

U.S. House of Representatives
Committee on Science and Technology

Research and Development of Cloud Whitening Technology

Tuesday, October 19, 2010

5:30 p.m. – 6:45 p.m.

Woodrow Wilson International Center for Scholars
1300 Pennsylvania Ave., NW, 5th Floor, Washington, D.C.

1. Purpose

On Tuesday, October 19, 2010, the Science and Technology Assessment Subcommittee will hold a hearing to explore citizens' views about research and development of cloud whitening technology—technologies that aim to lower global temperatures by reflecting sunlight back into space.

2. Witnesses

- Virginia: Jackie Browning.
- Maryland: Jordan Basl, Sapir Nachum & Olivia Walton.
- District of Columbia: Meghan Anand, Julia Truelove & Yunan Nie.

3. Overarching Questions

- Should the federal government undertake a geoengineering research program, and if so, how should it be organized, what level of funding would be appropriate, and what should its goals be?

4. Background

Congress has convened a special session to enact legislation that will accelerate the pace of current research and development in cloud whitening technology—technologies that aim to lower global temperatures by reflecting sunlight back into space.

Following considerations have contributed to this decision:

- The Copenhagen climate conference fell short of reaching the desired global accord about taking the necessary comprehensive measures for combating climate change.
- Congress failed to enact comprehensive legislation aimed at reducing greenhouse gas emissions in the United States due to lack of bi-partisan support.
- There has been a significant increase in the frequency of extreme climate events such as floods, hurricanes and droughts in recent time period.
- Certain climate change models show significant rise in temperature even with significant reduction in carbon dioxide emission.

- Although the risk (and potential timing) of severe or even catastrophic climate change is difficult to quantify, it is clearly non-trivial; there is some chance of such events occurring in this century.
- Some credible research and very limited experiments suggest it may be possible to use cloud whitening technologies to cool the global climate if it were necessary.
- A coalition of scientists and environmental groups have combined forces to argue in favor of research and development of geoengineering technologies such as cloud whitening as a potentially invaluable complement to other efforts to combat climate change through emissions reduction and adaptation.

In the past three weeks citizens groups from the States of Virginia and Maryland and the District of Columbia had deliberated with each other and with experts in the field about the prospects, potentials, uncertainties and challenges associated with the research and development of cloud whitening technologies. They had a chance to listen respectfully to each other, review publicly available information, and obtain answers to their questions directly from experts in the field. Reflecting on these deliberations they have formed a set of recommendations about how the research and development of these technologies should or should not be managed.

5. Questions for Witnesses

Witness from Virginia:

- Who should be held accountable if something goes wrong? Are you aware of the financial constraints in your quality of life (and your kids and grandchildren's) if we enact legislation to deploy or implement cloud whitening technologies?

Witness from Maryland:

- Because cloud brightening will affect certain areas and not other areas, this will create gradients in temperature that will affect the weather. In addition to reducing overall warming, this is likely to make certain areas wetter and certain drier, just as happens with El Nino events, but now conditions would be prolonged. So there will be some who win economically and some who lose economically. Will those who benefit be responsible for compensating those who suffer a loss? How would we deal with this within the U.S., and even more complex, at the international level?

Witness from District of Columbia:

- Should the U.S. enter into an international agreement that would limit the rights of individual nations to engineer the climate? Or should the U.S. preserve its right to act independently on geoengineering?

Jee In Seo, Debbie Yu, Kevin Lim, Jackie Browning, Manu Narra

Ms. Schoeplein

October 18, 2010

We, the citizens of Virginia, are concerned with the current state of global climate change. Mainly, global warming and ocean acidification are pressing issues as we head into the future. Cloud whitening technology provides a feasible temporary solution to decrease the average global temperature. Decreasing the global temperature could prevent the rising of sea levels which could destroy coastal cities. Additionally, this increase in temperature has a correlation with an increase in extreme weather such as floods, hurricanes, and droughts. Cloud whitening technology (CWT) is a cost efficient method of lowering the average global temperature by spraying sea water into the atmosphere to create clouds that have a high albedo. These clouds would reflect sunlight back into space, thereby decreasing the global temperature.

This technology would affect the entire world; therefore it should be regulated at an international level. We propose that the United Nations monitors, regulates, and administers the research and vessels that would be used for the implementation of CWT. This would allow for an equal opportunity among nations for contributing to the advancement of this technology. Countries could donate funds to CWT research and development. This system would allow countries to have input into the development of this technology without forcing them to be involved. In addition, research centers could be set up in nations throughout the world, not just in the United States.

As citizens of Virginia we are concerned with who should be held accountable if unforeseen problems should occur. The United Nation's control over CWT would prevent individual nations from being blamed for negative effects of CWT. Additionally, we are aware of the financial constraints in our quality of life (and that of future generations) if we enact legislation to deploy or implement cloud whitening technologies. We believe that having the United Nations oversee CWT the United States will not feel obligated to help fund this technology; therefore any donation would be less likely to come from taxes.

Although CWT is a valid option for reducing the average global temperature, we realize that it does not reduce the current amount of carbon dioxide present in the atmosphere. Research into technologies that would reduce the concentration of carbon dioxide from the atmosphere should be heavily encouraged. CWT is not a final solution and is only a step towards our ultimate goal. It will help buy scientists time for an efficient method to lower carbon dioxide emissions.

Research and Development of Cloud Whitening Technology

Maryland

By: Jordan Basl, Sapir Nachum, Sitara Sundar, & Olivia Walton

Overarching Question:

We believe that before cloud whitening technology can have the support of the federal government and before it can even come close to being applied in real world situations, a system of control over such technologies must be established. In an ideal world, every country would be equally represented in the organization. Countries would not be discriminated against based on size, political power, or economic status (concerning ability to fund research/technology). However, we understand that in reality, no such organization can exist without compromising the powers and rights of some countries; no such organization can effectively maintain control of this technology without assigning too much power to the organization as well as individuals within it.

The organization that controls the research should be privately funded by interest groups, corporate companies, individuals, etc. The organization should invest its time in researching possible global effects and consequences of the technology as well as its benefits. However, the company should not attempt to initiate the use of technology until it is approved by an international board. The organization should take into account consequences such as the inability to differentiate between the effects of the technology and other anomalies such as droughts and economic effects on various countries and how to compensate for such outcomes. The federal

government should not be involved in the funding or control of the technology, as this would cause political turmoil.

Therefore, we conclude that the federal government should not undertake a geoengineering research program because of the consequences to both the planet and political relationships among a number of countries. This technology would provide a limited number of individuals with too much power.

Compensation and International Relations (Maryland):

Cloud whitening technology may cause economic losses in a number of countries while causing gains in others. If an international board is created, it should dictate the compensation procedures. It should be ensured that all countries understand that compensation will not be given for all weather anomalies and it should be determined ahead of time which instances will receive compensation. The international organization should charge all countries for use of this technology based on their surface area. This money should then be collected and redistributed to areas that have been economically disadvantaged as a result of the use of this technology.

This technology is highly likely to cause international disputes as a result of the inadvertent consequences for any and all countries. As a result, a general consensus of a large majority of countries is necessary to avoid large-scale conflicts. Although this technology may pose a number of benefits, it will without a doubt cause international disagreements.

Cloud Whitening Technology Hearing Testimony-Washington D.C.

Should the US enter into an international agreement that would limit the rights of individual nations to engineer the climate? Or should the US preserve its right to act independently on geoengineering?

Signing an agreement that would limit the rights of individual nations to engineer the climate would suppress innovation and creativity. Furthermore, the two questions posed aren't mutually exclusive. The international geoengineering effort should foster a sense of cooperation rather than competition. The U.S. should sign an agreement with other countries developing regulations for Cloud Whitening Technology implementation, but said agreement should also encourage international research and development. As climate change is an international problem, the world science community should strive for an international solution.

Should the federal government undertake a geoengineering research program, and if so, how should it be organized, what level of funding would be appropriate, and what should its goals be?

An international organization, similar to the Intergovernmental Panel on Climate Change, should be created to oversee the development of cloud whitening technology. This organization should be able to enforce regulations. A nation's per capita carbon emissions should determine percentage of contributions to research and development. The international council should consider smart sanctions to encourage participation -- targeted towards the government itself, instead of the people. The United State Government has provided 385 million dollars for cellulosic ethanol research and development, and we strongly recommend that the government follow a similar grant funding paths to encourage research in the private sector.

The study of cloud whitening technology requires environmental research studies, but many groups are cautious of large-scale testing without more preliminary research. We recommend that initial testing and implementation begin in Antarctica for two reasons. First, ozone depletion in the atmosphere is highest over Antarctica. Second, Antarctica has long been an international neutral scientific testing ground. As Cloud

Meghan Anand, Julia Truelove,
Thalia Aoki, Yunan Nie

Whitening technology requires international approval and involvement, a world-wide commission allows all nations to participate in research, development, and regulation.

Additionally, the government should be encouraged to provide contracts to private sector groups for cloud whitening research and development. Cloud whitening technology is a method for treating a symptom rather than the cause of global climate change. Cloud whitening should be considered a short-term, rather than long-term, solution for climate change. Cloud whitening should be considered in addition to carbon emission regulations and the possibility of other geoengineering techniques such as carbon capture technology.

After further investigation has been conducted, there should be a national, if not international, public education campaign to explain the implications and caveats of cloud whitening technology. Emphasis should be placed on utility and safety as well as honesty with the public. Otherwise, 'not in my backyard' type attitudes are likely to develop and forestall any true progress being made.