Partners

The project brings together 15 partners from eight countries. The consortium includes leading academic and industrial R&D teams, from computer scientists and modellers to chemists, reactor designers, membrane specialists and catalyst companies.

Ollscoil na Gaillimhe University of Galway

Universitat Politècnica de València

SZTE University of Szeged

HZB Helmholtz Zentrum Berlin

EPFL

ICIQ

Kyambogo University

LEITAT managing technologies

DLR Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center

membrasenz

University of Amsterdam

Johnson Matthey Inspiring science, enhancing life

SoHHytec

eChemicles

Pintail

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FLOW PHOTO CHEM

Sustainable chemicals from sunlight and carbon dioxide

www.flowphotochem.eu

@flowphotochem

What is FlowPhotoChem?

FlowPhotoChem is a multi-national, EU-funded research project developing **new and more sustainable ways to manufacture chemicals**. The project addresses key technological challenges faced when using solar energy and advanced catalysts to convert carbon dioxide (CO_2) into valuable chemicals.

Why do we need FlowPhotoChem?

The European chemical industry is one of the largest manufacturing sectors and provides important materials used in many other sectors - but it is also **one of the most polluting sectors**, releasing 135 metric tons of CO_2 equivalents in 2017. Most chemicals produced by the sector are derived from fossil fuels, using processes that generate large amounts of CO_2 that are released into the atmosphere, contributing to climate change.

The European Union has committed to very challenging climate change targets with the aim of achieving a climate neutral economy by 2050. The United Nations Sustainable Development Goals also include a focus on developing sustainable industries. In order to meet climate change targets, **new and disruptive technologies are needed** - simply improving current technologies will not be enough.

European Chemicals

>€500 billion sales
>1 million direct jobs
High polluting industry

European Climate Targets

2030: ↓40% CO_2 emissions
2050: Climate neutral economy

Sustainable Development Goals

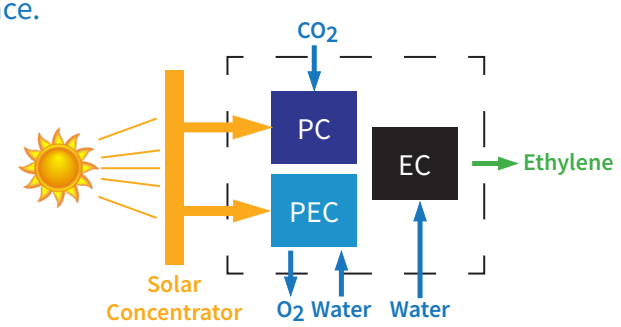
Reduced fossil fuel reliance
Sustainable manufacturing
EU-Africa cooperation

What will FlowPhotoChem achieve?

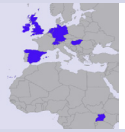
FlowPhotoChem focuses on developing innovative, sustainable ways to manufacture ethylene, a chemical used in producing the widely used plastic polyethylene and with a growing market demand. The production of ethylene will serve as a proof-of-concept - it will be possible in future to manufacture many other chemicals using the technologies developed in the project.

Rather than producing CO_2, FlowPhotoChem will develop an integrated demonstrator reactor that consumes CO_2 and uses concentrated sunlight to form ethylene. Producing ethylene in this way is very challenging, as a lot of energy is required and novel catalysts, membranes and reactors will be needed to make the process work.

Three types of modular flow reactors will be developed and then integrated into the demonstrator: photo-electrochemical (PEC), photo-catalytic (PC) and electrochemical (EC)). New catalysts and membranes, that are cheaper and more durable than today's best options, will be developed. Advanced computer modelling will be used for catalyst development, as well as to configure, optimise and manage the reactor performance.



Life Cycle Analysis embedded in design process



Fostering international cooperation

Engagement with industry to plan for commercialisation