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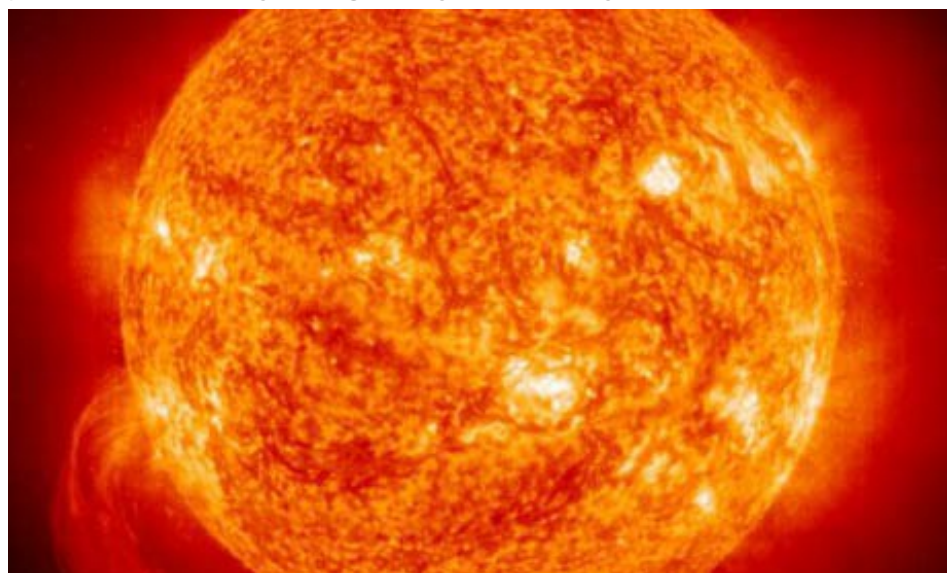
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Geoengineering

Investment in geo-engineering needed immediately, says Royal Society

Techniques such as CO2 removal and radiation reflection are 'untested parachutes' until they are rigorously tested, it says



The reflection of solar radiation could counter global warming. Photograph: Nasa/EPA

Alok Jha

Tuesday 1 September 2009 18.21 BST



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Experiments on giant sunshades for the Earth and vast forests of artificial trees must begin immediately, according to the Royal Society, to ensure such mega-engineering plans are available as a safety net in case global talks to combat climate change fail.

The scientists spent a year assessing geo-engineering technologies, deliberate planet-scale interventions in the climate system that attempt to counteract global warming. Their report, the most comprehensive to date, concluded that immediate investment is required to discover whether the potential risks outweigh the benefits.

"Unless the world community can do better at cutting emissions, we fear we will need additional techniques such as geo-engineering to avoid very dangerous climate change in the future," said John Shepherd of the University of Southampton, who chaired the RS report.

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"However, we are not advocates of geo-engineering - our opinions range from cautious consent to very serious scepticism about these ideas. It is not an alternative to emissions reductions and cannot provide an easy quick-fix to the problem."

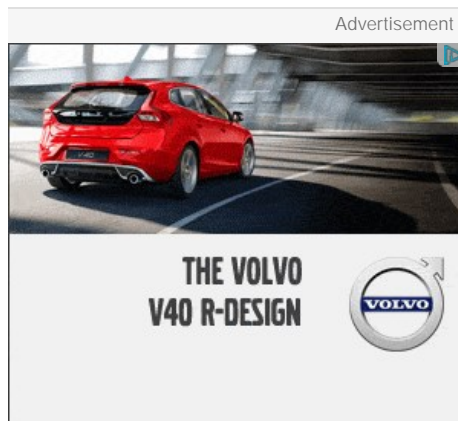
Its report, published today, concluded that some approaches - such as capturing CO2 from the atmosphere using artificial trees or shooting tiny particles into the upper atmosphere to reflect away sunlight - looked promising. But all geo-engineering techniques had major uncertainties regarding their own environmental impacts.

The Royal Society considered two main categories of the technology. One involves reflecting a small amount, around 2%, of the solar radiation that reaches the Earth, thus preventing the planet from warming up. The other category involves removing greenhouse gases from the atmosphere.

"CO2 removal methods are preferable because removing greenhouse gases from the atmosphere addresses the problem at its root and is returning the earth's climate system closer to its natural state," said Shepherd.

But he said crucial experimental data in the area was lacking. "We need to initiate research so we can understand the intended and unintended consequences of these methods so that, if we ever do need to deploy them, we can do so in a sensible and effective way."

The report calls for about £10m per year to be spent in the UK as part of a global £100m fund. "That's about 10 times what is being spent now and about 10 times less than what we spend on climate change research," said Shepherd. "And it's only 1% of what we spend on new energy technology."



Ken Caldeira, a climate scientist at the Carnegie Institution in California, said this early-stage research must be carried out as soon as possible. "The worst situation is to not test the options and then face a climate emergency and then be faced with deploying an untested option, a parachute that you've never tested out as the plane's crashing."

Among the most promising technologies identified by the Royal Society are techniques to [suck CO2 directly out of the atmosphere](#). The front-runner in this arena is a design by Klaus Lackner of Columbia University in New York. His artificial trees are not yet cost-effective to produce but Shepherd said it was probably just a matter of time.

Shooting sulphate aerosols into the stratosphere would also work well, said the Royal Society, as previous volcanic eruptions have showed in the past. When Mount Pinatubo in the Philippines erupted in 1991, for example, global temperatures dropped by 0.5C the following year. The costs would be relatively low but the scientists identified questions over potential adverse effects, in particular the destruction of the ozone layer.

Doug Parr, chief scientist at Greenpeace UK, said: "Geo-engineering is creeping onto the agenda because governments seem incapable of standing up to the vested interests of the fossil fuel lobby, who will use the idea to undermine the emissions reductions we can do safely."

"Intervening in our planet's systems carries huge risks, with winners and losers, and if we can't deliver political action on clean energy and efficiency then consensus on geo-engineering is a fantasy."

The Royal Society also pointed out that technical and scientific issues may not be the dominant ones when it came to the actual deployment of geo-engineering technology.

Social, legal, ethical and political issues would be of equal significance and implementing global-scale projects would require a pre-existing international agreement.

"When it comes to techniques that need to be field-tested, and where that will occur in places beyond national jurisdiction, such as sulphate aerosols, then inevitably we're looking at some kind of international governance framework," said Catherine Redgwell, a professor of international law at University College London and a member of the Royal Society working group on geoengineering.

At a meeting to launch the report at the Royal Society today, the government's chief scientific adviser John Beddington said the government should be thinking about a modest investment in geoengineering research.

"It is appropriate that the UK continues to support international research in this area including the possibility of considering the types of global governance systems that would be needed for geo-engineering," he said.

Geoengineering

Climate change (Environment)

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