WaterProof
A PROCESSES4PLANET SUCCESS STORY

A P4Planet Project for a Future-Proof Europe

Context

Cleaning products, hand creams and leather goods are products found in every household. However, the production of such consumer goods has a considerable impact on the environment, as it is resource-consuming, often based on fossil resources, and the packaging is incinerated after use. To achieve the climate goals of the European Union, alternative feedstock, innovative technologies and new business models are needed.

WaterProof: A Processes4Planet Project

To address the traditionally linear value chain model and support the European Union's ambition to become the first climate-neutral continent by 2050, the WaterProof project (**full title**: '*urban WAste and water Treatment Emission Reduction by utilizing CO_2 for the PROduction Of Formate derived chemicals*') proposes an alternative circular model.
The project is an RIA - Research and Innovation Action, and kicked off in June 2022 and is funded by Horizon Europe under a Processes4Planet call. WaterProof is expected to end on 31 May 2026.
Waste and wastewater treatment currently emit large amounts of CO2. In the WaterProof project, CO_2 is captured from waste incineration and wastewater treatment plants and turned into formic acid, which will later be used for **fish leather tanning—to sustainably produce fish leather**—and will be **tested in consumer cleaning products**.
Furthermore, formic acid is a feedstock for the production of Acidic Deep Eutectic Solvents (ADES), used to extract precious metals from water treatment sludge and incinerator ash.

Goals and Vision

In a nutshell, the WaterProof project proposes a resource-efficient solution to convert CO_2 emissions from waste(water) processing into green consumer products. The CO_2 generated after the products are used is again captured and deployed, thus creating a fully circular model.
The technology at the heart of the WaterProof concept—which turns the captured CO_2 into formic acid—is an electrochemical process. This reaction is paired with the generation of high-energy oxidants, which are used to remove persistent contaminants from wastewater, thereby contributing to a clean water cycle with zero waste. The energy to run the electrochemical process is provided by the waste incineration facility.
As part of the project, the team conducted a series of interviews in which experts from the consortium answered questions about wastewater treatment, circular economy, the social and cultural factors that might influence the social acceptance of the WaterProof technology, the consumer perception of CO_2-derived products, fishleather production with CO_2-based formic acid, etc. The interviews are available on the project website. Furthermore, comprehensive webinars on CO_2-derived chemicals and unlocking CCU potential through electrochemistry have been released (available here).

The Success Story

The WaterProof technology could lead to a reduction in greenhouse gas emissions through the utilisation of CO_2, the replacement of fossil feedstocks, and industrial electrification.
In the WaterProof project, a **TRL 6 plant** is constructed, including innovative downstream processing. The conversion of CO_2 from wastewater treatment and the CO_2 captured at a waste incinerator is demonstrated in **two consecutive campaigns.**
To maximise the impact of the WaterProof technology, lifecycle assessments and a full business case analysis were initiated in the early stage of the project to provide targets for technology development. A marketing and deployment strategy is developed to ensure social acceptance of the WaterProof technology.
An intermediate life cycle analysis indicates that the technology developed in the WaterProof project has less than half the climate change impact of the fossil-based alternative, demonstrating clear potential to reduce greenhouse gas emissions if implemented.
'*Besides the reduction of GHG emissions, WaterProof will have a societal impact by creating awareness through interaction with policy makers and civil society and the creation of new jobs in innovative fields. By targeting an industry as essential as waste(water) treatment, WaterProof aims to create a concept that can impact society and climate on a big scale,*' the project team told us.

WaterProof is implemented by a dedicated and diverse team of experts.
The coordinator and scientific coordinator are women, and four of the five work packages are led by women.
The consortium counts eleven European partners, of which two are SMEs.

The Coordinator's Angle

Asked about what makes WaterProof a success story, a representative from Avantium (the coordinator) points to the fact that the project will demonstrate and prove the full value chain of a closed carbon cycle: CO_2 from wastewater and consumer waste incineration will be converted into formic acid to make new bio-based consumer products—a unique and novel technology.

A.SPIRE considers WaterProof a success story and an ambitious multi-faceted initiative aiming to turn CO_2 from waste into valuable, sustainable products, reducing greenhouse gas emissions and replacing fossil resources. Through proven technology, societal impact, and a circular, climate-friendly model, WaterProof can demonstrate how innovation can drive Europe toward climate neutrality.

Visit the WaterProof website for more information.

Grant agreement ID: 101058578
HORIZON-CL4-2021-TWIN-TRANSITION-01-14 - Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (Processes4Planet Partnership) (RIA)

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or granting authority. Neither the European Union nor the granting authority can be held responsible for them.