INOGOV
INNOVATIONS IN CLIMATE GOVERNANCE

May 2018 | N° 4

Policy brief

Climate engineering and political decision-making: The importance of polarity in academic debate

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Summary

- Climate engineering approaches cannot yet be considered "physically-tangible technological object[s]" [1] as they have not yet been implemented on a large scale.
- There is, at this moment, a unique opportunity to actively and critically shape the way in which - and if at all - these approaches are considered.
- It is important to preserve the contentious character of the academic discussion on climate engineering for political decision-making.

Polarity in the academic discussion

In order to address the challenges posed by anthropogenic climate change, various approaches to engineer the climate have been proposed in recent years. The term 'climate engineering' refers to the "large-scale, deliberate intervention in the Earth system to counteract climate change" [2]. A number of very diverse approaches – varying in their impact, side effects, costs, social and political preconditions and implications, and many other aspects – are included under this umbrella term. Amongst them are ideas such as large-scale fertilization of iron-poor areas of ocean to increase CO_2 uptake, capturing ambient air to filter out CO_2, distribution of aerosols in the stratosphere to reflect solar radiation away from Earth or modification of surface areas to alter their albedo[1].

[1] i.e., the fraction of solar radiation that is reflected back into space

None of these approaches have been implemented on large scales to date. However, a few small-scale experiments as well as an increasing number of modelling studies have provided insights into some interactions with the climate and other natural systems – both concerning intended and unintended effects. Simultaneously, the discussion of climate engineering and its challenges and benefits in the face of anthropogenic climate change has grown in social sciences and humanities as well. Climate engineering approaches have been studied with regard to aspects of their economic, political, societal, linguistic, ethical and legal context. And while this academic discussion and analysis is increasing, the extent of public knowledge as well as political deliberation of climate engineering remains small.

Compared to other emerging technologies, the academic discussion of climate engineering is characterized by a strong polarity or a "dual high-stake framing" [3]: Academic publications tend to highlight either the dangers of doing nothing or the dangers of considering climate engineering. Studies indicate that a number of distinct and to some degree conflicting frames exist in the academic discussion on climate engineering [4-6]. This implies that academics consider stakes to be high in the decisions that are to be made concerning climate engineering, and that they are high either way.

Questions in need of political decision-making

Academic research, be it in the social sciences, humanities, natural or engineering sciences, can answer a lot of very important questions surrounding climate engineering in a very precise way. For example, it can tell us what the probable impact of the large-scale application of certain stratospheric aerosols is on the photosynthesis rate on plants or whether people can be expected to uphold mitigation endeavors when they know about stratospheric aerosol injection measures. However, some questions surrounding climate engineering are 'wicked' problems [7] that do not have a "pure technical solution" [8] and thus do not have a right or wrong answer, no matter how much data is collected and analyzed. An obvious example is the highly challenging question whether climate engineering should play any part in a global response to anthropogenic climate change at all.

Questions such as this one, I argue, warrant political deliberation. Politics are "processes of authoritative decision making" [9] which determine how both material and non-material values are distributed "in societies and among nations" [9]. To cite another example: While academic research on climate engineering can tell us, with a certain probability and a certain degree of uncertainty, which effect a given degree of albedo modification will have on the precipitation in India or South Africa and on average temperatures in China or France, it cannot tell us which level of albedo modification to choose: It can define a range of options to choose from, and it can identify the probable implications of these options: be they societal, economic, physical, chemical or otherwise. Thus, it can inform a decision. But this does not, usually, preclude the decision. In this, the issue of climate engineering is not different from other decisions concerning the global climate: While the IPCC can and does inform policymakers concerning the implications of various levels of climate stabilization, this body explicitly recognizes "the importance of governance, ethical dimension, equity, value judgements" for "[e]ffective decision-making to limit climate change and its effects" [10]. Its results are meant to be policy-relevant, but not policy-prescriptive [11]. Among researchers, there is broad agreement that political questions concerning climate engineering are profound [12].

No decision is also a decision

Also similar to climate governance in general, not making a decision concerning climate engineering is a decision concerning climate engineering is a decision in its own right: If GHG emissions are allowed to continue unabated – the scenario usually called 'business as usual' – this has consequences for various groups in society, just as much as deciding on rigorous mitigation measures does. Not making conscious political decisions on climate engineering implies accepting that these approaches will continue according to their own dynamics. This means that they might disappear from the discussion altogether, for example due to lack of funding, or that they might be developed in a way that does not consider the interests and needs of all those affected, but instead serves certain particular interests and goals. And while political deliberation does not guarantee that the best decision for all concerned will be made, I argue that it is the best tool at this point in time to draw near this ideal.

As pointed out above, climate engineering approaches, so far, exist in the world of ideas, but have not been implemented on a large scale in the material world. These approaches are not (yet) embedded in a highly complex and far-reaching socio-technical system [13] entangling expensive infrastructures, artifacts, investments and large amounts of livelihoods depending upon them. If they were, this would make decision-making even more complex than it already is, as well as costly in terms of the need to re-allocate values in society. The current situation offers the opportunity to actively and critically shape the way in which climate engineering develops in the future, and to put into place a highly politicized process to shape collectively binding decisions concerning climate engineering. This process would be politicized in the sense that climate engineering would become "subject to public deliberation, decision making and contingency where previously it was not" [14].

Preserving contention in academic information of political decision-making

Putting into place such a process could help prevent going down a slippery slope: This concern, which has been voiced by researchers as well as other actors in the discussion, points out the "possibility that permitting research on climate engineering could itself be a step onto a slippery slope, making development and eventual deployment of a technology more likely." [15] While this development is not deterministic, it is at least possible. This can be observed, for example, in the process through which the idea of the possibility of a nuclear explosion culminated in the dropping of two nuclear bombs in the 1940s [16].

To prevent the development of similar momentum in the case of climate engineering, we have to preserve the contentious character of climate engineering in the academic discussion so that both challenges and benefits of climate engineering approaches are considered. This would allow for conscious decision-making instead of assuming that there was no choice. One way of doing so is the idea of a *'red team'* and a *'blue team'* working on climate engineering in informing decision-making (see box below). Thus, the strong polarity of the academic discussion would not be artificially diminished and reduced to a seemingly unified, value-free 'voice of academia', but would benefit the deliberation by assuring that both extremes in the debate are present in expert advice on climate engineering [see, for example, 17, 18].

The red team/blue team approach

The idea is that any research project studying climate engineering would be made up of two 'teams' of researchers: "one team is tasked with showing how an approach can be made to work, and another team is tasked with showing why the approach cannot produce a system that can actually diminish environmental risk at an acceptable cost." [26] Both teams would serve as a counterweight to each other. The *red team/blue team approach* has been proposed in the discussion on climate engineering in order to capture the complexity of benefits and risks arising from these approaches: It is meant to ensure that research does not get carried away in analyzing the possibilities presented by climate engineering and ignoring the dangers, or vice versa.

The C2G2 initiative (Carnegie Climate Geoengineering Governance Initiative) of Carnegie Council for Ethics in International Affairs can be seen as an implementation of the idea that climate engineering needs political decision-making of these approaches on the basis of academic research. The initiative aims to "catalyze the creation of effective governance for climate geoengineering technologies by shifting the conversation from the scientific and research community to the global policy-making arena, and by encouraging a broader, society-wide discussion about the risks, potential benefits, ethical and governance challenges raised by climate geoengineering" [20].

Addressing the challenge of climate change is an ongoing process. It is important to remember that there are a large number of decisions to be made, and that, in making these decisions, global society can shape its own future. This policy brief highlighted the political character of many decisions relevant in the context of climate engineering, and pointed out the vital role that should be played by academia.

Policy recommendations

- Many questions surrounding climate engineering can be informed by academic study, but warrant political decision-making as they concern the allocation of values in society. The acceptance of the business-as-usual scenario should be recognized as a political choice in its own right.
- In order to assess the challenges and risks as well as opportunities afforded by various climate engineering approaches, the deliberation of these should be broadened.
- In order to ensure that the polarity inherent in academic study of climate engineering is not lost in translation to decision-makers, a process such as the *red team-blue team approach* should be put in place.

Acknowledgements

This policy brief has strongly benefited from comments from Carola Klöck, Pawel Pustelnik, Jeremy Moulton and Johanna Forster.

INOGOV is funded by COST, European Cooperation in Science and Technology (Action IS1309).

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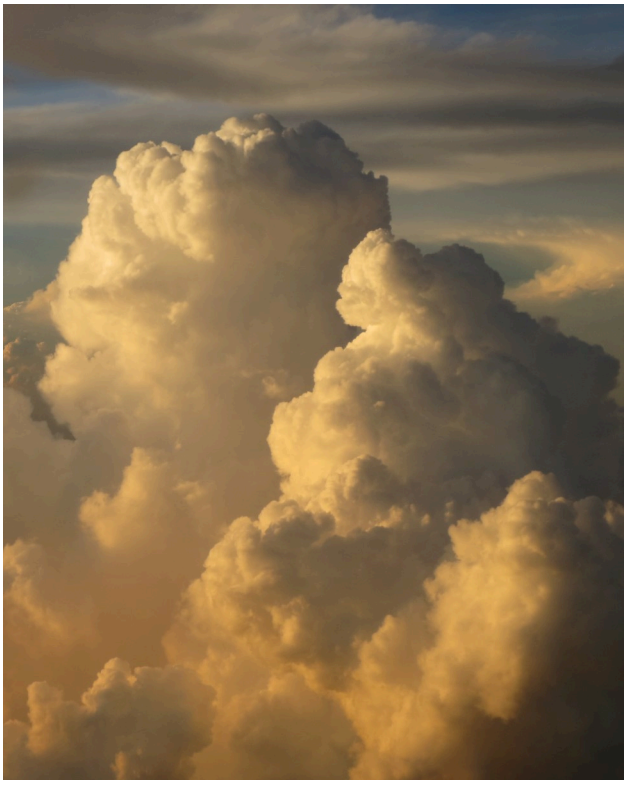

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Judith Kreuter is Research Fellow in the research group 'International Relations' at the Political Science Institute, Technische Universität Darmstadt. She studied Political Science, International Relations and Philosophy at the Universities of Heidelberg, Frankfurt/Main and Darmstadt as well as at the Institut des Sciences Politiques in Lille, France. During her research, she visited the Universities of Harvard and Oxford, among others. Her work focuses on the governance of climate engineering, as well as on the interaction between academia and politics surrounding these cutting edge technologies. Issues and topics such as nuclear energy technology, the transition to renewable energy technologies as well as processes of digitalization are foci of her teaching and research activities. In her PhD project, she studies the academic discussion on Climate Engineering.