling (SARDINIA 2025)*, the *7th European Steel and Application Days (ESTAD 2025)*, and the *2025 Annual Event* organized by the European Steel Technology Platform (ESTEP) in Udine (IT) at the end of October. At ESTAD 2025 GreenHeatEAF, in collaboration with another EU-funded project focused on the EAF steelmaking route, was also Exhibitor, which further enhanced the dissemination impact of the 4 presentations provided by SSSA and SWERIM on the project (see Figure 2).

Moreover, 1 paper was accepted for publication in open access mode in the important scientific journal *Steel Research International* to describe the intensive work on the assessment of the effects of feeding alternative C-bearing materials and hydrogen to the Electric Arc Furnace. The paper will become soon publicly available.