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Self-Destruction

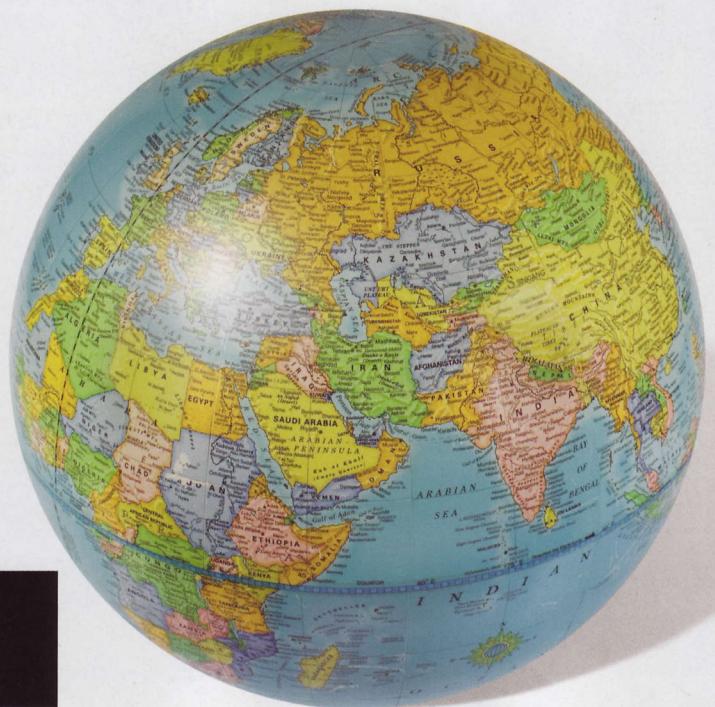


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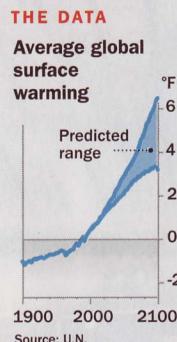
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#6 Geoengineering. Messing with nature caused global warming. Messing with it more might fix it

BY BRYAN WALSH

I'M GOING TO TELL YOU SOMETHING I PROBABLY shouldn't: we may not be able to stop global warming. The Arctic Ocean, which experienced record melting last year, could be ice-free in the summer as soon as 2013, decades ahead of what the earlier models told us. We need to begin curbing global greenhouse emissions right now, but more than a decade after the signing of the Kyoto Protocol, the world has utterly failed to do so.

For most environmentalists, the answer to that depressing litany is to keep pushing the same message harder: cut carbon and cut it now. But a few scientists are beginning to quietly raise the possibility of cooling the planet's fever directly through geoengineering. The principle behind it is straightforward—compensate for an intensified greenhouse effect by reducing the amount of solar radiation reaching the

**WHOM TO KNOW**

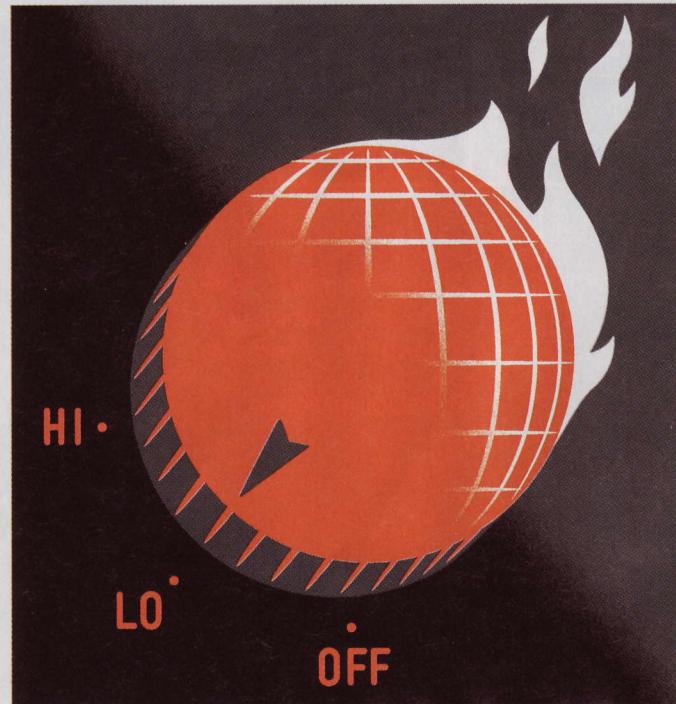
Paul Crutzen
The Nobel Prize winner made geoengineering safe to discuss when he wrote a 2006 paper in favor of more research

earth—but the techniques seem like pure science fiction. Just a few: using orbital mirrors to bounce sunlight back into space, fertilizing the oceans with iron to amplify their ability to absorb carbon and even painting roofs white to increase solar reflection.

Geoengineering has long been the province of kooks, but as the difficulty of reducing greenhouse-gas emissions has become harder to ignore, it is slowly emerging as an option of last resort. The tipping point came in 2006, when the Nobel Prize-winning atmospheric scientist Paul Crutzen published an editorial examining the possibility of releasing vast amounts of sulfurous debris into the atmosphere to create a haze that would keep the planet cool. "Over the past couple of years, it's gone from an outsider thing to something that is increasingly discussed," says Ken Caldeira of the Carnegie Institution for Science at Stanford University.

Caldeira modeled the effects on climate that Crutzen's notion of spreading sulfur particles into the air would have and found that geoengineering might be able to compensate for a doubling of the concentration of carbon dioxide in the atmosphere. Even more impressive was the price tag: somewhere between a few hundred million dollars and a couple of billion dollars a year, compared with the unknowable cost of decarbonizing the entire world. But the drawbacks are serious. Worsening air pollution is a risk. We'd have to keep geoengineering indefinitely to balance out continued greenhouse-gas emissions, and the motivation to decarbonize might disappear if we believed we had an insurance policy. And those are just the consequences we know about.

But the truth is, we're already performing an unauthorized experiment on our climate by adding billions of tons of man-made carbon dioxide to the atmosphere. Unless the geopolitics of global warming change soon, the Hail Mary pass of geoengineering might become our best shot. ■



1969 Soviet science
Russian Mikhail Budyko shows that the ice-albedo effect cools the earth

1991 Natural engineering
Mount Pinatubo erupts, releasing sulfur, which lowers world temperatures

1997 Teller's bombshell
Atomic scientist Edward Teller writes an editorial hyping geoengineering

2006 Nobel name-check
Paul Crutzen's paper pushes geoengineering into the mainstream

2008 Funding the future
The geoengineering start-up Climos secures \$3.5 million in initial funding