Carbon Capture and Utilization (CCU) in Flanders: current status, challenges and way forward

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Carbon Capture and Utilization or CCU includes processes in which CO_2 from point sources is being used as feedstock for the synthesis of new molecules with an economic value. This approach can contribute to the reduction of the greenhouse gas CO_2 in the atmosphere, which is considered one of the main causes for climate change. Although several CCU technologies are developed, the implementation of CCU on an industrial scale is rather limited in Flanders. To map the most promising new valorization pathways for CO_2 as raw material/feedstock with a view to their application in the Flemish Region and to define how CCU can be stimulated, the Environment, Nature and Energy Department of the Flemish Region commissioned a study to VITO and DNV GL.

The current CO_2-utilization projects of research centers and the industrial CCU-initiatives in Flanders were inventorized by means of a stakeholder survey, and evaluated according to a number of thermodynamic, economic and environmental criteria. Four cases were selected from the inventoried CCU technologies for further evaluation to assess their contribution to emission reductions in the Flemish Region. The analysis aimed to compare the different cases, to identify the strengths and to evaluate how weaknesses could be overcome, and was based on 5 criteria. To estimate the actual contribution of a CCU technology to emission migitation (criterion 1), the net CO_2 emissions of the industrial process were calculated. To this end, material and energy balances were compiled that allow to quantify (in)direct CO_2-emissions in comparison to a realistic benchmark scenario. Based on these balances the economic feasibility of the process was evaluated (criterion 2) and the potential scale of application in the Flemish region was determined (criterion 3). Given the preliminary nature of this study and the uncertainty of the input parameter values, a sensitivity analysis was performed. Subsequently, the level of technology development (TRL) was assessed (criterion 4). Furthermore, a system analysis was performed (criterion 5) focusing on input, technology, output and sustainability. Finally, concrete policy recommendations were formulated to encourage the application of CO_2 in the Flemish Region, taking into account the EU ETS (Emissions Trading System) framework in Europe.

In this presentation, an overview of the results obtained of this study will first be presented, and will then be complemented with different inter/crossregional activities in the field.