H2020 project fact sheet:

COmbined suN-Driven Oxidation and CO_2 Reduction for renewable energy storage

CONDOR

Introduction:

Over 80% of the world's primary energy supply is currently provided by fossil fuels. This implies the release of about 34 Gt/y of CO_2 into the atmosphere, which is the primary cause for the global warming that is already affecting the life of millions of people all over the world. Climate stability is a key prerequisite for the existence of modern civilisation, therefore the **decarbonisation of the global economy is a pressing need in the interest of present and future generations**. The decarbonisation of the electricity sector is widening, due to the enormous growth of photovoltaic and wind, which now represent the by far largest share in new installed electric capacity at the global level, i.e., over 60%. On the other hand, fuel supply – which covers about 75% of final energy demand, particularly in the transport and heating sector – is still dominated by fossil resources, i.e., oil, gas and coal. This is because the production of fuels (and chemicals) by renewable technologies is at a much lower level of advancement with respect to electricity. This calls for an enhanced effort for research and development in this area, which is exactly where the proposal CONDOR is positioned.

Project description:

CONDOR targets a modular device for the production of fuels by using water and carbon dioxide as feedstock and sunlight as the sole energy source. This is the most convenient way to store an intrinsically intermittent primary energy source (sunlight) into high density energy carriers that can be used whenever needed (fuels). The latter are termed solar fuels.

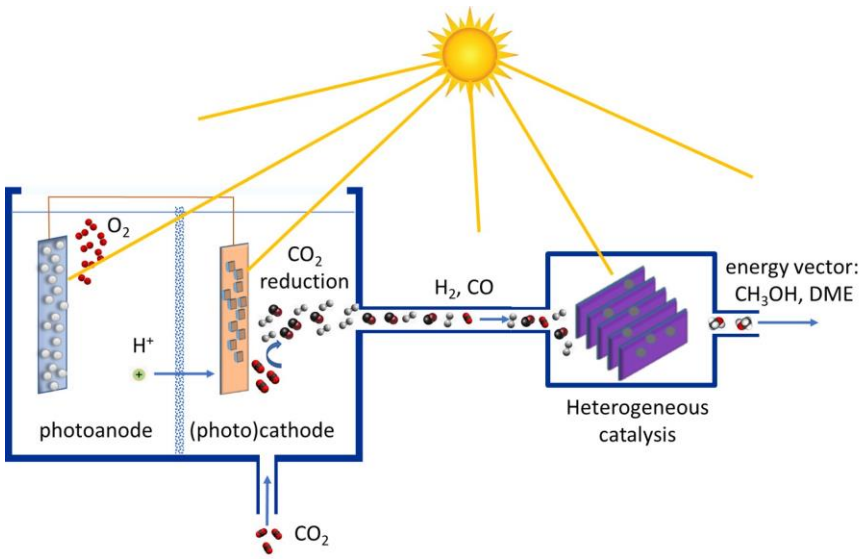

Figure 1: Scheme of the CONDOR device affording the solar driven conversion of CO_2 and H_2O into fuels

Project facts:

Start date: 01/11/2020
End date: 31/10/2024

Duration in months: 48

Project budget: € 3.98 M

Research & Innovation Action

Grant Agreement: 101006839

Call:
H2020-LC-SC3-2020-RES-RIA

Topic:
LC-SC3-RES-1-2019-2020
Developing the next generation of renewable energy technologies

Keywords:
Renewable energy sources
Artificial photosynthesis,
Photoelectrochemical cell,
Heterogeneous catalysis,
Syngas,
Solar fuel,
Electrocatalysis

The **CONDOR approach** focuses on converting sunlight into the energy stored in the chemical bonds of carbon-containing molecules. This will be accomplished by mastering key fundamental processes (light harvesting, electron transfer, bond breaking and forming) in molecules/materials which will be engineered in a two compartment device aimed primarily at the production of fuels, e.g., methanol (CH_3OH) and dimethylether (DME) using CO_2 as feedstock. At present, such a device is unprecedented.

CONDOR aims at increasing the overall TRL of the system from 2-3 to 4. The full system will be demonstrated in outdoor settings at CNR (TRL 4). Beyond the end of the project, the further scale-up is expected to occur.

CONDOR has the ambition to become a basis for the next generation of non-fossil fuel production technologies as it proposes an innovative approach that brings both techno-economic (cost reduction, higher efficiency, lower technological and manufacturing complexity) and environmental (reduced CO_2 emission, reduced energy for production, reduced usage of rare materials) advantages in comparison to current solutions for renewable production of methanol and DME.

Expected impact:

1. Contribute to accelerating and reducing the cost of the next generation of sustainable renewable energy generation
2. Advance the knowledge and scientific proofs of the technological feasibility of its concept including the environmental, social and economic benefits
3. Show contribution towards establishing a solid European innovation base and building a sustainable renewable energy system

Project team:

To meet the challenging scientific and technological goals of CONDOR, a multidisciplinary approach is needed, integrating expertise in chemical synthesis, nanomaterials preparation and characterization, heterogeneous catalysis, photochemistry, electrochemistry and photoelectrochemistry, as well as gas purification, chemical engineering and life cycle analysis (LCA). All the required competences and equipment are available in the consortium.

Consortium:

UNIBO	IT
ICIQ	ES
CNR	IT
UU	NL
UNIFE	IT
ENGIE	FR
LAB	BE
HYG	NL
AMI	CZ
UNC	US

Contacts:

Project coordinator:

Prof. Paola Ceroni
University of Bologna (Italy)
paola.ceroni(at)unibo.it

Project manager:

Anastasia Grozdanova
AMIRES s.r.o. (Czech Republic)
grozdanova(at)amires.eu

Website:

https://condor-h2020.eu/

Twitter:

@CONDOR_EU

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006839, project CONDOR