



The C⁴U Project: Advanced Carbon Capture for steel industries integrated in CCUS Clusters

In Short

The iron and steel industry represents the largest energy-consuming manufacturing sector in the world, accounting for up to 8% of anthropogenic CO₂ emissions. To meet critical 2030 net-zero targets, these emissions must be substantially reduced.

Funded by the European Union H2020 programme, the C⁴U project will demonstrate two CO₂ capture technologies, DISPLACE and CASOH, for optimal integration in the iron and steel industry as part of the CCUS chain.

C⁴U AMBITION

Our ambition is to substantially reduce the large CO₂ footprint of steel mills.

The real-world, long-term **impacts** of the C⁴U project will be:

- Successful demonstration of CO₂ capture from industrial sources
- Economical and safe demonstration of an integrated CCUS value chain
- Viable pathways to rollout CCUS in areas with high concentrations of CO₂-emitting industries and nearby geological storage

C⁴U is a first-of-its-kind project, as it considers technology development alongside **societal, environmental, business, and policy** considerations for the optimal integration of these technologies in a **real** industrial cluster.

The combined use of C⁴U technologies can result in an **89% reduction of CO₂ emissions** in steel mills.

Introducing the C⁴U Work Packages (WP)

Technology Readiness (WP1 – WP2)

C⁴U advances two emerging carbon capture technologies which have the potential to tackle up to 94% of the CO₂ sources in a steel mill.

- DISPLACE is a high temperature sorption-displacement process for CO₂ recovery from off-gases or combustion product flue gases at a steelwork. It is located at Swerim's site in Luleå (Sweden).
- CASOH allows the conversion of Blast Furnace Gas into an H₂-enriched gas, free of CO₂ and with higher calorific value, while producing a concentrated stream of CO₂ and high-grade heat. It operates at ArcelorMittal's Gas Lab Site (Asturias, Spain).



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A whole-system approach for the optimal integration of CCUS (WP3-WP4)

Using a whole system approach, C⁴U balances the requirements of capture, pipeline transportation, and storage - as well as society.

C⁴U assesses the impact of the captured CO₂'s quality for the safety and operation of the transportation and storage infrastructure, based on integration into the North Sea Port CCUS industrial cluster. C⁴U performs techno-economic and lifecycle assessments across the entire CCUS chain, based on the integration of capture technologies in real-life steelworks

SOCIETAL READINESS AND BUSINESS MODELS (WP5-WP6)

Public Perception and Societal Readiness for CCUS

Work Package 5: Societal Readiness and Public Policy

CCUS will not materialise in the EU without overcoming social-economic barriers. C⁴U explores societal readiness through research and engagement with relevant end-users, local stakeholders, and policy makers. In doing so, C⁴U aims to:

- **Construct an effective narrative and a framework model for CCUS** to contribute to societal readiness for CCUS in a local steel plant and the North Sea Port CCUS Industrial Cluster.
- **Analyse needs and concerns of stakeholders and end-users** associated with industrial CCUS clusters, with the aim of lowering the barriers for the wider uptake of CCUS.
- **Examine public policy options and implications that address the needs and concerns of stakeholders and end-users** to enable cross-country learning.

Business models for CCUS

Work Package 6: Long-term business models

The greatest barriers to the development of CCUS in Europe are commercial rather than technological. C⁴U will develop novel business models to ease deployment. C⁴U aims to establish the long-term business case for CCUS by considering stakeholder concerns and identifying optimal scenarios for overcoming financial risks. Our objectives include:

- Undertaking market, stakeholder and scenario analysis and a selection of Business Innovation Model frameworks.
- Developing business models, investment and funding strategies, revenue models, cash flow and risk analysis, ownership user/customer value propositions, operations, and strategic marketing plans.

