

THREADING-CO2 A PROCESSES4PLANET SUCCESS STORY

Revolutionising the Textile Manufacturing for a Decarbonised Future

Context



The textile industry causes significant damage to the environment, contributing heavily to water contamination, greenhouse gas emissions (GHG), and overflowing landfills. Polyester (PET), a synthetic fibre made from oil, is the most commonly used material in the sector. However, it is not a sustainable choice. Today's technology cannot address the textile industry's sustainability problem, and the most commonly used PET is virgin, made straight from fossil fuels. The demand for the fibre is expected to triple by 2050.

THREADING-CO2: A Processes4Planet Project



THREADING-CO2 (**full title:** 'Valorisation of CO₂ waste streams into polyester for a sustainable circular textile industry') is an Innovation Action (**IA**-*'produces plans or designs for new or improved products, processes or services including prototyping, testing, demonstrating, piloting, large-scale product validation and market replication. The EU funding covers up to 70% of the project costs.'*).

The project is funded by Horizon Europe under a **Processes4Planet** call, and started on 1 January 2023, with a planned duration of four years. It aims to '*demonstrate, on an industrial scale, a first-of-its-kind technology that converts CO₂ waste streams into high-quality, commercially viable, sustainable polyester textiles*' (**source**).

Goals and Vision

To achieve its ambitious end goal, the project will tackle four main objectives: scaling up a novel technology to produce PET from CO₂ waste streams (from TRL 5 to TRL 7), **reducing the PET production's GHG emissions by up to 70%**, creating a circular, renewable energy-powered manufacturing chain for polyester production, and validating the environmental, economic, and societal sustainability of the process.

Goals and Vision

The innovative technology will be integrated into **four demonstrators**: a pilot line for MEG (Monoethylene Glycol, a petrochemical product, used in the production of polyester fibers) production at TRL6, which involves the demonstration of three new systems and a full industrial scale demonstrator (TRL7).

The THREADING-CO₂ methodology is explained in detail on the [project's website](#) (hosted as an independent webpage, under the A.SPIRE platform).

The Success Story: Implementation and Potential Impact

When asked about the THREADING-CO₂'s progress, the project team says that *'two pilot systems are operational, and the production has been validated according to industry standards at the kilo/h scale.'*

THREADING-CO₂ is expected to finish on **31 December 2026**, and calculations for the capacity to reduce greenhouse gas (GHG) emissions, including CO₂ and the capacity to reduce waste and secondary raw materials use if implemented are still ongoing. However, there is already notable and promising progress, according to the THREADING-CO₂ team:

- The CO₂-to-CO electrolysis pilot, planned to reach 3 kg/h initially and 30 kg/h later, is under construction with delivery expected in Q4 2025. The goal of 3 kg/h should be achieved by Q1 2026, and 30 kg/h by Q4 2026. Polyester pellets produced have passed the customer's tests.
- Regarding the carbonylation Demo, the production has been demonstrated, but it is currently below the target of 2 kg/h. Issues have been identified, and new catalysts and recovery strategies are being tested and implemented.
- For the hydrogenation demo, TRL6 has been reached, with 2 kg/h productivity demonstrated.
- Process simulations and demo plant CAPEX/OPEX estimates for the full industrial-scale demonstrator have been completed.

Although not the main focus of the project, the developed process will avoid oil extraction that generates large quantities of wastewater.

Furthermore, the innovation could increase its impact capacity by being combined with other innovations and embedded in First-Of-A-Kind-Plant (FOAK), integrated with carbon capture units to valorise emissions at the source instead of expensive sequestration, promoting and enhancing circularity.

Addressing one of the challenges of the green and digital transitions of the energy-intensive industries—the skill gaps—MOOC (massive open online course) training programs have been launched, **with over 350 students enrolled**.

On the societal level, THERADING-CO2 raises awareness of climate action in industrial sectors and addresses one of the biggest challenges in tackling climate change—the textile industry pollution.

Moreover, as the project team informed us, the training programmes (MOOCs) developed reach professionals and students, creating green chemistry jobs in Europe.

The consortium includes four SMEs.

The Coordinator's Angle

When asked about what makes the THREADING-CO2 a success story, the coordinator points at the uniqueness of the cutting-edge technology, *‘turning ‘CO₂ waste into polyester – cutting emissions by up to 70%, matching fossil-based quality, and building Europe’s first circular value chain for green textiles.’*

A.SPIRE considers THREADING-CO2 a success story and an ambitious project addressing one of the major environmental pain points, the textile industry, one of the most polluting worldwide. Furthermore, THREADING-CO2 is a practical embodiment of the Processes4Planet Strategic Research and Innovation Agenda (SRIA), aiming to translate its vision of climate neutrality, circularity, and competitiveness into action. By converting CO₂ waste streams into polyester, the project directly advances SRIA innovation areas such as CO₂ capture and utilisation and the circularity of resources, while its training programmes support the development of the skills necessary for the green and digital transition of the European energy-intensive industries.

[Visit the THREADING CO2 website for more information.](#)

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