Carnegie Climate Geoengineering Governance Initiative

An initiative of CARNEGIE COUNCIL for Ethics in International Affairs

Need for Governance on CDR and SRM

Kai Uwe Barani SCHMIDT

Senior Program Director, C2G2

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C2G2 Mission

C2G2 seeks to catalyze the creation of effective governance for Solar Radiation Modification (SRM) and large-scale Carbon Dioxide Removal (CDR), collectively also referred to as Geoengineering.

- … through **expanding the conversation** from science to policy
- … by **staying impartial** toward questions of choices
- …by **encouraging honest and open society-wide conversations**

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Background

- **IPCC fifth assessment report (2014)**
- **Paris Agreement (2015)**
  - Impacts guide decisions to stay: **well below 2 dC and pursue limiting to 1.5dC**
  - Scenarios guide the agreement to **balance** remaining **emissions** with an equivalent amount of **removals** around mid century: **net-zero**.
- **IPCC report on pathways to 1.5 (2018)**
  - **All** with limited or no overshoot project the **use of carbon dioxide removal** (CDR) on **the order of 100–1000 GtCO**2 over the 21st century.
  - Solar radiation modification (SRM) measures are not included in any of the available assessed pathways.

Knowledge – awareness – learning – decision/choices : governance

⇒Large scale removal are a must, more reductions less removal, risks of overshoot

⇒Variety of removal approaches and methods (technologies)-> need of scale/speed

⇒SRM – too much unknown, risks

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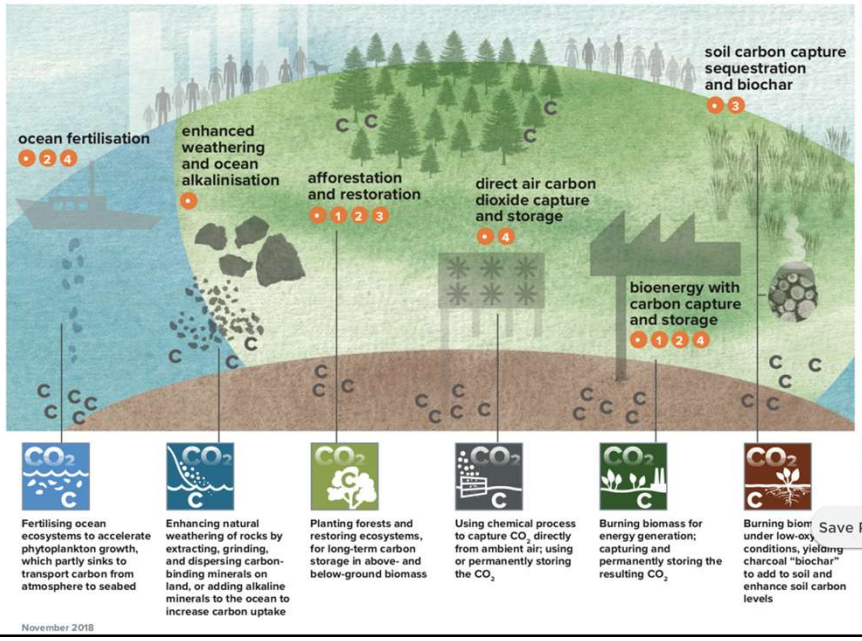
Governing Carbon Dioxide Removal



Shared Governance Challenges include:

- Measurement and reporting;
- Speed/scale issues;
- Potential public concerns, including transparency of information, accountability, involvement in decisions;
- Liability and compensation.

Specific Governance Challenges include:

1. Managing the competition for land use and related impacts on the SDGs at domestic and transboundary levels;
2. Managing risks and potential implications for biodiversity;
3. Addressing permanence of CO_2 isolated from atmosphere;
4. High costs — land use, capital, deployment, energy — mean policy signals, e.g., price on carbon or other regulation, are needed.

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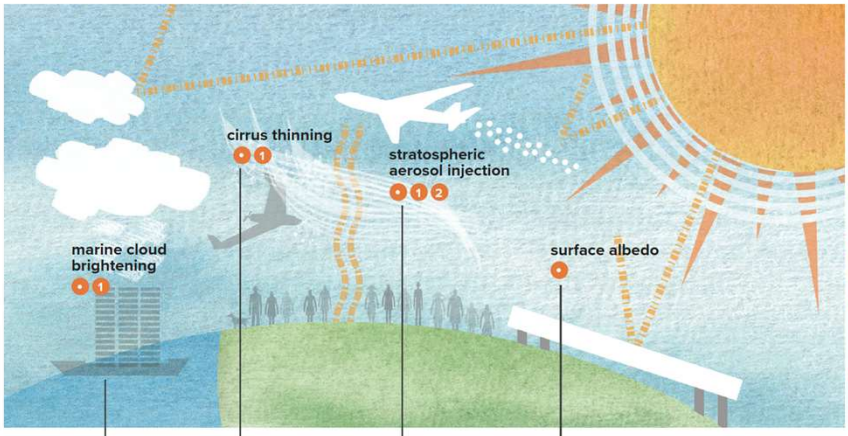
Governing Solar Radiation Modification



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.

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

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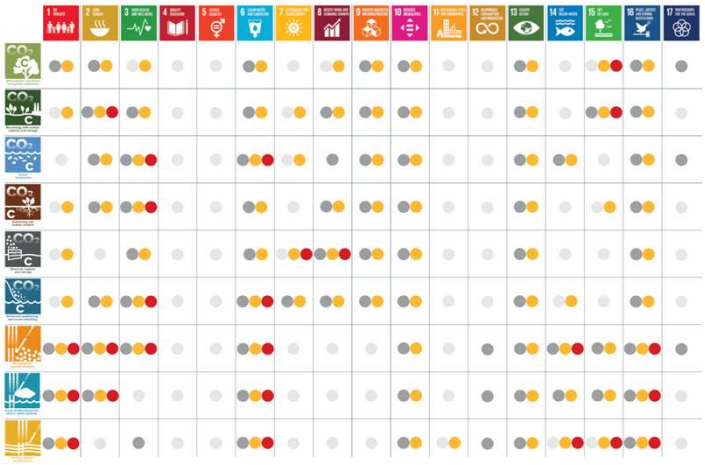
Potential implications for the SDGs



- Potential research gap identified.
- Key research gap identified.
- Interaction identified
- Risk identified

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Towards International Governance of Solar Geoengineering

	2017	2018	2019	2020	2021	2022
UN environment assembly		**Mar**: Delegate briefing Friends Group →	**UNEA 2019 resolution** →			
	Nov: Emissions Gap Report **Dec**: UNEA 3	*Nov: Emissions Gap Report*	**Mar**: UNEA 4 *Nov: Emissions Gap Report*	*Nov: Gap Report*	*Nov: Gap Report*	*Nov: Gap Report*
Convention on Biological Diversity	**Oct:** Agree research approach **Nov**: Webinar **Dec**: Montreal Workshop →	Development of Research framework **Nov**: COP 14 Egypt				
ipcc climate change	**Dec**: Expert reviewer 1.5 report	Input to 1.5 report *Oct: 1.5 Special Report*			*AR 6*	
United Nations Climate Change		**April**: Talanoa Dialogue input *Carbon Removal Community of Practice* →		Submission of new NDCs (COP26)		
	Nov: COP 23	**Nov**: COP24	**Nov**: COP25	**Nov**: COP26	**Nov**: COP27	**Nov**: COP28
United Nations General Assembly			Friends Group →		*Active consideration* →	**Sep**: UNGA decision
Other Processes		**Sep**: Global Climate Summit	Arctic Council → Regional Intergovernmental OECD, AU, EC, UN Regional) →			
Research Councils (International)			Research Councils (Future Earth, Belmont Forum, ISC) →			

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- What is geoengineering?
- Why does it need governing?
- What is the current status of governance?
- What are potential next steps for governance?
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\Thank You!

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Geoengineering technologies under two broad categories: CDR and SRM

- Two categories:
  - Carbon Dioxide Removal (CDR)
  - Solar Radiation Modification (SRM)
- Most 1.5C IPCC scenarios assume widespread deployment of CDR.

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Carbon Dioxide Removal (CDR)

- CDR reduces Carbon Dioxide (CO_2) and other greenhouse gases (GHG) from the atmosphere.
- IPCC special report on global warming of 1.5°C, project use of CDR at a large scale.
- Significant impacts on land, energy, water, or nutrients that would require governance systems if deployed at large scale.

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Solar Radiation Modification (SRM)

- SRM reflects more solar radiation into space by allowing more heat to escape the earth's atmosphere.
- Large uncertainties and knowledge gaps related to governance, ethics and impacts on sustainable development exist.
- Stratospheric Aerosol Injection (SAI) is the most researched method.

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Why does Geoengineering need governing?

- Governance provides the means for deciding whether or not to engage with large-scale CDR and SRM, and if so, how?
- Without governance there are no guardrails preventing a powerful sovereign or private actors attempting large scale unilateral deployment, before enough is known about the risks and benefits.

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What is the current governance status of large-scale CDR and SRM?

Eleven principal multilateral agreements identified as potentially relevant for governance of large-scale CDR or SRM.

Key fora include:

- UN Framework Convention on Climate Change (UNFCCC) and its Paris Agreement;
- Convention on Biological Diversity (CBD);
- London Convention and London Protocol on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (LC/LP).

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UN Framework Convention on Climate Change (UNFCCC)

- Paris Agreement may provide decentralised governance structure that large-scale CDR or SRM may demand.
- Several institutional arrangements have been considered for SRM governance under Page 4 UNFCCC and its Subsidiary Body on Scientific and Technological Advice (SBSTA).
- 2017 UN Environment Emissions Gap report featured the assessment of CDR options including recommendations on governance.

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Convention on Biological Diversity (CBD)

- International legal instrument with near universal participation whose institutions have addressed geoengineering in its entirety.
- International governance mechanism for research and development of one form of CDR - Ocean Fertilisation.
- 2010, Parties to the CBD adopted a decision on geoengineering covering all technologies that may affect biodiversity.

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London Convention and Protocol (LC/LP)

- Parties to the LC/LP have addressed marine geoengineering processes namely 'ocean fertilisation'.
- In 2013 Parties adopted a resolution to ban ocean fertilization activities, widely viewed as a de facto moratorium on commercial ocean fertilisation activities.

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Other international legal instruments

- Some SAI could fall under the purview of the following:
  - Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol;
  - Convention on Long-Range Transboundary Air Pollution (CLRTAP);
  - Environmental Modification Convention (ENMOD);
  - Customary International Law.

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Other groups addressing the issue of governance

- Academics and researchers raising awareness of the need for governance through online knowledge sharing platforms.
- Non-governmental and civil society organisations active in raising awareness of geoengineering and the need for governance.
- Mainstream media increasing references to geoengineering in the popular press.

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Academic and other researchers

- Countries, private actors, state and non-state actors funding research to influence the agenda and broker knowledge.
- Growing number of dedicated research collaborations such as:
  - EuTRACE, the GeoMIP, and the Geoengineering Governance Research project.
- Developing other options for governing geoengineering research, including:
  - Scientific self-governance;
  - High level principles;
  - Codes of conduct;

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Non-governmental organisations (NGOs) and Civil Society Organisations (CSOs)

- NGOs and CSOs are raising awareness of geoengineering and the need for governance.
- Coalitions of NGO/CSO actors collaborate to highlight the potential risks posed by geoengineering.
- Others Carnegie Climate Geoengineering Governance Initiative (C2G2) promote policy-dialogue to catalyse the development of geoengineering governance in the international policy arena.

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Media

Increasing references to geoengineering emerging in:

- Social media
- Blogs
- Non-fiction books
- Fictional movies,

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What are potential next steps for governance of large-scale CDR and SRM?

- International community must consider policy implications that large-scale CDR and SRM raise, with a view to developing international governance.
- Inclusive approach involving various levels of government and a range of actors.
- Achieved through knowledge-sharing to increase understanding and inform future decision-making on governance.

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Addressing knowledge gaps

- Feasibility, costs, and benefits of different geoengineering approaches.
- Whether or not they would be effective at alleviating the negative impacts of climate change
- How they might affect delivery of sustainable development and the Sustainable Development Goals (SDGs).

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Governance principles and approaches

- A range of different principles could be considered, including:
  - Precautionary;
  - Transparency;
  - Minimisation of harm;
  - Intergenerational equity;
  - International cooperation;
  - And research as a public good.
- Consideration has also been given to whether a regulatory or rights-based approach to governance would be sufficient or effective.

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Support for Sustainable Development

- Governance must reduce the risk of negative impacts, and include the possibility to prevent or ban use.
- Coordinated effort across intergovernmental organisations governments, research funders (public and private), and other relevant non-state actors.

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Governance of large-scale Carbon Dioxide Removal (CDR)

- UN Environment Emissions Gap report (2017) proposed role for governments:
  - Provide funding and incentives;
  - Setting standards;
  - Give attention to the risks and challenges presented by different options;
  - Implement policies to address them.
- CDR could be governed primarily through national and sub-national mechanisms, although there would be some need for international coordination.

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Governance of Solar Radiation Modification (SRM)

- Existing UN decisions (CBD) provide a foundation for international governance.
- Key issues for consideration:
  - How do we increase understanding on SRM as part of a global response to manage climate risks?
  - Whether and how to research SRM responsibly?
  - What governance framework(s) would allow coherent management of climate risks among the different available tools?

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Governance of Solar Radiation Modification (SRM)

- In the meantime, prevent deployment of SRM unless:

1. Enough knowledge about the risks and benefits for decision-making at the global, regional and sub-regional levels exist;

2. Global consensus via legitimate intergovernmental processes on the governance framework needed to take decisions and govern deployment and non-deployment, are applicable;

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Conclusion

- Geoengineering methods raise understandable fears.

- A precautionary approach whether or not to consider large-scale CDR or SRM as part of broader risk management responses to climate change is becoming a serious governance issue.

- The ungoverned deployment of these technologies poses potentially critical environmental and geopolitical risks that now demand urgent consideration.

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