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## **Opening Statement for the CEC14**

Berlin, 18 August 2014

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Welcome to the CEC14!

It is a privilege and a pleasure to see so many of you gathered together for this first international, transdisciplinary conference on the many issues which are subsumed under the umbrella term "Climate Engineering".

The CEC14 has brought together over 300 people from 40 countries with a wide range of backgrounds from academia, policy and civil society as well as the media and the arts. We expect this diversity to lead to rich discussions, with experts who approach the topic of climate engineering from all its various facets being available to provide well-informed input into the discussions. Many of you have probably also already witnessed this thirst for cross-disciplinary exchange in dialogues around this controversial topic, which was a large part of our motivation for conceiving and hosting the CEC14.

During the plenaries on this first day of the CEC14, you will already get a flavor of these varied perspectives. I'd like to open with three points that I have been bringing out on various occasions, which I think are central to the discussions around climate engineering, and valuable to keep in mind during a conference of this nature.

First, what exactly is "climate engineering", or "geoengineering" as it is alternately called? The Royal Society, in its landmark 2009 assessment, defined it as "deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change". This umbrella term encompasses a very wide range of proposed techniques, which are typically divided into two main categories: those that would remove greenhouse gases from the atmosphere, and those that would modify the Earth's atmospheric energy budget, mainly by increasing the reflection of sunlight back to space.

There are vast differences between these two categories of techniques, as well as between the individual techniques within each category, so that blanket statements applied to climate engineering as a whole are often inappropriate, or are meant to only apply to a subset of techniques, and can therefore be misleading and counterproductive. Thus, although the umbrella terms of “climate engineering” and “geoengineering” are in extensive use, it is important to use them judiciously, when they are really appropriate, and otherwise to differentiate carefully between the various techniques that are being addressed.

This point is well-known by much of the research community, and is mentioned repeatedly in discussions and various publications and assessments. Nevertheless, it is proving difficult for us to follow our own good advice, and most of the community – including me – still falls into the trap of generalizing too much.

So I would encourage care and effort by the participants of the CEC14 to make the distinctions clear in the critical discussions that will take place this week.

The second point I would like to bring across is that climate engineering should not be considered as a short-term solution to climate change, rather it mostly needs to be thought about on very long timescales – and yes, here I am generalizing, using the umbrella term “climate engineering”, but in this case that is appropriate, since it applies to both categories of techniques, for various reasons.

For all of the proposed techniques to remove CO<sub>2</sub> and other greenhouse gases from the atmosphere, based on an assessment of the current state of knowledge, it appears that very long timescales – generally decades – would be needed before a significant impact on the global atmospheric CO<sub>2</sub> concentrations could possibly be achieved.

For many of the techniques, this is due to the large infrastructure that would be needed – comparable for example to the size of the oil or the coal industry – associated with large energy requirements. For other techniques the long timescale is due to limitations in various ecosystems – and for most of these there are also potentially significant side effects that need to be considered. There are also uncertainties in the total storage capacities.

Nevertheless, given the daunting consequences of ever-increasing atmospheric greenhouse gas concentrations, it is worth continuing to investigate and develop the potential for removal of carbon dioxide and other greenhouse gases, but it is important to make clear that this is done from a long-term perspective; we cannot count on proposed techniques to notably supplement mitigation measures in the *near* future.

Techniques to modify the Earth's radiation budget are *theoretically* capable of cooling the planet much more quickly than greenhouse gas removal – on the timescale of a year or less. This potential for a rapid response provides a lot of the incentive for research that is currently going into understanding such techniques. However, there are many sets of concerns that go far beyond the questions about how to develop the associated technologies, and how well they would work:

- One main set of concerns involves determining what the various impacts would be on the Earth's climate parameters such as temperature, precipitation, and extreme weather events, and developing mechanisms to attribute these impacts and identify what would be considered as benefits and harms to the many different stakeholders worldwide.
- There are also many ethical concerns that would be raised by modifying the Earth's climate, and even by research on the topic. It is unclear how these concerns and their implications vary across cultures, political backgrounds and religious beliefs. This concern extends all the way to our understanding of what it means to be human in the Anthropocene: in the same way as we have to consider the deeper meaning of the possibilities presented by genetic modification and cloning, we also need to consider the *deeper meaning* of what it would imply if humanity ever were to decide to *try* to take coordinated control over the Earth System on a global scale.
- A third major set of concerns involves developing appropriate and effective global *governance* for the various steps that might be undertaken for each of the many proposed techniques for modifying the Earth's radiation budget, from research through testing through potential implementation.

Thus, even though it might be possible within a decade to develop and implement the technological capability to modify the Earth's radiation budget on a global scale, it is likely to take a decade or more beyond that – if it is ever possible at all – to adequately clarify these concerns as well as the many other issues associated with such an intervention.

Finally, the third point I would like to make picks up exactly here: the range of issues associated with climate engineering is very broad, not only spanning the natural and social sciences and humanities, but needing input from policy makers, societal leaders, and, especially given the global implications, from the broader public as well. Science alone will certainly not provide the answers – and I would venture to say that this is already recognized by the majority of the participants here, who are seeking out a different approach. Deep, multi-actor and multi-directional dialogues are going to be essential for making substantial progress towards making the difficult decisions that will lie ahead as climate change continues to worsen.

This approach of going beyond interdisciplinary interactions between researchers to incorporate stakeholders into the process of co-generating knowledge, is known as “transdisciplinarity”. The mission of the IASS includes developing and applying this approach to global sustainability-related problems. It is from this perspective that we have decided to host this first ever, international, inter- and transdisciplinary conference on climate engineering. Together with the tireless efforts of the International Steering Committee and the valuable input from the Advisory Group, we hope we have put together a program that will be highly conducive to this kind of needed exchange. I would like to thank all those who have contributed to putting this program together, and who will contribute to the many sessions this week, and I would like to wish you successful and highly informative critical discussions.

With that, it’s my pleasure now to give you a brief overview of what to expect on this opening day. Next we will hear a few further welcoming remarks, first from my colleague Klaus Töpfer, who is Executive Director at the IASS, followed by Georg Schütte, the Secretary of State at the German Ministry for Education and Research. You’ll then be provided an overview of program and logistical information by Stefan Schäfer, the chair of the CEC14 Steering Committee. Then, following a short break, we will have two panel discussions with a range of distinguished panelists, and we will close the day with a reception in the hotel lobby – already several good opportunities today to get started with the critical global discussions of the CEC14.