Committee: Environmental Commission (EC)

Topic**:** Evaluating the ethics of climate engineering

Student Officer**:** Evelina Bakopoulos

Position**:** Deputy President of the Environmental Commission

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Personal Introduction

Dear delegates,

My name is Evelina Bakopoulos and I would like to hereby formally welcome you to the Environmental Commission and to the 10th CSMUN. It is my utmost honour to be serving as your Deputy President in this year's Campion School Model United Nations.

From the moment I was introduced to MUN, I was captivated. MUN has given me the unique opportunity to develop my communication skills, broaden my horizons into politics and diversity, as well as allowed me to make new friends. I hope I can emulate my enthusiasm and love for MUN and create unforgettable memories with all of you.

This year's agenda entails very interesting and compelling topics. Specifically, the delegates of the Environmental Commission will be given the opportunity to discuss issues of great significance, such as evaluating the ethics of climate engineering and alleviating the effects of post-warfare on the environment. This study guide focuses on Topic 1, "Evaluating the ethics of climate engineering", meaning I will be providing you with an in-depth understanding of this topic in order for you to be able to come up with solutions regarding the issue and hence draft your own resolutions. However, further research is strongly encouraged in order to develop your knowledge on this topic, and I would advise you all not to exclusively rely on this study guide. I wish you all the best of luck and if needed, please do not hesitate to reach out and contact me for any procedural or topic related questions via email.

Looking forward to meeting you all!

Yours truly,

Evelina Bakopoulos

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Topic Introduction

It is without a shadow of a doubt that our climate is changing. The excessive amount of greenhouse gas emissions being emitted due to human activity has increased Earth's temperature. The effects of this change include sea level rise, ocean acidification, the frequency of increasingly severe weather events, and more. Those consequences pose risks for every ecosystem, every specie and every human life. Therefore, the ideal solution is to reduce the amount of greenhouse gas emissions released into the atmosphere. However, this is easier said than done since over the past few decades there has been a lack of progress.

Figure 1: Annual emissions around the globe of carbon dioxide (1850-2030)[1]

Greenhouse gas emissions have been increasing steadily since 1850, while the projected results are estimated to be even higher. For that reason, scientists are trying another effective, accelerated, but conflicting approach, climate engineering, which is

[1] "Renewable Energy." SlideShare a Scribd Company, https://www.slideshare.net/MurodKhusanov/renewable-energy-203517520.

a newly emerging high technology designed with the purpose of altering the climate system in response to rising temperatures. Implementing this method is rather expensive and is considered albeit risky. Furthermore, intervening in the global climate is very much an international affair, and it obviously raises challenging ethical issues and questions. One issue being the equal distribution across countries. More specifically, some countries may benefit from this approach while others will suffer. Would certain countries benefit more than others? Who should have the power to propose or carry out climate engineering plans? In addition, another ethical issue questions the impact of climate engineering on future generations. Would future generations be better off with climate engineering or are we endangering their future? Geoengineering allows us to modify the Earth's climate, meaning this approach will affect every living creature. The wildlife will be heavily affected from the sudden implementation of geoengineering since it will outpace the capacity of many species to migrate to cope with the temperature and weather change, increasing extinction risk. Lastly, will the use of climate engineering technology transform Earth in an artifact controlled by humans? And is this who we want to be? Due to the questions stated above, and many more climate engineering remains a vigorous debate.

Definition of key terms

Climate engineering

Climate engineering or Geoengineering is "the intentional large-scale involvement in the Earth's climate system" in order to protect the environment from further climate change as well as reverse the threatening outcomes of global warming.

Ethics

Ethics are a set of moral principles conducted by an individual or a group of people with the intention of controlling their behaviour.[2]

Global warming

Global warming is the rise in the average temperature of the Earth's climate which includes increasingly changing rainfall patterns, extreme weather, seasonal arrival and

[2] "Ethic." Cambridge Dictionary, https://dictionary.cambridge.org/dictionary/english/ethic

much more. Global warming and its consequences are generally defined as the phenomenon known as climate change.

Greenhouse gas emissions

Greenhouse gas emissions are the primary reason of global climate change. Greenhouse gas is any gas that absorbs infrared radiation emitted from Earth's surface and reradiating it back to Earth's surface, thus contributing to the greenhouse effect. The most important greenhouse gases are carbon dioxide, methane and water vapor.[3]

Ocean acidification

Ocean acidification is the worldwide reduction in the pH of seawater as a result of the captivation of large amounts of carbon dioxide by the oceans. Furthermore, it is primarily the outcome of loading Earth's atmosphere with large quantities of carbon dioxide, emitted by human activities including industrial and agricultural processes.[4]

Climate policy

Climate policy is a policy formulated with the aim to tackle climate change, and it can be local, national or international in scope. Climate policy includes decreasing climate change effects by reducing greenhouse gas emissions as well as adapting to climate change by helping communities to build a sustainable resilience and prevent the severe consequences.[5]

Solar radiation management (SRM)

Solar radiation or sunlight is the electromagnetic radiation emitted by the sun, while solar radiation management or solar engineering is climate engineering methods aiming to limit or even reverse global warming by reflecting solar resources into space before it is absorbed and the heat trapped in the environment. [6]

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[3] Mann, Michael E. "Greenhouse Gas." Encyclopædia Britannica, Encyclopædia Britannica, Inc., https://www.britannica.com/science/greenhouse-gas.

[4] "Ocean." Encyclopædia Britannica, Encyclopædia Britannica, Inc.,https://www.britannica.com/science/ocean.

[5] "Climate Change Policy." Nature News, Nature Publishing Group,. https://www.nature.com/subjects/climate-change-policy

[6] "Solar Radiation Basics." Energy.gov, https://www.energy.gov/eere/solar/solar-radiation-basics.

Carbon Dioxide Removal (CDR)

Carbon Dioxide Removal, also known as the negative carbon emissions, is the process of removing carbon dioxide from the atmosphere.[7]

Cloud seeding

Cloud seeding is a form of climate engineering technology, specifically a weather modification technique that allows clouds to produce rain with the presence of tiny ice nuclei in certain kinds of subfreezing clouds. Moreover, this a method is conducted in many countries such as Australia, Chile, China, France, Greece, India, Israel, Saudi Arabia, and Spain.[8]

Background Information

Historical Background

The Earth's average temperature record has been broken every year since 1976. The temperature's increase is approximately 0.8 degrees Celsius (1.4 degrees Fahrenheit), calculated since 1880, and is believed to escalate in the following decades.[9] In order to prevent that from happening, in 2015 at the Paris conference[10] regarding climate change, governments unanimously agreed to limit the temperature increase to a maximum of 2 degrees Celsius. However, scientists worry that the Paris Agreement is inadequate, since they claim that 2 degrees Celsius is considered an unattainable goal, especially because it is an international commitment without the structure of an international law behind it. For this reason, scientists and researches came up with a new solution, climate engineering, also known as geoengineering.

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[7] "Carbon Sequestration: Meaning & Definition for UK English." Lexico Dictionaries | English, Lexico Dictionaries, https://www.lexico.com/definition/carbon_sequestration.

[8] "NAWMC Mission Statement." North American Weather Modification Council, http://www.nawmc.org/.

[9] Dahlman, Rebecca Lindsey AND LuAnn. "Climate Change: Global Temperature." Climate Change: Global Temperature | NOAA Climate.gov, https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature.

[10] "The Paris Agreement - UNFCCC." parisagreement_publication, https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf.

Climate engineering is a deliberate attempt to control aspects of the Earth's system. It is widely accepted that humans have been manipulating the environment for centuries (e.g. anthropogenic climate change). These changes, however, have been largely unpredictable -burning of fossil fuel took place before understanding climate change - or incidental – nowadays, we are aware of the impact of burning fossil fuels. In addition, climate engineering is large-scale. Humans have pursued to change the weather throughout the history of civilization by using tactics such as cloud seeding, as well as prayers during drought and seawalls. Nonetheless, the development of today's technology has allowed us to practice a variety of climate engineering tactics such as Carbon Dioxide Removal (CDR) and Solar Radiation Management (SRM).

Carbon Dioxide Removal (CDR)

Carbon Dioxide Removal seeks to reduce the cause of climate change by removing a significant quantity of carbon dioxide from the atmosphere. Examples of CDR are artificial trees and algae blooms. CDR is considered slower-acting, costly, but less risky than Solar Radiation Management. It also requires planning for unique technical and political issues surrounding the need to confiscate the captured carbon dioxide. Some CDR proposals are based upon natural processes such as genetically modifying trees, while others rely solely on technology, such as ambient air scrubbers. Nonetheless, further progress must be conducted for their implementation since they are only an idea for now. Moreover, CDR approaches are often tied to efforts for climate mitigation, under the assumption that the cost of removing carbon dioxide will encourage people to reduce their emissions.

Solar Radiation Management (SRM)

Solar Radiation Management does not change the balance of greenhouse gases released into the atmosphere, but instead alters the albedo or reflectivity of the planet. Examples of SRM are space mirrors and particle clouds. These proposals seek to reduce the amount of thermal radiation available to trap rather than the amount of gas that traps it. In other words, "SRM focuses on the symptoms rather than the cure".

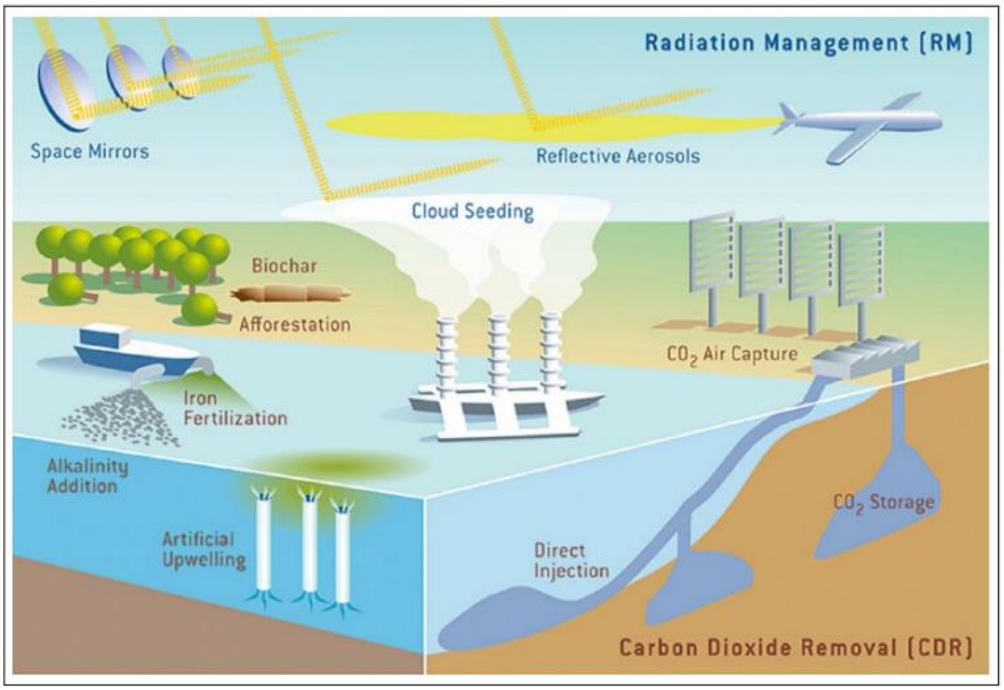

Figure 2: Climate engineering options[11]

Environmental and Socio-Economic Impacts

Climate engineering promises to resolve global climate change. At the same time, the unintended side effects on environmental, social and economic perspective as well as the distributional consequences resulting from possible uses of these technologies are ambiguous. Therefore, it does not come as a surprise that the development and distribution of these technologies are opposed.

The installation and the use of geoengineering technologies is expensive and requires international cooperation. Primarily focusing on the social aspect, it has been verified that many see geoengineering as a technological fix to a fundamentally social problem.[12] Critics advocate that geoengineering is incompatible with economic, social, and political transformations. In this sense, simply counting geoengineering as an

[11] "U.S. Climate Resilience Toolkit." U.S. Climate Resilience Toolkit | U.S. Climate Resilience Toolkit, https://toolkit.climate.gov/.

[12] "Non-Ideal Theory and Climate Engineering – David Morrow & Toby Svoboda." Forum for Climate Engineering Assesment, http://ceassessment.org/non-ideal-theory-and-climate-engineering-david-morrow-toby-svoboda/.

option worth considering is to make a significant moral claim or to assert that the growing climate crisis will not give us time to complete the social transformations that might make climate engineering irrelevant. Such a fundamental social decision should be made with great caution since it affects all nations and their social and economic development. What we need is a broad, society-wide discussion not just about what kind of world we want to make, but about what kind of society we want to become.

Political aspect

Geoengineering technologies are by definition only effective at scale, and therefore international policy development will be inevitable. Due to that fact, it is important to include governability as a dimension when assessing the technologies' feasibility and potential role in addressing climate change. However, the policy development at the international level could be exceedingly difficult, since there is a main obstacle that policymakers face when addressing geoengineering governance. More specifically, a significant part of the challenge lies in dissonances between problem definitions that are widely used in the geoengineering governance debate and the structures as well as the expectations that shape environmental policy making. These include a lack of institutional fit between the process-based differentiation of geoengineering technologies (CDR and SRM). Furthermore, the international legal architecture, a lack of fit between the urgency of demanded governance action, the prevalent scientific and political uncertainties, the lack of fit between risk trade-off narratives[13] and the precautionary norms of environmental governance pose major concern.

Ethics and responsibility

Climate change is one of the most pressing matters of the 21st century and the world's response, in the form of 'Climate Engineering', is of equal importance. However, while there are technological challenges, there are also ethical challenges that these technologies generate. Climate Engineering comes across as a counterintuitive suggestion since it requires meddling more with the climate which is

[13] Authenticity and Clinical Decision-Making - Wiley Online Library. https://onlinelibrary.wiley.com/doi/10.1002/hast.1331.

the cause of the world's current situation in the status quo. Therefore, the question is whether humans have the moral right to intentionally modify the Earth's climate.

Distributive Justice

Without a doubt Climate engineering requires intentional effort in order to modify the climate. While scientists are busy studying the environmental and social impacts of different models of geoengineering, ethicists have been debating whether the positive and negative impacts of any geoengineering could be fairly distributed. Without fair distribution some countries will benefit while others will suffer. SRM for example could have a devastating impact on Less Economically Developed Countries simply because they have the fewest resources available to manage and adapt to negative climate impacts. In addition, the financially challenged population will not be able to protect themselves from heat waves, while limited accessibility to water makes populations in many LEDCs more vulnerable to droughts. These populations are also vulnerable to flooding associated with heavier rainstorms, and as a result crops will be easily damaged by high temperatures during their sprouting season. Moreover, marginalized populations tend to depend more directly on local ecosystems for survival, therefore the ecosystem's pressure is likely to affect them more immediately than others. Lastly, rising sea levels pose severe risks for small island states, whose relative lack of mobility makes them particularly exposed to the effects of floods.

More Economically Developed Countries however, have greater economic resources to help solve the problem and can provide technological support to LEDCs. The implementation and use of climate engineering technologies by MEDCs will be beneficial for them, since they are at a stage where reducing greenhouse gas emissions is of highest priority. To be precise, MEDCs strive for clean energy and are searching for ways to diversify their energy supply in order to reduce carbon emissions.

Procedural Justice

Who will decide if and how to install climate engineering technology? When it comes to SRM and CDR the decision to deploy or not climate engineering is a fundamentally global choice and in fact one that may strain existing processes for international decision-making. All governments will need to find a tactic to balance the moral demands of legitimacy and procedural justice against the practical need for

feasibility and efficacy- this is why the creation of effective governance mechanisms is so important from an ethical standpoint.

Environmental Justice

Climate engineering has a significant role in global inequality Environmental Justice. It is without a shadow of a doubt that more economically developed nations have far greater emissions than LEDCs since by not addressing the issue or changing practices to emit less, they directly benefit from the damage they cause to the climate. However, it is the LEDCs that will be incapable to recompense the costly fees for the adaptation and reduction needed to meet the challenges of climate change. In other words, economically developed nations have the most to give and LEDCs have the most to lose. Climate engineering has the potential to address inequality by putting the burden on those who benefit from the emissions rather than sharing the weight with those who have little accountability and who are destined to endure the most.

Precaution principle

The precaution principle acknowledges that delaying action until there is compelling evidence of harm will often mean that it is then too expensive or impossible to prevent devastating consequences. The use of this principle promotes action to avert risks of serious or irreversible harm to the environment that climate engineering might cause. In this way, nations will manage to minimise harm towards the environment.

The principle of International Cooperation

Global cooperation is necessary to advance universal priorities. By rebuilding sustainability development, the third principle, we will have the opportunity to address the critical global risk of climate change. For this reason, the COVID-19 pandemic should not be considered a pretext to forego the inclusion of sustainable development elements in policies. Instead, measures that promote recovery, including funding, should advance carbon-neutral products and practices such as climate engineering

and be undertaken in a way that is consistent with the 2030 Agenda for Sustainable Development.[14]

Religion

Ethical arguments often provoke larger considerations of worldview, including individual and social-religious commitments. This may imply that discussions of climate engineering should reflect on how religious commitments might influence the discourse.

Future Generations

The deepest ethical issues about geoengineering are less technocratic and concern the kind of societies we want to have. Are we willing to transform Earth into an artifact controlled by humans? There is a possibility that future generations may be better off with geoengineering. However, if that is not the case, we might be condemning them to carry on an activity they will wish we had never initiated. Some claim that this is inevitable -or already happening in other ways- while others see it as an unacceptable and reckless act.

Effects on Less Economically Developed Countries (LEDCs)

Climate engineering may carry major risks for LEDCs that are often especially vulnerable to, and lack adaptive capacity to deal with, the impacts of such new technologies. In this situation, one would expect LEDCs that are most vulnerable should play a central role in the emerging discourse on climate engineering. However, the discussion about whether and how to engage with these technologies is shaped by experts from just a small set of countries in the Global North. Information about the production of climate engineering technologies remains dominated by the research institutions located in North America and Europe.

[14] "Sustainable Development Goals: United Nations Development Programme." UNDP, https://www.undp.org/sustainable-development-goals?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=Cj0KCQjw_viWBhD8ARIsAH1mCd7MBkC0T00F0_x9wqCenKaUrr3gkTzKDGVH86FgkxggrD94aMNnEF8aAlRVEALw_wcB.

Major countries and organizations involved

United States of America (USA)

The US government cannot further develop the concept of climate engineering without proper research being conducted. On the one hand, at the research and development stage, climate engineering is not likely to produce the level of popular opposition that greenhouse gas emissions control proposals have stirred-up. Some organized green groups oppose the concept, but others claim to be studying it. It is however difficult to credibly assert that climate change poses an imminent existential threat to mankind while refusing to explore what appears to be an approach to prevent its negative effects. On the other hand, there is not much support for climate engineering either. To them, climate engineering is an answer to a deceptive problem.

China

China may have stronger motives than the US to explore climate engineering. The government's frugality when it comes to climate change might recommend a low-cost and quick solution to climate change. China's environmental movement is fragile and its government's processes are unclear. Having mastered systems like thermo-nuclear warheads, intercontinental ballistic missiles (ICBMs), cruise missiles, moon rockets, satellites, and satellite systems, China could muster the needed technical wherewithal for geoengineering. Some models suggest that China and India have divergent interests with regard to the goals of a climate engineering system, and while each might gain from an altered climate, the pattern of temperature and rainfall that would be best for one would be less than ideal for the other.

The Gulf Cooperation Council countries

The GCC's climate is warm all year round. The lowest average temperatures are around 20ºC in January, while between June and August the averages are around 30ºC. The UAE in particular is vulnerable to the impacts of climate change from rising sea levels, which could affect the UAE's critical infrastructures, such as desalination and power stations, as well as habitats located on coastal zones. Therefore, these countries use primarily two kinds of geoengineering, cloud seeding and seawalls.

Kenya

In January of 2014, 33 qualitative interviews were conducted in Nairobi, and the Maasai Mara and Mt. Kenya regions in Kenya as part of a project to explore the perceptions of SRM offered by under-represented populations who are severely impacted by climate change. Questions included social and ethical issues such as justice, power, responsibility, concepts of nature, risk and uncertainty. Keeping in mind that the effects of climate change are more obvious and keenly felt in the GHA region than in many other places, while farming and pastoralism feature more prominently in everyday life than in other regions, the research's results were mostly about weather change. The agriculture sector is 60 percent of employment and 51 percent of GDP (World Bank, 2018)[15], with smallholder farms accounting for 78 percent of agricultural production (CIAT and World Bank, 2015). It is therefore likely that most participants have family and friends working in agriculture. In all, the results indicate how detrimental climate change is and how in need Kenya is off an effective and safe solution.

Somalia and Somaliland

Approximately 60 percent of Somalia's and Somaliland's population rely on pastoralism as their main livelihood (Hartmann et al., 2009).[16] The average rainfall in Somalia is down 15 percent, and therefore drought has become an inevitable way of life. Both countries have been pushed to their limits due to climate change and climate engineering is their only hope to overcome the situation they're in.

Environmental Defense Fund (EDF)

The EDF is a non-profit organisation founded in 1967 in the US which aims to eliminate any and all environmental issues. It has contributed to the NGO community in promoting governance of climate engineering research. Moreover, increasing

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[15] "Overview." World Bank, https://www.worldbank.org/en/country/kenya/overview.

[16] Hartmann, Ingrid. "Somaliland Baseline Study Integrated Food Security Education Authors, Contributors and Reviewer (in Alphabetical Order." Academia.edu, 15 Feb. 2016, https://www.academia.edu/22010375/Somaliland_Baseline_Study_Integrated_Food_Security_Education_Authors_Contributors_and_Reviewer_in_alphabetical_order.

numbers of environmental NGOs have joined in this effort, and some of them have endorsed small-scale research. For example, the Union of Concerned Scientists (UCS) for a U.S. government-led SRM research program, but called for guidance on governance before continuing the research.

Timeline of Events

1800	The beginning of climate science
1900	Climate science develops and ice ages as well as other natural changes in paleoclimate are being suspected for the first time while the natural greenhouse effect has been identified.
1950	Climate engineering was introduced for the first time.
1992	Framework Convention on Climate Change, every country agreed to stabilize their concentration of greenhouse gases (GHGs) in the atmosphere in order to prevent dangerous climate change.
October 2011	Bipartisan Policy Centre panel issued a report urging immediate researching and testing in case the climate system reaches a 'tipping point' and swift remedial action is required.
August 18-24, 2014	Climate Engineering Conference (CEC)[17] held in Berlin, Germany was the first international transdisciplinary conference on the many different views of climate engineering, engaging in critical global discussion.
12 December 2015	The Paris Agreement to limit global warming to a maximum of 2 degrees, has been signed by 196 nations. Climate activists and researchers begin to look for alternative measures. Climate engineering emerges as a possibly effective, but conflictual option.
June 1, 2017	The United States of America (USA), the world's second largest greenhouse gas emitter releasing annually 6.6 billion metric tons, decided to withdraw from the Paris Agreement.

[17] Problem Definitions and Evaluation Criteria for the CEC 2014 https://www.researchgate.net/publication/271646935_Problem_definitions_and_evaluation_criteria_for_the_CEC_2014_special_session_and_competition_on_single_objective_real-parameter_numerical_optimization.

2019	Governments disagree on climate change engineering governance at the 2019 United Nations Environmental Assembly negotiations

Previous attempts to solve the issue

United Nations Environmental Assembly (UNEA)

The United Nations Environment Assembly (UNEA) in 2019, for the UN Environment Programme to undertake an ambiguously defined assessment process of “climate engineering and its governance.” The proposal acknowledged the capabilities of geoengineering and therefore, included planetary-scale shading and CDR. The resolution did not pass and its failure, was due to a number of reasons, including timing, terminology, and the implications of evaluation for governance. The United States and Saudi Arabia rejected the resolution and continued discussions on climate engineering under the support of the Intergovernmental Panel on Climate Change (IPCC), under which the analysis will be based on science rather than political affairs.

Paris Agreement

The Paris Agreement is a legally binding international treaty on climate change. It was signed by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. As a result, they raised awareness on the catastrophic impact of climate change as well as set a goal, to limit global warming to a maximum of 2 degrees Celsius. With the Paris Agreement, countries established an enhanced transparency framework (ETF). Under ETF, starting in 2024, countries will report transparently on actions taken and progress in climate change mitigation, adaptation measures and support provided or received. It also provides for international procedures for the review of the submitted reports. The information gathered through the ETF will feed into the Global stocktake which will assess the collective progress towards the long-term climate goals. In all, the Paris Agreement raised awareness about the catastrophic consequences of climate change and encouraged global cooperation.

Relevant UN Resolutions, Events, Treaties and Legislation

UNESCO on climate engineering (SHS/COMEST-12/21/3)

Taking all UN legislative plans into account, including past resolutions and conventions, this annual resolution reaffirms the importance of the issue. It mentions all the times UNESCO acknowledged this pressing matter. Specifically, back in 2010, “the Intergovernmental Oceanographic Commission (IOC) of UNESCO commissioned a report on ocean fertilization”, in 2011 “the IOC, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) cosponsored an International Scientific Conference” and in 2015 “the WMO published the Weather Modification Statement and Guidelines of the Expert Team on Weather Modification”.

Inclusive and state-of-the art basis for a global ethical discussion on climate engineering (SHS/COMEST-12/21/3)

This document proposes a structured report divided in three parts. The first part will present an overview of the technical aspects, highlighting the different challenges and risks, while the second part will elaborate on the ethical challenges arising from climate engineering. Finally, the report will examine governance issues, including international law and the Sustainable Development Goals (SDGs), before articulating ethical values and principles on ethical dialogue, and policy recommendations for Member States.

Solar radiation management techniques (SHS/COMEST-12/21/3)

The implementation of SRM has been taken into consideration and the techniques include increasing the surface reflectivity of the planet, enhancing the reflectivity of clouds, injecting sulphate aerosols into the lower stratosphere and placing reflectors or shields in space in order to reducing the solar radiation reaching the Earth. However, there is still no single geoengineering approach that currently meets all three basic criteria for effectiveness, safety and affordability. The current situation urges the promotion of approaches that can be considered well-researched by requesting the practicalities of their implementation which have yet to be investigated, and mechanisms for their governance which may be potentially

challenging. Moreover, present indications show several of the techniques, both SRM and CDR, to be unlikely to be effective in a global scale.

Possible solutions

Installation of Carbon Dioxide Removal (CDR) and Sun Radiation Management (SRM)

A possible solution would be the preparation of an assessment carried out by UNEA of the status of climate engineering technologies, specifically carbon dioxide removal technologies and solar radiation management, to include, inter alia: criteria which define these technologies, the current state of the science, including research gaps, the actors and activities with regard to research and deployment, current knowledge of potential impacts, including risks and benefits with regard to each geoengineering technology, current state, including challenges, of governance frameworks for research, potential deployment and control for each geoengineering technology, decisions on potential global governance frameworks for each geoengineering technology.

Climate Engineering Agency

An international climate engineering agency should be created in order to coordinate and disseminate research on climate engineering. This agency will take part in decision-making on climate engineering in cooperation with the UNFCCC, where the parties to that convention should decide on norms and rules that govern climate engineering (regarding, for example, an upper limit for manipulations of the radiation balance, a uniform metric for making different responses to climate change comparable, and a time limited moratorium on field tests and deployments of climate engineering technologies). In this way, climate engineering plans will be carried out more efficiently and ethically since they will be carried out by an international corporation.

Policies for the fair distribution of climate engineering technologies

Research on and potential uses of climate engineering technologies need to be coordinated internationally in a multilateral institutional setting. Moreover, researchers

must strive for a favourable risk–benefit ratio and a fair distribution of risks and anticipated benefits, all while protecting the basic rights of the individuals being affected. Field experiments that might affect humans or ecosystems in significant ways should not proceed until a full discussion of the ethics of climate engineering research arises and suitable foundations for regulating such experiments are established.

Securing a habitable planet

The most ethical solution is clear. We have to implement what we set out to do with the Paris Agreement, slowing down our greenhouse gas emissions and mitigating our output of carbon. Developing and implementing renewable energy technology will help spur the advancement of the industry by growing our economies, give back to societies, but it will also assist us to work toward a more habitable planet.

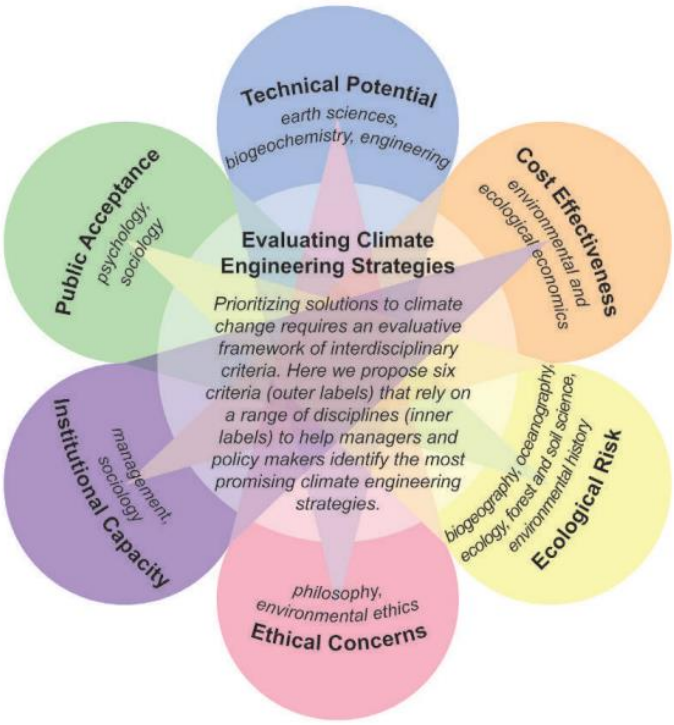

Figure 3: The interdisciplinary analytical framework for assessing climate engineering strategies.[18]

[18] The Interdisciplinary Analytical Framework for Assessing Climate ... https://researchgate.net/figure/The-interdisciplinary-analytical-framework-for-assessing-climate-engineering-strategies_fig2_266314292.

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