Carbon2Chem® – Valorising Emissions from the Steel Industry

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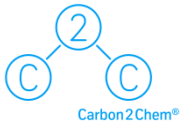

Abstract

Reducing greenhouse gas emissions and limiting global warming to well below 2 ° are the major targets set by the international community in 2015 with the adoption of the Paris agreement on climate change. But the technical realization of these goals poses a huge challenge for many industrial sectors with high emissions, such as the steel sector. A highly promising approach is the establishment of synergetic networks across large industries. Carbon dioxide (CO_2) produced e.g. during the steel production can replace fossil fuels in the chemical industry by using renewable energy. (Oles et al. 2018)

Under the coordination of thyssenkrupp AG, the Max Planck Institute for Chemical Energy Conversion, and the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, another 16 well-known industrial and academic partners have joined forces across all sectors. In the project Carbon2Chem®, which has been running for a year now and is funded by the BMBF, technologies and strategies are developed to make a contribution to climate protection and the protection of energy-intensive industry sites.

In steel production significant amounts of metallurgical gases are produced in the various process steps. The metallurgical gases consist of various components such as hydrogen, carbon monoxide and carbon dioxide as well as nitrogen. At Carbon2Chem® the goal is to produce valuable chemical products instead of using the smelter gases to generate electricity, as it was the case until now. By separating the components of the metallurgical gases followed by a purification and the chemical reaction, the carbon including CO_2 is used a second time in the chemical production. The synthesis of the most important basic chemicals such as methanol, ammonia, hydrogen and various polymers and fuels can be achieved on the basis of metallurgical gases. The list of chemical products is arbitrarily expandable, for example in the direction of higher alcohols as a gasoline additive or in the direction of oxymethylene ether (OME) as a diesel substitute. In the manufacturing process of these chemicals, electricity from renewable energies shall be used as an energy source. If the hydrogen from the electrolysis of water is not continuously available due to the use of fluctuating renewable energies, procedural concepts must be applied to ensure stable plant operation. Thus by the merger of key industries an essential contribution to climate protection is made and contributes to the success of the energy transition. (Marzi et al. 2017)

Heading for this goal can only be mastered within a cross-industrial network; different competencies can be bundled successfully and combined into a new system.

Literature:

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