The future role of CCS as part of a German mitigation strategy

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The German Federal Government has set CO₂ reduction targets of 40% for 2020 and 80 – 90% for 2050 in relation to levels of 1990. In addition to CO₂ reduction, German energy and climate policy comprises further ambitious targets (governmental energy concept). These include rapidly and strongly increasing of efficiency and the use of renewable energy.

According to the 5th IPCC assessment report CCS is one key technology to meet the ambitious reduction goal of 2°C. Because of acceptance problems carbon capture and storage (CCS) is not an element of the German governmental energy concept. Nevertheless, we analyzed the system value of CCS in Germany within the context of consistent greenhouse gas reduction scenarios with and without the implementation of CCS technologies. The system value of CCS is determined by identifying additional CO₂ avoidance costs that would occur if climate change mitigation targets were to be met without using CCS even though CCS technology was available. The methodological basis for the scenario calculations is the bottom-up energy system model IKARUS with detailed depictions of the technical energy supply structures in Germany for scenario-based analysis of CO₂ reduction strategies. The energy economics results comprise energy and CO₂ balances, capacity development, and the cost of CO₂ mitigation strategies. From this, the system value of CCS and the contribution of all model sectors to it are derived.

Our calculations show, that the additional costs in the scenario without CCS are higher over the whole period than the costs of the scenario with CCS, i.e. the CCS option is used and cuts the costs. In the scenario without CCS, additional costs arise especially in the sectors households and transport, as well as to a smaller extend in the industrial sector. Overall, the integral additional costs for the period until 2050 are approximately 50% higher than for the case with CCS. Over the whole period until 2050 the net present value of additional system cost of excluding CCS technologies is approx. €2010 100 billion.

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