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JOINT PROJECT

Carbon2Chem®

KEEPING CARBON IN THE LOOP

1 *Dr.-Ing. Ulrich Seifert, Head of Carbon2Chem® subproject “CO_2 Sources and Infrastructure”.*

L-I | CO_2 SOURCES AND INFRASTRUCTURE

SOURCES AND TIME DEVELOPMENT, TRANSFORMATION PATH, PROCESS CONCEPTS, DEMONSTRATOR

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Background

Within the Carbon2Chem® project, technologies are being developed to reduce CO_2 emissions at large industrial sites by using the emissions as a new source of raw materials for the chemical industry.

The focus lies on forming cross-industrial value creation chains and increasing energy efficiency by establishing cross-industrial networks.

This will be shown using the steel production site Duisburg/NRW as an example.

Aims

The aim of subproject L-I is to identify further CO_2 sources outside the steel industry and to create a CO/CO_2 matrix that includes the composition and size of the sources as well as the respective sites and their foreseeable development over time. Using alternative energy sources or new process routes will change the CO_2 flow and content in the process gases and flue gas. The production of lime will also be examined, as well as thermal waste treatment.

Questions of infrastructure apply to CO_2 as well as to the availability and supply of hydrogen produced in a greenhouse gas neutral way. Relevant transformation paths will be depicted and evaluated, supplemented by process concepts and demonstrators.

1 *Carbon2Chem®-Laboratory, Oberhausen.*

Tasks

Projekt duration 2020 to 2024

The systematic survey and the description of current CO and CO_2 sources in industrial processes outside of steel production form the starting point for determining current and expected future process gas flows containing CO/CO_2 as feedstock for the production of chemicals.

Using the examples of lime production and waste incineration, information on the temporal and spatial availability of these gases as well as other gas components will be determined, processed and presented with a view to future development.
The expected influence of technical and regulatory conditions will be elucidated. Based on this, the specific hydrogen demand and the necessary infrastructure are to be determined and evaluated for each location.

The process concepts to be formulated, especially for modular/decentralized plants, will be provided as input to the communities "Simulation" and "Sustainability Assessment".

Milestones

Projekt duration 2016 to 2020

- Static CO/CO_2 matrix with main and secondary components
- Carbon matrix of the main users
- Shift of the carbon matrix based on new technologies, regulatory changes and changing needs
- $C/CO/CO_2$ matrix with main and secondary components including expected changes till 2050
- Implications of site-specific characteristics on approval procedures
- Concept for deriving possible transformation paths
- Description of possible transformation paths
- Evaluation of showcase process and operation concepts
- Concepts for the transfer of existing solutions to container systems
- Analysis of the gas and electricity network with regard to the required infrastructure

Project duration

The Carbon2Chem® project was launched on March 15, 2016. In the second project phase (start: June 1, 2020, duration: 4 years), the focus is on demonstrating the robustness of the concepts already developed for the purification of steel mill gases, the synthesis of various chemicals and, in particular, system integration.

By the end of the second phase, an industrial implementation and basic engineering/PDP of the plant networks should be technically feasible.

Further project partners in L-0

- thyssenkrupp AG (coordination)
- Lhoist Rheinkalk Germany
- Remondis (associated partner)
- thyssen Vermögensverwaltung

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Further information
www.umsicht.fraunhofer.de/carbon-cycle

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