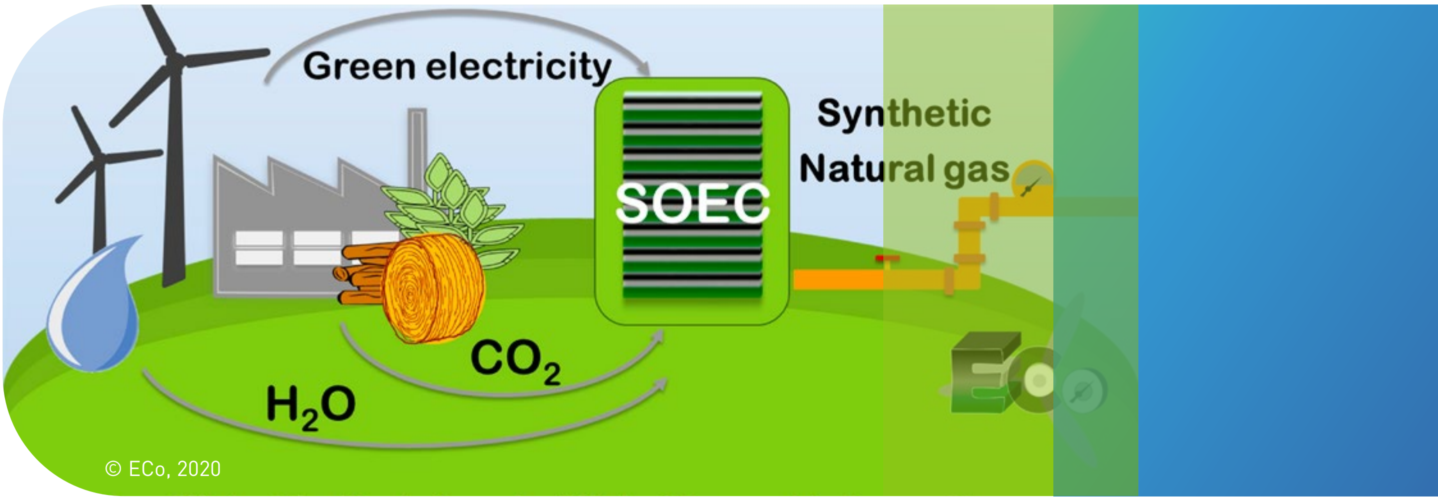
Making an impact on the clean energy transition

ENERGY

GREEN SYNGAS FOR A GREENER FUTURE



From sunshine to synthetic natural gas

Decarbonising our electricity supply is only part of the green energy challenge – 80 % of the energy we use is supplied in the form of molecules. Sustainable syngas could add the momentum on both fronts by helping to green our fuels and facilitating the integration of variable renewable energies such as wind and solar power.

The Fuel Cells Hydrogen Joint Undertaking project Efficient Co-Electrolyser for Efficient Renewable Energy Storage (Eco) has brought the technology closer to commercialisation. It has improved its performance and the overall business case, produced designs and laboratory-scale prototypes for a power-to-methane plant operating on intermittent electricity, and developed the wider vision by performing techno-economic analysis for three potential industrial applications.

Harnessing the potential of co-electrolysis

The ECo project notably improved the design of the electrolysis cells that underpin the process, achieving remarkable performances. These advances were made using existing materials and established manufacturing paths in a bid to facilitate large-scale production.

Research building on ECo's achievements will begin in a follow-on project in 2021, again with support from the FCH JU. This new initiative will focus on demonstrating the technology's potential contribution to reducing carbon emissions in the chemicals industry. It will involve scaling up the technology to suitable dimensions for this sector, with the goal of building and operating the world's largest co-electrolyser.

Syngas has many uses – notably as an energy carrier that can be transformed into resources such as synthetic natural gas or biofuel. The FCH JU is supporting the development of co-electrolysis technology to produce it sustainably from steam and carbon dioxide using renewable electricity, thereby helping to harness its potential to advance decarbonisation.

KEY ACHIEVEMENTS

4 IMPROVED SOEC VERSIONS
delivered and tested at cell and stack level

94 % IF STEAM IS AVAILABLE
high levels of efficiency reached: 74 % if steam is to be generated

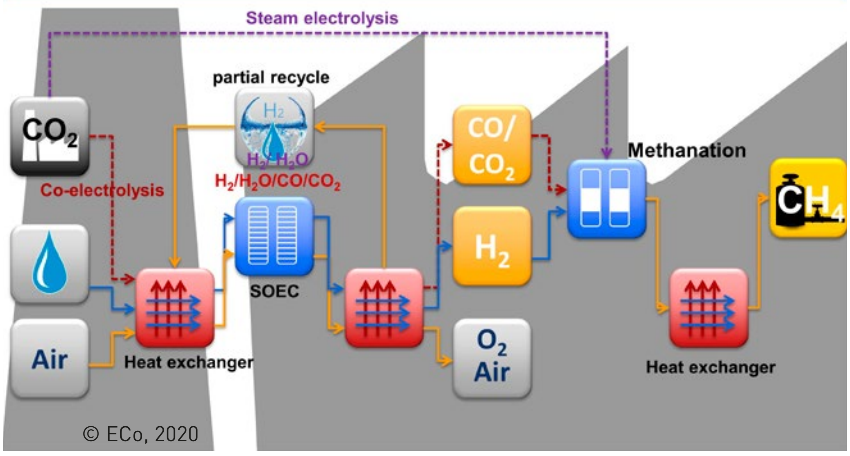
100 °C REDUCTION
operating temperature lowered (from ~800 to ~700 °C) – without affecting the gas output

3 -> 5
technology readiness level raised

<1 %/1 000 HOURS OF OPERATION
very low degradation rates achieved even under dynamic operation

A PIONEERING DESIGN
for a methane-producing co-electrolysis plant operating with fluctuating electricity input

SOEC Plant - Illustration



A COMPELLING PROPOSITION

High-temperature co-electrolysis can produce syngas – a blend of hydrogen, carbon monoxide and CO_2 – directly from steam and CO_2, but further development is needed.

IMPACT

BETTER UNDERSTANDING
of operation and durability under relevant conditions

VALIDATION AT SYSTEM LEVEL
confirming that SOE is an efficient technology solution for the storage of energy from intermittent sources

A STRONGER BUSINESS CASE
e.g. with regard to durability and cost

ADDED INSIGHT
as to the perspectives, impacts and requirements

A STRONG MESSAGE
favourable conditions for this technology already exist!

SOLID SUPPORT FOR SUSTAINABLE SYNGAS

Research and innovation backed by the FCH JU is helping to advance the technology and pave the way for commercialisation. **The goal?** Via the production of green syngas and its transformation into energy carriers such as synthetic natural gas, electricity from intermittent sources could be transformed into a storable supply. **Key results?** The ECo project has achieved significant progress, including refinements of the solid oxide electrolysis cells (SOECs) on which the process relies, exploration of the business case and studies of potential applications.

FIND OUT MORE

www.fch.europa.eu/page/fch-ju-projects
https://www.eco-soec-project.eu

@fch_ju

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

A partnership dedicated to clean energy and transport in Europe

PDF	ISBN 978-92-9246-363-2	doi:10.2843/17949	EG-04-20-543-EN-N
PRINT	ISBN 978-92-9246-362-5	doi:10.2843/240418	EG-04-20-543-EN-C