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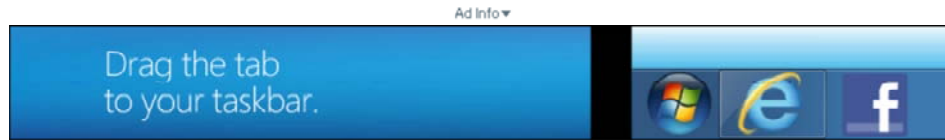
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## 'Geoengineering': Space mirror over Greenland?

by [Martin LaMonica](#)

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Scientists are starting to consider planet-scale engineering projects to slow the pace of climate change--anything from causing massive plankton growth in the ocean to putting a giant mirror in space above Greenland to stop ice from melting.

These ideas to alter the earth's environment at large scale, called "geoengineering," are increasingly being articulated and seriously evaluated even though they are likely to be controversial.



Earlier this month, climate scientists held a conference in Cambridge, Mass., to discuss the importance of geoengineering projects. The overall consensus was that geoengineering deserves further study, according to one of the organizers and news reports.

Beyond that general agreement, though, there was a wide diversity of views on the potential effectiveness of these proposals and the impact they could have on how people address climate change, according to a [report in Science magazine](#). Some feared that geoengineering could dampen efforts to

address global warming in other ways, such as using less energy and investing in renewable energies.

One of the summit organizers is Harvard University Professor [Daniel Schrag](#), a geochemist who studies climate changes over the Earth's history. Last Wednesday in Cambridge, he gave a brief outline of some of the techniques being considered and his feelings on the subject during an MIT Enterprise Forum on energy.

Most of all, Schrag is scared of the risks that undertaking these projects pose.

"We don't understand the climate system very well and so trying to engineer a system that is probably unknowable and almost certainly uncontrollable is a very frightening thing," Schrag said.

Large-scale geoengineering concepts go back decades but they appear to be gaining more currency as concerns about global warming heighten. During a presentation, Schrag noted that greenhouse gas emissions over the last two years have been higher than the "business as usual" scenario created by the [Intergovernmental Panel on Climate Change](#).

"This may be a terrible idea but it might be better than the alternative, which is to let greenhouse-gas forming run away," he said.

### **Capturing carbon**

Some efforts led by commercial companies are already going ahead.

[Planktos](#) and [Climos](#) are two companies that intend to "seed" the ocean with iron to stimulate the growth of plankton. During a plankton "bloom," or large-scale growth, plankton metabolize carbon dioxide.

The idea behind these ocean fertilization companies, which have already been [sharply criticized](#), is that plankton growth can sequester large amounts of carbon dioxide in the ocean. [Planktos, which launched its vessel](#) from Florida earlier this month, has said it intends to sell [carbon credits](#) for the captured carbon dioxide.

Although not generally considered geoengineering, another technology being seriously pursued is [carbon capture and sequestration](#) at coal-fired power plants.

The U.S. Department of Energy is sponsoring a project called [FutureGen](#) to build a power plant with integrated sequestration and hydrogen production.

[Commercial efforts](#) are now getting started as well, although financing them is a significant hurdle, according to Phillip Boyle, president and chief operating officer of Powerspan. The company has developed scrubbing technology, now in testing, that it says removes 90 percent of carbon dioxide from coal power plants, along with other pollutants.

Other carbon-sequestration plans call for pumping carbon dioxide under the sea.

### **Artificial volcanoes**

Schrag mentioned other approaches being considered, including releasing sulfur into the atmosphere in an attempt to mimic large volcanic eruptions. When sulfate aerosols are released into the atmosphere, they cool the climate; the eruption of [Mount Pinatubo](#) in the Philippines had a measurable downward effect on temperatures. Sulfur could act as a "crude" substitute for sulfate aerosols, he said.

"You could get more technical and actually put in things that are more sophisticated than sulfur that actually would hover over Greenland and reflect light away from Greenland to keep the ice sheet from melting," Schrag said. "All these ideas are actually being discussed."

Another concept put forth by Columbia University Professor Klaus Lackner is making [artificial trees](#) that would be designed to capture carbon dioxide from the air.

Apart from the technical challenges and environmental risks, geoengineering poses difficult questions over control.

"This is exactly the opposite of greenhouse gas reductions. Greenhouse gas reductions--we can't do it alone. We can do it but we need everybody to do it--China, India, and Europe and Russia and lots of other countries to participate," Schrag said.

"With climate engineering, we're not the only ones that can do it. There are any one of 25 countries that could do it. Who gets to control it? Who gets to decide?" he said. "This is a really scary thing."

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