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CLIMATE CHANGE

A Coordinated Strategy Could Focus Federal Geoengineering Research and Inform Governance Efforts

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Highlights

Highlights of GAO-10-903, a report to the Chairman, Committee on Science and Technology, House of Representatives

Why GAO Did This Study

Policymakers have raised questions about geoengineering—large-scale deliberate interventions in the earth's climate system to diminish climate change or its impacts—and its role in a broader strategy of mitigating and adapting to climate change. Most geoengineering proposals fall into two categories: carbon dioxide removal (CDR), which would remove carbon dioxide (CO_2) from the atmosphere, and solar radiation management (SRM), which would offset temperature increases by reflecting sunlight back into space.

GAO was asked to examine (1) the state of geoengineering science, (2) federal involvement in geoengineering, and (3) the views of experts and federal officials about the extent to which federal laws and international agreements apply to geoengineering, and any governance challenges. GAO examined relevant scientific and policy studies, relevant domestic laws and international agreements, analyzed agency data describing relevant research for fiscal years 2009 and 2010, and interviewed federal officials and selected recognized experts in the field.

What GAO Recommends

GAO recommends that within the Executive Office of the President, the appropriate entities, such as the Office of Science and Technology Policy (OSTP), establish a clear strategy for geoengineering research in the context of the federal response to climate change to ensure a coordinated federal approach. OSTP neither agreed nor disagreed with our recommendation, but provided technical comments.

View GAO-10-903 or key components.
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What GAO Found

Few geoengineering experiments or modeling studies have been conducted, and major uncertainties remain on the efficacy and potential consequences of geoengineering approaches. GAO's review of relevant studies and discussions with selected experts indicated that relatively more laboratory and field research relevant to certain CDR approaches exists, although most of this research was not designed to apply to geoengineering. In contrast, few modeling studies or field experiments have focused on SRM approaches, according to experts and recent studies. Experts identified only one SRM field experiment with published results—a 2009 Russian experiment that injected aerosols into the middle troposphere to measure their reflectivity. Experts, as well as relevant studies, identified several major uncertainties in need of further investigation for CDR and SRM.

Federal agencies identified 52 research activities, totaling about $100.9 million, relevant to geoengineering during fiscal years 2009 and 2010. GAO's analysis found that 43 activities, totaling about $99 million, focused either on mitigation strategies or basic science. Most of the research focused on mitigation efforts, such as geological sequestration of CO_2, which were identified as relevant to CDR approaches but not designed to address them directly. GAO found that nine activities, totaling about $1.9 million, directly investigated SRM or less conventional CDR approaches. Officials from interagency bodies coordinating federal responses to climate change indicated that their offices have not developed a coordinated strategy, and believe that, due to limited federal investment, it is premature to coordinate geoengineering activities. However, federal officials also noted that a large share of existing federal climate science research could be relevant to geoengineering. Agencies requested roughly $2 billion for such activities in fiscal year 2010. Without a coordinated federal strategy for geoengineering, it is difficult for agencies to determine the extent of relevant research, and policymakers may lack key information to inform subsequent decisions on geoengineering and existing climate science efforts.

According to legal experts and federal officials, the extent to which federal laws and international agreements apply to geoengineering is unclear. The Environmental Protection Agency (EPA) has taken steps to regulate one CDR approach and has determined that it has sufficient authority to regulate two other approaches. EPA officials said EPA has not assessed the applicability of other laws because geoengineering research is in its initial stages. Similarly, legal experts and Department of State officials said that, except for three instances, parties to international agreements have not addressed their agreements' applicability to geoengineering, largely due to limited geoengineering activity and awareness of the issue. Legal experts' and officials' views differed on the best approach for international governance, but generally agreed that the federal government should take a coordinated, interagency approach on domestic regulation. Experts and officials also identified governance challenges, such as the need to address liability.