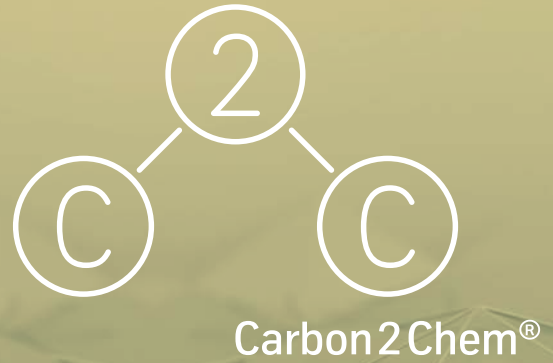


Subproject L-0

SYSTEM INTEGRATION

Project content for the period 2020 to 2024



PROJECT AIMS

The aim of the second phase is to expand the previously developed concepts for purifying metallurgical gases, which are used to synthesize various chemicals and, in particular, for system integration, in such a way that industrial implementation is realized following the project phase and the robustness of the solution can be demonstrated.

Methanol and higher alcohols are primarily considered here as starting materials for synthetic fuels, as well as urea as a starting material for artificial fertilizers. In addition, the individual technology modules are combined and adapted in such a way that they can also be used to implement greenhouse gas neutrality in other sectors. The system boundaries are extended beyond the metallurgical plant in the second project phase, so that all technology modules can ultimately be linked to new cross-industrial inter-linked productions. Possible target areas include, for instance, the cement and lime industry or the recycling of residual materials, in addition to the steel industry. With regard to steel production, the “hydrogen route”, which is considered in parallel by thyssenkrupp, is included in the system analysis and compared with the Carbon2Chem® path.

PROJECT CONTENT

In the second phase, the process concepts that were developed in the first phase and assessed as economically and ecologically beneficial are further refined for the metallurgical plant at the Duisburg site. Solutions are developed in detail for technical hurdles and the coupled processes are optimized. Using this as a basis, analyses are conducted on the transferability of previously developed concepts to further sources of carbon dioxide (CO₂) and metallurgical plants at other sites and the integration of other procedural/chemical processes is investigated. Taking into account a comprehensive system approach, possible technological transformation paths are developed and assessed.

The previously developed methods are used here, in particular the Carbon2Chem® simulation and the previous experimental tests. The methods of simulation and the subsequent assessment are gradually expanded according to the new requirements. In addition to this wide-ranging approach, the industrial implementation and the preparations that are necessary for this take priority in the second project phase.

MILESTONES

Several milestones are planned in the second phase of the project. The clear goal of having developed and optimized the Carbon2Chem® technology to such an extent at the end of the second funding phase that an industrial implementation can be begun is based on the third level of consideration of subproject L-0. The introduction of the technology on the market is explicitly driven forward and relates to the establishment of a Carbon2Chem® system on an industrial scale at the Duisburg site using the metallurgical gases from the metallurgical plant of thyssenkrupp Steel Europe AG. In order for it to be possible to implement this project in 2025, basic engineering is prepared as far as possible as early as the second project phase.

PROJECT PARTNERS

- thyssenkrupp AG (coordinator)
- Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT
- Max Planck Institute for Chemical Energy Conversion (MPI-CEC)
- Siemens Energy AG