Solar Geoengineering as a Tool to Manage Climate Risks

David Keith, Department of Chemical and Petroleum Engineering, University of Calgary

Monday, January 31, 2011 | 04:15 PM - 05:15 PM | NVIDIA Auditorium, Jen-Hsun Huang Engineering Center | Free and Open to All

The combination of inertia and uncertainty makes the coupled climate-economic system dangerously hard to control. If the climate's sensitivity is at the high end of current estimates it may be too late to avert dramatic consequences for human societies and natural ecosystems even if we could quickly cut emissions to zero. Emissions cuts are necessary to manage climate risks, but they are not necessarily sufficient. Prudence demands that we study methods that offer the hope of limiting the environmental risks posed by the accumulation of fossil carbon in the atmosphere. The engineered alteration of the earth's radiation budget—geoengineering—offers a fast means of managing climate risk, but it entails a host of new risks and it cannot fully compensate for the risk posed by carbon in the air. I will review the science and technology of solar geoengineering and then argue that systematic management of climate risks may require the capability to implement these technologies. Finally, I will speculate about the elements of a geoengineering research program needed to build and regulate such capability.

Brief Bio:

Professor Keith has worked near the interface between climate science, energy technology and public policy for twenty years. His work in technology and policy assessment has centered on the capture and storage of CO_2, the technology and implications of global climate engineering, the economics and climatic impacts of large-scale wind power and the prospects for hydrogen fuel. As a technologist, David has built a high-accuracy infrared spectrometer for NASA's ER-2 and developed new methods for reservoir engineering increase the safety of stored CO_2. He now leads a team of engineers developing technology to capture of CO_2 from ambient air at an industrial scale.

David took first prize in Canada's national physics prize exam, won MIT's prize for excellence in experimental physics, was listed as one of TIME magazine's Heroes of the Environment 2009 and was named Environmental Scientist of the Year by Canadian Geographic in 2006. He spent most of his career in the United States at Harvard University and Carnegie Mellon University before returning to Canada in 2004 to lead a research group in energy and environmental systems at the University of Calgary.

David has served on numerous high-profile advisory panels such as the UK Royal Society's geoengineering study, the IPCC, and various Canadian 'blue ribbon' panels and boards. David has addressed technical audiences with articles in Science and Nature, he has consulted for national governments, global industry leaders and international environmental groups, and has reached the public through venues such as the BBC, NPR, CNN and the editorial page of the New York Times.

Background Reading:

John Shepherd, Ken Caldeira, Joanna Haigh, David Keith, Brian Launder, Georgina Mace, Gordon MacKerron, John Pyle, Steve Rayner, Catherine Redgwell, Peter Cox and Andrew Watson (2009). *Geoengineering the climate - Science, governance and uncertainty*. The Royal Society.

96. D. W. Keith. Photophoretic levitation of engineered aerosols for geoengineering. (2010). *Proceedings of the National Academy of Sciences*.

Jeffrey R. Pierce, Debra K. Weisenstein, Patricia Heckendorn, Thomas Peter and David W. Keith. (2010). Efficient formation of stratospheric aerosol for geoengineering by emission of condensible vapor from aircraft. *Geophysical Research Letters*, 37, L18805, doi:10.1029/2010GL043975

Related Themes:

Speaker Slides