

Mini Simulation

Solar Geoengineering

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Overview

As the threat of climate change continues to grow, some policymakers are starting to consider solar geoengineering: reflecting sunlight in the atmosphere to counter global warming. The idea could offer a vital tool against climate change, but it could be risky, especially without worldwide coordination on its use. How should the United States approach solar geoengineering?

Students will understand that solar geoengineering offers both opportunities and risks for combating climate change.

Students will understand that the nature of solar geoengineering makes the adoption of an international system to govern the practice an especially important question.

The Situation

Climate change threatens catastrophic consequences: rising temperatures bring stronger and more frequent natural disasters, droughts and crop failures, and damaged ecosystems. Many existing tools and others in development can address climate change in different ways and to various degrees, but none are perfect. Mustering the political will and resources to reduce the greenhouse-gas [emissions](#) driving climate change has proven exceedingly difficult. Carbon-capture technology that would remove those gases from the atmosphere is still in its infancy. [Adaptation](#) and resilience projects will be expensive and uproot millions of lives. Accordingly, scientists continue to explore other tools. One is solar geoengineering: reflecting sunlight in the atmosphere to lower global temperatures. This could be done by releasing reflective particles into the upper atmosphere or spraying a sea-salt mist into clouds over the ocean to make them more reflective. Solar geoengineering has received greater attention in recent years as a tool to slow climate change, but it comes with its own risks and challenges.

Solar geoengineering would be far cheaper to implement than decarbonizing the economy has been or than ongoing resilience efforts will be. It also could bear fruit far faster. However, critics assert that geoengineering could have unknown and unpredictable risks. Proponents counter that runaway greenhouse-gas emissions are already subjecting the planet to a large-scale climate experiment. With all of this in mind, one approach could be to use geoengineering as a stopgap until reduced emissions and carbon capture have matured. In such a scenario, some negative consequences of solar geoengineering could be acceptable if they are expected to be temporary. However, this approach has its own risk: if solar geoengineering is effective, countries could lose the political will to follow through with more expensive tools.

Even if policymakers accept those risks, the question of how to implement and regulate solar geoengineering remains. Any decision to implement solar geoengineering carries profound implications for the entire world. Yet, nothing is stopping any country from using solar geoengineering unilaterally. Another challenge is that even if the practice does not have significant harms, its effects could be uneven, cooling some regions more than others and potentially shifting weather patterns. Disproportionately affected regions could face hardship, even if solar geoengineering succeeds in lowering the global average temperature. Current treaties are largely silent on the topic, so a new agreement would be necessary to create a framework for managing any future solar geoengineering. Such an agreement would ensure that all countries have input in and take ownership of any decisions about solar geoengineering. It could also create a forum for sharing research and technology, as well as a mechanism for aiding

any countries that could face adverse effects.

However, negotiations could be time-consuming and contentious, with no guarantee that parties could even reach an agreement. If negotiations dragged on, climate change would continue. Undertaking solar geoengineering without international agreement would address global warming faster, but it could lead to recriminations from other countries who see the choice being made for them without their input. It could also encourage other countries to adopt the practice with no organizing framework to assess the risks of various approaches or coordinate their use. Still, climate change is an emergency. Policymakers need to carefully weigh the risks and potential benefits of solar geoengineering and consider how best, if at all, to approach the practice.

Decision Point

Interest in solar geoengineering is growing. Scientists continue to model possible approaches and their consequences, yet policymakers will need to decide how, if at all, to use the tool once it is viable. With climate change continuing unabated, the president has asked the National Security Council (NSC) to consider whether and how to use solar geoengineering.

NSC members should consider one of the following policies:

- *Do not pursue solar geoengineering.* Such a policy would clearly signal that the United States considers the risks of solar geoengineering too high and could influence other countries to take the same course. However, the United States could still experience solar geoengineering without having any say in the matter if another country or countries decide to use the tool anyway.
- *Take steps toward solar geoengineering, but clarify that pursuing it will require an international agreement.* If an agreement is reached, this option could lead to some of solar geoengineering's predicted benefits while also maximizing the possibility of responsible and equitable implementation. However, an international agreement could take valuable time—and there is no guarantee that one can even be reached.
- *Take steps toward solar geoengineering and declare that the United States will pursue it even without an international agreement.* This option could also lead to some of the predicted benefits of solar geoengineering, with the United States calling the shots. However, other countries could protest and potentially enact diplomatic or economic retaliation against the United States. They could also feel emboldened to adopt their own potentially riskier geoengineering programs.

[What is Geoengineering?](#) CFR Education

[As Earth Heats up, the World Must Consider Sunlight Reflection](#) The Hill

[Can Solar Geoengineering Be Used as a Weapon?](#) Council on Foreign Relations