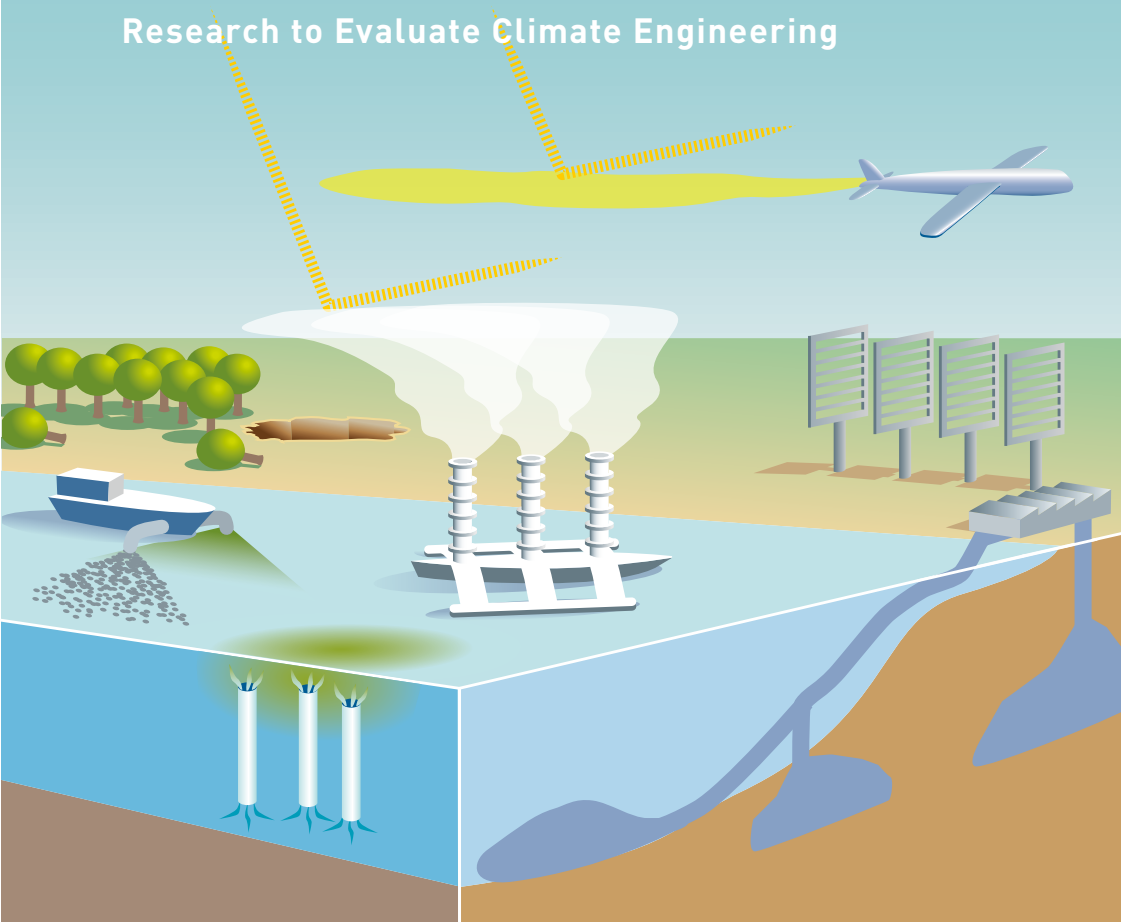


Risks, Challenges,
Opportunities?

Risks, Challenges, Opportunities?

Research to Evaluate Climate Engineering



Priority Programme 1689 of the
German Research Foundation (DFG)



PRIORITY PROGRAMME 1689

The Priority Programme »Climate Engineering: Risks, Challenges, Opportunities« (SPP 1689) evaluates the potential effectiveness and side effects of several climate engineering methods on both short- and long-term, as well as regional and global scales. For a comprehensive assessment we consider the scientific and technical dimensions, as well as the social, political, legal and ethical aspects of climate engineering. The 2nd phase of the SPP 1689 started in May 2016 and will run three years. Eighteen universities and research institutes collaborate in ten projects to continue the successful work of the 1st phase. The SPP 1689 is funded by the German Research Foundation (DFG) with nearly 10.5 million euros for the whole project period. Coordinator of the SPP 1689 is Prof. Dr. Andreas Oschlies from the GEOMAR Helmholtz Centre for Ocean Research Kiel and the Kiel Earth Institute.

Three climate engineering methods, which exemplify the typical scales and characteristics of the different climate engineering ideas, are considered in the SPP 1689:

- // addition of alkaline (basic) substances to the ocean to increase the uptake of CO₂ from the atmosphere;
- // injection of aerosols into the atmosphere, to increase the reflection of solar radiation and thus counteract global warming;
- // methods to increase terrestrial carbon sequestration.

Effects of different climate engineering methods are simulated with Earth system models. Field experiments and research to develop new climate engineering methods are not carried out.

MAIN OBJECTIVES:

- // investigation of the climatic, ecological and social risks and potential effectiveness of different climate engineering methods;
- // evaluation of the scientific and public perception of climate engineering;
- // assessment – not development! – of climate engineering, including scientific, social, political, legal and ethical aspects.

Risks,
Challenges,
Opportunities?

BACKGROUND

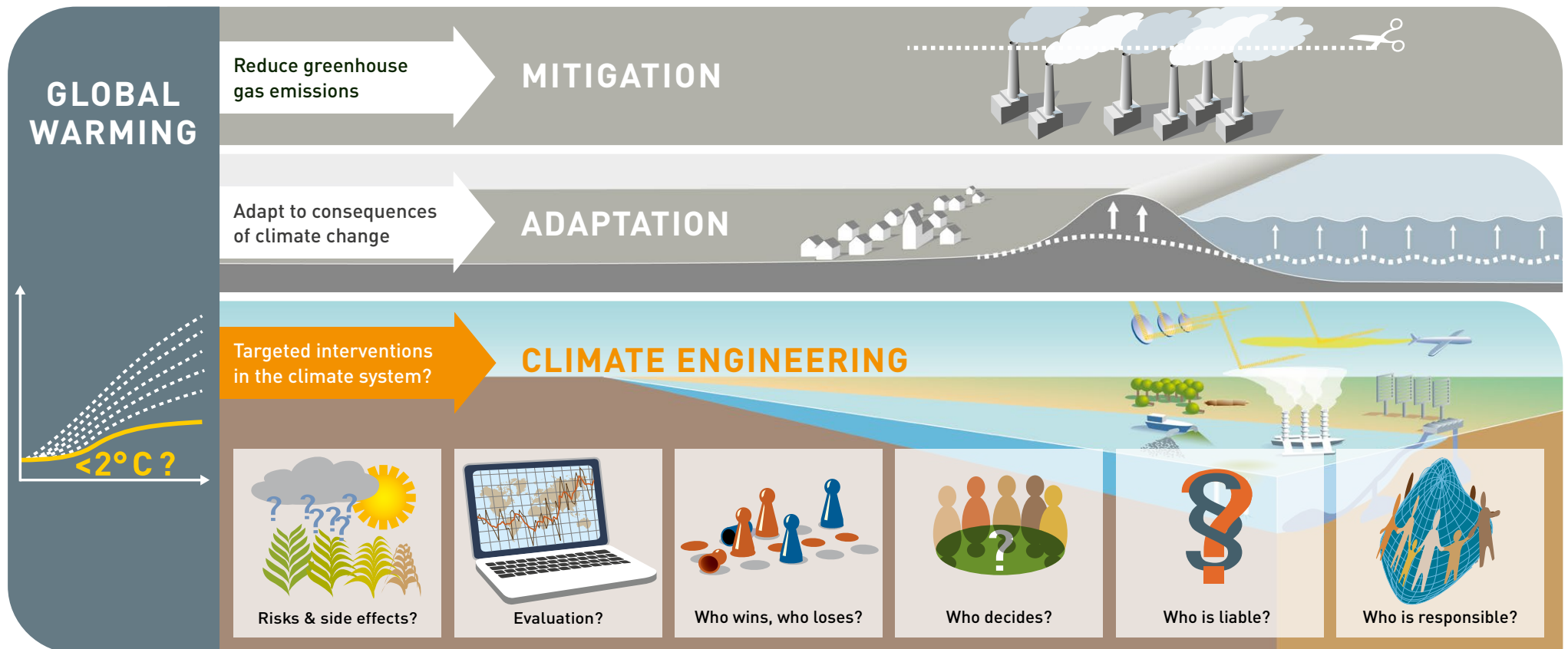
The term »climate engineering« covers several large-scale technical methods that have been proposed to counteract global warming by either carbon dioxide removal (CDR) or solar radiation management (SRM). The general idea of climate engineering is discussed controversially among scientists and generally met with great scepticism by the scientific community, the public and policy makers. The SPP 1689 aims at a critical assessment of the pros and cons, and at providing unbiased

scientific information that can help society to take decisions about our future climate policy. With the Paris Agreement in 2015 the world community committed itself to keep global warming well below 2 °C. To meet the agreed target, global CO₂ emissions would have to be reduced radically. Even optimistic mitigation scenarios (e.g. some used by the IPCC) generally assume »negative emissions«, broadly referring to the removal of CO₂ from the atmosphere (CDR).

The environmental and social implications of individual CDR options, their overall potential and their side effects are not yet well understood. What would be the trade-offs of such negative emission technologies? Would, in addition to CDR, also SRM methods be needed to prevent temperature overshoots? Would a world with climate engineering be desirable?

Despite the pressing need to develop strategies to combat climate change, and despite the lack of scenarios that meet agreed climate goals without climate engineering, a comprehensive scientific assessment of the potential environmental, political and moral risks, challenges and opportunities of climate engineering is not yet available. To assess climate engineering as a possible option to counteract global warming is the focus of the SPP 1689.

CLIMATE ENGINEERING – OPTIONS TO PREVENT CLIMATE CHANGE?



RESEARCH PROJECTS PRIORITY PROGRAMME 1689



Coordination

Coordination of SPP 1689

- // KIEL EARTH INSTITUTE
- // GEOMAR Helmholtz Centre for Ocean Research Kiel

CELARIT

Climate engineering liability and reliability: an integrated treatment

- // Bielefeld University
- // Heidelberg University
- // Trier University
- // Max Planck Institute for Meteorology, Hamburg

CEMICS2

Contextualizing climate engineering and mitigation: illusion, complement, or substitute?

- // Universität Hamburg
- // Institute for Advanced Sustainability Studies, Potsdam
- // University of Graz
- // Potsdam Institute for Climate Impact Research

TOMACE

Trade-offs between mitigation and climate engineering: an interdisciplinary approach

- // Kiel Institute for the World Economy
- // University of Kassel
- // Kiel University

LEAC - II

Learning about cloud modification under risk and uncertainty: investigation of feasibility, traceability, incentives and decentralised governance of limited-area climate engineering

- // Leipzig University
- // Kiel University

CE-LAND+

Climate engineering on land: comprehensive evaluation of Earth system impacts of terrestrial carbon dioxide removal

- // Potsdam Institute for Climate Impact Research
- // Max Planck Institute for Meteorology, Hamburg

ComparCE-2

Comparative assessment of potential impacts, side effects and uncertainties of climate engineering measures and emission-reduction efforts

- // GEOMAR Helmholtz Centre for Ocean Research Kiel
- // Max Planck Institute for Meteorology, Hamburg

CDR-MIA

Carbon dioxide removal model intercomparison assessment

- // GEOMAR Helmholtz Centre for Ocean Research Kiel
- // Potsdam Institute for Climate Impact Research

AWiCiT

Climate engineering by arctic winter cirrus thinning: risks and feasibility

- // Karlsruhe Institute of Technology
- // ETH Zurich

CE-03

Stratospheric ozone loss in mid-latitudes in summer – a potential risk of climate engineering?

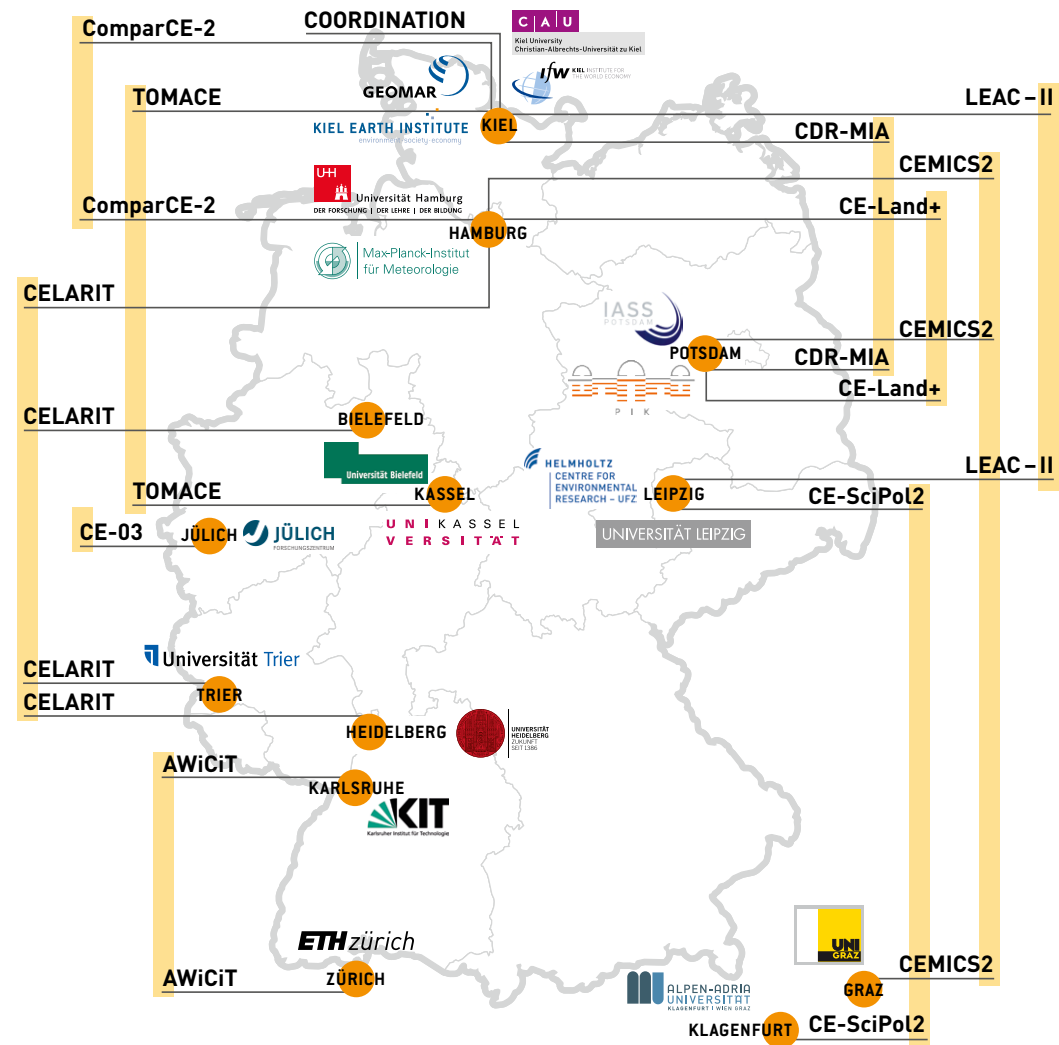
- // Forschungszentrum Jülich

CE-SciPol2

Responsible research and governance at the science-policy nexus of climate change: new discourses, epistemic communities and Climate policy regimes through climate engineering?

- // Alpen-Adria-Universität Klagenfurt
- // Helmholtz-Centre for Environmental Research GmbH - UFZ

SPP 1689 RESEARCH PROJECTS 2nd PHASE // 2016 – 2019



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More information about the Priority Programme 1689 and the individual projects is available at:
www.spp-climate-engineering.de