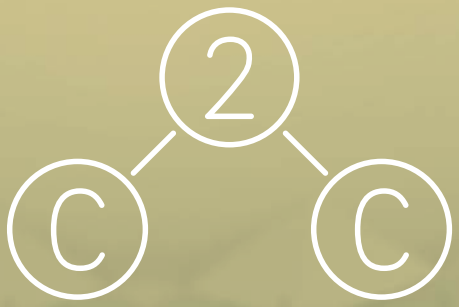
Subproject L-I

CO_2 SOURCES AND INFRASTRUCTURE

Project content
for the period 2020 to 2024



Carbon2Chem®

PROJECT AIMS

The solutions and concepts on the use of carbon dioxide (CO_2) in the joint project Carbon2Chem® should be transferred to other sources of CO_2. A roll-out thus takes place to other industries with unavoidable CO_2 emissions, such as the lime industry or waste incineration plants. This means that CO_2 emissions are minimized across sectors.

The various CO_2 reduction initiatives within industries will fundamentally change the CO_2 sources and their availability in the next 30 years. These changes are shown in a CO_2 matrix, which serves as the basis for investment and technology decisions involved in the transformation of industries towards climate neutrality. One example is a sensible combination of CO_2 use and hydrogen metallurgy in the steel industry.

Other areas of focus are the comparison of the availability of and need for hydrogen (H_2) and suggested solutions to balance this, e.g. with a feasibility study on a hydrogen cavern storage facility as intermediate storage.

PROJECT CONTENT

In subproject L-I, new cross-industrial networks are examined. To transfer the process concepts developed in the first phase of Carbon2Chem® to other industries, the technologies need to be adapted. This concerns the changed gas composition and also the quantity of the gases that arise. Smaller, modular concepts are thus developed in the project. These are theoretically evaluated in the first half of the project and designed in the second half of the project as demonstrators. Alongside this, CO_2 sources, including their composition and temporal availability, the necessary hydrogen and its availability, and the availability of renewable energy are analyzed.

A database is thus developed to enable sensible optimizations and a suitable setup of the necessary infrastructure for the overall system.

MILESTONES

- Creation of a CO-/CO_2 matrix (static in project month 12, forecast up to 2050 in project month 45), also comparison with the necessary H_2 (static in project month 12, forecast in project month 48)
- Geological feasibility study on H_2 cavern storage (project month 23) and the development of the associated technical requirements (project month 48)
- System concepts for CCU in the lime industry (project month 15) and the implementation of options for a pilot plant (project month 21)
- Changed process gas availability in the steel industry by using DRI and H_2 as a reducing agent (project month 21)
- Creation of framework conditions for the construction of a demonstrator (project month 30) and associated operator concepts (project month 36)
- Analysis of the gas and electricity network infrastructure (project month 21)
- First concepts for regulatory framework conditions in coordination with the subproject L-KK (project month 15)

PROJECT PARTNERS

- thyssenkrupp AG (coordinator)
- Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT
- Lhoist Germany Rheinkalk GmbH
- Thyssen Asset Management Ltd.
- REMONDIS Assets & Services GmbH & Co. KG