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COUPLED

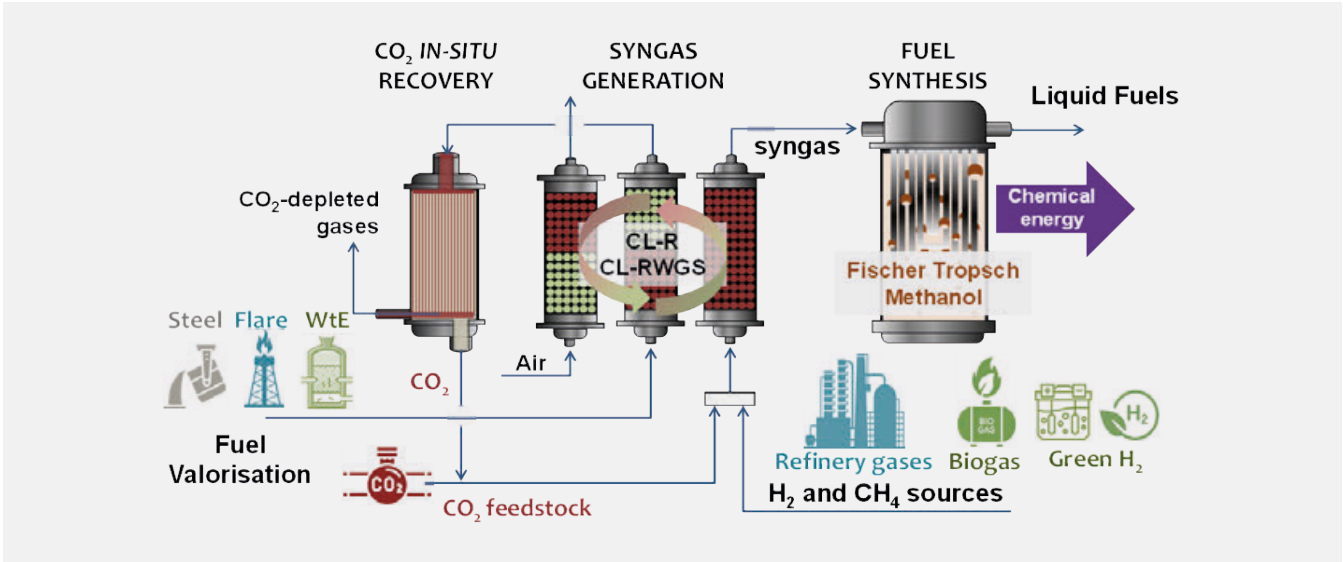
coupled-horizoneurope.eu

CO_2 Utilisation Process via Looping tEchnology Demostration

COUPLED is a Horizon Europe project working to transform how renewable fuels are produced in Europe. At a time when accelerating the energy transition is more urgent than ever, the project develops a concrete solution: converting CO_2 into sustainable fuels through an innovative and integrated technological approach.

What is COUPLED?

COUPLED is pioneering a novel approach to CO_2 utilization for renewable fuel production, integrating three breakthrough technologies into a single, industrially ready system (TRL7): chemical looping processes, advanced CO_2 separation membranes, and fuel synthesis routes such as Fischer–Tropsch and methanol production.



At its core, the project develops a modular process that converts CO_2 together with green hydrogen or biogas into sustainable syngas, which is then further upgraded into carbon-neutral liquid fuels, such as sustainable aviation fuel and methanol.

The project combines technological innovation with a strong focus on:

- safety and reliability
- environmental performance
- societal acceptance
- policy alignment
- business viability

By bridging the gap between research and industrial deployment, COUPLED aims to unlock scalable and sustainable pathways for renewable fuels, supporting Europe's decarbonization goals and strengthening energy independence.

A strong European Consortium

COUPLED is powered by a multidisciplinary consortium of 15 partners from 7 countries, bringing together complementary expertise across the entire value chain, from research and technology development to industrial implementation and market uptake.

The University of Manchester coordinates the project and leads key activities in process design and pilot plant engineering. Technology development is driven by leading research and industrial players, including Johnson Matthey (syngas generation and fuel syntheisis), Tecnalia and Zefira (CO_2 separation membranes), and Techfem (process modelling and digital twin development).

Engineering and scale-up are supported by partners such as Helical Enterprises, Wood, and IMI Remosa, ensuring robust system integration and industrial feasibility.

Industrial validation is at the core of COUPLED, with Snam hosting and operating the demonstration plant in Italy, while partners such as SOCAR Türkiye R&D, Contarina, and FINOCAS contribute with real industrial data, use cases, and end-user perspectives.

Finally, innovation, sustainability, and market uptake are strengthened by partners including PNO Innovation Italia (exploitation, dissemination, and communication), Innsight (sustainability assessment), and ETAM (social acceptance and stakeholder engagement), ensuring that COUPLED solutions are not only technically sound, but also viable, accepted, and ready for deployment.

This strong collaboration enables COUPLED to address not only technological challenges, but also industrial relevance, business potential, and societal acceptance, paving the way for effective deployment in Europe.

Why COUPLED matters

The path to climate neutrality requires more than innovation - it demands solutions that work at scale, in real industrial conditions. COUPLED responds to this challenge by:

- demonstrating CO_2-based fuel production in an industrially relevant environment
- ensuring solutions are safe, efficient, and economically viable
- engaging stakeholders across industry, policy, and society
- contributing to EU climate and energy objectives

By doing so, COUPLED helps pave the way towards a circular carbon economy and a more resilient European energy system.

CONSORTIUM

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Get in touch with the COUPLED consortium

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