



CE-SC3-NZE-2-2018

eCOCO2

Full Title: Direct electrocatalytic conversion of CO₂ into chemical energy carriers in a co-ionic membrane reactor

Aim:

GHG emissions reduction policies to mitigate the alarming climate change can impact carbon-intensive industrial sectors, leading to loss of employment and competitiveness. Current multistage CCU technologies using renewable electricity to yield fuels suffer from low energy efficiency and require large CAPEX. eCOCO2 combines smart molecular catalysis and process intensification to bring out a novel efficient, flexible and scalable CCU technology. The project aims to set up a CO₂ conversion process using renewable electricity and water steam to directly produce synthetic jet fuels with balanced hydrocarbon distribution (paraffin, olefins and aromatics) to meet the stringent specifications in aviation. The CO₂ converter consists of a tailor-made multifunctional catalyst integrated in a co-ionic electrochemical cell that enables to in-situ realise electrolysis and water removal from hydrocarbon synthesis reaction. This intensified process can lead to breakthrough product yield and efficiency for chemical energy storage from electricity, specifically CO₂ per-pass conversion > 85%, energy efficiency > 85% and net specific demand < 6 MWh/t CO₂. In addition, the process is compact, modular –quickly scalable- and flexible, thus, process operation and economics can be adjusted to renewable energy fluctuations. As a result, this technology will enable to store more energy per processed CO₂ molecule and therefore to reduce GHG emissions per jet fuel tone produced from electricity at a substantial higher level. eCOCO2 aims to demonstrate the technology (TRL-5) by producing > 250 g of jet fuel per day in an existing modular prototype rig that integrates 18 tubular intensified electrochemical reactors. Studies on societal

perception and acceptance will be carried out across several European regions. The consortium counts on academic partners with the highest world-wide excellence and exceptional industrial partners with three major actors in the most CO2-emitting sectors.

Start date:

01/05/2019

End date:

31/05/2022