



HylInHeat A PROCESSES4PLANET SUCCESS STORY

Hydrogen for the Steel and Aluminium European Sectors

Context



The energy-intensive industries release 30% of global greenhouse gas (GHG) emissions.

The cornerstone of the **Processes4Planet 2050 Strategic Research and Innovation Agenda (SRIA)** is the transformation of the European energy-intensive industries towards climate neutrality, circularity and competitiveness.

A promising solution for decarbonising the steel and aluminium sectors is using hydrogen as fuel, as the combustion of hydrogen emits no CO₂, only water in higher concentrations, solving the emission problems. However, this innovation comes with new challenges (**source**), and new technologies must be created. HylInHeat, a promising project funded by Horizon Europe, aims to address this need.

HylInHeat: A Processes4Planet Project



Funded under a P4Planet call, HylInHeat (**full title** *Hydrogen technologies for decarbonization of industrial heating processes*) started on 1 January 2023, and is expected to end on 31 December 2026. During its lifetime, an interdisciplinary consortium of 30 international partners, under the coordination of the A.SPIRE member, **RWTH Aachen University**, will work towards achieving the project's ambitious objectives.

HylInHeat is an **Innovation Action (IA)**.

The project aims to transform the aluminium and steel industries through achieving: a significant reduction of CO₂ emissions from industrial processes by using H₂ combustion, NO_x (nitrogen oxides, gases typically produced during natural gas combustion processes) levels of the processes, at least not higher than the equivalent fossil fuel-based solutions, improved energy efficiency of industrial processes,

significant reduction of H₂ fuel consumption of the developed process compared to the current fossil fuel demand, and competitive costs of the developed technologies.

Implementation and Emissions Reduction Potential

The developed solution will be implemented in various demonstrators in the steel and aluminium sectors.

Steel demonstrators:

- Pilot radiant tube furnace for steel heat treatment
- Pilot walking beam furnace for steel reheating for hot rolling (flat products)
- Industrial walking beam furnace for steel reheating for hot rolling (long products)
- Industrial steel ladle preheater
- Industrial tunnel heating furnace

Aluminium demonstrators:

- Industrial aluminium ladle preheater
- Industrial 12 t reverberatory melting furnace
- Industrial 1.5 t rotary tilting furnace
- Industrial annealing furnace

In July 2025, when HyInHeat was more than halfway through its duration, the project team informed A.SPIRE that the team had already conducted trials in the pilot rotary furnace with blends of NG (natural gas) and H₂.

The trials included gas flow and flue gas measurements and gross quality analysis. A 1.5-tonne rotary furnace represents a small industrial installation for niche production. However, *'the results are fully transferable to bigger installations'*, the team stresses.

Furthermore, trials in a 12-tonne reverberatory furnace with blends of NG and H₂ and aluminium melt were carried out. The furnace is a full-scale industrial installation and part of a casting line for special niche aluminium flat products. Also these results are fully transferable to bigger installations.

If implemented, the solution developed by HyInHeat has the potential to reduce **7.2% of global emissions in the steel industry and 0.7% of global emissions in the aluminium industry.**

Moreover, implementing the technology developed by the HyInHeat project will translate into a notable societal impact, as it promotes the decarbonisation of steel and aluminium production through the integration of hydrogen-based heating technologies. This innovative solution supports the EU Green Deal objectives and climate neutrality in Europe, contributing to the health and well-being of people and the protection of ecosystems.

On a broader societal level, the project provides awareness and acceptance of hydrogen as a clean energy carrier, enhances industrial safety practices, promotes interdisciplinary collaboration, and enables skill development through training and upskilling of workers.

HylnHeat engages an ample and multidisciplinary consortium from 12 countries, fostering inclusive research and innovation practices.

Success Story: First Promising Results

The first successes and promising results came along in July 2024, when the HylnHeat partner Constellium announced *‘the successful completion of its first industrial-scale hydrogen casting at C-TEC, Constellium's primary R&D center’*([source](#)). The HylnHeat partner cast the first 12-tonne aluminium slab with hydrogen. This is the *‘world’s first successful industrial-scale production of aluminium slab using hydrogen combustion,’* Constellium says.

For the dedicated team implementing it, HylnHeat is *‘unique in demonstrating, for the first time at an industrial scale, the full substitution of fossil fuels with hydrogen in high-temperature heating processes in the steel and aluminium sectors. By combining the development of burner technology, refractory solutions, emission measurement and control systems to build nine industrial demonstrators, the project delivers a holistic and world-class solution that enables deep decarbonisation of the steel and aluminium industry.’*

A.SPIRE considers HylnHeat a success story as it proves that hydrogen can replace fossil fuels in high-temperature industrial processes in the metals industry, marking a major step towards decarbonising steel and aluminium production. The project delivers tangible progress on EU climate goals while supporting cleaner air, healthier communities, and a more climate-neutral and competitive European industry.

[Visit the HylnHeat website for more information.](#)

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