

## The powerful coalition that wants to engineer the world's climate

Businessmen, scientists and right-wing thinktanks are joining forces to promote 'geo-engineering' ideas to cool the planet's climate, writes Clive Hamilton

- Clive Hamilton for [OurWorld 2.0](#), part of the [Guardian Environment Network](#)
- [guardian.co.uk](#), Monday 13 September 2010 16.16 BST
- [Article history](#)



Some geo-engineering techniques, such as filling the sky with shiny dust to reflect sunlight, could curb such temperature rises without the need to restrict greenhouse gas emissions

In August 1883 the painter Edvard Munch witnessed an unusual blood-red sunset over Oslo. Shaken up by it, he wrote in his diary that he "felt a great, unending scream piercing through nature". The incident inspired him to create his most famous work, *The Scream*.

The sunset he saw that evening followed the eruption of Krakatoa off the coast of Java. The explosion, one of the most violent in recorded history, sent a massive plume of ash into the stratosphere, turning sunsets red around the globe. The gases emitted also caused the Earth to cool by more than one degree and disrupted weather patterns for several years.

The cooling effect of large volcanic eruptions has been known for some time. A haze forms from the sulphur dioxide spewed into the upper atmosphere reducing the amount of solar radiation reaching the Earth. It's estimated that the eruption of Mount Pinatubo in the Philippines in 1991 — the largest since Krakatoa — cooled the Earth by around [0.5°C](#) for a year or more.

Now, a powerful coalition of forces is quietly constellating around the idea of transforming the Earth's atmosphere by simulating volcanic eruptions to counter the warming effects of carbon pollution. Engineering the planet's climate system is attracting the attention of scientists, scientific societies, venture capitalists and conservative think tanks. Despite the enormity of what is being proposed — nothing less than taking control of Earth's climate system — the public has been almost entirely excluded from the planning.

The [Royal Society](#) defines geoengineering as "the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic [climate change](#)" and divides methods into two types: carbon dioxide removal from the atmosphere, and solar radiation management aimed at reducing heat coming in or reflecting more of it out.

Techniques ranging from the intriguing to the wacky have been proposed to remove carbon from the atmosphere, including fertilising the oceans with iron filings to promote the growth of tiny marine plants that absorb carbon dioxide, installing in the ocean a vast number of floating funnels that draw nutrient-rich cold water from the deep to encourage algal blooms that suck carbon dioxide from the air, and construction of thousands of 'sodium trees' that extract carbon dioxide directly from the air and turn it into sodium bicarbonate.

Some of the ideas put forward to block the Sun's heat would be far-fetched even in a science fiction novel. One is to send billions of reflective discs to a point in space known as L1 and located between the Earth and the Sun. Another is to launch hundreds of special unmanned ships that plough the oceans sending up plumes of water vapour that increase cloud cover. Or dark-coloured forests could be converted into light-coloured grasslands that reflect more sunlight.

### **Enhanced dimming**

But the option that is taken most seriously is altogether grander in conception and scale. The scheme proposes nothing less than the transformation of the chemical composition of the Earth's atmosphere so that humans can regulate the temperature of the planet as desired. Like volcanic eruptions, it involves injecting sulphur dioxide gas into the stratosphere to blanket the Earth with tiny particles that reflect solar radiation.

Various schemes have been proposed, with the most promising being adaptation of high-flying aircraft fitted with extra tanks and nozzles to spray the chemicals. A fleet of 747s could do the job. To have the desired effect we would need the equivalent of one Mount Pinatubo eruption every three or four years. The emissions from the eruption in April of Iceland's 'Mount Unpronounceable' were less than a hundredth of those from Pinatubo, so to engineer the climate we'd need the equivalent of one of those every week, every year for decades.

More cautious scientists recognise that attempting to regulate the Earth's climate by enhancing global dimming is fraught with dangers. Most worryingly, the oceans are absorbing around a third of the extra carbon dioxide pumped into the atmosphere by humans, which is raising their acidity, dissolving corals and inhibiting shell-formation by marine organisms. Turning down the dimmer switch may reduce incoming solar radiation but would do nothing to slow ocean acidification. The climate system is hugely complicated and tinkering with it might be akin to introducing [cane toads](#) to control sugarcane beetles.

### **Moral hazards**

Although ideas for climate engineering have been around for at least twenty years, until recently public discussion has been discouraged by the scientific community. Environmentalists and governments have been reluctant to talk about it too. The reason is simple: apart from its unknown side-effects, geoengineering would weaken resolve to reduce [carbon emissions](#).

Economically it is an extremely attractive substitute because its cost is estimated to be "trivial" compared to those of cutting carbon pollution. While the international community has found it difficult

to agree on strong collective measures to reduce carbon emissions, climate engineering is cheap, immediately effective and, most importantly, available to a single nation.

Among the feasible [contenders](#) for unilateral intervention, one expert names China, the USA, the European Union, Russia, India, Japan and Australia. Could they agree? It's like seven people living together in a centrally heated house, each with their own thermostat and each with a different ideal temperature. China will be severely affected by warming, but Russia might prefer the globe to be a couple of degrees warmer.

If there is no international agreement an impatient nation suffering the effects of climate disruption may decide to act alone. It is not out of the question that in three decades the climate of the Earth could be determined by a handful of Communist Party officials in Beijing. Or the government of an Australia crippled by permanent drought, collapsing agriculture and ferocious bushfires could risk the wrath of the world by embarking on a climate control project.

To date, governments have shunned geoengineering for fear of being accused of wanting to avoid their responsibilities with science fiction solutions. The topic is not mentioned in the Stern report and receives only one page in Australia's Garnaut report (see [Section 2.4.2](#)). As a sign of its continuing political sensitivity, when in April 2009 it was reported that President Obama's new science adviser John Holdren had said that geoengineering is being vigorously discussed as an emergency option in the White House, he immediately felt the need to issue a "clarification" claiming that he was only expressing his personal views.

Holdren is one of the sharpest minds in the business and would not be entertaining what is now known as 'Plan B'— engineering the planet to head off catastrophic warming — unless he was fairly sure Plan A would fail.

Fiddling with the dimmer switch may prove an almost irresistible political fix for governments. It gets powerful lobbies off their backs, gives the green light to burn more coal, avoids the need to raise petrol taxes, allows unrestrained growth and is no threat to consumer lifestyles.

In short, compared to cutting greenhouse gas emissions, geoengineering gets everyone off the hook. No government is yet willing to lend official support to geoengineering. However, the pressure is building and the day when the government of a major nation like the United States, Russia or China publicly backs Plan B cannot be far off. Then the floodgates will open.

Even now, beneath the radar, Russia has already begun testing. Yuri Izrael, a Russian scientist who is both a global-warming sceptic and a senior adviser to Prime Minister Putin, has tested the effects of aerosol spraying from a helicopter on solar radiation reaching the ground. He now plans a [full-scale trial](#).

## **Strangelove and son**

Two of the earliest and most aggressive advocates of planetary engineering were Edward Teller and Lowell Wood. Teller, who died in 2003, was the co-founder and director of the Lawrence Livermore National Laboratory near San Francisco, described by US author Jeff Goodell as having a "near-mythological status as the dark heart of weapons research". Teller is often described as the "father of the hydrogen bomb" and was the inspiration for Dr. Strangelove, the wheelchair-bound mad scientist prone to Nazi salutes in Stanley Kubrick's 1964 film of that name.

Lowell Wood was recruited by Teller to the Lawrence Livermore National Laboratory and became his protégé. For decades Wood was one of the Pentagon's foremost "weaponers", leading him to be christened "Dr. Evil" by critics. He led the group tasked with developing Ronald Reagan's ill-fated Star Wars missile shield that included plans for an array of orbiting X-ray lasers powered by nuclear reactors.

Since 1998 Wood and Teller have been promoting aerosol spraying into the stratosphere as a simple and cheap counter to global warming. Reflecting the dominant opinion of the 1950s, they believe it is humankind's duty to exert supremacy over nature. It is perhaps for this reason that they have long been associated with conservative think tanks that deny the existence of human-induced global warming. Both men have been associated with the Hoover Institution, a centre of climate scepticism partly funded by ExxonMobil, and Wood is listed as an expert with the George C. Marshall Institute, a Washington think tank that became one of the main centres of climate denial in the 1990s.

It is strange that geoengineering is being promoted enthusiastically by a number of right-wing think tanks that are active in climate denialism. The [American Enterprise Institute](#), an influential think tank also part-funded by ExxonMobil that offered US\$10,000 to academics for papers debunking the reports of the Intergovernmental Panel on Climate Change, has launched a high-profile project to promote geoengineering.

Of course, geoengineering protects their supporters and financiers in the fossil industries because it can be a substitute for carbon reductions and justify delay. But a deeper explanation lies in their beliefs about the relationship of humans to the natural world.

Pursuing abatement is an admission that industrial society has harmed nature, while engineering the Earth's climate would be confirmation of our mastery over it — final proof that, whatever minor errors made on the way, human ingenuity and faith in our own abilities will always triumph. Geoengineering promises to turn failure into triumph.

Lowell Wood believes that climate engineering is inevitable; it's a matter of time before the 'political elites' wake up to its cheapness and effectiveness. In a statement that could serve as Earth's epitaph, he declared: "We've engineered every other environment we live in—why not the planet?"

Wood is contemptuous of the ability of world leaders to reduce emissions (which he dubs "the bureaucratic suppression of CO<sub>2</sub>") and of their ability to reach a consensus on trialling geoengineering. He predicts that necessity will overrun popular resistance to the idea of fiddling with the atmosphere.

Faced with this resistance, Wood speculates about getting private funding from a billionaire for an experiment. "As far as I can determine, there is no law that prohibits doing something like this". Wood is right: there is no law against a private individual attempting to take control of the Earth's climate.

### **Regulating climate regulation (Global Geoengineering Governance)**

This goes to the heart of the push to develop the tools for climatic manipulation. The debate over climate engineering is at present confined largely to a tight-knit group of scientists, some of whom want to keep the public in the dark and fend off regulation of their activities. In his book, [How To Cool the Planet](#), Goodell describes a series of three private dinners in early 2009 that brought together the main players. Convened by two of the leading advocates, Ken Caldeira of Stanford University and

David Keith of the University of Calgary, they were "a turning point in the evolution of geoengineering as a policy tool".

In March this year a [private meeting](#) of leading climate engineers, held in Asilomar, California, aimed to develop guidelines to govern research and testing. The invitees wanted a voluntary code of conduct that would forestall regulation by governments and the international community so that the experts could work unhindered at their task of understanding how to control of the Earth's climate system.

[David Keith](#) argues that an international treaty may be unnecessary because the use of solar radiation management could be regulated by unwritten "norms". This is despite his acknowledgement that the threat of unilateral action is very real; any one of a dozen countries could begin it within a few years. Indeed, one wealthy individual could transform the atmosphere and, with enough determination, bring on an ice age.

Perhaps the wealthy individual he has in mind is [Bill Gates](#), who has covertly been funding geoengineering research for three years with advice from Keith and Caldeira. They now oversee Gates' research fund, which has spent some \$4.5 million to date, including funding the three private dinners. Keith will not reveal what the money is being spent on, downplaying it as "a little private funding agency". Right—the world's richest man has a little private funding agency devoted to researching ways to manipulate the Earth's climate system. Conspiracy theory anyone?

Gates is also an investor in a firm named Intellectual Ventures that is promoting a scheme called "[StratoShield](#)", which would pump sulphur dioxide into the upper atmosphere through a 30-kilometre hose held aloft by V-shaped blimps. Intellectual Ventures is run by Nathan Myhrvold, former chief technology officer at Microsoft, and includes Lowell Wood among its associates.

Gates is not the only billionaire lone ranger who wants to save the planet. Richard Branson has set up his own "war room" to do battle with global warming. The battalions he wants to mobilise on "the path to victory" are successful entrepreneurs—like himself—and their weapons are "market driven solutions to climate change", including geoengineering.

The [Carbon War Room](#) — where inspirational quotes from Branson are mixed in with those of other titans like Churchill, Roosevelt and Einstein — represents the type of rich man's folly common amongst modern entrepreneurs with a Messiah complex.

The War Room site promotes a paper co-authored by Lee Lane of the American Enterprise Institute and published by the centre run by "skeptical environmentalist" Bjorn Lomborg. It argues that the benefits of geoengineering vastly outweigh the costs and shows how to set an optimal temperature for the Earth for the next two hundred years.

The authors worry that ethical objections from environmental advocacy groups may block the deployment of solar radiation management, before noting with relief, "in reality, important economies remain largely beyond the influence of environmental advocacy groups." They expect deployment of solar radiation management will be led by nations with weak environmental lobbies—which of course means dictatorships.

## Blue-sky dreaming

More vivid sunsets like the one Edvard Munch saw in 1883 would be one of the consequences of using sulphate aerosols to engineer the climate; but a more disturbing effect of enhanced dimming would be the permanent whitening of day-time skies. A washed-out sky would become the norm.

If the nations of the world resort to climate engineering, and in doing so relieve pressure to cut carbon emissions, then the concentration of carbon dioxide in the atmosphere would continue to rise and so would the latent warming that would need suppressing. It would then become impossible to call a halt to sulphur injections into the stratosphere, even for a year or two, without an immediate jump in temperature.

It's estimated that, if whoever controls the scheme decided to stop, the back-up of greenhouse gases could see warming rebound at a rate 10-20 times faster than in the recent past, a phenomenon referred to, apparently without irony, as the "[termination problem](#)".

Once we start manipulating the atmosphere we could be trapped, forever dependent on a program of sulphur injections into the stratosphere. In that case, human beings would never see a blue sky again.

• **16 September update:** Projects supported by the Gates' fund are [now fully disclosed online](#)

End

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-  [evelinev](#)

13 September 2010 4:47PM

Human arrogance knows no bounds.....

-  [loupblanc](#)

13 September 2010 5:03PM

If science fiction solutions are gonna be implemented to tackle the Global Warming issue (did these guys even heard of "climate change"?!?), can they also build us spaceships with Warp capability so that those of us actually wanting to reduce carbon emissions so we can return to a more harmonious and balanced world can depart in search of another planet?

Thanks

13 September 2010 5:17PM

Humans could not plug a hole 2500 m deep in water for four months; (Not that oil has stopped leaking; But they have stopped the media from 'leaking').

There is a easier way to stop AGW and we have all the resources ready. **Nuclear Winter.** (You can kill the over population problem also).

**evllinev**

'Human Idiocy knows no bounds.'



• [GRLCowan](#)

13 September 2010 5:27PM

[Let the earth help us to save the earth-SchuilingJune2008.pdf.](#)



• [JamesEastwood](#)

13 September 2010 5:33PM

I can see how a plan that means we carry on exactly as we are and effectively do nothing for now would be ideologically very convenient for some group. My concerns, as pointed out in the article, would be it's completely unproven technology we are putting our faith in. Also it would tend to lead to countries geo-engineering their own local climate to benefit themselves and maybe not thinking about, or even to the detriment, of other poorer nations.

I guess there is one good thing to take from this. At least they accept there is a problem and those in total denial are becoming increasing limited to a few crackpot bloggers.



• [whiten](#)

13 September 2010 5:50PM

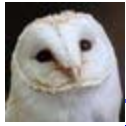
"Businessmen, scientists and right-wing thinktanks are joining forces"

Only A. H.....r missing now..... and the "Great solution" will be forthcoming.

Time for the prayers, I think.

The only thing left, I guess, so get started.....

cheers



• [TBombadil](#)

13 September 2010 5:51PM

This proposal shows the danger of putting too much money and hence too much power in the hands of a small group of people who are not subject to democratic control. Some of their companies are now more powerful than all but the largest countries. How many countries for example apart from USA could have held BP accountable for accidents like their recent oil spill in the Gulf of Mexico? Nobody wants world government but some form of global legal authority may be needed to prevent these mavericks from doing irreparable damage to the planet.



• [Pearl999](#)

13 September 2010 6:17PM

*Various schemes have been proposed, with the most promising being adaptation of high-flying aircraft fitted with extra tanks and nozzles to spray the chemical*

s.

Proposed? [It's been going on in plane sight since 1998 !](#)



• [whunose](#)

13 September 2010 7:48PM

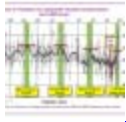
They will probably succeed in killing us a bit quicker than waiting for the climate to do so, that's if lower sperm counts don't cause our species to disappear first.



• [whunose](#)

13 September 2010 7:58PM

Hang on , wait just a minute, didn't a volcanic eruption in 540 A. D. cause the equivalent of a nuclear winter that decimated populations and crops for years? But maybe that's what they want, and it might just work out cheaper than a world war, and that's all they can afford after wasting our money on useless carbon trading rather than practical help in reducing carbon emissions.



## [FedUpWithPropaganda](#)

13 September 2010 8:29PM

No need to worry. Observational EVIDENCE keeps coming in to contradict the AGW HYPOTHESIS.

Ocean heat plays a crucial role in the AGW hypothesis, which maintains that climate change is dominated by human-added, well-mixed green house gasses (GHG). IR radiation that is absorbed and re-emitted by these gases, particularly CO<sub>2</sub>, is said to be amplified by positive feedback from clouds and water vapor. This process results in a gradual accumulation of heat throughout the climate system, which includes the atmosphere, cryosphere, biosphere, lithosphere, and, most importantly, the hydrosphere. The increase in retained heat is projected to result in rising atmospheric temperatures of 2-6°C by the year 2100.....

In 2005 James Hansen, Josh Willis, and Gavin Schmidt of NASA coauthored a significant article (in collaboration with twelve other scientists), on the “Earth’s Energy Imbalance: Confirmation and Implications” (Science, 3 June 2005, 1431-35). This paper affirmed the critical role of ocean heat as a robust metric for AGW. “Confirmation of the planetary energy imbalance,” they maintained, “can be obtained by measuring the heat content of the ocean, which must be the principal reservoir for excess energy” (1432)....

These figures reveal a robust failure on the part of the GISS model to project warming. The heat deficit shows that from 2003-2008 there was no positive radiative imbalance caused by anthropogenic forcing, despite increasing levels of CO<sub>2</sub>. Indeed, the radiative imbalance was negative, meaning the earth was losing slightly more energy than it absorbed.....

Though other criteria, such as climate sensitivity (Spencer, Lindzen), can be used to test the AGW hypothesis, ocean heat has one main advantage: Simplicity. While work on climate sensitivity certainly needs to continue, it requires more complex observations and hypotheses making verification more difficult. Ocean heat touches on the very core of the AGW hypothesis: When all is said and done, if the climate system is not accumulating heat, the hypothesis is invalid.

Writing in 2005, Hansen, Willis, Schmidt et al. suggested that GISS model projections had been verified by a solid decade of increasing ocean heat (1993 to 2003). This was regarded as further confirmation the IPCC’s AGW hypothesis. Their expectation was that the earth’s climate system would continue accumulating heat more or less monotonically. Now that heat accumulation has stopped (and perhaps even reversed), the tables have turned. The same criteria used to support their hypothesis, is now being used to falsify it.

It is evident that the AGW hypothesis, as it now stands, is either false or fundamentally inadequate. One may argue that projections for global warming are measured in decades rather than months or years, so not enough time has elapsed to falsify this hypothesis. This would be true if it were not for the enormous deficit of heat we have observed. In other words, no matter how much time has elapsed, if a projection misses its target by such a large magnitude (6x to 8x), we can safely assume that it is either false or seriously flawed.

Go take a look, it is easily digestable...

<http://pielkeclimatesci.wordpress.com/2009/05/05/have-changes-in-ocean-heat-falsified-the-global-warming-hypothesis-a-guest-weblog-by-william-dipuccio/>



• [donotdespisethesnake](#)

13 September 2010 9:41PM

I have to ask, what did we expect? Surely, a technological fix is the predictable and logical response to a global threat for a technology based society. People who have raised alarm about AGW ("some hysteria is justified" -- RealClimate), should not be too surprised at if geoengineering is the outcome. Climate scientists have proved that it is possible for humans to alter the climate... maybe now we can do it intentionally.

It seems odd that some people say there is no uncertainty about AGW, but on the other hand, say that the effects of geo-engineering are unpredictable. Do the climate scientists have good models of the climate, or not?

It would be tragic although par for the course if in attempting to "fix" the climate we end up making an even worse mess. Here, the paradox is that well-meaning action is often worse than inaction.



• [EthicsEdinburgh](#)

13 September 2010 11:04PM

Ocean acidification. Ocean acidification. Ocean acidification.

Spraying sulphur does nothing about this evil twin of climate change that could turn out to be just as destructive.



• [JBowers](#)

13 September 2010 11:24PM

Plenty of need to worry. Observational and scientific evidence keeps coming in to demonstrate that pumping carbon dioxide into the atmosphere will kill off a significant part of the bottom of the food chain.

[Marine Phytoplankton Declining: Striking Global Changes at the Base of the Marine Food Web Linked to Rising Ocean Temperatures](#)

[Acidifying Oceans Spell Bleak Marine Biological Future 'by End of Century', Mediterranean Research Finds](#)

[Oceans in Peril: Primed for Mass Extinction?](#)

[Ocean Acidification Threatens Food Webs, 150 Scientists Warn](#)

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[Scientists warn of global warming threat to marine food chain](#)

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Carbonic acid.

Geo-engineer your way out of that.



• [Teratornis](#)

13 September 2010 11:57PM

**JBowers:**

Carbonic acid.

Geo-engineer your way out of that.

[Bio-energy with carbon capture and storage](#) might be the only practical large-scale method for removing significant amounts of previously-emitted carbon dioxide from the atmosphere. Of course to realize a net reduction in carbon dioxide concentration, any capture method would have to be on top of eliminating emissions from fossil fuels, since it is unlikely that capture methods could be ramped up high enough to keep pace with continued fossil fuel burning, let alone post a reduction.

Because ocean acidification could turn out to be as destructive as global warming, or more, I think solar radiation management methods should be abandoned. Only carbon dioxide removal methods should be considered as geoengineering tools. That won't happen because carbon dioxide removal methods are not a quick fix - they work much more slowly than solar radiation management methods and would cost more.

Some form of carbon dioxide removal technology seems unavoidable [if we want to get atmospheric carbon dioxide back down to 350 ppm](#). Reducing our emissions to zero won't be enough to do that. Carbon dioxide will stay elevated in the atmosphere for centuries after humans stop adding more, if it's down to natural processes such as [rock weathering](#) to work off the excess.



• [Teratornis](#)

13 September 2010 11:59PM

China will be severely affected by warming, but Russia might prefer the globe to be a couple of degrees warmer.

Russia's preference for a warmer world might depend on how often [its wheat crop gets burned](#).



• [skr7252](#)

14 September 2010 12:13AM

i think manipulating the earth's atmosphere by such shiny dust or articial clouds or by laying down white sheets of cloth on ice is going to be hazardous and costly. the best way is to have less babies. one or max 2 and live in a eco friendly way. if everyone understands theirs responsibility towards the environment we would not have an global warming



• [JBowers](#)

14 September 2010 12:21AM

[Rob Dunbar: The threat of ocean acidification](#)  
*"From an oceanic perspective, 450 (parts per million) is way too high. Now there's compelling evidence that it really needs to be 350. We are, right now, at 390 parts per million of CO2 in the atmosphere..."*



• [Teratornis](#)

14 September 2010 1:42AM

**donotdespisethesnake:**

It seems odd that some people say there is no uncertainty about AGW, but on the other hand, say that the effects of geo-engineering are unpredictable. Do the climate scientists have good models of the climate, or not?

The late Stephen Schneider explains the nature of climate prediction uncertainty in [his excellent lecture at Stanford University](#).

Schneider uses the example of homeowner's fire insurance as an example of risk avoidance. The vast majority of people who buy fire insurance will not need it. Is that an argument against buying insurance? For a few percent of global GDP invested each year in low-carbon energy sources, energy efficiency, and lifestyle changes we can wean ourselves off fossil fuels and insure against the possible bad outcomes of staying on the business as usual course.

In the case of fire insurance, almost everyone understands that even a 1% risk of your house burning down is worth insuring against. In the case of climate change, many of the same people seem to think it's worth gambling when the odds of destroying our one and only planetary life support system might be 10% on the business as usual course.

Going forward, we can expect progress in science and computing to continue improving scientists' ability to predict the future - that has been the general trend over the last few centuries. Predictions aren't perfect yet, but they are better than they were in 1930, which was better than they had been in 1850, etc.

Also, the term "geo-engineering" is somewhat vague, because the two major classes of geo-engineering techniques are so fundamentally different. [Carbon dioxide removal](#) methods could actually un-do some (or potentially all, if humanity really got serious) of the damage we are now building in to the climate and oceans by burning fossil fuels and chopping down forests. [Solar radiation management](#) methods, in contrast, treat only one of the symptoms of the problem (heat) without addressing the underlying cause, sort of like dressing up earth to be a giant Potemkin village. And only temporarily.

If you had some sort of a progressive wasting disease, you might be able to maintain a semblance of your strength by taking increasing doses of anabolic steroids to counteract some of the effects of the disease. However, you wouldn't be treating the disease, and you would need to keep taking more steroids to compensate as the disease worsened. Plus you would expect the steroids to begin causing their own problems at some point. It's hard to imagine a pleasant outcome from that approach. You'd really prefer to cure the underlying disease if possible, rather than having to put an increasingly elaborate and ultimately ineffective band-aid on it.

Everyone should read Arthur C. Clarke's short story [Superiority](#) which illustrates the techno-fix treadmill approach to problem solving, wherein each fix introduces new unexpected problems which require more fixes, etc.



• [JaneBasingstoke](#)

14 September 2010 2:16AM

@FedUpWithPropaganda  
@donotdespisethesnake

When are you sceptics going to learn? All the really stupid political climate stuff happens despite any science. Their references to AGW are just greenwash.



Carbon Trading happens because people can make big money. You try and take away their baby from them and they'll accuse you of damaging the economy or forgetting energy security. And remember, these are the people that convinced governments that the casino that is investment banking didn't need regulation because they could trade away risk.

Biofuels happen because they make people richer than keeping rainforest or growing food crops for poor people. You try and take away biofuels and again they'll accuse you of damaging the economy or forgetting energy security.

With extreme geoengineering we have what looks like two motivations.

The people who really do want to help the planet will hold off large scale action until we clearly need it.

The control freaks who have been ODing on sci fi and the money men who see business opportunities in selling the weather and the political tacticians who see power in manipulating the weather are nothing to do with AGW. Their references to AGW are just greenwash.



• [TBombadil](#)

14 September 2010 2:35AM

This seems to be an attempt to treat the symptoms of the problem rather than the problem itself. It is like giving someone suffering from pneumonia an ice bath to bring down their temperature rather finding the cause (bacteria) and treating that by a course of antibiotics. We know the warmer climate is almost certainly due to an increase in atmospheric greenhouse gases. We should treat the cause by cutting our output of greenhouse gases and by increasing CO2 absorbing vegetation, not by adding pollution to the atmosphere.



• [Ausername](#)

14 September 2010 6:15AM

*"It is strange that geoengineering is being promoted enthusiastically by a number of right-wing think tanks that are active in climate denialism."*

Yes it is strange. It demonstrates that denialism is often political, but we knew that anyway.

A fleet of planes spraying chemicals at high level into the atmosphere. What will they be powered by? Will these chemicals be "perfectly safe", just like Monsanto's Agent Orange?



• [Monkeybiz](#)

14 September 2010 9:28AM

Sulphate particles in the upper atmosphere are one thing, but what happens when the billions of tons of sulphate begins to precipitate out as sulphuric acid? the Acid rain of the 1980s will look nothing like the battery acid that will be the rain if these nuts get their way. Venus at 270K anyone?

o



• [GWerthers](#)

14 September 2010 9:47AM

Like most top secret theories, when they say these ideas are being discussed they're probably already being experimented on. Who gets to decide what temperature is best? Who gets to operate the God machines and what happens if they can be used as weapons? How do we know for sure that the Raygun Star Wars' scheme was ill-fated? How will I learn to stop worrying and love the geo-engineer?



• [profmandia](#)

14 September 2010 10:57AM

Geoengineering so that we can keep our addiction to carbon is like an alcoholic that keeps on drinking but decides to take extra pain killers to make himself feel better the next day.



• [Pearl999](#)

14 September 2010 12:23PM

["Several things were immediately apparent about the spray planes.](#) First, they weren't high enough to be making contrails and even if they were, the sprayed liquid was flashing into voluminous white visibility much too fast to have any connection with the process by which moisture in 1000 degree (F) jet exhaust can freeze into visible ice crystals. Second, you could literally watch the crew turn the pumps on and off [as the trails were being laid]...



[JaneBasingstoke](#)

14 September 2010 1:22PM

Teller has Form on ridiculously oversized fixes for engineering problems. Want to build a canal or a harbour? How about nuking the site into shape first?

<http://www.wired.com/wiredscience/2009/04/yourfriendatom>



[JaneBasingstoke](#)

14 September 2010 1:54PM

@Pearl999

"they weren't high enough to be making contrails"

No. Such. Height.

<http://en.wikipedia.org/wiki/Fog>

"freeze into visible ice crystals"

Ah. Always wondered why I could see the "steam" coming out of a boiling kettle. You're saying it's too hot for ice crystals so kettle "steam" is some sort of government plot. That would explain it.



[passenger66](#)

14 September 2010 2:31PM

[@GRLCowan 13 September 2010 5:27PM](#)

Let the earth help us to save the earth-SchuilingJune2008.pdf.

One question I'd have about this idea is does it not take the CO2 out of the carbon cycle permanently?



[Pearl999](#)

14 September 2010 2:34PM

Contrails produced from jet engine exhaust are seen at high altitude, ...  
<http://en.wikipedia.org/wiki/Contrail>

Hydrogen in the 1000 degree (F) jet exhaust combines with oxygen in the surrounding cold air to form water vapor. The high temperature keeps this water in a vapor state, only becoming visible as contrails some distance behind the aircraft, ... unlike chemtrails.

It is important to distinguish between contrails and chemtrails. Contrails are streaks of condensed water vapor created in the air by jet airplanes at high altitudes. Contrails can exist in two forms: water droplet and ice crystal. Contrails typically become visible about a wingspan distance behind an aircraft flying at high altitude. The trail dissipates quite quickly, usually within a minute or so. Chemtrails, on the other hand, are visible directly behind an aircraft, with little or no gap between the aircraft and the start of the trail. Chemtrails are said to vary from contrails in their length of persistence. Chemtrails do not dissipate quickly; they tend to form into mushy clouds which can block sunlight. ...  
[http://www.youtube.com/watch?v=Psdg3OAw\\_a8](http://www.youtube.com/watch?v=Psdg3OAw_a8) You see the differences very clearly in that [video](#).



• [carlcimini](#)

14 September 2010 4:42PM

Ok, its been going on for a while, my city is getting all kinds of sulfur sprayed, euro cities are getting aluminum, its global and its well on its way, 60 million in Obama stimulus money has been given to these "scientists" enjoy the journey <http://acrf-campaign.arm.gov/isdac/>



• [Jobin](#)

14 September 2010 4:43PM

This is the danger with AGW alarmism. Sooner or later some quacks are going to try to alter the weather with unintended consequences. Warmist scientists admit that the climate is highly complex yet the powerful coalition understands it enough to perform geoengineering. People in 50 years time will [laugh at us](#). [Shame!!!!](#)

Here are some cautionary papers:  
[Scientists weigh geoengineering in global warming battle](#)  
[20 reasons why geoengineering may be a bad idea](#) [pdf]



• [whiten](#)

14 September 2010 5:05PM

"It is strange that geoengineering is being promoted enthusiastically by a number of right-wing think tanks that are active in climate denialism. "

If you think carefully, that is not strange at all.

This just proves, that them people do not take seriously the CC and they totally oppose the idea of the GW or AGW.

As been deniers of the GW and AGW, they are convinced the CC is not going to be dangerous any way, and also they are betting on the new climate prospect which is taking hold lately. The prospect that the planet most probably is about to enter a cooling period. So, as far as they concerned, they are going to invest in something that suppose to solve what actually it will be solved naturally.

So they are trying to create an industry and a business on a win-win scenario. That industry and business does not even really need (or nor is expected) to achieve what it suppose to, the suppression of the GW or AGW through climate engineering. These people never have and never will consider the GW and the CC as with catastrophic probability outcomes in the future, let alone the AGW.

They are unable of such thought processing. That industry it is simply expected to grow in a very lucrative business, with a lot of profits to some, regardless of it becoming another huge economic bubble.

Apart from the outcome wealth of such a ghostly enterprise, also they expect to be seen as the heroes instead of the villains they know they are. But hey what the hell, in the end of the day they will manage to grow some of them wealth, regardless who is going to fit or pick-up the bill, regardless of what really happens with the climate and it's associated hazardous impacts. They are the "Elite" and nothing bad ever happens to them, or so they think.

Is not it, how the business has ben run lately???! Is not it another business as usual, the great addiction of the blind fat cats.??!! cheers



[ecocampaigner](#)

14 September 2010 5:38PM

Why is it a problem when its a right-ing think tank?

When its a left-wing think tank proposing the exact same geo-engineering fixes, its a brilliant idea by a noble scientist / engineer.

Does the left-wing have a problem with a Climate Solution that doesn't involve their pet "social justice" add-ons?



[whiten](#)

14 September 2010 6:07PM

@ecocampaigner

14 September 2010 5:38PM

YOU

ask:

"Why is it a problem when its a right-ing think tank?"

When its a left-wing think tank proposing the exact same geo-engineering fixes, its a brilliant idea by a noble scientist / engineer. "

I answer:

The problem with the right-wing think tank is that they are jumping in a solution to a problem that they feverishly have opposed for so long and still opposing it. A kind of paradox, is not it??!

Probably that makes it clear as definitely the wrong one solution.

The left-wing may have considered to a degree, but never have tried to promote it as a conventional solution by trying to join the business and science together in such a task.

Think, the left-wing will know now they were right to not jump blindly in such a wasteful venture.... : ))

It takes only for a right-wing think tank to get involved in such matters and you know how the definitely wrong solutions look and sound like.... : ))

Take care.

cheers



[GRLCowan](#)

14 September 2010 6:22PM

'passenger66' asks, with reference to [Dr. R.D. Schuiling's proposal](#),

One question I'd have about this idea is does it not take the CO2 out of the carbon cycle permanently

Yes, or for quite a while anyway, and notice how this answers 'JBowers' and 'EthicsEdinburgh'. You could say this isn't geoengineering, or anyway, it isn't geoengineering of the SACTCAR

variety -- Swallow A Cat To Catch A Rat -- but is just putting the atmosphere back the way it was.

I like a variant where instead of being transported and deposited by -- presumably -- surface transport -- the 25-micron pulverized peridotite is simply thrown up into the sky, in a thick enough and fast enough stream to top out around 5 km above the launch, and from there ride a suitable trade wind.



[deconvoluter](#)

14 September 2010 7:39PM

If the fossil fuel industry were to support this kind of hazardous project they would need first to abandon their phobia about climate modelling. Predicting a fall in global surface temperature is easy, estimating its value a little harder but asking a model to determine who who would suffer drought and who would suffer floods wuld be another kettle of fish. I wouldn't like to be asked to do that and then be penalised if I got it wrong.

The United Nations would probably become involved as various nations felt their vital security was \_\_\_\_\_ at \_\_\_\_\_ stake.

-----  
Incidentally a fussy point.

Strangelove = Teller;, as stated above, was probably false.  
Strangelove = Kissinger \* was certainly false.  
Strangelove = von Braun,who had worked for the Nazis is plausible.  
Strangelove = Herman Kahn may also have been partly true. He was the guy who probably advised the US on Mutually Assured Destruction.

-----  
\* In the Last Generation, Fred Pearce asserts that Strangelove represented Dr.Kissinger, but that nonsense was just one of Fred Pearce's more trivial examples of carelessness.. his later blunders over Latif and Emailgate were more serious.



[ecocampaigner](#)

14 September 2010 8:21PM

@whitten

@ecocampaigner

14 September 2010 5:38PM

YOU

ask:

*"Why is it a problem when its a right-ing think tank? When its a left-wing think tank proposing the exact same geo-engineering fixes, its a brilliant idea by a noble scientist / engineer. "*

I answer:

The problem with the right-wing think tank is that they are jumping in a solution to a problem that they feverishly have opposed for so long and still opposing it. A kind of paradox, is not it??!

The right-wing thinks climate change is natural, not man made, so mitigating the problem isn't any acknowledgment of the cause. So no, no paradox at all.

Probably that makes it clear as definitely the wrong one solution.

You assume they are wrong, simply because they are right wing?

The left-wing may have considered to a degree, but never have tried to promote it as a conventional solution by trying to join the business and science together in such a task.

Considered it to a degree? Have you heard of the bloke who wants to wrap Greenland in tarps to prevent ice loss? Have you heard of the guy who wants to sink a cargo ship full of iron to "fertilize" the ocean? There are dozens of bonkers left-wing climate mitigation schemes.

Not having combined science with business to fix a problem is idiocy. Science needs business to fund its ideas. That's why left wing mitigation has failed, because it demonizes business who have time money and expertise to turn science fantasy into reality.



• [JaneBasingstoke](#)

14 September 2010 8:33PM

@Jobin

Didn't you read the article? This is fuck all to do with fixing AGW. The keenest of these weather merchants see weather control as money and power and destiny.



• [JaneBasingstoke](#)

14 September 2010 8:45PM

@GRLCowan

Do like the grey moggie avatar.

Don't like the link to this Schuiling pdf you keep posting. It links back here. I can't see anything on this page to suggest where the pdf might be located.





• [GRLCowan](#)

14 September 2010 9:00PM

Oops. Must be because the link starts with "FTP".

Going to this [Utrecht University poster listing](#) and finding its link there should work.



• [deconvoluter](#)

14 September 2010 9:14PM

It seems odd that some people say there is no uncertainty about AGW,

Only asserted by contrarians like Lindzen, who when asked to provide his uncertainty range, chose a low climate sensitivity with a high degree of certainty. The main stream climatologists all provided higher estimates of warming but with substantial ranges of uncertainty. (Sorry but can't find the reference to this old research into subjective probability of climate change)



• [TurningTide](#)

14 September 2010 9:19PM

profmandia

our addiction to carbon

We're not *addicted* to carbon: we're *made* of it. Demonising carbon in this way just demonstrates your ignorance.



• [JaneBasingstoke](#)

14 September 2010 9:22PM

@Pearl999

You need to make your sourcing clearer. Your first paragraph is cut and pasted from Wikipedia. Your second paragraph appears to be partially covered by Wikipedia. Your third is nothing to do with Wikipedia and comes from your chemtrail campaign.

Wikipedia text on contrails is based on the following NASA FAQ.

<http://asd-www.larc.nasa.gov/GLOBE/faq.html>

Note how it explicitly mentions contrails at lower altitudes when the weather conditions are closer to my fog example. I repeat, there is no minimum height for contrails. Note how it also describes weather affecting the length of time a contrail lasts.

NASA also provide further info on contrails here.

<http://asd-www.larc.nasa.gov/GLOBE/science.html>

PS, if your video was correct about the very short duration of real contrails, most commercial passenger jets flying over Basingstoke would be doing chemtrails most of the time. I consider that unlikely.



[donotdespisethesnake](#)

14 September 2010 9:44PM

The problem with insisting on CO2 emission reductions, is that it seems pretty clear there will never be a global agreement with any teeth, especially if the US government moves back towards the right. Getting significant CO2 cuts will take a long time, probably won't happen until we run out of fossil fuels.

So instead of chasing the Holy Grail, surely it makes sense to look at Plan B? Wouldn't addressing the symptoms at least reduce some of the impact on the environment, and provide more breathing space to address CO2 reduction?

Why not go for what we can do now, instead of waiting for the perfect solution that may never happen?



[passenger66](#)

14 September 2010 9:55PM

[GRLCowan 14 September 2010 6:22PM](#)

One question I'd have about this idea is does it not take the CO2 out of the carbon cycle permanently

Yes, or for quite a while anyway

I thought I read somewhere we don't want carbon to be (semi) permanently removed from the carbon cycle - when it was stored as fossil fuels it was an available store, but washed out into



[GRLCowan](#)

14 September 2010 10:03PM

when it was stored as fossil fuels it was an available store, but washed out into a wide thin layer it is not

Much of the continents' surfaces is limestone. That's an available store.



[whiten](#)

14 September 2010 10:13PM

@ecocampaigner

14

September

2010

8:21PM

You say:

"The right-wing thinks climate change is natural, not man made, so mitigating the problem isn't any acknowledgment of the cause. So no, no paradox at all."

I say:

So do I my friend think that climate change it is natural, but I do not deny the green house effect has contributed to a global warming trend during this last 100 years till now. I do not dispute or deny the CO2 emissions of our civilization are increasing and becoming very hazardous. I am pro to a significant CO2 emissions cut and careful management. I don't think that makes me a righty as they totally deny the GW and the greenhouse effect that has contributed to it. And I am not a lefty either.

I am as critical to leftys when I think they wrong, as I am to the rightys when I think they wrong. But have to say the rightys are the denying side of the climate change issue, if you ask me.

Then if some one trying to cool what he feverishly denies to be hot or warming, that seems to me paradoxal, probably not you.

But then, that's you.

Again you ask:

" You assume they are wrong, simply because they are right wing?"

I answer:

Not at all.

First, I do not assume, I think. And there is a big difference in between the assumption and the thinking.

Second, I think and am convinced of the right-wing been wrong in this, simply because of the paradoxal attitude represented by it in the issue of climate change.

Again, you can not propagate, uphold and support solution that result in cooling, when you feverishly deny warming and it's cause been a problem, and then expect to not be seen and considered paradoxal in your way of thinking.

Then you continue:

"Considered it to a degree? Have you heard of the bloke who wants to wrap Greenland in tarps to prevent ice loss? Have you heard of the guy who wants to sink a cargo ship full of iron to "fertilize" the ocean? There are dozens of bonkers left-wing climate mitigation schemes."

My answer:

I have heard of many such blokes, probably even more than you have heard, but hey these are the blokes the ideas and projects of whom the right-wing thinktank and the business they advice, are going to invest-on if they achive to fool the rest of us. I never heard of any bonkers left-wing climate mitigations schemes been considered as an exploitation for business investment till now, thanks to the right-wing thinktank "thinking", that is. And I assure you there is more than a dozen of such bonkers. They all bonkers if you ask me..... Am sure the right-wing thinktank is not pro-beting in all of them. Probably looking at the most convincing ones, to exploit. : ))

YOU:

"Not having combined science with business to fix a problem is idiocy"

Me:

Definitely you are oversating there when you use the word "idiocy" in your above statment.

YOU:

"Science needs business to fund its ideas."

Me:

Probably that is a right thing to say. No problems with it if put so simply.

YOU:

"That's why left wing mitigation has failed, because it demonizes business who have time money and expertise to turn science fantasy into reality."

Me:

Again you are overstating so much that the above statement becomes ridiculous and not true.

Take care

cheers



[donotdespisethesnake](#)

14 September 2010 10:16PM

*Only asserted by contrarians like Lindzen, who when asked to provide his uncertainty range, chose a low climate sensitivity with a high degree of certainty.*

What about Al Gore?

I think there is a lot of fudging on this issue. Scientists correctly say science may not be 100% certain, in all respects, but the overwhelming scientific consensus is that there is unprecedented warming and it is caused in large part by humans (a view I share), and there is sufficient certainty to warrant action. Whether its 100%, 95% or 90% is just splitting hairs, the science is settled for practical purposes.

For the record, I don't have fire insurance. The chance of a house fire is a lot less than 1%.



[donotdespisethesnake](#)

14 September 2010 10:26PM

@JaneBasingstoke

*When are you sceptics going to learn?*

Actually I subscribe to Bill Ruddimans theory that humans have been causing climate change for the past 10,000 years. I think that puts me at the extreme end of the pro-AGW camp?

Where I diverge is in believing what should be done about AGW, not whether it is happening. I am also not under the illusion that anything people like us do or say will make a jot of difference.


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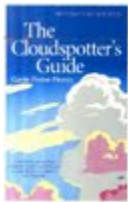
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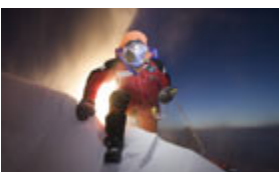
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