McKENNA MUN

# United Nations Environment Programme


**CLAREMONT MCKENNA COLLEGE**

**April 26-27, 2025**

# Letter From the Chair

Dear Delegates,

My name is Shaira Busnawi and I am excited to be directing McKenna MUN 2025's United Nations Environment Programme. I am a senior at Claremont McKenna College studying Philosophy, Politics, and Economics (PPE). I have been on the MUN team since my freshman year, and my time on the team has been an invaluable experience.

I am from Los Angeles, and this winter, we faced destructive wildfires that shattered the lives of thousands. Although Southern California is no stranger to wildfires, natural disasters such as these will continue to worsen year after year because of climate change. Watching my community endure such devastation reinforced the urgent need to address climate change — not just through policies, but through innovation and action. This is why I chose to write on climate technologies. These innovations hold the power to revolutionize our fight against climate change; but with new technologies come new challenges – questions of equity, accessibility, and Governance.

During this debate, you will be tasked with confronting these questions head-on. You will need to consider how we can harness technology to protect our planet, while ensuring that no country or community is left behind in this transition. I am thrilled to see the ideas you will bring to this important conversation and encourage you to engage with empathy, curiosity, and urgency, knowing that the work we do in these rooms reflects the kind of world we hope to create.

See you all soon,

**Shaira Busnawi**

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# Introduction

The United Nations Environment Programme (UNEP) is the global authority on environmental issues, responsible for setting the international environmental agenda, promoting sustainable development, and serving as a powerful advocate for the planet. UNEP's mission is to inspire, inform, and enable nations and peoples to improve their quality of life without compromising that of future generations.[1]

Headquartered in Nairobi, Kenya, UNEP bridges the gap between diplomacy, science, and policy. The programme works with member states, NGOs, and civil society to address critical environmental challenges, including climate change, biodiversity loss, pollution, and resource depletion. It also plays a key role in developing and enforcing international environmental agreements, such as the Paris Agreement on Climate Change and the Convention on Biological Diversity.[2] UNEP's work spans a variety of focus areas, including mitigation and adaptation to climate change, marine conservation, sustainable urban development, and the promotion of a green economy. UNEP collaborates with other UN bodies and regional organizations to ensure the implementation of sustainable policies at local, national, and international levels.

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[1] United Nations Environment Programme, "About Us," accessed January 4, 2025, https://www.unep.org/who-we-are/about-us.

[2] United Nations Environment Programme, "Nations Must Go Further Than Current Paris Pledges or Face Global Warming," accessed January 4, 2025, https://www.unep.org/news-and-stories/press-release/nations-must-go-further-current-paris-pledges-or-face-global-warming.

# History of the Committee

UNEP was founded in 1972 as a result of the growing global awareness of environmental issues during the late 1960s and early 1970s. This period saw an unprecedented rise in environmental activism, as concerns over pollution, deforestation, and resource depletion began to gain international attention. UNEP was founded during the United Nations Conference on the Human Environment, held in Stockholm, Sweden, in 1972.[3] This historic event was the first international gathering focused exclusively on environmental protection and laid the foundation for modern environmental diplomacy.

The conference resulted in the proposal to establish a new UN body dedicated to environmental issues, leading to the adoption of UN General Assembly Resolution 2997, which formally created the United Nations Environment Programme on December 15, 1972.[4] UNEP is based in Nairobi, Kenya, marking a historic moment for the United Nations as it was the first major UN agency to be headquartered in a developing country. The decision to headquarter UNEP in Kenya reflected the growing recognition of the importance of ensuring that environmental issues were addressed on a truly global scale, with collaboration and input from both developed and developing nations.[5] UNEP helped establish regional offices to coordinate environmental initiatives in different parts of the world and launched several key programs, including the Global Environment Monitoring System (GEMS) in 1975 and the International Register of Potentially Toxic Chemicals (IRPTC) in 1976.[6] These initiatives laid the groundwork for modern environmental governance by improving access to environmental data and increasing awareness of the dangers of toxic substances.

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[3] United Nations Environment Programme, "Environmental Moments: UNEP@50 Timeline," accessed January 14, 2025, https://www.unep.org/environmental-moments-unep50-timeline.

[4] United Nations, "Looking Back at 50 Years of UNEP," Africa Renewal, March 2022, accessed January 14, 2025, https://www.un.org/africarenewal/magazine/march-2022/looking-back-50-years-unep#:~:text=If%20you%

[5] United Nations Environment Programme. "How Nairobi Came to Host UNEP's Headquarters." Accessed January 12, 2025. https://www.unep.org/news-and-stories/story/how-nairobi-came-host-uneps-headquarters.

[6] United Nations Environment Programme, "Environmental Moments: UNEP@50 Timeline," accessed January 14, 2025, https://www.unep.org/environmental-moments-unep50-timeline.

Since its creation in 1972, UNEP has played a pivotal role in negotiating and facilitating multilateral environmental agreements (MEAs), providing the legal framework for addressing global environmental challenges. UNEP serves as the secretariat for 15 MEAs, including landmark treaties such as the Montreal Protocol, which has successfully reduced ozone-depleting substances.[7] Beyond this, UNEP focuses on capacity-building and knowledge-sharing, working with governments, civil society, academia, and the private sector to promote sustainability through dialogue and innovation. UNEP has solidified its role as the global environmental voice, helping nations work collectively toward a sustainable future.

[7] 7 United Nations Environment Programme. "We Enable: Why Invest in UNEP." Accessed January 12, 2025. https://www.unep.org/about-un-environment/funding-and-partnerships/why-invest-unep/we-enable#:~:text=One%20of%20UNEP's%20major%20achievements,support%20to%20several%20other%20conventions

# McKenna MUN XI Sensitivity Statement

Claremont McKenna College's McKenna MUN conference is committed to promoting inclusivity, respect, and diversity among its participants. We recognize that participants come from a variety of backgrounds and experiences, and we are dedicated to creating an environment that is welcoming and safe for all. We also strive to ensure that our conference is accessible to everyone regardless of ability, race, ethnicity, gender, sexual orientation, religion, or nationality.

For these reasons, McKenna MUN has a conference-wide zero-tolerance policy for any forms of discrimination or bigotry, including but not limited to homophobia, sexism, racism, and xenophobia. We insist that all delegates adhere to our zero-tolerance policy, even when representing characters whose beliefs would not fall in line with that policy. If you have any questions about how you can represent the policies of your allocated position with integrity while maintaining our conference-wide commitment to inclusivity, please ask your Chair, who will be more than happy to help you navigate that challenge.

When navigating General Assembly, ECOSOC, and Crisis Committees, the following restrictions will be imposed:

1. In light of COVID-19, any attempts to use biological warfare is expressly prohibited. Arc or policies that deny real world events or facts such as COVID-19, genocides, or exoduses are expressly prohibited.
2. Arcs or policies involving the exploitation or oppression of historically marginalized communities, the invocation of ethnic cleansing, or the use of human trafficking are strictly prohibited.
3. Anything else that is deemed inappropriate, insensitive, or offensive by the conference staff will not be a part of proceedings.

We appreciate your cooperation in maintaining a safe and respectful conference environment, and thank you for your commitment to upholding our policies and values. We welcome feedback regarding our efforts to maintain an inclusive environment at McKenna MUN XI at Advisor Feedback sessions.

# Rules of Procedure for General Assembly

**Scope**

The rules of procedure outlined below are offered as a framework for both delegates and conference staff. These rules are not perfect, nor absolute. In the event of confusion or conflict of information in this guide, ultimate discretion is given to the dais for their respective committee.

**Plagiarism**

McKennaMUN XI has a zero tolerance policy for plagiarism of any kind. This includes plagiarism in position papers, working papers, and draft resolutions. McKennaMUN also has a strict policy against the prewriting of clauses. If it is discovered a delegate has prewritten clauses, they will be disqualified from awards.

**Electronics**

Electronic devices including laptops, cell phones, and tablets may not be used at any point during the course of committee. All working papers and draft resolutions must be written on paper, and will be typed up by the chairs once all papers and resolutions have been written. Electronics are not permitted during moderated or unmoderated caucuses, and should not be out during committee sessions at any time. Please print any research or notes you may need during committee, and we will provide paper and pens to write the working papers and draft resolutions.

**Decorum**

Delegates and conference staff must present themselves with respect and decorum throughout the entirety of the conference. This includes appropriate dress, restraint from interrupting other delegates, and interacting in a courteous manner. Conference staff and Secretariat reserve the right to penalize or disqualify delegates who do not adhere to decorous manners.

**Working Outside Committee**

Delegates in all committees are *not* permitted to work outside committee. The writing of working papers and draft resolutions and meetings to make alliances and cooperate must all be conducted during committee time. This is to ensure that delegates are able to put in the same amount of time into committee, and that all delegates are able to take the time they need to take care for themselves outside of committee.

**Sponsors and Signatories**

Working papers and directives must be supported by a minimum number of sponsors and signatories to be specified by the dais of each committee in order to be accepted by the dais and introduced in committee.

**Points:**

- Point of Personal Privilege:
  - At any point, delegates may rise to a point of personal privilege to signal to the chair they have a personal concern
- Point of Order:
  - A delegate may rise to a point of order to correct an error in parliamentary procedure during the course of debate. A point of order may not interrupt a speaker unless it pertains to the speaker's right to speak. A point of order is not appealable.
- Point of Parliamentary Inquiry:
  - A point of parliamentary inquiry may be raised at any time the floor is open to points or motions. Delegates may rise to this point to ask a question about parliamentary procedure, and should never interrupt the speaker.

**Motions:**

- Motion to Open Debate
  - Requires a simple majority
- Motion to Set the Agenda
  - Triggers two speeches in favor and two speeches against, with 30 second speaking time
  - Requires a simple majority
- Motion to Open the General Speakers List

- Requires a simple majority
- Has a default speaking time of 30 seconds
- Motion to Enter an Unmoderated Caucus
  - Requires a simple majority
- Motion to Enter a Moderated Caucus
  - Requires a simple majority to pass
  - Motions must specify the total caucus time and the speaking time for each individual speaker
- Motion to Extend a Caucus
  - Requires a simple majority to pass
  - Must contain a specific time for extension, not to exceed ½ of the original length of the caucus
  - Each caucus can be extended a maximum of one time
- Motion to Introduce Working Papers
  - Requires a simple majority
  - This will trigger Author's Panel, per the discretion of the dais
- Motion to Introduce Draft Resolutions/Directives
  - Requires a simple majority
  - This will trigger Author's Panel, per the discretion of the dais (for GA)
- Motion to Enter Voting Bloc
  - Requires a ⅔ vote from committee
- Motion to Divide the Question
  - Requires a ⅔ vote from committee
- Motion to Introduce Amendments
  - Requires a simple majority
  - Prompts the dais to introduce all entertained amendments that have been submitted

- All friendly amendments are automatically added to the draft resolution/directive in question
- All unfriendly amendments are debated and then delegates take a substantive vote on the clauses

- Motion to Suspend Debate
  - Requires a simple majority
- Motion to Adjourn Debate
  - Requires a simple majority

**Yields During Formal Speeches**

- Yield to Comments
  - A speaker may designate their remaining time to be used for other delegates of the dais selection to make comments on their speech. Delegates will be allotted the time left in the speech
- Yield to Questions
  - The speaker may designate the time remaining in their speech to be used to answer questions from other delegates as selected by the dais. Question time is not counted in the speaker's time.
- Yield to Another Delegate
  - The speaker may designate the time remaining in their speech to be used by another delegate, as specified by the speaker
- Yield to the Chair
  - Speakers may at any time during their speech choose to yield the remaining time to the chair

**Right of Reply**

The right of reply allows delegates to respond to a specific statement made against their person via motion, and approved speech. The right of reply is not intended to allow delegates to respond directly to an offensive statement about their country. Rather, it is intended to be used to respond to insults against the delegates themselves. Petitions for right of reply are left entirely to the discretion of the chair.

**General Precedence of All Motions**

When more than one motion is presented, they are voted on in order from most to least disruptive. That order is:

1. Right of Reply
2. Extensions (longest extension first)
3. Unmoderated Caucus (longest first)
4. Round Robin (longest speaking time first)
5. Moderated Caucus (longest first, then by most number of speakers)

In voting procedure, motions have the following precedence:

1. Reordering of the Draft Resolutions
2. Voting by Acclamation
3. Division of the Question
4. Voting by Roll Call

**Flow of Debate**

1. Roll Call
    a. At the beginning of every committee session, the dais will take the roll of the delegates
    b. Delegates may respond with “present” or “present in voting”
    c. If a delegate indicates they are “present in voting” they may not abstain from any substantive vote
2. Debate is opened
    a. A delegate may motion to open or resume debate once roll call has been taken
    b. This must be passed by a simple majority of the committee

3. The General Speakers' List is Opened
    a. A delegate may motion to open the speakers' list once debate has been opened
    b. The motion must be passed by a simple majority of the committee
    c. The delegate who made the motion is offered the opportunity to be the first speaker on the speakers' list
    d. The speakers' list has a default time of 1 minute, unless otherwise stipulated in the motion that is passed
4. The agenda is set
    a. A delegate may motion to set the agenda to one of the topics listed in the background guide
    b. If there is only one topic in the background and committee materials, the agenda is automatically set to that topic
5. Moderated Caucus
    a. A motion to enter a moderated caucus may be made by any delegate whenever motions are entertained, debate is open, and the committee is not in voting bloc
    b. If multiple motions are presented, motions will be voted on by most to least disruptive. This applies to moderated and unmoderated caucuses.
    c. A motion for a moderated caucus must be passed by a simple majority
    d. The delegate who made the motion is offered the opportunity to speak first or last in the caucus
    e. The motion to enter a moderated caucus must specify a total time for the caucus, a maximum speaking time for each speaker, and a specific topic of discussion
    f. The total time for the caucus must be divisible by the specified speaking time
    g. A motion to extend the moderated caucus may only be made once the caucus has elapsed, have to specify a time for the extension that does not exceed ½ of the original time, and passes by a simple majority
6. Unmoderated caucus

a. A motion to enter an unmoderated caucus may be made by any delegate whenever motions are entertained, debate is open, and the committee is not in voting bloc
b. A motion for an unmoderated caucus must pass by a simple majority
c. The motion to enter an unmoderated caucus must contain a total time for the caucus
d. A motion to extend the unmoderated caucus may be made once the caucus has elapsed, must specify a time that does not exceed ½ of the original time, and must pass by simple majority

7. Author's Panel
    a. A motion to introduce working papers and draft resolutions may be made by any delegate once all working papers have been accepted by the dais and motions are being entertained
    b. Papers will be presented in the order of submission to the dais unless otherwise specified by the motion that is passed
    c. An Author's Panel for working papers will be left to the discretion of the dais based on the time left in the conference, but Author's Panel on draft resolutions are mandatory
    d. A motion to introduce working papers and draft resolutions must pass by a simple majority
    e. Author's Panel will consist of an allotted amount of sponsors to present their paper and resolution to the committee, followed by an allotted amount of time for committee to ask questions, to which sponsors will answer
    f. The duration of presentations and Q&A sessions are determined by the discretion of the dais
    g. The time delegates take to ask questions will not be counted towards the timing of the Q&A

   h. The number of representatives from each bloc allowed to present and answer questions are determined by the discretion of the dais
8. Voting bloc
   a. A motion to enter voting bloc may be made by any delegate after draft resolutions or directives have been formally accepted by the dais and and motions are being entertained
   b. A motion to enter voting bloc must be pass by a ⅔ majority of committee
   c. In crisis committees, a motion to introduce directives is often combined with a motion to enter the voting bloc. Such a motion should specify the procedure for the combined introduction and voting bloc, and such a motion constitutes a suspension of the rules which must pass by a ⅔ majority of committee
   d. The default speakers for/against each directive is two for, two against with 30 second speaking time
   e. The delegate who makes the motion to enter voting bloc may specify a non-default order or for/against structure in their motion
   f. No person other than the authorized conference staff may pass notes, talk to other people in the room, enter the room, or leave the room during voting bloc unless directed to do so by a member of the Secretariat
   g. A delegate may motion to leave voting bloc, or the chair may move out of voting bloc at their discretion after all draft resolutions/directives have been voted on
9. Dividing the Question
   a. A motion to divide the question may be made at any point during voting bloc before the draft resolution/directive in question has been voted on
   b. Divided the question is the process by which one or more clauses of a draft resolution/directive may be voted on separately from the body of the draft resolution/directive
   c. The motion first must pass by a ⅔ majority, and is not a substantive vote

   d. If the vote passes by a simple majority to divide the question, that clause will be substantively voted on
   e. Preambulatory clauses may not be altered by division of the question
   f. Multiple motions on specific divisions may be accepted by the dais

10. Amending a draft resolution/directive
    a. At any point when the floor is open after a draft resolution/directive has been introduced and before it has been voted on, a delegate may make a motion to introduce an amendment to the draft resolution/directive
    b. Time permitting, the amendment is then read out by the dais
    c. If the amendment in question has been submitted to and entertained by the dais, a procedural vote on the motion to introduce the amendment takes place
    d. All amendments must garner a sponsor threshold determined by the dais
    e. An amendment with the support of all sponsors of the draft is a “friendly” amendment, and all other amendments are considered unfriendly and require a vote of ⅔ to pass
    f. For unfriendly amendments, for/against speeches are triggered in which two speakers speak for and against, for a default speaking time of 30 seconds
11. Suspend debate
    a. This motion may only be entertained at the end of a committee session
    b. Passes by a simple majority of committee
12. Adjourn debate
    a. This motion may only be entertained at the end of the conference
    b. Passes by a simple majority of committee

**Voting**

- Procedural Voting
  - All votes on motions are procedural unless otherwise stated
  - All delegates present must vote on procedural matters

- Substantive Voting
    - Voting on draft resolutions, directives, specific divisions of the question, and amendments is considered substantive
    - All delegates must indicate a yes vote, no vote, or abstention during substantive voting
    - The dais may ask for a re-vote if the total number of votes is less than the total number of delegates present
    - Delegates who indicated they were "present and voting" at the beginning of the session must vote "yes" or "no"
- Voting by Acclamation
    - During a substantive vote with for/against speakers, the floor may be eligible to pass by acclamation
    - In such a case, the dais must remind the committee that if no delegate speaks against the matter, it will automatically pass by acclamation
    - The dais must ask the committee once more, and if no delegate speaks against, it is automatically passed
    - A delegate may motion to pass any matter that calls for a substantive vote by acclamation
- Roll Call Voting
    - Immediately preceding a substantive vote, a delegate may motion for a roll call vote
    - If entertained by the dais, a roll call vote will commence in which each delegate's allocation will be called out by the dais and they must either say yes, no, abstain, yes with right, or no with rights
    - All those who vote "with rights" indicate they wish to explain why they voted the way they did. The dais determines if they have the right to speak, and for how long

Any questions? Clarifications? Totally confused?

Please route all questions to ejobrack46@students.claremontmckenna.edu, and we will get back to you as soon as possible.

# Introduction to the Topic

As the world faces more severe consequences from human-induced climate change, the need for innovative climate technologies has become a topic of interest. From carbon capture and storage to solar geoengineering and renewable energy advancements, these innovations could offer pathways to mitigate the devastating impacts of climate change. However, the development and use of these technologies raises a set of concerns that must be addressed to ensure that their use does not create new risks, inequalities, or unintended consequences. The ethics of climate technologies asks us to consider who will benefit from these advancements, who will bear the risks, and how we can ensure that solutions are accessible and equitable for the entire world.

The ethical questions surrounding climate technology are urgent. Climate change is already affecting millions of people worldwide, particularly those in developing countries. According to the Intergovernmental Panel of Climate Change (IPCC), vulnerable populations face the worst impacts of rising sea levels, extreme weather events, and resource scarcity.[8] Many developing nations are already struggling to adapt to climate impacts, and without equitable access to climate technologies, they risk being left further behind. Climate-induced displacement could force 143 million people in sub-Saharan Africa, South Asia, and Latin America to migrate by 2050 due to rising sea levels, crop failures, and water scarcity.[9] Further, the effects of climate change disproportionately threaten political stability, food and water security, health, and economic development in developing countries. The increasing impacts of climate change to at-risk countries highlights the need for climate technologies to be deployed in ways that prioritize justice and equity, ensuring that all countries have a voice in climate solutions.

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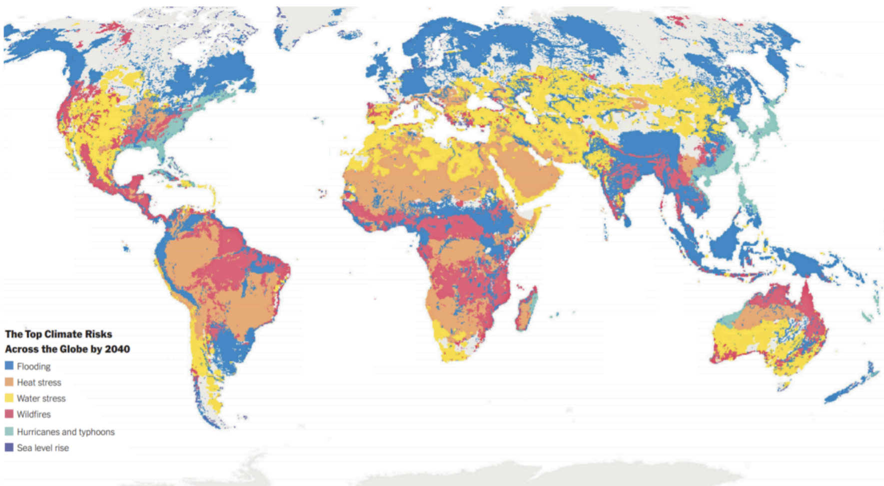
[8] Intergovernmental Panel on Climate Change, Climate Change 2022: Impacts, Adaptation and Vulnerability, accessed January 14, 2025, https://www.ipcc.ch/report/ar6/wg2/.
[9] U.S. Global Leadership Coalition, "Climate Change and the Developing World: A Disproportionate Impact," accessed January 10, 2025, https://www.usglc.org/blog/climate-change-and-the-developing-world-a-disproportionate-impact/.



[10]

Climate technologies have the potential to reshape the global environment and the way communities interact with it. For example, geoengineering techniques, such as ocean fertilization, could artificially mitigate atmospheric CO2 levels, but their deployment could lead to unpredictable environmental side effects such as deoxygenated “dead zones” in the ocean and kill marine life in the area.[11] Further, climate technologies raise questions surrounding the governance of such innovations. While these solutions could theoretically tackle climate change and help the world adapt to its effects, the risks and ethical implications are extensive; Who should decide if these tools are ever deployed? How would they impact weather patterns, ecosystems, and human health? These questions remain largely unanswered, and the lack of global governance norms complicates any move toward real-world experimentation.[12] The governance dilemma becomes even more pressing when considering the potential militarization of climate technologies. Without university-led research and transparent public discourse, these technologies could fall under the control of governments or militaries, potentially turning climate

[10] The New York Times, "What’s Going On in This Graph? Global Climate Risks," March 25, 2021, accessed January 14, 2025, https://www.nytimes.com/2021/03/25/learning/whats-going-on-in-this-graph-global-climate-risks.html.

[11] Trellis, "Debate Over Geoengineering Intensifying," accessed January 8, 2025, https://trellis.net/article/debate-over-geoengineering-intensifying/.

[12] Salata Institute, "The Science and Ethics of Solar Geoengineering," accessed January 9, 2025, https://salatainstitute.harvard.edu/the-science-and-ethics-of-solar-geoengineering/#:~:text=Panelists%20largely%20agreed%20that%20solar,:%20'Who%20would%20control%20it.

interventions into tools of geopolitical power. Decisions about deploying these technologies may not be made by scientists or policymakers, but by those in power who see strategic or security benefits.[13]

Additionally, climate technologies are tied to global justice, raising questions about whether they will reduce inequalities or make them worse. Developing countries lack the resources to protect themselves or invest in climate technologies, making this debate crucial to ask whether these technologies will be used to help those most at risk or whether they will become tools for wealthy nations to maintain control. The Universal Declaration of Human Rights affirms that all people have the right to food, water, and safety, but climate change threatens these rights by causing droughts, food shortages, and displacement. Future climate scenarios could be devastating, and failing to explore climate technologies would knowingly allow millions to suffer.[14] However, controversial technologies pose global risks that may not be shared equally. Research shows that solar geoengineering could decrease rainfall, worsening droughts in Africa and India, where communities already face food insecurity.[15] This raises concerns about distributive justice, which asks whether the benefits and risks of a policy are fairly shared. Without careful governance, geoengineering could harm the very people it aims to protect. Experts stress the need for inclusive research to ensure marginalized voices are heard in climate technology decisions; they argue that geoengineering should follow medical ethics principles, meaning it must avoid disproportionate risks to vulnerable populations.[16]

This debate must also consider future generations, who will shoulder the long-term impacts of today's choices. The key question is whether we'll have the capabilities and knowledge to use these technologies when needed – or if failing to invest in research now will leave future leaders unprepared to act in a crisis. The debate surrounding climate technology is also about fairness, not just science. Who decides how these technologies are used? Who

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[13] Ibid
[14] USC Viterbi School of Engineering, "Ethics of Geoengineering," accessed January 10, 2025, https://vce.usc.edu/volume-5-issue-1/ethics-of-geoengineering/.
[15] Ibid
[16] Ibid

benefits? Who bears the risks? Without ethical guidelines and global cooperation, these innovations could reinforce the inequalities that exacerbate and reinforce the climate crisis in the first place.

## History of Climate Technologies

The history of climate technologies reflects human innovation in the face of environmental challenges. From ancient sustainable practices to modern advancements in carbon capture and artificial intelligence, the evolution of these technologies has been driven by the growing need to reduce emissions, protect ecosystems, and adapt to climate change. Understanding how these technologies have developed and evolved provides insight into the complex relationship between technology, policy, and ethics in addressing the climate crisis.

The emergence of green technologies dates back centuries with early efforts focused on harnessing natural resources while curbing emissions through sustainable solutions and renewable energy technologies. For example, around 200 BC, the Chinese used decomposing organic matter to produce methane for heating and lighting; this sustainable innovation mirrors current bioengineering initiatives that convert waste into valuable energy.[17] Similarly, solar energy has been harnessed for thousands of years, with ancient civilizations using passive solar design to heat buildings. Awareness of human-induced climate change began in the mid-20th century as scientists observed rising levels of carbon dioxide in the atmosphere due to the burning of fossil fuels. This led to the development of climate models in the late 1960s, which predicted the warming effects of increased greenhouse gases.[18] These climate models produced the metric that is known as “climate sensitivity,” which estimates the effect of doubling CO2 levels on the global average temperature. By 1969, NASA launched its Nimbus III satellite, which helped test and validate climate models, marking the beginnings of the era of

[17] The Renewables, "History of Green Technology: Journey Through Time," accessed January 11, 2025, https://therenewables.org/history-of-green-technology-journey-through-time/.

[18] Carbon Brief, "Timeline: The History of Climate Modelling," accessed January 10, 2025, https://www.carbonbrief.org/timeline-history-climate-modelling/.

satellite-based climate observation and modern climate science.[19]

The 20th century saw significant advancements in green technology, particularly in the 1970s, when the oil crisis and growing environmental awareness around the limitations of fossil fuels pushed governments to invest in alternative energy sources.[20] This era marked the rise of solar panels for residential use, wind farms, and the first large-scale hydroelectric projects.

Further, this period saw the development of energy efficiency technologies, including LED lighting and insulation improvements, to reduce energy consumption. In the late 1980s and early 1990s, the environmental movement gained significant momentum, culminating in the negotiation of the United Nations Framework Convention on Climate Change (UNFCCC) at the Rio Earth Summit in 1992.[21] This landmark event marked the first global effort to address climate change through international cooperation. During the summit, various technological proposals were introduced to mitigate climate impacts, including ocean iron fertilization to boost carbon absorption and the large-scale deployment of nuclear power as a low-carbon energy source. However, these solutions faced high costs, technical challenges, and public skepticism over potential risks. Building on the commitments made at Rio, the Kyoto Protocol was adopted in 1997, becoming the first legally binding international agreement to set targets for reducing greenhouse gas emissions.[22] The protocol established differentiated responsibilities, placing greater obligations on developed nations, which had contributed the most to historical emissions. These early agreements laid the foundation for future climate policies and sparked ongoing debates about the role of technology and equity in addressing the climate crisis.[23]

[19] Ibid
[20] Ibid
[21] Carbon Brief, "Guest Post: A Brief History of Climate Targets and Technological Promises," accessed January 10, 2025, https://www.carbonbrief.org/guest-post-a-brief-history-of-climate-targets-and-technological-promises/.

[22] Carbon Brief, "Guest Post: A Brief History of Climate Targets and Technological Promises," accessed January 13, 2025, https://www.carbonbrief.org/guest-post-a-brief-history-of-climate-targets-and-technological-promises/.
[23] Ibid

## Emerging Climate Technologies[24]

1. *Carbon Capture*

One of the technologies being pursued to help solve the climate crisis is carbon capture and storage (CCS), a method that has been used since the 1920s to separate and store carbon dioxide (CO2) from industrial emissions. Initially developed to extract marketable gases, CCS has evolved into a climate technology aimed at reducing greenhouse gas emissions.[25] The process involves capturing CO2, compressing it, and storing it underground in geological formations. This technology can capture 90-100% of carbon emissions, making it a promising solution for hard-to-decarbonize industries such as cement, steel, and chemical production.[26] However, CCS has faced several historical challenges, particularly regarding cost, scalability, and public perception. The high costs of installation and operation have limited its widespread adoption, especially in regions without government incentives like those offered in Norway, where the first large-scale CCS project launched in 1996[27]. Additionally, early projects faced skepticism about whether CCS could store carbon safely for the long term, as well as concerns about whether it might prolong fossil fuel dependence by allowing industries to continue emitting CO2 instead of transitioning to renewable energy. Despite these challenges, oil and gas companies have invested heavily in CCS, seeing it as a way to reduce their carbon footprint while maintaining their operations. For example, ExxonMobilGas Processing Plant in Wyoming is the largest CCS facility in the world, with the capacity to capture 7.7 million metric tons of CO2 annually.[28] Some critics argue that CCS could create a moral hazard by delaying the shift to

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[24]Please note that this list of climate technologies are not exhaustive

[25] Environmental Law Institute, "Carbon Capture and Storage: History, Current State, and Obstacles to the Future (Part 1)," accessed January 13, 2025, https://www.eli.org/vibrant-environment-blog/carbon-capture-and-storage-history-current-state-and-obstacles-future-part.

[26] Ibid

[27] Environmental Law Institute, "Carbon Capture and Storage: History, Current State, and Obstacles to the Future (Part 1)," accessed January 10, 2025, https://www.eli.org/vibrant-environment-blog/carbon-capture-and-storage-history-current-state-and-obstacles-future-part.

[28] Ibid

clean energy, but others see it as a necessary interim solution to reduce carbon intensity during the transition to net-zero emissions.

2. *Geoengineering*

As the urgency to address climate change grew, geoengineering – the intentional manipulation of the Earth's climate – entered the conversation during World War II.[29] Early geoengineering proposals, such as solar radiation management (SRM) and marine cloud brightening, sparked interest for their potential to quickly cool the planet. One of the earliest geoengineering methods is cloud seeding, which involves dispersing silver iodide or solid carbon dioxide into rain-bearing clouds to induce rainfall over dry farmland.[30] Since then, cloud seeding has also been used to reduce the intensity of tropical storms. However, by the 21st century, cloud seeding and other forms of weather modification sparked debate about whether they truly qualify as geoengineering. Critics argued that these techniques operate on a limited scale, rather than planet-wide, and do not directly address the underlying causes of human-induced climate change.

Additionally, during the Cold War, the U.S. military proposed using nuclear weapons to modify regional climates, aiming to make certain areas more habitable, though this idea was never put into practice.[31]

Modern geoengineering proposals have shifted toward global interventions as a response to the rising threat of global warming. Two primary strategies have emerged to tackle climate change. The first involves increasing Earth's reflectivity to reduce solar radiation and limit the amount of heat absorbed by the planet's surface.[32] This approach, known as solar radiation management, could help lower global temperatures but does nothing to address excess carbon dioxide in the atmosphere. The second approach focuses on removing CO2 from the air and storing it safely to prevent further atmospheric buildup. This method is considered more effective than SRM because it addresses both rising temperatures and high CO2 concentrations, and it

29 Encyclopaedia Britannica, s.v. "Geoengineering," accessed January 12, 2025, https://www.britannica.com/science/geoengineering.
30 Ibid
31 Ibid
32 Ibid

could also help mitigate ocean acidification.[33] Reducing atmospheric CO2 would slow the production of carbonic acid, potentially protecting ocean biodiversity from further harm.

However, many scientists remain skeptical of geoengineering solutions, viewing them as high-risk interventions bordering on science fiction. Since the global climate system is complex and not fully understood, attempts to manipulate it carry significant risks of unintended consequences. Geoengineering has been portrayed in the media as a last-resort option if efforts to reduce CO2 emissions fail in the coming decades. Nevertheless, experts argue that rigorous testing must occur before any large-scale deployment, to avoid unexpected negative outcomes.

3. *Genetically Modified Foods*

In addition to these, advancements in agriculture have played a significant role in the development of green technologies, particularly through the creation of drought-resistant crops. As climate change has worsened, droughts and extreme weather events have become more frequent, posing a serious threat to global food security. In response, scientists began developing genetically modified organisms (GMOs) to create crops that can withstand harsh climate conditions, including high temperatures, low water availability, and poor soil quality. Genetic technologies allow for the production of more resilient crop varieties such as drought-tolerant corn, wheat, and rice, which have been developed to maintain high yields even in water-scarce regions.[34]

Genetically modified crops are a critical climate technology because they help reduce the vulnerability of agricultural systems to climate change impacts. By improving crop resilience, these technologies can protect farmers' livelihoods and ensure food production in regions experiencing increasingly unpredictable weather patterns. In 2003, the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) of the UN developed international guidelines to determine the safety of GMO foods. However, the debate around the

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[33] Ibid

[34] United Nations Department of Economic and Social Affairs, "Frontier Technology Quarterly: May 2019," accessed January 20, 2025, https://www.un.org/development/desa/dpad/publication/frontier-technology-quarterly-may-2019/.

use of GMOs and gene-edited crops to combat food insecurity fueled by climate change remains significant today. Questions about inequities in access to these technologies, whether scientific advancements can be scaled to benefit all farmers, and the potential for disproportionate impacts on low-income countries continue to shape this ongoing discussion. GMOs are a critical climate technology that holds promise in addressing global food shortage, however, without equitable distribution and strong governance, it risks exacerbating existing inequalities.

4. *Artificial Intelligence*

In recent years, artificial intelligence (AI) has emerged as a powerful tool in combating the climate crisis by improving efficiency, reducing emissions, and enhancing climate predictions. AI is increasingly being used to optimize renewable energy systems, reduce industrial emissions, and monitor environmental changes in real time. AI systems are now used to track melting icebergs, map deforestation, and predict climate disasters, helping scientists and policymakers make faster, data-driven decisions. One notable example is the use of AI in tracking icebergs in Antarctica, where it maps large ice formations 10,000 times faster than humans, improving scientists' understanding of meltwater contributions to sea level rise.[35] AI is also playing a role in deforestation tracking, with companies using satellite data to measure forest carbon storage and track land use changes in over 30 countries. In Africa, AI is helping communities in climate-vulnerable regions like Burundi, Chad, and Sudan to adapt to climate risks by improving weather predictions and resource management.[36] These insights enable communities to better prepare for droughts, floods, and other climate-related challenges, reducing vulnerability. AI is also being used to improve waste management by identifying recoverable materials in recycling processes, which helps reduce methane emissions from landfills. Additionally, organizations like The Ocean Cleanup use AI to identify and map plastic pollution in oceans, making waste collection efforts more efficient. In Brazil, AI-powered drones

[35]World Economic Forum, "AI to Combat Climate Change," accessed January 20, 2025, https://www.weforum.org/stories/2024/02/ai-combat-climate-change/#:~:text=The%20use%20of%20artificial%20intelligence,the%20World%20Economic%20Forum%20says.

[36] Ibid

are assisting with reforestation projects, planting seeds in hard-to-reach areas at 100 times the speed of traditional methods. These efforts are crucial for carbon sequestration and restoring biodiversity.[37] AI's ability to predict climate disasters, such as cyclones and floods, is also helping businesses and governments better prepare for risks, ultimately protecting communities and infrastructure from climate impacts

While AI offers promising solutions, it also raises ethical and environmental concerns, particularly regarding energy consumption. AI systems require significant computing power, which could increase emissions if not managed sustainably. Further, AI model training itself can lead to the evaporation of freshwater into the atmosphere for data center heat rejection, which could stress already limited freshwater resources.[38] As AI models expect to scale considerably, environmental impacts from electricity consumption, data center heating, and cooling demands are becoming growing concerns, particularly as energy-intensive machine learning processes require large amounts of power. Nonetheless, with careful implementation, AI has the potential to play a key role in addressing the climate crisis by enhancing efficiency, reducing emissions, and protecting ecosystems.

[37] World Economic Forum, "AI to Combat Climate Change," accessed January 10, 2025, https://www.weforum.org/stories/2024/02/ai-combat-climate-change/#:~:text=The%20use%20of%20artificial%20intelligence,the%20World%20Economic%20Forum%20says.

[38] Harvard Business Review, "The Uneven Distribution of AI's Environmental Impacts," accessed January 10, 2025, https://hbr.org/2024/07/the-uneven-distribution-of-ais-environmental-impacts#:~:text=Even%20putting%20aside%20the%20environmental,hundreds%20of%20tons%20of%20carbon.

# Key Issues

Emerging climate technologies are widely seen as essential tools in addressing climate change. However, their development and implementation raise critical questions about their role, risks and ethical concerns, and the need for international cooperation and governance. The debate over whether technology alone can solve the climate crisis or whether systemic changes are necessary remains central to the climate conversation. This section will explore the two key issues shaping the discussion around climate technologies.

1. *Role of Climate Technologies*

A central question in the climate debate is whether technology alone can solve the climate crisis, or if changes in consumption patterns, policy, and economic structures are more effective. The discussion often revolves around short-term fixes versus long-term solutions – whether focusing on technological innovations can provide immediate relief from climate impacts or if it fosters an over-reliance that could delay meaningful action. One side argues that technological promises have historically been used as political tools to justify delays. They call for an end to climate targets framed around future technologies, which they say perpetuate a politics of "prevarication" — a cycle of postponed commitments and insufficient policies.[39]

Proponents of this view suggest that new climate modeling methods and technologies have raised expectations of future breakthroughs, allowing current elites to preserve their interests while shifting climate risks to future generations and vulnerable communities, particularly in the global South.[40] These researchers argue that the history of climate targets reflects this pattern of relying on future technologies to avoid hard policy decisions. They

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[39] ScienceDaily, "Geoengineering: Risky Proposal or Technological Response to Climate Change?," accessed January 10, 2025, https://www.sciencedaily.com/releases/2020/04/200420125510.htm#:~:text=Summary%3A,technological%20responses%20to%20climate%20change.

[40] ScienceDaily, "Geoengineering: Risky Proposal or Technological Response to Climate Change?," accessed January 10, 2025, https://www.sciencedaily.com/releases/2020/04/200420125510.htm#:~:text=Summary%3A,technological%20responses%20to%20climate%20change.

identify five phases in the evolution of climate commitments, showing how technological promises have justified inaction:

Rio (1992): Emission stabilization through energy efficiency, carbon sinks, and nuclear Power.

Kyoto (1997): Percentage reductions with a focus on fuel switching and carbon capture (CCS).

Copenhagen (2009): Targets tied to atmospheric $CO_2$ concentrations and bioenergy with CCS (BECCS).

Global Carbon Budgets: Emphasis on negative emissions to achieve net-zero.

Paris (2015): Formalized temperature targets aimed at limiting warming to 1.5°C.[41]

Each phase introduced new technological solutions that reduced the perceived urgency for immediate action. Solutions like CCS were framed as ways to buy time, enabling industries to continue emitting while waiting for future advancements. According to this perspective, technological approaches shift focus from immediate reductions to hypothetical future scenarios, ultimately delaying real progress.

On the other side of the debate, supporters of climate technologies argue that innovation is essential for both cutting emissions and adapting to the impacts of climate change. A report emphasizes that advanced technologies are central to global decarbonization efforts. The research finds that while existing technologies could achieve around 60% of the emissions reductions needed by 2050, more progress will rely on scaling up emerging solutions like clean hydrogen, advanced batteries, carbon capture, and next-generation nuclear power.[42] Advocates see technological advancement as the most practical way to achieve deep emissions cuts without harming economic growth. They point to recent breakthroughs – such as falling costs for renewable energy and electric vehicle batteries – as proof that innovation can happen quickly and

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[41] Ibid

[42] McKinsey & Company, "Innovating to Net Zero: An Executive's Guide to Climate Technology," accessed January 10, 2025,

lead to major transformations.[43] Additionally, they argue that technologies like carbon capture and direct air capture are essential for reducing emissions in industries where cutting carbon is especially difficult, such as steel production and aviation.

Proponents of climate technologies argue that rapidly investing in and scaling these innovations is essential for achieving net-zero goals. They emphasize that waiting for behavioral changes or relying solely on policy shifts will not deliver results fast enough. Instead, integrating new technologies into existing systems can provide scalable, practical solutions that both reduce emissions and drive economic growth. United States President Joe Biden's national climate adviser, Ali Zaidi, reinforces this view, highlighting the critical role of government in leading progress through financial incentives and supportive policies. Zaidi points to advancements in sectors like geothermal energy, next-generation nuclear power, and sustainable transportation as examples of how technology can modernize infrastructure and reduce emissions.[44] He advocates for a "tech-agnostic" approach, where governments and the private sector collaborate to accelerate the clean energy transition, creating economic opportunities while addressing the climate crisis.[45]

The debate over climate technologies highlights a key tension between preventative and reactive approaches to climate action. Proponents view innovations like renewable energy, carbon capture, and geoengineering as essential tools to reduce emissions and stabilize global temperatures, arguing that they provide practical solutions to accelerate decarbonization. However, critics caution that over-reliance on future technologies risks delaying necessary systemic reforms, such as reducing consumption and transitioning to sustainable economic

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[43] Ibid

[44] Justine Calma, "Joe Biden's National Climate Adviser Sees AI as a 'Massive Opportunity'," The Verge, January 10, 2025, accessed January 15, 2025, https://www.theverge.com/2025/1/10/24339455/national-climate-adviser-ali-zaidi-interview-biden-trump-energy-transition.

[45] Justine Calma, "Joe Biden's National Climate Adviser Sees AI as a 'Massive Opportunity'," The Verge, January 10, 2025, accessed January 15, 2025, https://www.theverge.com/2025/1/10/24339455/national-climate-adviser-ali-zaidi-interview-biden-trump-energy-transition.

models. While technological solutions can mitigate climate impacts, they may disproportionately benefit wealthier nations and industries, perpetuating global inequalities and shifting climate risks onto future generations. A balanced approach may be beneficial – one that considers the potential of climate technologies while also acknowledging the importance of systemic changes to address the underlying causes of the climate crisis and promote equitable solutions across all Nations.

2. *Ethics and Environmental Risks*

A second issue in the debate over climate technologies is whether these innovations carry ethical and environmental risks, and if they will exacerbate or reduce inequalities between nations. Advocates argue that the risks associated with climate technologies are minimal compared to their potential benefits. These technologies are increasingly leveraged by environmental advocacy organizations to address urgent challenges, mobilize stakeholders, and influence policy.[46] For example, digital platforms and AI tools have enabled organizations to identify pressing environmental issues, conduct detailed research, and communicate their findings more effectively with the public and policymakers. AI plays a particularly powerful role by analyzing vast amounts of data to predict climate trends, identify at-risk ecosystems, and optimize resource allocation.[47] These insights allow advocacy groups to tailor their outreach strategies, whether targeting specific legislative proposals or engaging with communities on sustainable practices. Digital platforms and social media amplify the reach of advocacy campaigns, making it easier to raise awareness about climate issues.[48] Tools like data visualization and legislative trackers also enable organizations to monitor environmental laws and hold stakeholders accountable for implementing climate technologies. This demonstrates that climate technologies are not just tools for mitigation but also catalysts for advocacy. They

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[46] Plural Policy, "Environmental Advocacy in the Age of Tech," accessed January 13, 2025, https://pluralpolicy.com/blog/environmental-advocacy-tech/.

[47] Plural Policy, "Environmental Advocacy in the Age of Tech," accessed January 13, 2025, https://pluralpolicy.com/blog/environmental-advocacy-tech/.

[48] Ibid

enable environmental organizations to act strategically, connect with broader audiences, and push for transformative change.

Further, advocates emphasize that technologies are crucial to building resilience against future impacts. For example, advanced technologies are pivotal in building climate-resilient food systems. As climate change increasingly disrupts agriculture, particularly in the Global South, innovative technologies like in-ground water accounting sensors and satellite imagery offer transformative solutions.[49] In-ground sensors measure soil moisture levels, providing real-time data to optimize irrigation practices. Meanwhile, satellite imagery enables farmers to monitor water distribution across their fields, offering insights on maintaining optimal water levels for maximizing crop yields. Together, these technologies empower farmers to adapt to changing conditions, conserve resources, and improve agricultural productivity in the face of climate challenges.[50] These technologies also enable nations, especially those vulnerable to climate risks, to adopt proactive strategies that improve disaster response and recovery. By harnessing AI and combining it with computer vision, digital tools such as these, can aid humanitarian organizations like the Red Cross identify and find refugees, migrants, or missing family members in the wake of climate-related disasters.[51]

On the other hand, critics argue that climate technologies risk exacerbating existing global inequalities if not implemented equitably. The development, deployment, and access to these technologies are often dominated by wealthier nations and corporations, leaving many developing countries without the means to benefit from these advancements.[52] This disparity raises concerns about who truly reaps the rewards of climate technologies and who bears the

[49] World Economic Forum, Innovation and Adaptation in the Climate Crisis, 2024, accessed January 18, 2025, https://www3.weforum.org/docs/WEF_Innovation_and_Adaptation_in_the_Climate_Crisis_2024.pdf.
[50] World Economic Forum, Innovation and Adaptation in the Climate Crisis, 2024, accessed January 18, 2025, https://www3.weforum.org/docs/WEF_Innovation_and_Adaptation_in_the_Climate_Crisis_2024.pdf.

[51] Ibid
[52] World Economic Forum, "Climate Action Disparities Risk Compounding Existing Economic Inequality," accessed January 12, 2025, https://www.weforum.org/press/2024/07/climate-action-disparities-risk-compounding-existing-economic-inequality/.

burdens of their implementation. Developing countries face significant barriers to accessing climate technologies, including high costs, restrictive intellectual property rights (IPR), and inadequate infrastructure. Many low-income nations lack the financial resources to invest in advanced systems like carbon capture, satellite monitoring, or AI-powered agricultural tools.[53] Even when climate technologies are deployed, their benefits often disproportionately favor wealthier nations and urban areas. For instance, technologies like AI-driven climate modeling or renewable energy infrastructure require significant investment and digital infrastructure, which are often lacking in rural or low-income regions. This inequitable distribution can leave marginalized communities and developing nations further vulnerable to the impacts of climate change. Meanwhile, wealthier countries and private companies continue to monopolize these technologies, creating a “technology gap” that exacerbates existing disparities between the Global North and South. This reliance of developing countries on imported climate technologies from wealthier nations can create economic dependencies. Without the capacity to produce and adapt these technologies locally, developing nations may face exploitation through high licensing fees, restrictive intellectual property rights, and unfavorable trade terms.[54] This dynamic not only limits their ability to innovate but can deepen economic inequalities between nations.

Moreover, developing nations are often excluded from key decision-making processes regarding the governance and deployment of climate technologies. Policies and initiatives are frequently shaped by the interests of high-income countries, leaving the priorities and perspectives of the Global South underrepresented. This exclusion risks creating solutions that do not address the unique needs and challenges faced by these regions, further marginalizing their role in global climate action. Additionally, the shift to greener economies involves

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[53] World Economic Forum, Accelerating an Equitable Transition: A Data-Driven Approach, 2024, accessed January 16, 2025, https://www3.weforum.org/docs/WEF_Accelerating_an_Equitable_Transition_A_data_driven_approach_2024.pdf.

[54] TESS Forum, "Addressing the Climate Technology Gap in Developing Countries Through Effective Technology Transfer," accessed January 14, 2025, https://tessforum.org/latest/addressing-the-climate-technology-gap-in-developing-countries-through-effective-technology-transfer.

decarbonizing industries such as fossil fuels, heavy manufacturing, and agriculture. However, this transition risks displacing workers in these sectors, particularly in countries heavily reliant on such industries.[55] Without robust social safety nets and retraining programs, this displacement could exacerbate economic inequalities both within and between nations.

[55] World Economic Forum, Accelerating an Equitable Transition: A Data-Driven Approach, 2024, accessed January 16, 2025, https://www3.weforum.org/docs/WEF_Accelerating_an_Equitable_Transition_A_data_driven_approach_2024.pdf.

# Key Actors

*United States:*

The United States has been a leading advocate for advancing climate technologies, recognizing their potential to reduce greenhouse gas emissions, modernize infrastructure, and enhance climate resilience. Through initiatives such as the Inflation Reduction Act, the U.S. government has provided financial incentives to accelerate the adoption of clean energy technologies like wind, solar, and electric vehicles.[56] The Biden-Harris Administration has further emphasized innovation by investing over $50 billion in climate resilience efforts to help communities prepare for and recover from extreme weather events fueled by climate change.

The U.S. approach to climate technologies focuses on bolstering private investments in next-generation solutions, such as advanced grid systems, water management technologies, and natural disaster detection tools.[57] The government has launched programs like the Climate Resilience Game Changers Assessment, identifying critical technologies to improve public safety, promote environmental justice, and drive economic growth. Additionally, initiatives such as the National Climate Resilience Framework aim to strengthen climate resilience through innovation hubs and accelerators across the country, ensuring that climate technologies are developed and deployed domestically. The U.S's stance on the usage of climate technologies is built on the belief that technological innovation is a key driver in addressing climate risks and creating economic opportunities. By partnering with the private sector and leveraging public funds, the U.S. aims to lead in the development of critical climate technologies that will shape a more resilient and sustainable future.

However, it is interesting to note that at the United Nations Environment Assembly (UNEA) meeting in Nairobi in 2019, efforts to advance international governance of climate

[56] White House Council on Environmental Quality, "Catalyzing American Innovation in Climate Resilience," July 25, 2024, accessed January 19, 2025, https://www.whitehouse.gov/ceq/news-updates/2024/07/25/catalyzing-american-innovation-in-climate-resilience/.

[57] Ibid

geoengineering technologies were blocked by the United States and Saudi Arabia.[58] A resolution, led by Switzerland and supported by several countries, aimed to mandate a report on the state of geoengineering research, associated risks, and potential governance options. The U.S. and Saudi Arabia opposed the resolution, arguing that the Intergovernmental Panel on Climate Change (IPCC) would address these issues in its upcoming report. Critics, including environmental groups, view this opposition as a refusal by major emitters and fossil fuel-reliant economies to accept oversight that could interfere with their interests.[59] The blocked resolution highlights ongoing concerns about the risks of unregulated geoengineering technologies, which include injecting particles into the atmosphere or fertilizing oceans to combat climate change. Advocates for governance argue that international oversight is necessary to mitigate risks to biodiversity, ecosystems, and human rights.

*China:*

China has emerged as a global leader in climate technologies, particularly in renewable energy and electric vehicles, driven by both economic and diplomatic motivations. The country is the world's largest producer of renewable energy, responsible for nearly two-thirds of large-scale wind and solar installations globally. China has also made significant investments in developing and exporting electric vehicles, spreading these technologies across markets in Latin America, Africa, and Southeast Asia.[60]

The Chinese government views its climate technology investments as both a business strategy and a way to strengthen its global reputation. By manufacturing and selling clean energy

[58] Governance," accessed January 13, 2025, https://www.geoengineeringmonitor.org/us-and-saudi-arabia-block-un-efforts-at-climate-geoengineering-governance.

[59] Governance," accessed January 13, 2025, https://www.geoengineeringmonitor.org/us-and-saudi-arabia-block-un-efforts-at-climate-geoengineering-governance.

[60] OPB, "Why China Is a Climate Technology Leader Even With Coal Plants," November 22, 2024, accessed January 17, 2025, https://www.opb.org/article/2024/11/22/why-china-is-a-climate-technology-leader-even-with-coal-plants/#:~:text=China%20has%20made%20it%20clear,to%20nonprofit%20Global%20Energy%20Monitor.

solutions, China enhances its economic standing while positioning itself as a key player in international climate diplomacy. The country has mobilized more than $24 billion since 2016 to assist developing nations in transitioning to clean energy, using climate investments to build diplomatic ties and extend its influence in the Global South.[61] Despite these efforts, China's reliance on coal remains a challenge. Although the country continues to expand its coal power capacity, many plants now function as backup power sources, operating at about 50% capacity.[62] This shift indicates that while coal remains part of China's energy mix, the priority is increasingly on renewable energy sources. China's long-term strategy focuses on dominating the global clean energy market, with substantial investments in solar, wind, and battery technology. This approach not only boosts China's economy but also strengthens its leadership in the global transition toward a greener future.

*Saudi Arabia:*

Saudi Arabia, traditionally known for its oil production, has recently demonstrated a strong commitment to green energy initiatives through the Saudi Green Initiative (SGI). Launched in 2021, SGI aims to combat climate change, improve quality of life, and protect the environment for future generations by uniting all sustainability efforts in the country. As part of this initiative, Saudi Arabia has set ambitious targets to reduce carbon emissions, increase afforestation, and protect land and sea. The Kingdom plans to achieve net-zero emissions by 2060 through the implementation of comprehensive energy efficiency programs, significant investments in clean hydrogen and renewable energy sources, and the development of cutting-edge carbon capture technology.[63] Saudi Arabia's shift toward climate technologies includes significant investments in clean hydrogen as part of its broader renewable energy strategy. For example, the NEOM Green Hydrogen Project – a $5 billion initiative set to become

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[61] OPB, "Why China Is a Climate Technology Leader Even With Coal Plants," November 22, 2024, accessed January 17, 2025, https://www.opb.org/article/2024/11/22/why-china-is-a-climate-technology-leader-even-with-coal-plants/#:~:text=China%20has%20made%20it%20clear,to%20nonprofit%20Global%20Energy%20Monitor.

[62] Ibid

[63] Saudi Green Initiative, "Reduce Carbon Emissions," accessed January 10, 2025, https://www.sgi.gov.sa/about-sgi/sgi-targets/reduce-carbon-emissions/.

the world's largest green hydrogen plant – aims to produce 600 tons of green hydrogen daily by 2026.[64]

In addition to hydrogen, the Kingdom is expanding its solar and wind capacity, with plans to develop 10 new renewable energy projects and increase overall clean energy output to power millions of homes. These initiatives are part of Saudi Arabia's broader strategy to diversify its energy portfolio, reduce dependence on fossil fuels, and position itself as a key player in global climate action. By investing in renewable energy and climate technologies, the Kingdom aims to drive economic growth, create job opportunities, and contribute to global efforts to combat climate change.

*Russia:*

Russia's stance on climate technologies and policies is complex, as it is characterized by limited ambition and a strong reliance on fossil fuels. The Russian government has set a net-zero emissions target for 2060, but the comprehensiveness of its plan is rated as poor by the Climate Action Tracker.[65] The country's strategy relies heavily on its land use and forestry sector to offset emissions, rather than committing to substantial emissions cuts across its economy. Russia's climate policies remain highly insufficient, with minimal progress in developing renewable energy infrastructure or adopting ambitious climate technologies. Instead, its Energy Strategy to 2035 prioritizes fossil fuel extraction, consumption, and exports.[66] While Russia has taken steps to promote electric vehicle production and reduce transport emissions, the overall focus on fossil fuels presents a significant challenge to global climate goals.

In recent years, Russia has sought to use climate diplomacy as a tool to advance its national security and geopolitical interests. Moscow's participation in international climate discussions, including its support for Azerbaijan's hosting of COP29, demonstrates its desire to

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[64] Saudi Green Initiative, "Reduce Carbon Emissions," accessed January 10, 2025, https://www.sgi.gov.sa/about-sgi/sgi-targets/reduce-carbon-emissions/.

[65] Climate Action Tracker, "Russian Federation," accessed January 18, 2025, https://climateactiontracker.org/countries/russian-federation/.

[66] Ibid

shape global climate policies to align with its strategic goals.[67] Russia's climate diplomacy emphasizes nuclear energy as a low-carbon solution, with state-owned Rosatom driving exports to Asia, the Middle East, and Africa to secure long-term energy partnerships and expand geopolitical influence. Critics argue that this focus on nuclear power, rather than renewables, serves Russia's strategic interests more than global climate goals.

Domestically, Russia prioritizes adaptation over aggressive mitigation. The Sakhalin carbon neutrality pilot aims for regional carbon neutrality by 2025 through emission quotas and reforestation, but broader policies remain vague and lack ambition.[68] The government favors economic stability, fearing that stricter climate measures could harm key industries like energy and mining. Overall, Russia balances international climate engagement with protecting its fossil fuel-based economy. While it participates in global climate forums, its actions largely focus on safeguarding economic and geopolitical interests rather than making substantial emissions reductions.

*India:*

At COP29, India emphasized the need for equitable access to climate technologies, arguing that current frameworks often prioritize the preferences of developed nations over the developmental needs of the Global South. India's intervention extended beyond access to technologies, addressing broader inequities in climate governance. India criticized unilateral trade measures, like the European Union's Carbon Border Adjustment Mechanism (CBAM), which imposes carbon tariffs on imports from developing nations.[69] India argued that such policies unfairly shift the burden of emissions reductions onto poorer countries, making their goods less competitive in global markets.

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[67] Think Global Health, "Russia's Strategic Approach to Climate Change," accessed January 15, 2025, https://www.thinkglobalhealth.org/article/russias-strategic-approach-climate-change.

[68] Ibid

[69] Colombo Gazette, "India at COP29: Advocating for Equity, Opposing Unilateral Trade Measures, and Bridging Technology Gaps," November 20, 2024, accessed January 14, 2025, https://colombogazette.com/2024/11/20/india-at-cop29-advocating-for-equity-opposing-unilateral-trade-measures-and-bridging-technology-gaps/

India also highlighted barriers to green technology transfer, shedding light on intellectual property rights (IPR) restrictions and high costs continue to hinder the deployment of clean technologies in developing countries. To bridge these gaps, India proposed creating a Technology Implementation Program to ensure affordable, adaptable, and locally relevant solutions reach vulnerable nations.[70] Furthermore, India called for addressing the historical "carbon debt" owed by developed nations, suggesting that monetizing this debt could fund mitigation and adaptation efforts in the Global South.[71]

India's stance at COP29 reflects a broader demand for equity in climate governance, urging wealthier nations to fulfill their commitments to technology transfer, climate finance, and fair trade practices to ensure that climate action benefits all nations, not just the wealthiest. India's position at COP29 also emphasized the importance of sustainable lifestyles, highlighting that developing nations often bear the brunt of environmental degradation caused by unsustainable consumption patterns in wealthier countries.[72] India argued that promoting responsible consumption is essential for achieving global sustainability goals, alongside fair technology transfer and climate finance commitments.

India's position at COP29 reflects a comprehensive push for equity in climate governance, calling for more inclusive policies that bridge the technology and finance gaps between developed and developing nations. India's proposals highlight the need for wealthier countries to address systemic inequalities in climate action frameworks and to ensure that global transitions to low-carbon economies are both fair and sustainable.

*Malaysia:*

Malaysia's stance on climate technologies is shaped by its efforts to balance economic growth with sustainability. Renewable energy has been part of Malaysia's energy strategy since the 8th Malaysian Plan, which included a target to achieve 5% of the country's energy supply

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[70] Ibid
[71] Ibid
[72] Ibid

from renewable sources; however, progress has been slow, with the country achieving less than 1% of its electricity generation from renewables by 2005.[73] Despite various government initiatives, barriers such as high costs, lack of public awareness, and ineffective policies have hindered the widespread adoption of renewable technologies.

Public opinion in Malaysia shows strong concern about climate change, with nearly 70% of Malaysians acknowledging its significance. However, the adoption of renewable energy products remains limited, partly due to high costs and limited public understanding of government policies. The Malaysian government has taken steps to promote renewable energy through initiatives like the National Renewable Energy Policy and the Small Renewable Energy Power (SREP) Program, but public trust in these policies and knowledge about their benefits remain crucial to driving further adoption.[74] Malaysia's climate strategy emphasizes a gradual transition toward renewable energy, with a focus on improving energy efficiency and diversifying its energy mix. The government recognizes the need for more effective communication with the public to increase acceptance of renewable energy technologies.[75] Moving forward, Malaysia aims to strengthen its renewable energy infrastructure and reduce its reliance on fossil fuels by integrating more sustainable energy solutions.

[73] Roozbeh Kardooni, "Public Opinion on Renewable Energy Technologies and Climate Change in Peninsular Malaysia," Renewable Energy, September 24, 2017, https://www.sciencedirect.com/science/article/abs/pii/S0960148117309370.

[74] Ibid

[75] Ibid

# Past UN Actions

The UN has actively engaged in the development, deployment, and regulation of climate technologies, addressing key areas such as technology transfer to developing nations and the oversight of geoengineering practices. Under the United Nations Framework Convention on Climate Change (UNFCCC), the UN has established mechanisms to facilitate the development and transfer of climate technologies to developing countries. The Technology Mechanism, comprising the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN), plays a central role in this effort.[76] The committee consists of 22 technology experts, representing developed and developing countries, and meets at least twice per year to address technology-related policy issues. The TEC provides policy recommendations to enhance technology development and transfer, while the CTCN offers technical assistance and fosters collaboration among stakeholders.[77] In 2022, the TEC and CTCN launched a joint work program to accelerate the development and transfer of climate technologies to developing countries, aiming to enhance coherence and synergy in their efforts.

Further, the CTCN has supported developing countries by responding to over 300 requests for technical assistance, covering areas such as energy systems, water management, urban planning, and sustainable agriculture. These efforts have contributed to an anticipated reduction of 12.9 million tonnes of CO2 equivalent annually and leveraged approximately $1.24 billion in public and private funding.[78] The CTCN works closely with governments and local stakeholders to foster South-South learning and capacity building. It provides tools and expertise to help nations integrate transformative technologies into their climate strategies, aligning with long-term goals such as the Paris Agreement's target of net-zero emissions by 2050.[79]

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[76] United Nations Framework Convention on Climate Change, "Technology Executive Committee (TEC)," accessed January 17, 2025, https://unfccc.int/ttclear/tec.

[77] Ibid

[78] United Nations Environment Programme, "Technology for a Net-Zero World: Meeting People's Needs," accessed January 19, 2025, https://www.unep.org/news-and-stories/speech/technology-net-zero-world-meeting-peoples-needs.

[79] Ibid

Geoengineering, particularly solar radiation management (SRM) and carbon dioxide removal (CDR), has garnered attention as potential methods to mitigate climate change. However, these technologies pose significant environmental and ethical challenges. In 2019, during the fourth session of the UN Environment Assembly (UNEA-4), delegates debated a draft resolution on geoengineering governance.[80] The resolution, introduced by Switzerland with support from other nations, highlighted concerns about the lack of multilateral oversight and the potential global risks associated with geoengineering technologies. The debate at UNEA-4 highlighted the need for precaution, rights-based approaches, and fairness in considering geoengineering solutions.[81] Critics emphasized that governance discussions should not merely legitimize further research but should carefully evaluate the implications for sustainable development and environmental integrity. In 2024, the UN Environment Assembly continued to address geoengineering governance. A resolution proposed by Switzerland aimed to mandate assessments of SRM and CDR technologies. However, the resolution faced opposition from several countries, particularly from the Global South, who expressed concerns about the potential risks and the lack of comprehensive governance frameworks for these technologies.[82]

The United Nations has also engaged in discussions regarding the oversight of genetically modified organisms, particularly in the context of their use in least developed countries (LDCs) and their role in addressing climate change. GMOs have been proposed as a means to enhance agricultural productivity and food security in the face of climate-related challenges. However, debates persist over their safety, environmental impact, and socio-economic implications. Developing nations often face challenges in building adequate regulatory frameworks and capacity to enforce them, which can hinder the effective assessment and management of

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[80] Harvard University Center for Climate Geoengineering, "Perspectives on the UNEA Resolution," accessed January 16, 2025, https://geoengineering.environment.harvard.edu/blog/perspectives-unea-resolution.

[81] Ibid

[82] Frank Biermann and Aarti Gupta, "A Paradigm Shift? African Countries Call for the Non-Use of Solar Geoengineering at UN Environment Assembly," PLOS Climate, May 2024, https://journals.plos.org/climate/article?id=10.1371%2Fjournal.pclm.0000413&.

GMO-related risks.[83] The UN has recognized the need for comprehensive discussions and assessments to address the potential benefits and risks associated with GMOs in the context of sustainable development and climate resilience. This includes considering the unique vulnerabilities of LDCs and ensuring that any technological interventions do not exacerbate existing inequalities or environmental challenges.[84] The ongoing debates demonstrate the importance of inclusive and transparent governance mechanisms in the development and deployment of such technologies.

At the 2024 COP29, the UN further expanded its focus on the role of digital technologies in climate action. The International Telecommunications Union (ITU) emphasized that digital innovations, such as artificial intelligence, big data, and early warning systems, can accelerate climate adaptation and mitigation efforts.[85] Digital technologies can optimize energy consumption through smarter infrastructure and provide life-saving tools to warn communities of extreme weather events. During this conference, the COP29 Declaration on Green Digital Action was adopted, highlighting the need to reduce the environmental footprint of digital technologies while maximizing their potential to combat climate change.[86] ITU Secretary-General Doreen Bogdan-Martin stressed that the declaration marks a milestone in recognizing the role of digital tools in climate action and called for sustained momentum in integrating green digital solutions into climate strategies. The UN's involvement in digital climate solutions reflects a broader recognition that technology must play a dual role in reducing emissions and ensuring resilience

[83] Adenle, Ademola A., "Addressing Social and Political Dispute of GMOs That Influences Decision-Making in Developing Countries," https://sustainabledevelopment.un.org/content/documents/6539117_Adenle_Addressing%20Social_Political%20Dispute%20of%20GMOs%20that%20Influences%20Decision_Making%20in%20Developing%20c

[84] Ibid

[85] United Nations, "Unlocking Digital Technology for Climate Action," November 2024, accessed January 15, 2025, https://news.un.org/en/story/2024/11/1157086#:~:text=Unlocking%20digital%20technology%20for%20climate,to%20come%2C%E2%80%9D%20she%20said.&text=On%20the%20first%2Dever%20Digitalisation,videos%2C%20explainers%20and%20our%20newsletter.

[86] United Nations, "Unlocking Digital Technology for Climate Action," November 2024, accessed January 15, 2025, https://news.un.org/en/story/2024/11/1157086#:~:text=Unlocking%20digital%20technology%20for%20climate,to%20come%2C%E2%80%9D%20she%20said.&text=On%20the%20first%2Dever%20Digitalisation,videos%2C%20explainers%20and%20our%20newsletter.

to climate impacts.

# Looking Ahead

This committee may wish to address concerns surrounding climate technologies on several fronts, ensuring that their development, deployment, and access are equitable and sustainable. Potential solutions can be designed around:

*Bridging the Technology Gap:*

Addressing the disparity in access to climate technologies between developed and developing countries is critical. This can be achieved through enhanced international cooperation, increased financial support, and robust technology transfer mechanisms. Programs like the UNFCCC's Technology Mechanism should prioritize providing resources, technical expertise, and infrastructure to nations most vulnerable to climate impacts.[87]

*Inclusive Governance:*

Developing nations must have a voice in global decision-making processes regarding climate technologies. International bodies should collaborate to ensure that the needs and priorities of the Global South are represented in negotiations on technology development and deployment. Committee members should focus on creatively designing equitable governance frameworks that align with local contexts and priorities.

*Monitoring and Accountability:*

Equitable access to climate technologies requires transparent mechanisms to track progress and hold stakeholders accountable. Establishing benchmarks for technology transfer, financing commitments, and the safe deployment of climate technologies can be useful to ensure that climate action and promises are fulfilled.

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[87] TESS Forum, "Addressing the Climate Technology Gap in Developing Countries Through Effective Technology Transfer," accessed January 18, 2025, https://tessforum.org/latest/addressing-the-climate-technology-gap-in-developing-countries-through-effective-technology-transfer.

# Questions to Consider

1. What role should climate technologies play in addressing the global climate crisis, and how do we balance their potential benefits with their associated risks?
2. How do we balance short-term needs for climate technologies with long-term sustainability goals?
3. How can we ensure that climate technologies are accessible to all nations, particularly developing countries, which often lack the resources to invest in these innovations?
4. What role should wealthier nations play in financing and supporting the use of climate technologies in the Global South?
5. What international frameworks are needed to regulate emerging climate technologies, such as geoengineering, to prevent misuse or unintended consequences?
6. How can we ensure that developing nations have a meaningful voice in shaping global policies surrounding climate technologies?

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