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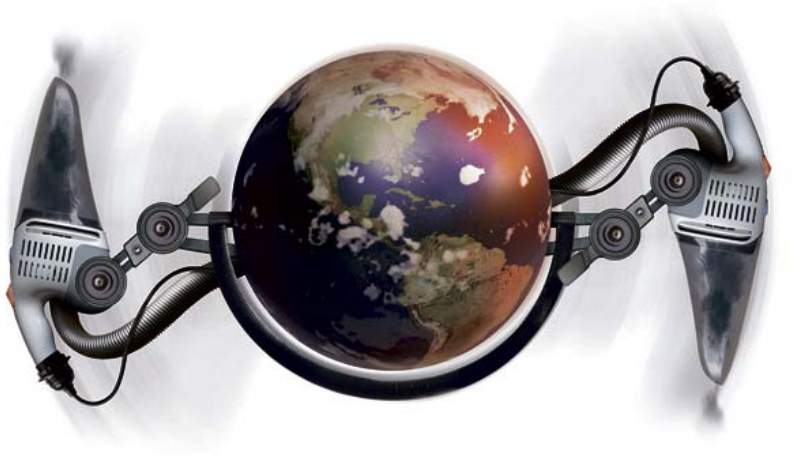
The Earth Is Warming? Adjust the Thermostat



Viktor Koen

By JOHN TIERNEY
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President Obama and the rest of the Group of 8 leaders decreed last month that the planet's average temperature shall not rise more than 2 degrees Fahrenheit above today's level. But what if Mother Earth didn't get the memo? How do we stay cool in the future? Two options:

Plan A. Keep talking about the weather. This has been the preferred approach for the past two decades in Western Europe, where leaders like to promise one another that they will keep the globe cool by drastically reducing carbon emissions. Then, when their countries' emissions keep rising anyway, they convene to make new promises and swear that they really, really mean it this time.

Plan B. Do something about the weather. Originally called geoengineering, this approach used to be dismissed as science fiction fantasies: cooling the planet with sun-blocking particles or shades; tinkering with clouds to make them more reflective; removing vast quantities of carbon from the atmosphere.

Today this approach goes by the slightly less grandiose name of climate engineering, and

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it is looking more practical. Several recent reviews of these ideas conclude that cooling the planet would be technically feasible and economically affordable.

There are still plenty of skeptics, but even they have started calling for more research into climate engineering. The skeptics understandably fear the unintended consequences of tampering with the planet's thermostat, but they also fear the possibility — which I'd call a near certainty — that political leaders will not seriously reduce carbon emissions anytime soon.

The National Academy of Sciences and Britain's Royal Society are preparing reports on climate engineering, and the Obama administration has promised to consider it. But so far there has been virtually no government support for research and development — certainly nothing like the tens of billions of dollars allotted to green energy and other programs whose effects on the climate would not be felt for decades.

For perhaps $100 million, climate engineers could begin field tests within five years, says Ken Caldeira of the Carnegie Institution for Science. Dr. Caldeira is a member of a climate-engineering study group that met last year at the Kavli Institute for Theoretical Physics under the leadership of Steven E. Koonin, who has since become the under secretary for science at the United States Department of Energy. The group has just issued a report, published by the Novim research organization, analyzing the use of aerosol particles to reflect shortwave solar radiation back into space.

These particles could be lofted into the stratosphere to reproduce the effects of sulfate aerosols from volcanic eruptions like that of Mount Pinatubo in 1991, which was followed by a global cooling of nearly 1 degree Fahrenheit. Just as occurred after that eruption, the effects would wane as the particles fell back to Earth. Keeping the planet cooled steadily (at least until carbon emissions declined) might cost $30 billion per year if the particles were fired from military artillery, or $8 billion annually if delivered by aircraft, according to the Novim report.

The idea of even testing such a system scares many people, and some scientists argue that climate-engineering research should remain theoretical. But Dr. Caldeira says that small-scale testing — perhaps an experiment intended to slightly cool the Arctic — could be safer than the alternative.

"The worst-case scenario," he says, "is one in which you have an untested system that you need to deploy quickly at large scale in a desperate attempt to ward off some sort of climate crisis. It could be much better to start testing soon at small scale and to observe what happens as the system is deployed." The sooner we start, he reasons, the more delicately we can proceed.

"Because of natural variability in weather and climate, the smaller the experiment, the longer it needs to be observed for the signal to rise out of the noise," Dr. Caldeira says. "With short testing periods, you would need to hit the system with a hammer."

Another way to cool the globe would be to spray seawater mist from ships up toward low-lying clouds, which would become brighter and reflect more sunlight away from Earth. (For details, see nytimes.com/tierneylab.)

This cloud-brightening technology might counteract a century's worth of global warming for $9 billion, according to J. Eric Bickel and Lee Lane. They identified it as the most promising form of climate engineering in a report published Friday by the Copenhagen Consensus Center, which is sponsoring cost-benefit analyses of strategies for dealing with climate change.

Other researchers say that it is impossible to do a cost-benefit analysis of these engineering proposals because the potential downside is so uncertain — and large. Injecting aerosols into the stratosphere or brightening clouds would do more than just cool the planet. In a paper in the current Science, Gabriele C. Hegerl and Susan Solomon point to a drop in global precipitation after the eruption of Mount Pinatubo, and warn that climate engineering could lead to dangerous droughts.

A less risky form of climate engineering would be to gradually remove enough carbon dioxide from the atmosphere to keep the planet cool. Some experts argue that the technology already exists to make this "air-capture" method reasonably economical, and that its political advantages make it the most realistic long-term strategy. What politician wants to tamper directly with the climate and risk getting blamed for the next hurricane or drought?

But if the climate does become dangerously warm, there could be enormous political pressure to do something quickly. And while it wouldn't be easy reaching international agreement on how to reset the planet's thermostat, in some ways it is less daunting than trying to negotiate a global carbon treaty.

If rich European countries with strong green constituencies cannot live up to their own promises to cut carbon, how much hope is there of permanently enforcing tough restrictions in the United States, much less in poor countries like India and China? If even a few nations demur or cheat, the whole system can break down.

By contrast, climate engineering does not require unanimous agreement or steadfast enforcement throughout the world. Instead of relying on politicians' promises, we might find it simpler to deal directly with Mother Earth's hot air.

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