

# Preface

In numerous national and international energy scenarios, high priority is being given to technologies for carbon capture and storage (CCS) as an option for reducing energy- and process-related CO<sub>2</sub> emissions. This is particularly important against the background of a globally increasing use of fossil fuels despite the growing significance of renewable energy.

Numerous core components for CCS have already reached a high level of technical maturity, even though the requirements for industrial-scale application in the energy system (first-generation processes) have revealed a need for further research and development, e.g. improved conversion efficiency, less severe environmental impacts of the use of scrubbing substances, storage that is safe in the long term, reduced investment costs, and the use of CO<sub>2</sub> for material production and energy generation. National and international research in this area is intensive, and some activities are already concentrating on second-generation processes.

In Germany, the transportation and storage of CO<sub>2</sub> in geological formations is a controversial topic. In other potential user countries in Europe and throughout the world, scepticism is growing in different sections of society with regard to the implementation of CCS technologies.

Against this background, an integrated technology study is urgently required to discuss and assess the technical, economic, environmental, and social perspectives of CCS technologies, even though a wealth of information and scientific expertise already exists on individual aspects. The Institute of Energy and Climate Research – Systems Analysis and Technology Evaluation (IEK-STE) at Forschungszentrum Jülich has therefore published this study compiled by an interdisciplinary team of engineers, economists, social scientists, and political scientists. The preliminary work for this study was completed in a series of projects funded by the Helmholtz Association and third parties. Further scientific expertise has been incorporated with contributions on using and storing CO<sub>2</sub> written by our colleagues at RWTH Aachen University and the German Research Centre for Geosciences in Potsdam.

The editors would like to thank the scientists for their contributions and for their unwavering motivation – right from the initial idea and the development of the framework to the actual creation and editing of the manuscripts.

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