



E-ECO DOWNSTREAM

Development of Heating Technologies for the
Efficient Renewable Energy Consumption of
CO₂-Neutral Downstream-Processes



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The downstream sector — a hidden lever for decarbonization

Steel's reheating furnaces, heat-treatment lines, and rolling mills consume vast quantities of fossil fuels — yet have received **far less decarbonisation attention** than blast furnaces.

EU climate targets:

- –55 % Greenhouse gas emissions by 2030
- Full climate neutrality by 2050

Replacing natural gas with **hydrogen**, **biogas**, and **electricity** alters combustion dynamics, heat-transfer profiles, and waste-heat recovery. Existing equipment must be redesigned.

The E-ECO Downstream project

Funded by the **European Union** under Horizon Europe (GA No. 101178210), the project runs **January 2025–June 2028**, uniting **8 partners** from Italy, Sweden, and Germany to develop and validate CO₂-neutral downstream steel processing technologies.



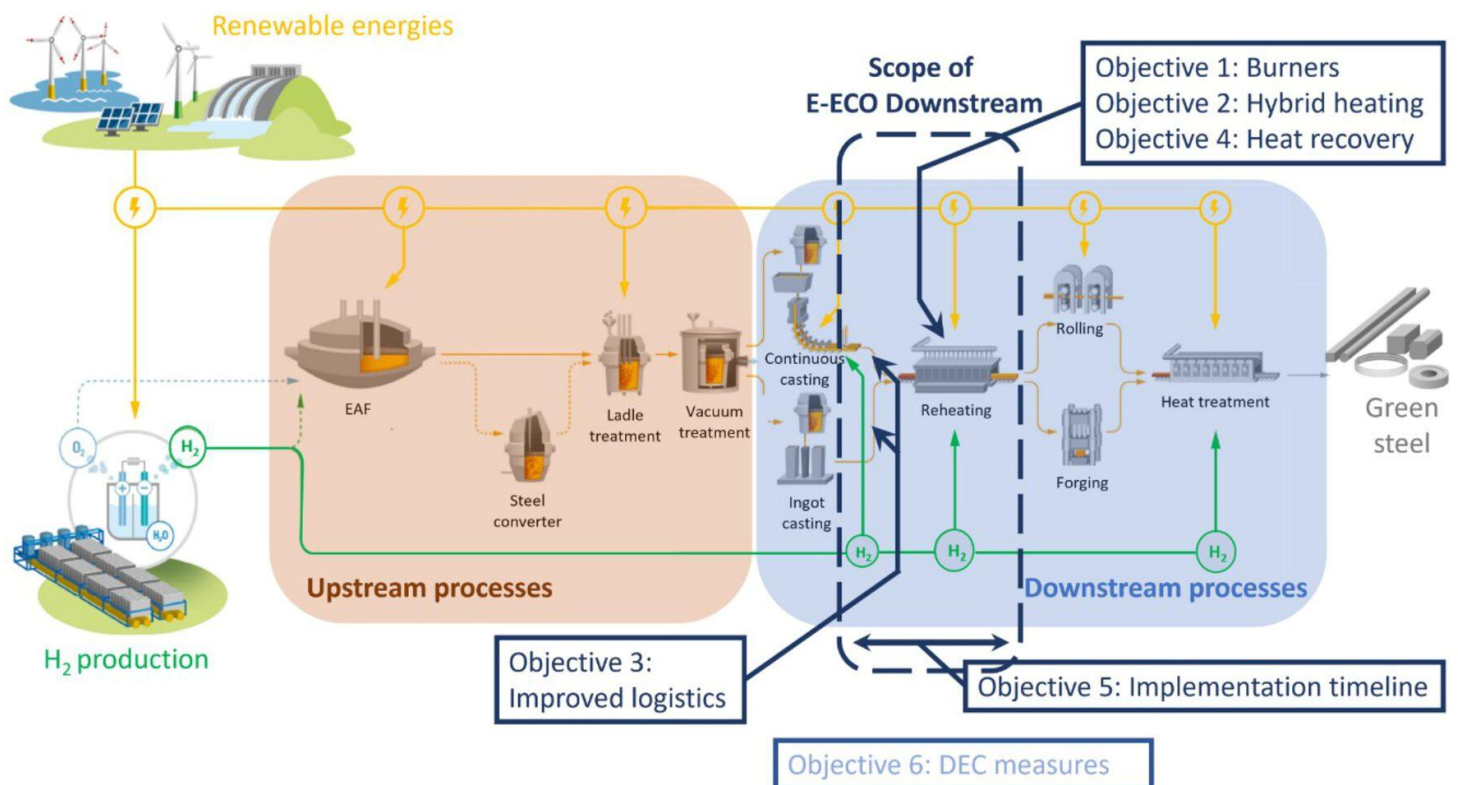
The Consortium

Eight partners:

- Scuola Superiore Sant'Anna (IT) — Project coordinator
- Acciaierie d'Italia S.p.A. (IT) — Steel producer
- Feralpi Siderurgica S.p.A. (IT) — Steel producer
- Kanthal AB (SE) — Technology supplier
- Swerim AB (SE) — Research institute
- Küppers Solutions GmbH (DE) — Technology supplier
- VDM Metals International GmbH (DE) — Materials supplier
- BFI – VDEh-Betriebsforschungsinstitut GmbH (DE) — Research institute

Six research objectives:

1. **Green-fuel combustion** — retrofit burners for H₂/biogas via 3D-printed redesign
2. **Hybrid heating** — electrical induction + H₂ in a walking-beam pilot furnace
3. **Hot-charging logistics** — preserve slab temperature between casting and rolling
4. **Waste-heat recovery** — adapt recuperators/regenerators to H₂ and biogas conditions
5. **Implementation roadmap** — techno-economic-ecological assessment for the EU steel sector
6. **Dissemination** — open-access publications, conferences, and this newsletter



Project Overview

The project is structured into seven interconnected **Work Packages** that cover the full innovation chain from combustion technology to industrial deployment.

WP 1 develops **fuel-flexible burner components** — including novel 3D-printed designs — capable of operating on hydrogen, biogas, and natural gas.

WP 2 adapts **waste-heat recovery systems** (recuperators and regenerators) to the different off-gas conditions resulting from alternative and future fuel combustion.

WP 3 targets **hot-charging logistics**, optimizing the transfer of cast slabs to the rolling mill at maximum temperature to minimize reheating energy.

WP 4 demonstrates **hybrid heating** by combining electrical resistive heating with hydrogen combustion in a pilot walking-beam furnace.

WP 5 provides a **cross-cutting techno-economic and ecological assessment**, delivering an actionable implementation roadmap for the European steel sector.

WP 6 handles **dissemination and communication** — publications, conferences, and this newsletter series — while **WP 7** coordinates the entire consortium under the leadership of **Scuola Superiore Sant'Anna**.

