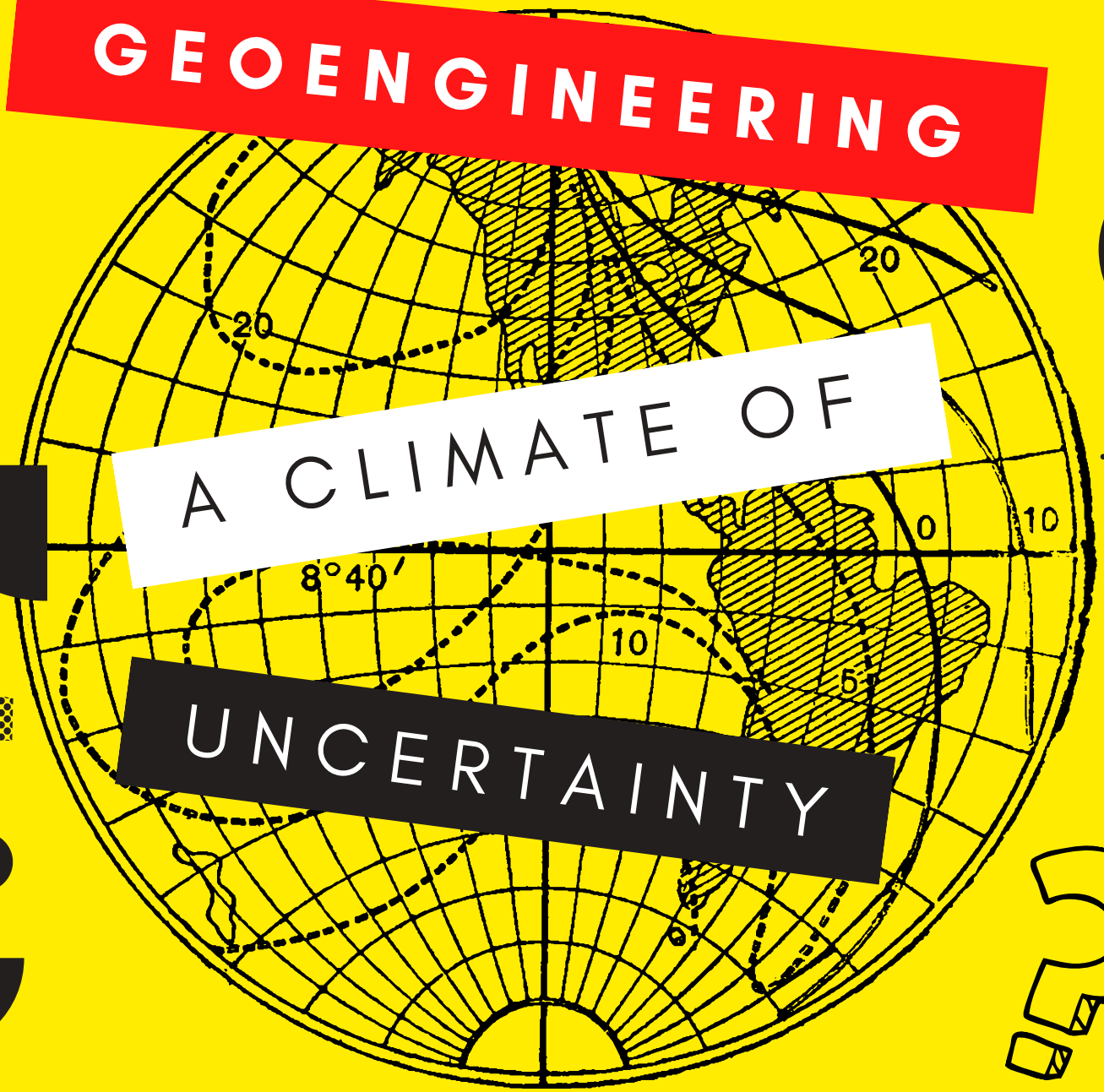
YOUTH GUIDE AND POLICY BRIEF

JUNE 2021

GEOENGINEERING

A CLIMATE OF UNCERTAINTY



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YOUTH GUIDE TO GEOENGINEERING

The purpose of this guide is to introduce key ideas and questions about geoengineering in order to spark a conversation about intervention in the Earth's climate system in the context of the range of possible responses to the climate crisis.

It has been written by young people, for young people.

CONTENTS

THE CLIMATE CRISIS

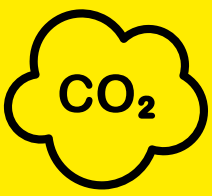
The climate crisis has become a key issue over the past decade and describes the consequences of anthropogenic climate change. The intensification of various economic sectors, such as energy and agriculture, has resulted in an increase of carbon intensive activities (e.g. burning fossil fuels, deforestation) causing a higher atmospheric concentration of greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). GHG emissions have never been higher in human history and current policies have proved inadequate to reduce emissions to a sustainable level, nor to meet the target of limiting warming to 1.5°C above pre-industrial levels set by the 2015 Paris Agreement. A warmer climate will lead to more extreme and unpredictable weather patterns, which will likely result in food and water insecurity, as well as migration and conflict. Responding to climate change requires collective action to empower people.

Young people have been at the forefront of climate justice movements, such as Fridays for Future. They call for a range of climate mitigation and adaptation measures to slow down global warming before 2030. As those who will face the consequences of actions taken (or not) now in response to climate change, young people must be included in discussions and decisions about how to respond to the climate crisis. There is a need for generations to work together to find just solutions to the climate crisis. At present, proposed responses to the climate crisis are:

ADAPTATION

Adjusting how we live and responding to the impacts of climate change

MITIGATION



Reducing GHG emissions and stabilising the concentration of GHGs in the atmosphere

GEOENGINEERING

Deliberate intervention in the Earth's climate to influence temperatures on Earth

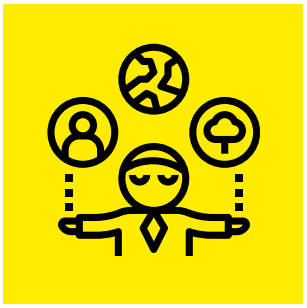
THE CLIMATE CRISIS

The authors of this guide identified the following desirable characteristics of responses to climate change. Do you agree or disagree with these principles?

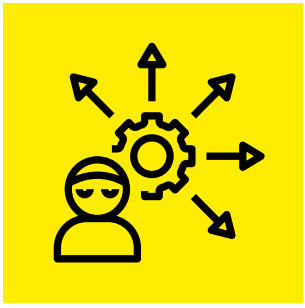
GOOD INTERVENTIONS TO TACKLE CLIMATE CHANGE:

Buy time for adaptation and mitigation, not allow a continuation of 'business-as-usual'.

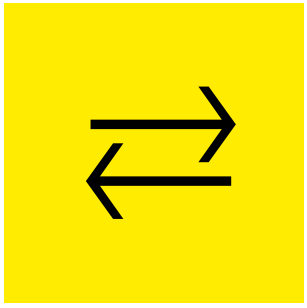
Result from transparent and inclusive decision making.



Connect to clear lines of responsibility and accountability.



Have well-understood consequences.



Are reversible, effective and affordable.

Result in equitable impacts on people and places, or be highly localised.

Minimise risk to people including potential harm stemming from lack of knowledge and research into the effects.

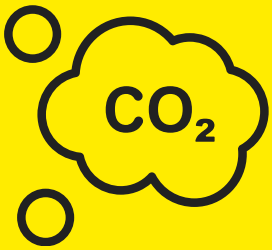
Minimise risk to the planet (e.g. to aquifers, biodiversity, ecosystem health and services).

Are a final resort and not an alternative to adaptation and mitigation strategies.

ENGINEERING THE CLIMATE

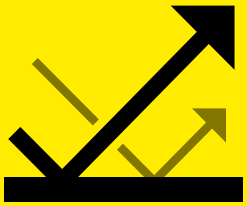
As the impacts of the climate emergency have become more severe, the proposed responses have become more radical. Geoengineering – sometimes called climate intervention or climate engineering – is the deliberate intervention in the Earth's climate system and describes many different types of activity to control or manage temperatures on Earth. These range from highly technological interventions like stratospheric aerosol injection to those which rely on natural processes, such as large-scale afforestation, microalgae cultivation and restoration of wetlands. Geoengineering has gathered some high-profile support, for example from billionaires and scientists at prestigious universities. There are two main approaches to geoengineering.

CARBON GEOENGINEERING



These approaches remove carbon dioxide from the atmosphere. Carbon geoengineering includes biological, chemical and physical methods from traditional approaches like afforestation to novel methods including ocean fertilisation and ocean liming. It is important to consider the full life cycle of the process when assessing the effectiveness of these methods.

SOLAR GEOENGINEERING



These approaches reflect heat from the sun back into space without changing atmospheric concentrations of greenhouse gases. Solar geoengineering methods include installing reflectors on land and in space, and releasing aerosols into the atmosphere to scatter heat into space.

METHODS OF GEOENGINEERING

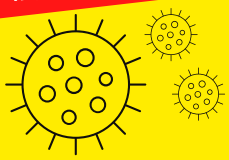
Approaches to geoengineering differ in their mechanism, affordability, feasibility, consequences, risk to humans and the environment, effectiveness and reversibility.

Examples of carbon geoengineering

OCEAN LIMING

Adds calcium oxide to the ocean to raise its pH which removes CO_2 from the atmosphere.

OCEAN FERTILISATION



Adds nutrients to the ocean to stimulate photosynthesis by plankton which removes atmospheric CO_2.

BIO-ENERGY WITH CCS

Bio-energy with carbon capture and storage produces energy from biomass and stores CO_2 in rocks.

Examples of solar geoengineering

SPACE MIRRORS

Use of reflective materials in space to reflect sunlight away from Earth.

AEROSOLS

Aerosols injected into the stratosphere reflect sunlight away from Earth.

CLOUD THINNING

Seeding cirrus clouds thins them, which limits absorption and re-radiation of heat.

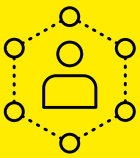
For more information, see Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals
The Royal Society. (2009). Geoengineering the climate: science, governance and uncertainty

CONTROVERSIES

The authors of this guide have different positions on geoengineering, but there is broad agreement that engineering the climate is controversial because:

The outcomes of geoengineering are uncertain – particularly compared to mitigation strategies.

Geoengineering should be compared with the impacts of mitigation and adaptation. Comparison should include the environmental, social and economic costs over different timescales.



Different stakeholders will gain and lose differently from geoengineering.

For example, Russia may benefit from climate change if melting of permafrost allows more land to be cultivated whereas Bangladesh and some island nations will suffer from rising sea levels and monsoons.

There is conflict between economic growth and sustainability.

Economic growth demands increasing use of energy and resources. This prevents collective mitigation efforts needed to deal with the climate crisis. Geoengineering tends not to deal with the root cause of the climate crisis (production of GHGs).

POLICY BRIEFING

KEY MESSAGE

Geoengineering must be considered in the context of other responses to the climate crisis, including adaptation and mitigation strategies, so that effective long-term solutions can be identified through research.

The impacts of climate change and geoengineering strategies change over space and time. This means that the use and governance of geoengineering technologies must involve the perspectives of adults and youth from all parts of the globe.

Proposals for geoengineering must be transparent, open and accessible to public scrutiny and regulation. Proactive international cooperation is needed now.

WHAT IS THE PROBLEM?

The global community needs to take immediate action to reduce carbon emissions, and, in our view, geoengineering can only ever be part of a temporary solution.

Geoengineering is a complex and controversial area of research where there remains great uncertainty as to the effects, feedbacks and permanency of some approaches and techniques.

There is a lack of credible and reliable information that is available to and comprehensible by the public. This raises questions as to the extent to which communities are able to make informed decisions about geoengineering approaches that are presented to them.

There is a lack of public interest in policymaking related to geoengineering which is of concern.

WHY SHOULD POLICYMAKERS CARE?

Geoengineering addresses challenging issues, such as global warming, which directly impacts the quality of the environment including air, water, and soil quality.

As young citizens from across the world, we care and, although we recognise that each one of us is part of both the problems and solutions, our generation will have to live with the long-term consequences of policy decisions or inaction.

We believe that communities of people at every scale (including local, regional, national and global) should be empowered through examples from everyday life that inspire rather than create fear so that positive changes are made that benefit the long-term future of the climate for all.

RECOMMENDATIONS

Mitigation must be prioritised over geoengineering. We must reduce our greenhouse gas emissions.

In the next three years we need to negotiate a global agreement that provides a political structure and governance system for geoengineering. The Paris Agreement could provide a useful model of successful differentiation of each nations' responsibility and obligations dependent on their carbon emissions and financial resources.

As part of this global agreement, we would like to see:

Substantial global investment in research to understand the potential environmental and social consequences of geoengineering - and share this research freely with every nation.

A communication charter for geoengineering that empowers individuals and communities and is built on shared values and ideas of respect, tolerance, inclusion and a commitment to safeguarding the planet for the benefit of all now and in the future. Leaders from politics, science and business have a particular responsibility to provide positive and inclusive role models in this regard.

QUESTIONS TO CONSIDER

Can questions change the world?

Is it possible to live without harming the planet?

How are decisions about geoengineering made?

What is the best way to protect global ecosystems?

Who would be responsible for geoengineering?

...and who is accountable? How?

Is destruction of nature part of human nature?

Can people create a healthy relationship with the environment?

Is geoengineering a distraction from other climate measures?

Should we enter into geoengineering not knowing the consequences?

Is climate change the biggest threat to the population?

Which methods are most effective?

Can science lead to more equality?

How could different geoengineering methods impact society?

Who should make decisions about geoengineering – and how?

Can equality produce better science?

Which sort of governance suits geoengineering best?

Who decides which methods should be researched?

Are capitalism and consumerism the cause of environmental damage?

Who is responsible for climate change?

Is a global regulatory framework for geoengineering needed?

Who should pay?

Who should benefit?

AUTHORS

This guide was written as a result of a series of online workshops on geoengineering held in April and May 2021. Contributors to this guide are residents of Albania, Belgium, Brazil, China, Czech Republic, the Netherlands, Poland, Portugal and the United Kingdom.

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