International Seminar on

# The Security Implications of Emerging Climate Altering Technologies

Royal Military Academy
Hobbemastraat 8, 1000 Brussels
23 October 2019

Belgium
UN Security Council 2019-2020 Fostering Consensus Acting for Peace

## Introduction to Geoengineering: Feasibility, Costs and Impacts

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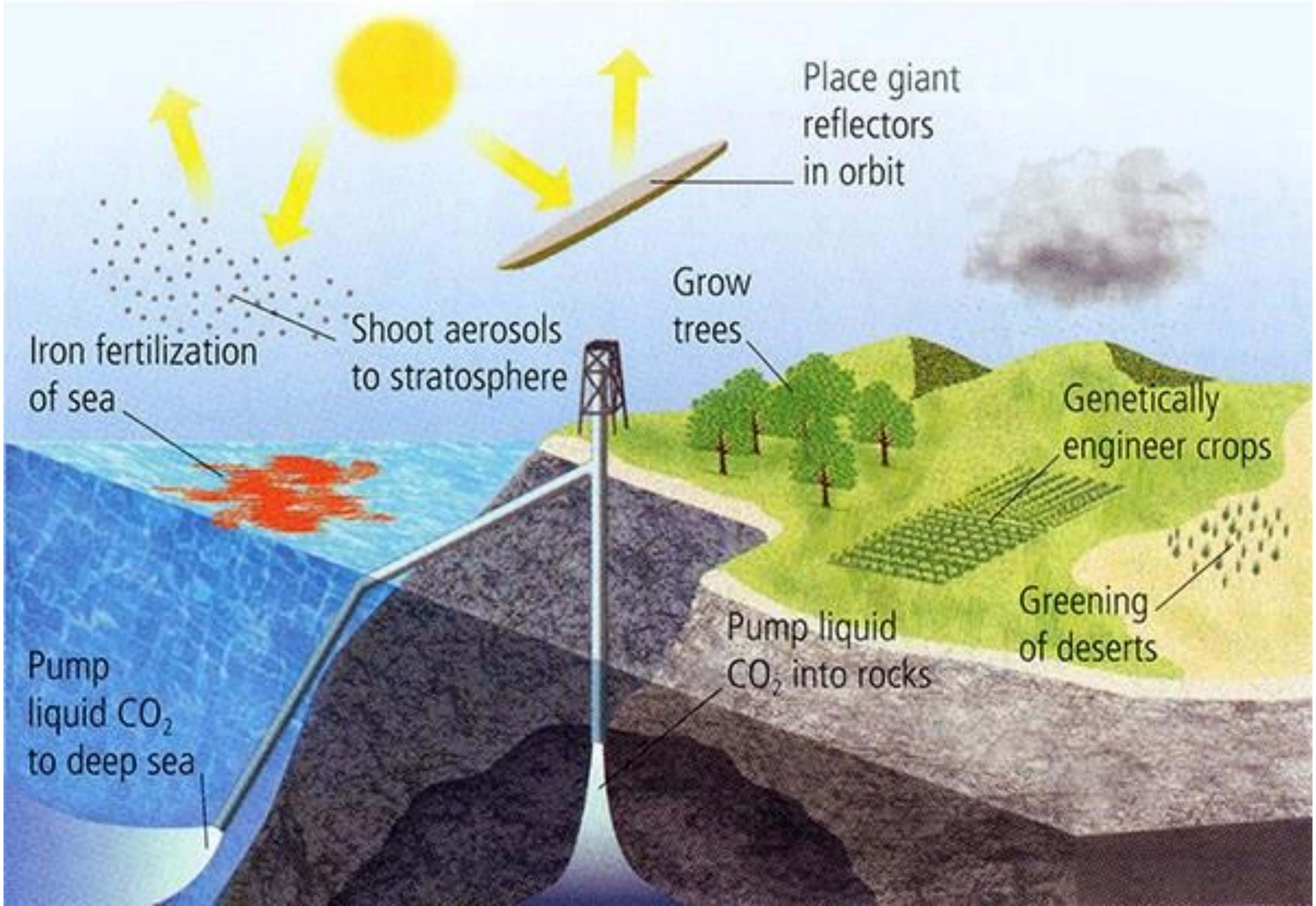
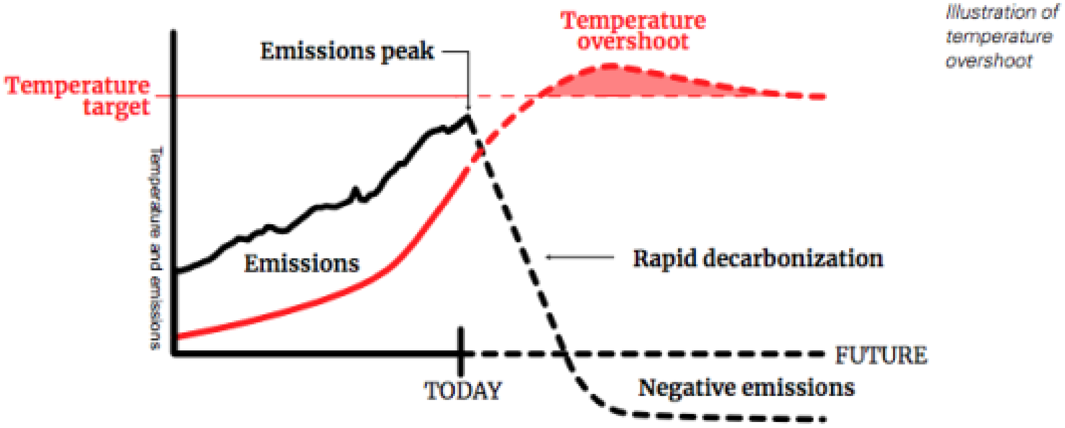
BRUSSELS DIALOGUE ON CLIMATE DIPLOMACY
C2G Carnegie Climate Governance Initiative
GMACCC
EGMONT

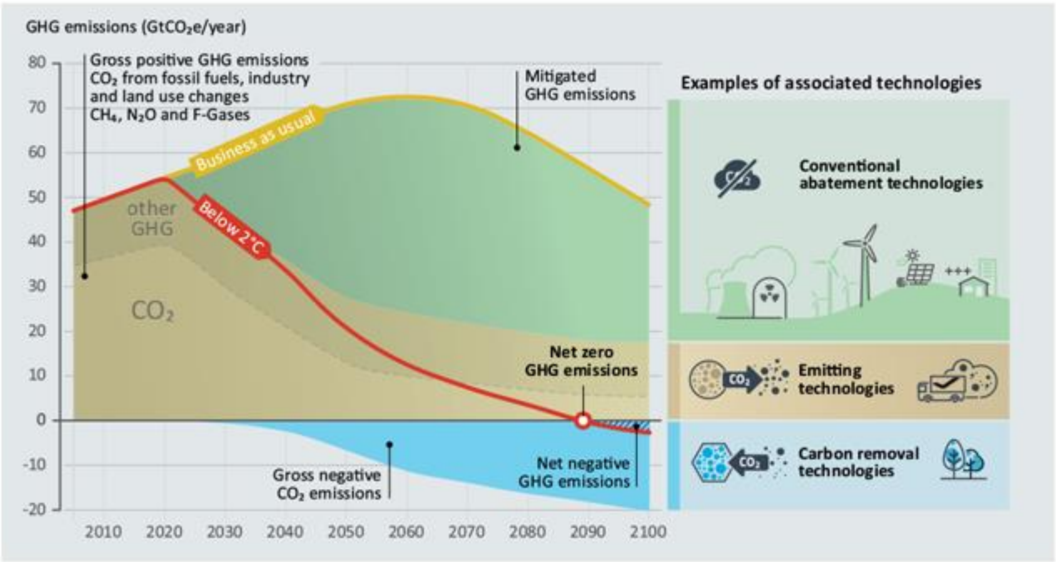
# GEOENGINEERING SOLUTIONS TO CLIMATE CHANGE



# Summary of IPCC 1.5 Report




The role of carbon dioxide removal in climate change mitigation

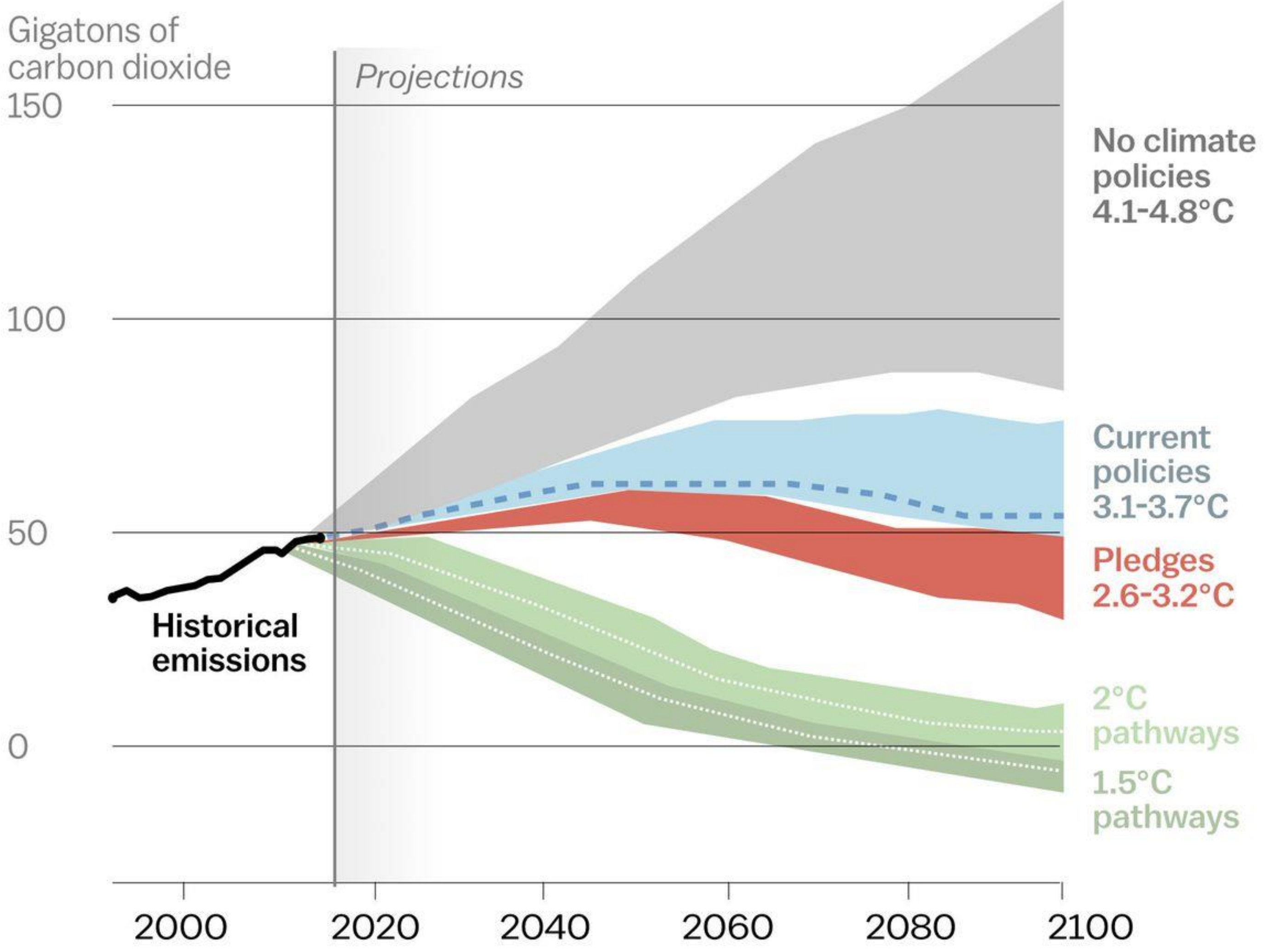



Note: This figure shows emission reductions from conventional mitigation technologies combined with carbon dioxide removal. This exemplary scenario is consistent with an at least 66 percent chance of keeping warming below 2°C relative to pre-industrial levels. Emission reductions are shown against a business-as-usual scenario without any additional climate policies. Global net emissions levels turn to net negative towards the very end of the century, but carbon dioxide removal is already being deployed much earlier. Some residual greenhouse gas emissions remain at the end of the century, as they are too difficult to mitigate in the scenario. Note that the scenario used is different from the scenarios used in Chapter 3, which leads to small variations in emission levels and timing of negative emissions.

Source: The Emissions Gap Report 2017. UNEP.

# Effect of current pledges and policies

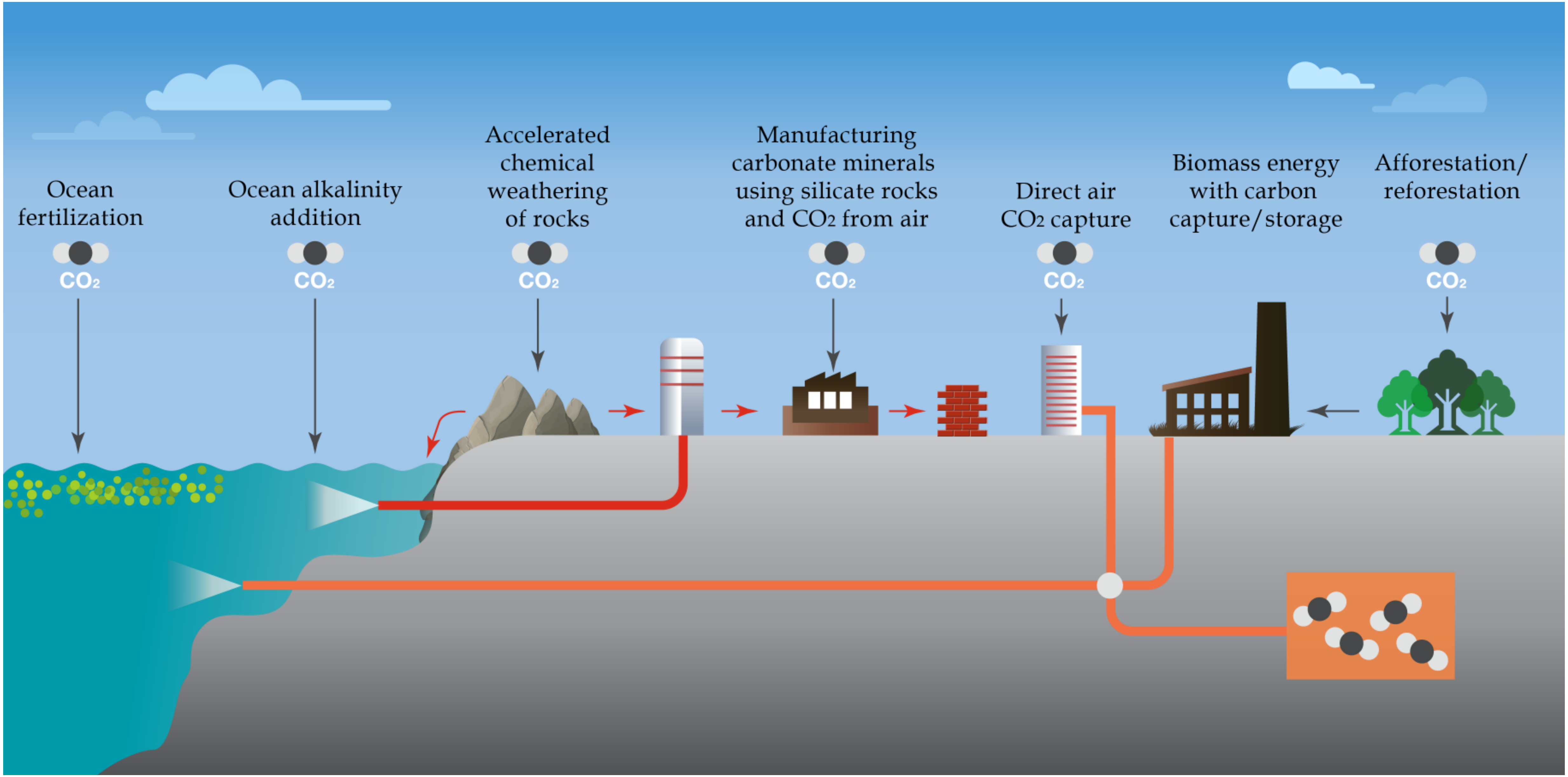
*Global greenhouse gas emissions*




Source: Climate Action Tracker

Vox

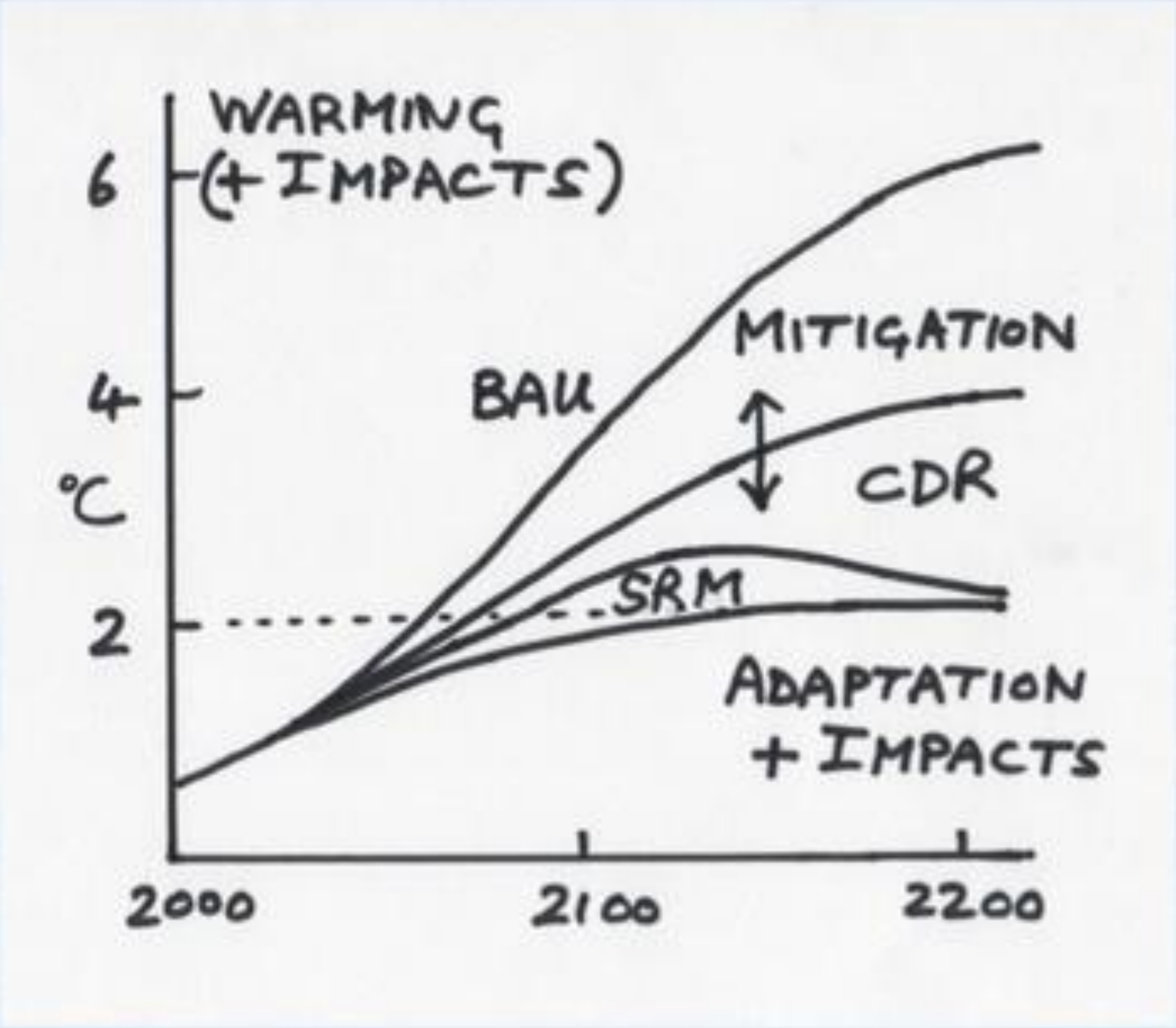
# Negative Emission Technologies



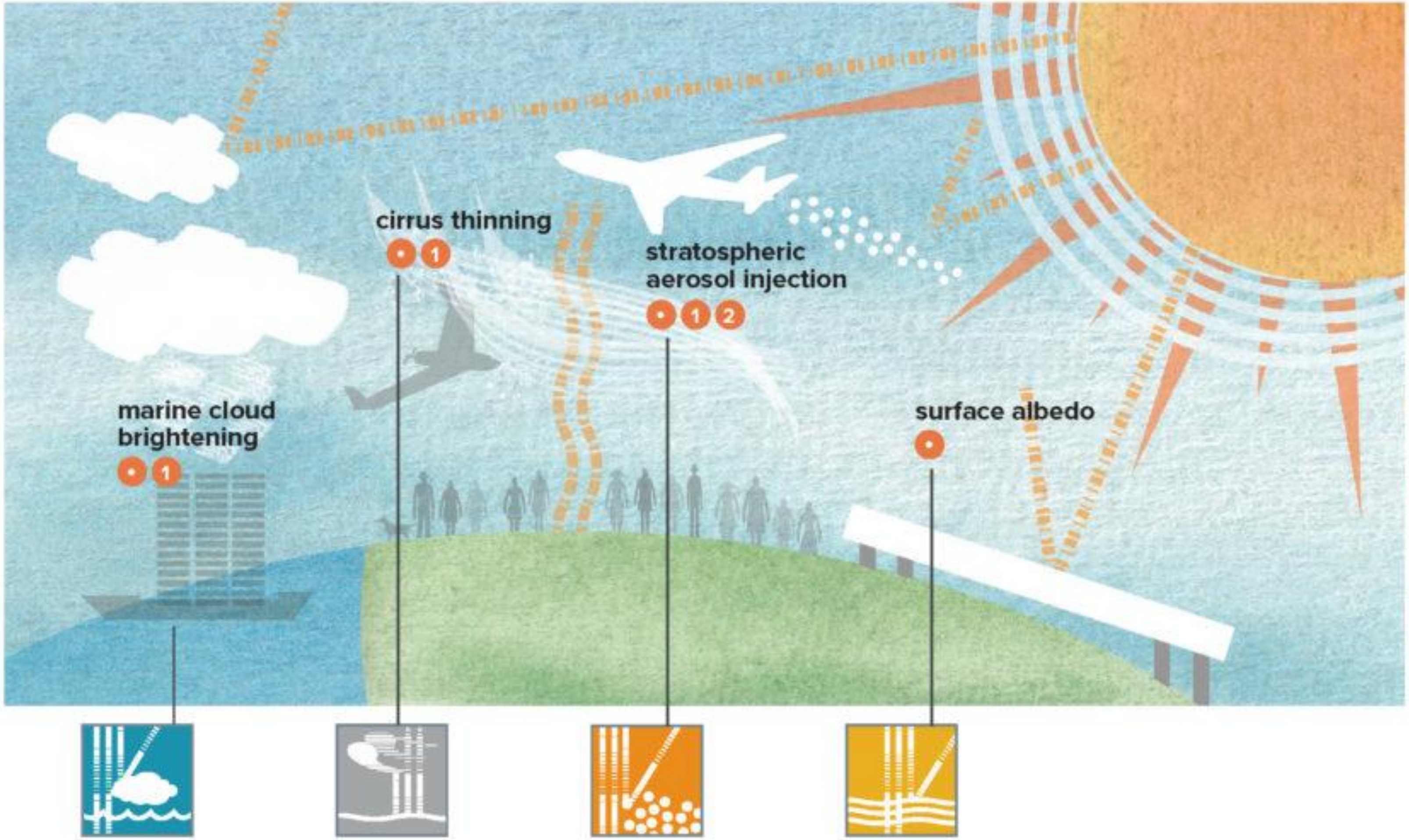

From: Stranded Carbon Assets and Negative Emissions Technologies ()February 2015 )
University of Oxford

Carbon Engineering

# Mitigation, Adaptation, Geoengineering… & Suffering



# Governing Solar Radiation Modification




Seeding clouds above ocean surfaces (such as with self-steering, autonomous ships) or whitening clouds above land to reflect sunlight back into space

Thinning cirrus clouds to allow more infrared radiation to escape from the Earth

Injecting reflective aerosol into the lower stratosphere to increase planetary albedo (reflectivity), and reduce temperatures

Making surfaces (such as urban areas, roads, agricultural land, grasslands, deserts, polar ice caps, or oceans) brighter to reflect solar radiation

## Shared Governance Challenges include:

- Codes of conduct, guardrails and public policy direction for research;
- Assessing the risks and potential benefits to sustainable development in a risk-risk framework;
- Monitoring, attribution and management of risks and impacts;
- Potential public concerns, including transparency of information, accountability, involvement in decisions;
- Liability and compensation.

## Specific Governance Challenges include:

1. Globally legitimate decision-making on whether or not to research; to consider for use; to decide whether or not to deploy;
2. Institutional guarantees against premature termination.

C2G2


Carnegie Climate Geoengineering Governance Initiative

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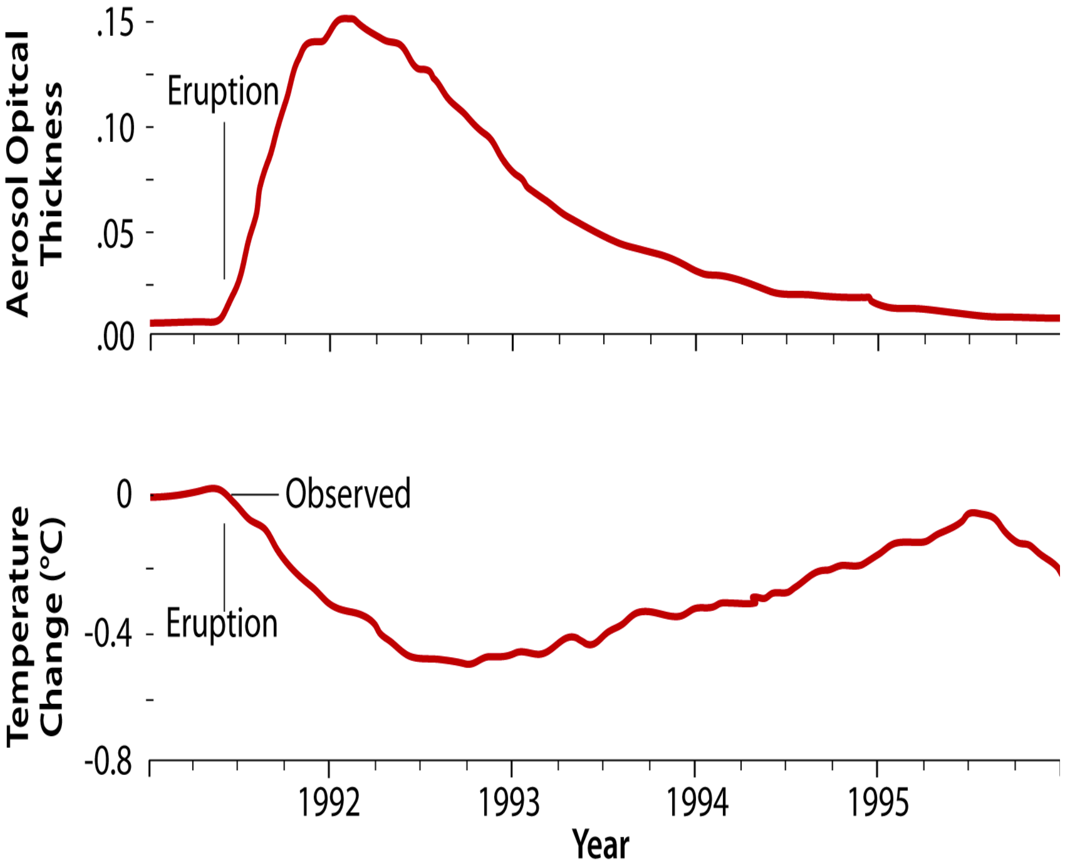
November 2018

# Solar Geoengineering
# A "natural" stratospheric aerosol experiment


Mount Pinatubo 1991




**10 Mt stratospheric S as $SO_2$** (~20% of annual fossil S)

**In 1992, ΔT ~ -0.5C** (ΔT~-3.0C for sustained peak loading)

Over several years effects disappeared; no evident enduring impact

**"Undesired" consequences**

- ozone down ~3% (polar ~5%, equatorial ~2%)
- Hydrological Cycle Impacts

Science in Society Series

# GEOENGINEERING OUR CLIMATE?

## ETHICS, POLITICS AND GOVERNANCE

EDITED BY
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earthscan
from Routledge

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**For more information about this seminar visit:**

https://www.edrc.net/events/the-security-implications-of-emerging-climate-altering-technologies