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Climate Engineering Is Doable, as Long as We Never Stop

Eric Smalley [✉](#) 07.25.07 | 2:00 AM[✉ Email Article](#)[🖨 Print](#)[📄 Full Page](#)[💬 Comments](#)

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Stanford climatologist Ken Caldeira examines a simulation of atmospheric alterations aimed at combating global warming. New research indicates that hacking the atmosphere -- pumping microscopic particles into the stratosphere or clouds to block sunlight and offset global warming caused by greenhouse gases -- is imminently possible. The problem is we could never, ever stop doing it. Climate scientists [Damon Matthews](#) of Concordia University and [Ken Caldeira](#) of Stanford [ran the numbers](#) on atmospheric geo-engineering through a climate simulation and found that while cranking out carbon dioxide at business-as-usual rates we can geo-engineer our way back toward pre-industrial temperatures in short order, reaching 1900 levels in about five years. Not only that, it would be fairly cheap and easy to do.

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Pumping 20 to 25 liters of aerosols per second to keep enough particles in the stratosphere would cool temperatures, causing the planet's carbon sinks to suck more carbon dioxide out of the atmosphere.

"That kind of flow rate can be handled by a single fire hose," said Caldeira. "For something like \$100 million a year you could probably keep a hose in the stratosphere suspended by an array of balloons with pumps along the way."

The problem is what happens if we stop short or screw it up.

Bring the geo-engineering process to a halt, and those sun-warmed carbon sinks spit the carbon dioxide right back into the atmosphere. The rebound warming, to temperatures that would have been reached without the geo-engineering, would be 10 to 20 times the pace of today's global warming. The rapid warming, up to 7 degrees Fahrenheit per decade, would wreak havoc on the planet and threaten civilization.

To prevent disaster, the geo-engineering process would have to continue as long as carbon-dioxide levels were elevated. A quarter of the carbon dioxide that comes out of your car's tailpipe is still in the atmosphere a thousand years later, Caldeira said.

"We've never had systems work for a thousand years without failure," he added.

Even without technical failures, other circumstances including a world war, economic collapse or a simple change of political will could turn off the hose.

Matthews and Caldeira's study underscores the need for any country that attempts geo-engineering to make a durable and long-term commitment to the effort, said [David Victor](#), an energy and sustainable development specialist at Stanford Law School. "It's a bit like riding a bicycle down a steep hill without brakes," he said.

The idea of injecting particles into the stratosphere to block sunlight has hovered just beyond the bounds of scientific respectability since Soviet climatologist Mikhail Budyko first suggested it in the '70s. That changed last year when Nobel laureate [Paul Crutzen](#) published an essay calling for scientists to seriously consider the possibility. (See "[This Global Warming Fix Stinks](#).")

But studying geo-engineering is not the same as doing it, and Crutzen said that this latest research shows the significant risks involved in counteracting global warming induced by carbon dioxide. "Far better to reduce the emissions of CO₂," he said.

For Caldeira the danger is not in geo-engineering itself but in the risk that politicians will turn to it to avoid the hard work of transforming our energy and transportation systems. "If somebody is driving an SUV, I would be against deploying geo-engineering. If there is a coal-fired power plant still spewing carbon dioxide into the atmosphere, I would be against geo-engineering."

We should think of geo-engineering only as a parachute, said Caldeira. It's something you desperately hope you never need.



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Posted by: MsLuv 1 hours ago 1 Point

Geez, people. The sooner we stop trying to control nature the better off we will be. We are addicted to control. It's not working, and it won't work, ever. Anyone familiar with the Bioneers? Now, there's some hope. Science and technology that works W...

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Posted by: yohon 7 hours ago 1 Point

Could someone please tell me the current % of carbon in the atmosphere and whether increases happen before or after <I>warming</I>?

And to think I almost payed that 10 bucks to have wired sent to my house..

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Posted by: syphax 8 hours ago 1 Point

Of course, this wouldn't help much with the lowering of the oceans' pH due to their uptake of excess atmospheric CO₂. Over eons that's no big deal b/c of carbonate buffering, but in the next century or two? I hope those corals really know how to ho...

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Posted by: DrColes 11 hours ago -1 Points

The 100 year old con <http://www.InteliOrg.com/archive/FireandIce.pdf> on climate change. In order to be an intelligent reader you must have a basic knowledg. Please do your own homework, a starting point [http://www.InteliOrg.com/...](http://www.InteliOrg.com/)

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Posted by: syphax 8 hours ago 1 Point

I found it interesting that your little pdf doesn't mention Svante Arrhenius's 1895 paper, "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground". Then again, it really focused on media coverage, not the scientific basis b...

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Posted by: marketanomaly 12 hours ago 0 Points

How long am I going to have to listen to the half-baked science that makes CO₂ out to be the only factor controlling global temperature? The incompetent reporting done by Wired and the rest of the world media completely ignores research, which shows ...

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Posted by: syphax 8 hours ago 1 Point

Here's your homework assignment: Please cite a reference to a published paper that makes the claim that CO₂ is the only factor controlling global temperature. I'd be really thrilled if you found one. Of course the sun, clouds, etc. impact climate. ...

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Posted by: dr2chase 15 hours ago 1 Point

Seems to me that deciding just how much to pump could be an interesting issue. Here

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little -- seems like a good thing. Back in Florida, not so good. Canada and ...

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Posted by: eckschi 17 hours ago 2 Points

I thought that little movie suits perfectly to this article

http://www.youtube.com/watch?v=SgE_mkR2oac

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Posted by: rally2xs 18 hours ago 1 Point

We need 1 "hose", worldwide, for \$100 million a year, and turning it off would be a worry? I don't think so. There are a lot of rich individuals that could afford this. Eventually we're going to learn how to do our fossil fueled activities with 10...

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