

The kick-off meeting of the new project ICO2CHEM was held in Frankfurt on December 1st, 2017. The project aims to convert industrial CO₂ streams to added value Fischer-Tropsch chemicals.

The new project [ICO2CHEM](#) got started. The project is now part of the [SPIRE](#) projects portfolio. SPIRE is the European Public-Private Partnership dedicated to innovation in resource and energy efficiency enabled by the process industries. The kick-off meeting took place on the December 1st, 2017 in Frankfurt at the Industriepark Höchst, in which the Fischer-Tropsch pilot plant will be installed.

The overall aim of the ICO2CHEM project is to develop a new production concept for converting waste CO₂ to value-added chemicals. The focus is on the production of white oils and high molecular weight aliphatic waxes. The technological core of the project consists in the combination of a Reverse Water Gas Shift (RWGS) reactor coupled with an innovative modular Fischer-Tropsch (FT) reactor, which will utilize a novel catalyst with improved selectivity and lifetime.



Context

The EU agenda on energy foresees the decarbonization of the energy system. One of the implementation actions of the EU Integrated Strategic Energy Technology ([SET](#)) Plan focuses on carbon capture and sequestration (CCS) and carbon capture and (re-)use (CCU) technologies. While CCS technologies are well-established, the underlying paradigm is that of treating the carbon dioxide emission as a waste, which is to be disposed of. Reutilization, instead, attempts to add value to CO₂, which becomes then a commodity for a new generation of synthetic fuels and chemicals that will displace their fossil-based counterparts.

ICO2CHEM specifically address a possible CCU pathway to catalytically convert CO₂ to chemicals. The project was founded within the call [SPIRE08-2017 'Utilisation of CO₂'](#) together with two sister projects – Carbon4PUR (Turning industrial waste gases into intermediates for polyurethane plastics for rigid foams/building



insulation and coatings) and Recode (Recycling carbon dioxide in the cement industry to produce added-value additives: a step towards a CO₂ circular economy).

The application

Within ICO2CHEM, a container sized system comprising of RWGS and FT to produce raw chemicals will be installed and operated. The RWGS-step will convert CO₂ with H₂ to carbon monoxide. The following FT-reaction step will be carried out in a novel intensified reactor recently developed and patented by Ineratec (SME partner of ICO2CHEM). White oils and high-molecular-weight wax will be manufactured, being raw material for wax emulsions and white oils to be used in coatings and sealant materials. The properties of the raw material will be tested against the benchmark fossil-based material by partner Altana.

ICO2CHEM not only foresees at developing a novel feasible CO₂ economic route but also enlightening further knowledge about the FT catalyst: project coordinator and partner VTT will develop a novel Co-based catalyst with enhanced selectivity for specific synthetic hydrocarbons.

The FT pilot unit will be installed at the Höchst Industrial Park (Frankfurt, DE) to which CO₂ will be available from a biogas upgrade plant. The required H₂ will also be available on-site as the by-product of a chloro-alkali plant.

The consortium

The project is conducted by the joint effort of 6 EU partners. Coordinator: [VTT](#) (FI). Project partners: [Ineratec](#) (DE), [Altana](#) (DE), [Infraserv](#) (DE), [Provadis Hochschule](#) (DE) and [Politecnico di Torino](#) (IT).