PRESS RELEASE

H2STEEL Project Develops Groundbreaking Proof of Concept for Green Steel Production

- Clean hydrogen, low emissions, and circular carbon, a new PoC points the way to defossilize steel sector.
- Turning bio-methane into clean hydrogen and biocoal: a game-changing step for Europe's Green Deal.

Innovative process enables clean hydrogen production with low CO_2 emissions, while valorising biogenic waste to support EU industrial decarbonisation.

8, August 2025 – The Horizon Europe-funded **H2STEEL project** has achieved a key milestone in the transition to climate-neutral industry by developing and testing a **proof of concept (PoC)** for the catalytic pyrolysis of methane using biocarbon-based catalysts. This innovation marks a crucial step toward **green hydrogen-based steel production**, directly supporting the goals of the **European Green Deal** and the EU's industrial decarbonisation agenda.

By moving beyond lab-scale trials, the H2STEEL PoC demonstrates how **clean hydrogen can be produced with low CO_2 emissions**, using an innovative process that valorises carbon rather than releasing it into the atmosphere as CO2. The main core is therefore catalytic methane pyrolysis. The technology was developed and tested at the RE-CORD (Renewable Energy Consortium for Research & Demonstration) facilities, and is designed for continuous, flexible operation under industrially relevant conditions including temperatures up to 900 °C and different inlet streams (i.e. methane and methane/nitrogen blend).

The **catalytic methane pyrolysis system** is supported by a modular plant architecture comprising 12 fully integrated units that manage catalyst dosing, gas flow, heating, cooling, filtration, and control. Notably, the process enables **continuous catalyst renewal**, with the carbon deposited on the catalyst recovered as **carbon-enriched biocoal**, reinforcing circular economic principles and reducing the need for fossil-derived materials. The biogenic carbon consists of both the carbon derived from cracked methane during pyrolysis and the carbon originating from the catalyst itself.

Key outcomes of the PoC include:

- A real-world demonstration of low-emission hydrogen production through methane pyrolysis.
- Capability to process up to 100% methane and produce hydrogen with low CO_2 emissions.
- Use of biocoal-based pellets with high durability, water resistance and low dust formation during storage.

Funded by the European Union- European Innovation Council - H2STEEL project - Grant Agreement nr.101070741. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Innovation Council. Neither the European Union nor the granting authority can be held responsible for them.

This innovation offers **significant potential to reduce the climate footprint** of hard-to-abate sectors such as steelmaking, while opening opportunities for technology transfer and new applications in carbon and hydrogen-dependent industries. A **full patent application** has been submitted.

H2STEEL is not only a scientific achievement; it is a direct response to Europe's urgent need for sustainable industrial processes. This PoC proves that green steel is not a distant ambition, it is becoming a tangible reality.

Now in its final phase, the H2STEEL project is focusing on **system optimisation, scale-up, and knowledge transfer** to industrial stakeholders across Europe, further advancing the EU's climate and energy goals.

Key Project Information

The project, **coordinated by the Politecnico di Torino** and funded under the European Innovation Council (Grant Agreement No. 101070741), brings together **six partners from four countries.** Their collaborative work supports the EU Green Deal and Climate Target Plan 2030, as well as the long-term goal of climate neutrality by 2050.

More Information:

Project coordinator: david.chiaramonti@polito.it

Communication and dissemination: josefina.trecco@contactica.es

Project link: https://h2steelproject.eu/

Social media: LinkedIn: H2Steel Project X: @H2steelProject

Funded by the European Union- European Innovation Council - H2STEEL project - Grant Agreement nr.101070741. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Innovation Council. Neither the European Union nor the granting authority can be held responsible for them.