Startups and Solar Geoengineering

(Alt title: What's Wrong with Cooling Credits?)

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Background

- In 2023, Make Sunsets began selling ‘cooling credits’—$5 for 1g of SO_2 injected into the stratosphere (or so they claim).
- Patents and entrepreneurial interest in solar geoengineering are increasing (Ramos and Santos 2025).
- Widespread condemnation from the climate and geoengineering research communities.
  - Less agreement regarding the *nature* of the condemnation.

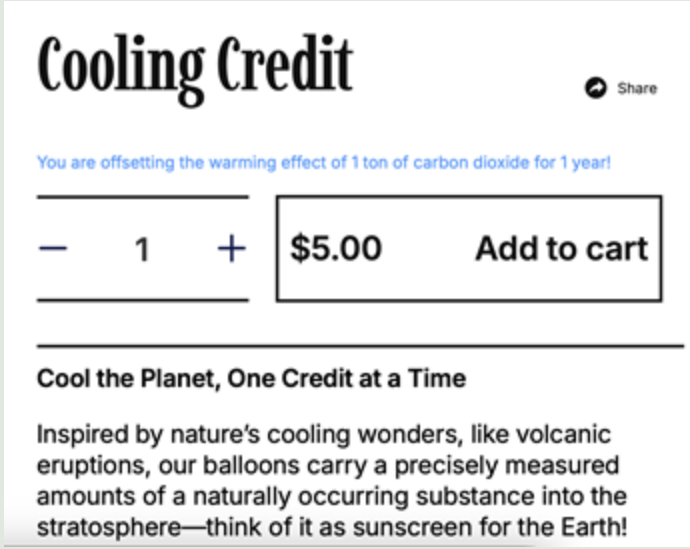
My Question

Why exactly should we be concerned about a market-based approach to solar geoengineering?

Focus: Stratospheric aerosol injection and the ‘cooling credit’ model

Goals

1. Differentiate between distinct arguments against the cooling credits model.
2. Begin to assess those arguments.



Outline

1. ~~The Business Case Objection~~
2. ~~The ‘Impact on Legitimate Research/Deployment’ Objection~~
3. ~~The ‘Governance First’ Objection~~
4. ~~The ‘Risk Redistribution’ Objection~~
5. The ‘Separate Responsibilities’ Objection + Implications

What is objectionable about this scenario?

1. The Business Case Objection

Objection: There won't be a market for cooling credits because demand is unlikely.

- Cooling credits are arguably a public good (non rivalrous and non excludable); markets tend to under produce such goods.
- Hard to verify that your purchase had intended effect.

Reply 1: This objection also applies to markets in Carbon Dioxide Removal (CDR). Yet these markets are growing.

Reply 2: Weak business case does not amount to a *normative* objection.

2. The Impacts on Legitimate Research or Deployment Objection

Objection: Selling cooling credits has a chilling effect on ‘legitimate’ research or deployment.

Reply 1: Circularity: The above argument assumes the conclusion it was trying to prove--that selling cooling credits is illegitimate.

Reply 2: Though hard to test the counterfactual, research funding and interest in solar geoengineering have grown despite startup activity (SRM 360 Funding Tracker)

3. The Governance First Objection

Objection: Private actors are bypassing public governance, acting without necessary legitimacy, consent, or public trust.

Reply: Does not rule out a future cooling credit system if embedded in legitimate governance structures.

- *Procedural,* not *substantive* critique.

"A couple of rogue tech bros taking action completely outside the scope of government authority or any public engagement are really embodying the nightmare of what folks think this could be."

- Sikina Jinnah

4. The Risk Redistribution Objection

- Buying and selling stratospheric injection of SO_2 is not *intrinsically* problematic.
  - ≠ Markets in organs, votes, people.

- Problematic when market involves **avoided mitigation.**
  - SG distribute risks and benefits differently than mitigation, even for the same amount of avoided warming.

- Is this **risk redistribution** a reason to reject cooling credit markets?
  - No, lots (all?) markets re-distribute risks and benefits.

5. Separate Responsibilities Objection

- Solar geoengineering and mitigation are *distinct obligations* owed to different groups.
  - **Solar geoengineering:** Benefits people in the relatively short term by quickly reducing warming.
  - **Mitigation:** Largest benefits are to those in the further future who are avoiding the worst impacts of cumulative emissions.

- A purchase of a cooling credit does not count against obligation to reduce emissions.

- Without strong decarbonization policy, cooling credits risk being used in this way.

Implications of the Separate Responsibilities Objection

- Challenges the underlying normative framework of most Integrated Assessment Models.
  - Usually *one* obligation: Maximizing global welfare
  - Solar geoengineering and mitigation are substitutable means to the same welfare-maximizing end.

- Implications extend to how we think about CDR markets and other offset-based mechanisms.
  - If emissions reductions and CDR are properly conceived of as separate responsibilities, same conclusion will apply.

Thank you

Further feedback and conversation warmly welcome at brittaclark@g.harvard.edu

Link to slides