Geoengineering Explained: Pros and Cons of Geoengineering
Master Class, June 7, 2021
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Important: *This article was rewritten to make it easier for students to understand*.

As the Earth faces increasing changes in its climate, some leaders, scientists, and members of the Intergovernmental Panel on Climate Change (IPCC) have suggested new ways to fix these problems. These methods are called geoengineering.

What Is Geoengineering?
Geoengineering means changing the Earth's climate on purpose. The main goals of geoengineering are to stop global warming and remove carbon dioxide from the air. Big geoengineering projects could try to fix many things, like global warming, ocean problems, melting ice, or volcanic eruptions.

What Is the Purpose of Geoengineering?
Most geoengineering projects aim to fix the negative effects of human activities on Earth's climate. Activities like cutting down trees and burning fossil fuels add harmful gases like carbon dioxide (CO2) and methane (CH4) to the air. Geoengineering goes beyond just saving resources and reducing emissions; it tries to actively remove these gases from the atmosphere.

What are the Two Primary Types of Geoengineering
Current geoengineering technologies focus on two main areas: solar geoengineering and carbon capture.

- Solar geoengineering: This is also called albedo modification or solar radiation management (SRM). It aims to block sunlight from reaching Earth to reduce global temperatures. Methods include making clouds brighter with seawater, adding particles to the air to reflect sunlight, and using giant mirrors in space. Simpler methods include painting roofs and streets light colors to reflect sunlight.
- Carbon capture: This seeks to remove carbon-based greenhouse gases from the atmosphere. Simple methods include planting trees and restoring forests to capture carbon. More complex methods involve capturing carbon dioxide from the air and storing it underground. Another idea is iron fertilization, which means adding iron to the ocean to help grow carbon-absorbing plants.

What are Some Advantages of Geoengineering

1. **Actively reverses climate damage:** Unlike methods that just slow down damage, geoengineering aims to fix the damage already done.
2. **Quick results:** Some methods, like adding iron to the ocean or particles to the air, could lower temperatures quickly.
3. **Creates jobs:** Research and projects in geoengineering can provide jobs for scientists, engineers, and other workers.

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What are Some Disadvantages of Geoengineering

1. **Unknown risks (& side effects):** Geoengineering could change the Earth's systems in ways we don't expect. We won't know the full effects of methods like iron fertilization or aerosol injections until we try them.
2. **Unproven technology:** Many geoengineering projects are still theoretical and haven't been proven to work without harmful side effects.
3. **Too Costly (Expensive):** Some methods, like planting trees, are affordable and easy. Others need a lot of government money and public support.

Conclusion
Geoengineering presents both exciting opportunities and significant challenges as a potential solution to climate change. While it offers rapid and active methods to combat environmental damage, it also carries risks and uncertainties that must be carefully considered.