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Framing geoengineering in the media: spectacle, tragedy, solution?

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Climate engineering— large-scale technological interventions in the climate system—would in theory affect every organism habiting the planet. Thus, many people believe that there should be public participation in climate engineering decision-making. An initial question, then: how do decision-makers invite public participation on an issue the public knows next-to-nothing about? Social scientist Anthony Leiserowitz added a question about geoengineering to his latest climate change poll, and found that 74% of respondents had never heard of geoengineering—and only 3% of the respondents had a correct idea about what it actually is (2010a). As Leiserowitz told scientists gathered for an international geoengineering conference at Asilomar, "Americans know nothing about geoengineering. The first impression, frame, and narrative has yet to be set" (2010b).

This study, which comprises a content analysis of both print newsmedia and online content, addresses two key questions. First, who has voice or authority in current media treatment? Second, how is geoengineering framed in the news media? That is, what interpretive storylines emerge that suggest boundaries for how to think about the issue? Through studying authority and framing, I hope to glean some insight how these stories write the audience into the text—how they position the reader—which could lay the groundwork for a discussion of how media portrayals enable specific forms of governance. Can there be a media space for public participation in geoengineering conversation and decisions? Examining how the media space looks now will help us assess how the media can become a better habitat for public discussion of climate engineering.

Content analysis is the "systematic, objective, quantitative analysis of message characteristics" (Neuendorf, 2002: 1). By undertaking a quantitative content analysis of stories on climate engineering, I don't expect to find definitive numbers about all media ever generated on the topic. However, I do believe the sample is representative of English-language news media, and that some rough truths can be gleaned from this method. The sample consists of two parts, print and online. The print news media study collected articles from the Nexis UK Global News database, using the search strings "geoengineering" or "climate engineering" from the category "Major World Newspapers — English". Ninety-three of the 208 articles found are over 300 words and have three or more sentences pertaining to geoengineering. They span the years 1990-2010, though almost all of them were written in 2006 or afterwards.

The online media sample was compiled using Digg (www.digg.com), a site where users submit content from all over the web and other users vet this content for popularity. All content appears on the front page for a period. After the initial display, content with the highest number of votes rises to the top, thus using peer review to democratically and collectively select items users like best. Eighty-five text-based items which were rated over 8 points for the search strings "geoengineering" or "climate engineering" were selected. These are items which range from articles published from sources such as *Reader's Digest* online and the *Financial Times* online to blogs like *The Daily Green* and *Wired*.

My interest in drawing samples from these two sources is the idea that they represent two different (though interlinked) media ecologies. The first is a traditional broadcast media environment, where content is packaged with all other important "news" and the audience buys the whole package (whether or not they are interested in geoengineering). The second is an online media ecology where the audience has the power to choose which stories they like and want to read about; an environment in which there may be more freedom to write in-depth stories with different angles.

The content analysis examined various attributes:

1) **Trigger event** of each publication (is the story inspired by a politician's statement, the release of a study, a meeting of scientists, the release of a popular book?)

2) **Location** of both where the news is generated and where the news is published.

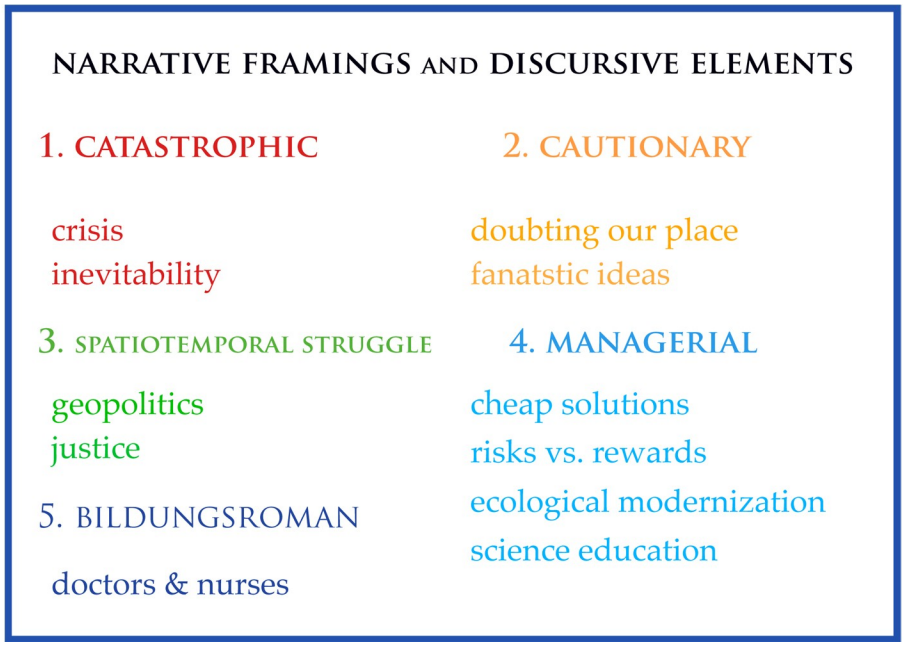
3) **Voices**: Who does the article cite, and what is their role? This attempts to directly investigate who has the authority to make assertions about geoengineering. Do some actors have more power to speak than others? Only the 71 news articles which were standard news articles were coded for voice; the commentary and opinion pieces were omitted for this evaluation. The evaluation looked at each *assertion* or declarative statement made about geoengineering by a specific person or body (direct quotes or paraphrases of declarations); general statements in passive voice were not included.

4) **Frames**: "Frames are interpretive storylines that set a specific train of thought in motion communicating why and issue might be a problem, who or what might be responsible for it, and what should be done about it" (Nisbet, 2009: 15). As Koteyko et al observe, "framing creates the boundaries around an issue and allows certain actors to claim ownership of it"

(2010: 27). Which actors do the framings privilege, and how do the different framings write the audience into the text?

Climate change framing studies often divide texts into broad categories such as "progress" , "conflict and strategy", or "science fiction" (Nisbet, 2009; Weaver et al, 2009). This study looked at two distinct aspects of the frames employed: the *spatial* aspect and the *narrative* aspect. For the spatial aspect, I modified a framework used by Liu et al (2010), dividing the spatial dimension into five levels: individual, regional, societal (or national), international, and biospheric (articles in which the dominant frame is addressing the entire planetary system, rather than human societies or nation-states).

Narrative frames relate to which story is being told. After reading all the articles, I identified five dominant frames: catastrophic, managerial, cautionary, spatiotemporal struggle, and *bildungsroman*. This is of course a typology which I have identified— in some sense, it is then a typology I am arguing for— but it is a typology developed based upon quantitative research, so it has some empirical grounding. Four of these stories are the common stories being told about (or around) geoengineering; the fifth, the *bildungsroman*, is a story which I think has emergent potential.



Because many of the articles feature a combination of these frames, the articles were not neatly divided by frame: this would have been too arbitrary and artificially simple. Instead, I coded the presence of eleven discursive elements, which were identified by cues in the text.

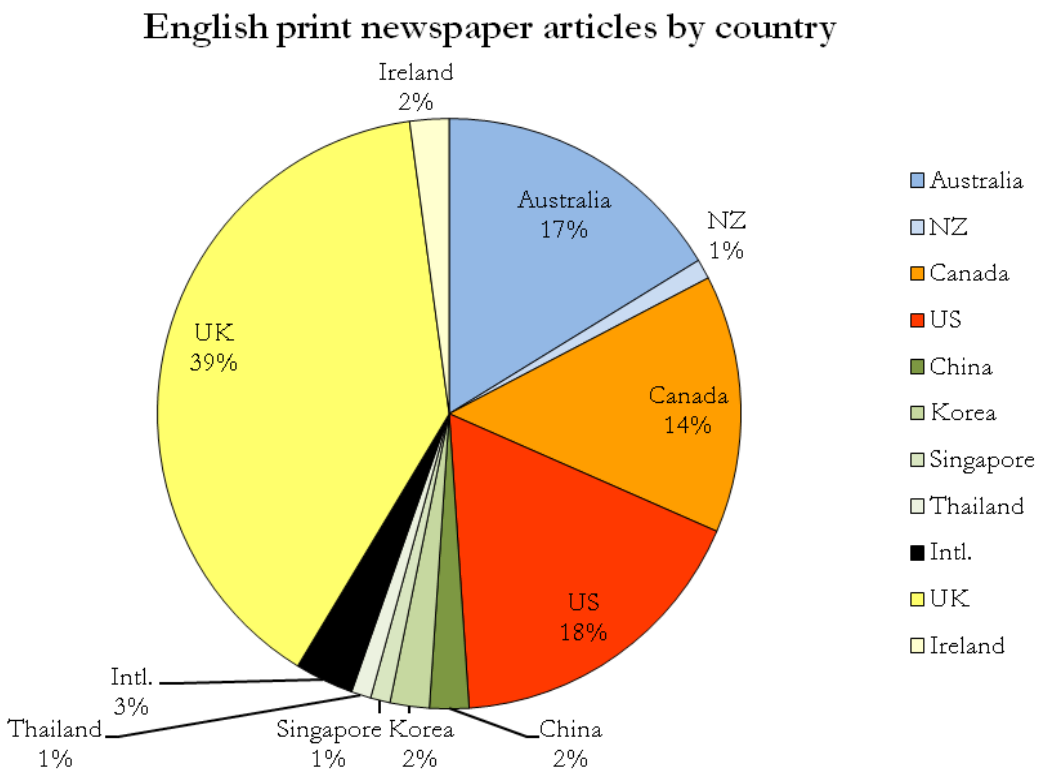
Discursive element	Textual evidence that indicates this element	The story being told
crisis	Headlines like "Bombing the sky to save us from global warming" or "Can the ecohackers save us"?; phrases like "dangerous climate change" or "climate catastrophe".	The world / the planet / "we" are in urgent trouble and need to be saved.
inevitability	Headlines like "Life may depend on giant sunshade"; statements which give a sense of fatalistic likelihood to geoengineering, from strong inevitability "the world will need to suck carbon from the atmosphere to avoid permanent damage to the climate" (Pagnamenta, 2009) to more nuanced inevitability.	We have screwed up and now these climate engineering technologies may / will be necessary.
doubting our place	To be clear, there are many statements which express scientific doubt. Uncertainty is a part of science. Here, I have only included statements which doubt our *right,* or existential ability, to be doing climate engineering. Thus, any phrases about "playing God", "hubris", or "tinkering with Mother Nature" count, while statements conveying reasonable uncertainty about the consequences of such experiments aren't counted.	The planet is messed up because of technology, so technology can't solve this; humans aren't wise enough to mess with Mother Nature.
fantastic ideas	Headlines like "Wild and Crazy Ideas to Cool the Planet"; statements about "wacky" or "loony" ideas, either for entertainment appeal or to be derisive; mentions of "science fiction", "fantastic", or "futuristic" ideas.	Look at all these crazy / cool / spectacular ideas!
geopolitics	Headlines like "Global Climate Engineering: Who Controls the Thermostat?"; statements darkly warning about "rogue states" that are "difficult to restrain" by other "powers"	The world is a geopolitical game of strategy. Climate engineering will be used in this game of great powers.
justice	Headlines like "Who gets rich in a geoengineered world"; statements that give a justice dimension to the problem, either by questioning the actors, questioning the spatial impacts of geoengineering, or intergenerational issues, i.e. "Is it fair to leave this kind of burden and commitment to the next generations?" (Song, 2008)	There are winners and losers in geoengineering.

cheap solutions	Headlines like "Global Warming's Cheap, Effective Solution", statements like "It would be 100 times cheaper to shield the Earth from sunlight with a man-made 'sun block' than to cut emissions of greenhouse gases" (Connor, 2010). This evaluation doesn't count attention to cost (many articles feature cost estimates), but statements which are explicitly comparing the cost of geoengineering to mitigation.	It is cheaper to geoengineer than to cut emissions.
risks vs. rewards	Metaphors about geoengineering as "insurance", discussions of "rolling the dice" with our planet, talk of risks of both geoengineering and climate change.	"Life is about weighing risks" (Gorrie, 2008).
ecological modernization	Headlines like "It's a new route in drive to save the planet: motorways lined with synthetic trees"; statements like "in 200 years the earth will be 'an artifact', a product of human design" (Keith, qtd. by Dean, 2007), which create a vision of the future where the earth has become ecologically modernized, and is successfully managed. This discourse is admittedly hard to distinguish, since it is implied in the very idea of geoengineering— most stories contain a grain of it.	With cooperation and technology, we can make the future work. We can still develop and modernize, and take care of the planet, too: caring for the planet is a question of proper management.
science education	Any material which attempts to enhance the reader's understanding of science. Many stories relay facts; here only those which make a genuine attempt to explain the underlying concepts are counted.	Let me teach you about the science underlying climate engineering.
doctors & nurses	Metaphors with the earth as patient, geoengineering as "planetary medicine", statements like "we should be the heart and mind of the Earth not its malady" (Lovelock, 2008).	The Earth is sick, but maybe humans have the power to heal her.

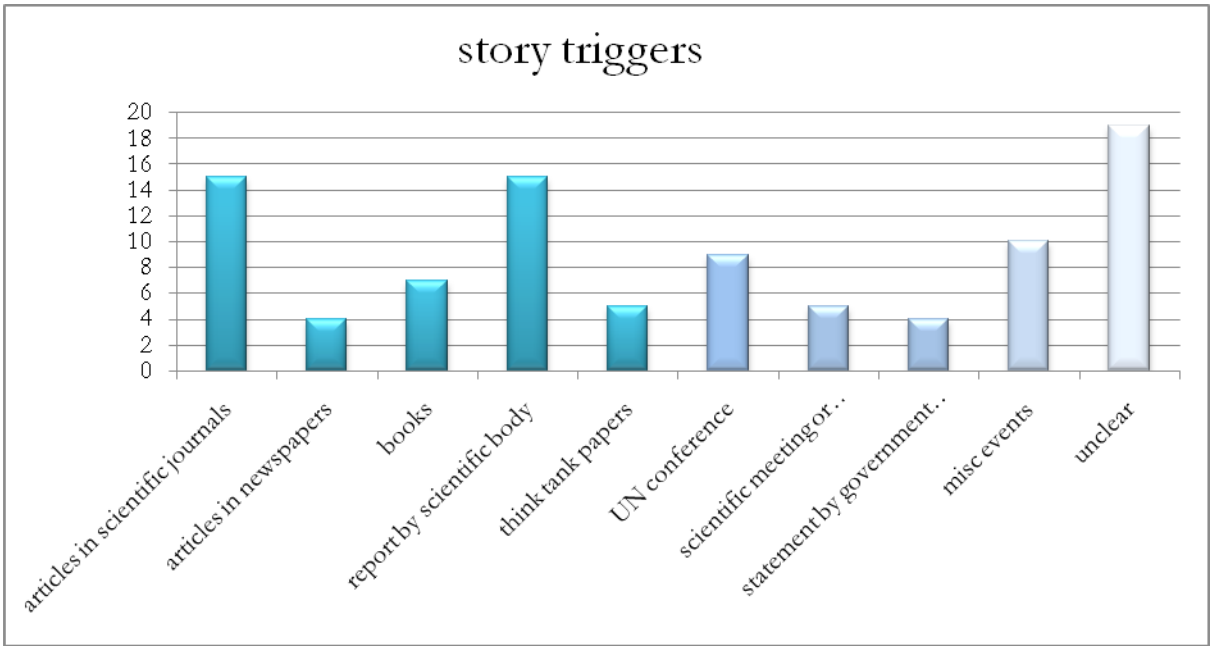
Results

where does the news happen? / *trigger events and geography of coverage*

Geoengineering coverage, as anyone who follows the topic can intuit, has increased over the past few years, peaking with the release of the Royal Society report in September 2009. The topic is especially prominent in UK newspapers.



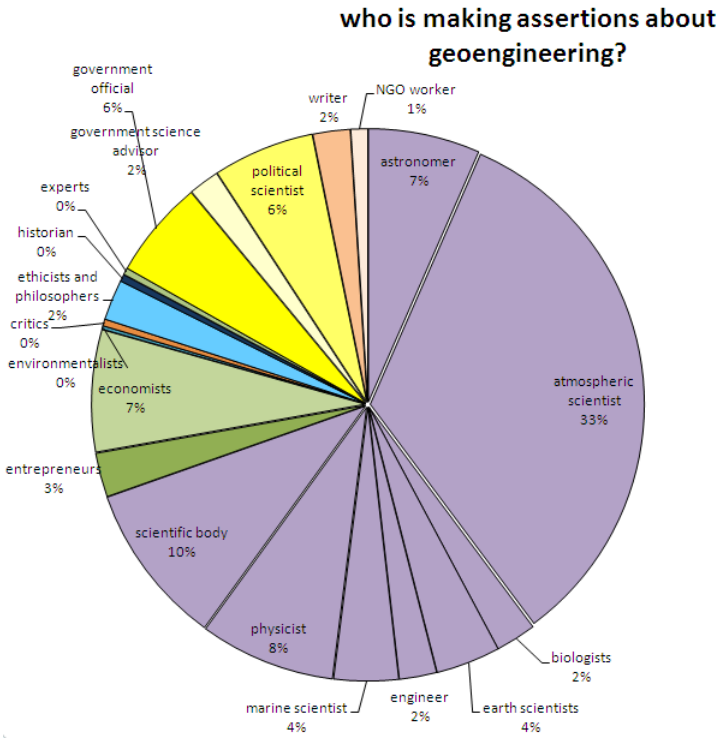
About ten percent of these stories were triggered by events in North America, 12% in Europe, and 25% with unclear trigger events (e.g. feature stories that ran somewhat independently of specific moments). At least half of the stories (49%) were triggered, however, in what I call the "mediasphere": the stories were written in response to publications, such as an article in *Nature,* or a book. In some sense, these *events* take place in a space which transcends borders —a realm of discourse or ideas. Geoengineering is not yet something that *happens* in the physical realm: it is enacted in this mediasphere.



who is speaking? / *voice*

In his book *Hack the Planet*, science writer Eli Kintisch refers to what he calls the "Geoclique": the network of scientists who are working on geoengineering. This geoclique, to borrow the neologism, is responsible for about 36% of the 500 assertions made about geoengineering in the 93 print articles.

Most-quoted geoengineering scientists		Other heavily cited people	
David Keith	9.4 % (47)	The Royal Society	6.4 % (34)
Ken Caldeira	6 % (30)	Stephen Chu	5 % (25)
John Shepherd	3.2 % (16)	Martin Rees	3.2 % (16)
Paul Crutzen	3 % (15)	J. Eric Bickel	1.8 % (9)
Roger Angel	3 % (15)	Lee Lane	1.8 % (9)
Alan Robock	1.8 % (9)	David Victor	1.6 % (8)
John Latham	1.8 % (9)	Bjorn Lomborg	1.6 % (8)
Mike MacCracken	1.6 % (8)		
Steven Schneider	1.6 % (8)		



Notice that natural scientists and engineers together create 70% of the discourse on

geoengineering, followed in much smaller parts by government officials and political scientists (14%) and economists (7%). By and large, it is voices in the scientific community who are making assertions about this topic. As asked by political ecologist Joan Martinez-Alier, with regards to environmental governance: "Who has the power to simplify complexity, ruling some languages of valuation out of order?" (2002: 271). Those who are speaking have the power to simplify complexity; it is in some crude sense those who have voice that have the power, the authority, the ability to author reality.

Who is not speaking? Well, citizens. Social scientists and philosophers are fairly unquoted on the topic, as well. There is little attention to geoengineering from a cultural perspective. Economists and politicians are also surprisingly quiet, given how prominent they are in Western society.

But the loudest silence, so to speak, is from women. Only three percent of assertions of geoengineering were made by women (15 statements). Furthermore, none of these statements were encouraging of geoengineering: all of them expressed skepticism or even hostility to the idea. Is this because there are simply less women scientists? Can we attribute the voicelessness to the media— perhaps it is simply not representing the women scientists who are out there, somehow? Or is it that geoengineering is a male project?[1]

what is being spoken about? / *framing*

1. spatial frames

Most stories are framed internationally. This is none-too-surprising, given the existing definition of geoengineering as large-scale. It also reflects what Hulme has observed about the universalization of the idea of climate: he argues that we have "detached it from its cultural settings" (2008: 9). Both the "de-culturization" of climate and the universalization of "the human plight" under climate change have implications for the governance structures that can be imagined. Further research could investigate whether individual, regional, or societal frames would increase public engagement with the subject.

print newspapers — percent of stories possessing this spatial frame		online content — percent of stories possessing this spatial frame	
individual	7 %	individual	1 %
regional	7 %	regional	0 %
societal	10 %	societal	15 %
international	88 %	international	93 %
biospheric	8 %	biospheric	11 %

* some stories use two frames, so the numbers don't add up to 100%.

1 To simply state that geoengineering is a male project, if we came to that conclusion—and some have, see Bronson (2009)—might be a dead end. If geoengineering is a male project, the real question is: how then should we handle this? Does it work to argue that we simply shouldn't go down that path, because men are designing it, and it might lead to a male-dominated destination? Should we be trying to feminize climate engineering, or make it more inclusive to female participation and values (whatever that would mean)?

2. narrative frames

The most dominant frame has been the catastrophic frame: most journalists are telling a story about "saving the world." What does this signify? Is it "saving the world" simply a story with classic appeal?[2] Or do we actually believe that "the world" is in such grave danger?

	print newspaper stories	online media stories
Catastrophic	60 %	43.5 %
Ecological modernization	59 %	30.5 %
Risks vs. rewards	31 %	35 %
Fantastic Ideas	29% *	33% *
Inevitability	29 %	29 %
Doubt	24 %	23.5 %
Cheapness	21 %	12 %
Justice	12 %	23.5 %
Geopolitics	11 %	23.5 %
Science education	7.5 %	18 %
Doctors & nurses	6.50%	3 %

* of these stories, 33% of print stories and 25% of online stories present geoengineering as something which used to be "science fiction" or "far-out", but is now being considered seriously.

This emphasis on catastrophe seems to square with social science research on climate change attitudes. As of June 2010, about half of Americans are worried about climate change; 11% think it will harm their families and communities "a great deal", while 25% think it will harm their families and communities a moderate amount (Leiserowitz et al, 2010). In Europe, a Eurobarometer poll found that 67% of respondents thought that climate change is a very serious problem, and 65% believe that the seriousness of climate change has not been exaggerated (2009). So, despite a recent drop in belief in global warming (in America, anyway, see Pew 2009), the catastrophic frame is not out-of-line with how people are feeling. (Which came first, the media representation or the public sentiment?)

Print newsmedia and online articles are employing similar frames. Online stories were

2 What pleasure do these stories offer? How much do we take sublime enjoyment from the idea of manipulating our climate? Latour: "It is not only out of arrogance that Westerners think they are radically different from others, it is also out of despair, and by way of self-punishment. They like to frighten themselves with their own destiny. ... Why do we get so much pleasure out of being so different, not only from others but from our own past?" (1993: 114). The Anthropocene as a New Epoch has certain sublime, mythic appeal: if modernity equals a rupture with the past, the Anthropocene proves we are truly modern.

more likely to frame things in terms of justice or geopolitics, less likely to focus on the cheapness of geoengineering, and more likely to educate their readers on the science. Most of these slight differences between print and online stories, I attribute to narrowcasting—the fragmentation of audiences—and the on-demand nature of online media. People who read online stories are often seeking topics they are interested in, and they are often reading stories written for audiences interested in science or the environment. Potentially, narrowcasting could allow writers to go more in-depth in certain areas, but it also makes it difficult to have a wider public debate.

what a piece of work is a man / *Discussion & Conclusion*

These results could look rather dry: anyone who has read a few stories on geoengineering could guess that articles are framed in terms of saving the planet, managing the planet, and weighing risks and benefits. We reach richer material when we ask: What stories are *not* being told?

1. Despite the managerial framing and the elements of ecological modernization, almost nobody is framing this story with attention to the positive power of humans to transform their societies or environments. Humans, even when they are cast as fixers, are rarely protagonists. Even the stories which featured ecological modernization weren't exactly enthusiastic or positive: more often, they approached managing the earth as a chore, rather than a creative activity. The actors featured seem unable to act; if there is a protagonist, he is more a jaded, reluctant Hamlet than a Hollywood disaster-flick hero. We might have never been modern, but if the lack of enthusiasm about the human potential to transform the planet is any indication, we have definitely been postmodern. It is necessary to stabilize the climate to avert chaos—as Boykoff explains, "a guiding ethos of climate stabilization is the imagined future, safe, secure, stable climate, which can be engineered by our actions now" (2010: 60)—but this stability is about averting the negative, not about establishing something positive.

2. Unsurprisingly, these stories tend to treat warming as the problem, and examine whether geoengineering is the potential answer. But rarely do we get a comprehensive look at the dilemma (by that I mean the extraction and burning of fossil fuels, though it could be extended to the wider dilemma of the socioeconomic system; see Foster, 1999; Kovel, 2002; O'Connor, 1998). Generally, the comprehensive nature of the dilemma is recognized with a few sentences, but it is not examined; the focus is elsewhere. A fairly typical article will mention that "the battle to contain emissions seems every day less winnable", and that geoengineering would be "a last resort because we couldn't curb our excesses" (Boyer, 2010)—yet the articles always muse within the bounds of this geoengineering topic. The question is, of course, how did those bounds come to be set? Can any topic have "natural" bounds? Because geoengineering looks at the waste disposal aspect of our energy woes, not the waste creation aspect, it would be easy to say the boundaries are inherent in the topic. An more material reason for the limited scope is the for-profit nature of the media system: in print media, each page is valuable "real estate." Hence, it's quite expensive to write an in-depth treatment of any problem. With online media, the limits aren't space, but attention span: it is hard to get engrossed in a computer screen, and hypertext makes for hyperactivity. There are few forms

with mass appeal that can treat the issue with a wide scope.

3. The justice issue is seldom considered; even when it was present, it was rarely the dominant frame. Of course, it is hard to write about the justice aspects of specific geoengineering situations when the science is still so speculative. As for considering the justice aspects of geoengineering *as an idea*, this also requires a comprehensive look at our fossil fuel dilemma. The antagonist in the dominant frames is CO_2, which mundanely threatens everyone, making questions of justice invisible (see Swyngedouw, 2010: 222).

Bounding the issue

When we look at who is speaking in these stories, geoengineering becomes bounded as the province of experts. This is consonant with ecological modernization discourses, where the layperson is disqualified (Hajer, 1995: 10). As Hajer observes, "this disqualification in fact not only affects the proverbial man in the street: specialist natural scientists, politicians, philosophers, or social scientists, all experience how their stocks of knowledge and normative theories about proper procedural roles of reaching social agreements are devalued too" (Ibid.). We are all negotiating where our role and usefulness lies.

There are at least two ways of looking at the role of the individual reader:

1. *Educated chooser*. We are encouraged, in the ecological modernization discourse—especially where this risks versus rewards element is present—to weigh the risks and benefits; to make informed choices along with the people who are actually doing the decision-making. While the public is not invited to weigh in directly, we are presented the rudimentary information to make evaluative decisions. As consumers, we possess and use these decision-making skills daily, at least in the rational-choice model of economics.

2. *Spectator*. The topic is bounded as something which civil society should *keep watch on*, but the audience is written into the text simply *as an audience*, meant to observe while geoengineering matures into whatever it will become. NGOs have a role in this story (as vigilant watchers); often the ETC group is called a "watchdog." The state has a role: that of watcher (over*sight*), and a role which is expanded to that of protector, in the "strategic realism" of geopolitical discourse. Think tanks have a slightly more dynamic role; they can provide ideas-as-food for this growing project. The media is the stage upon which geoengineering is performed, and it also actively performs geoengineering. Scientists are ususally the stars. But the conflicts and characters take place *within* the scientific community; it's a self-enclosed dramatic system which usually provides the necessary dramatic elements without venturing into political landscapes. Civil society, however, has an uncertain place in this story.

What could change this, and give the citizen more agency? A dismantling of this construction "geoengineering", which would smash these common survey approaches to the topic (e.g. "Ten crazy ideas to save the planet", with rendered graphics that depict all the geoengineering strategies at once, as if in an open market).

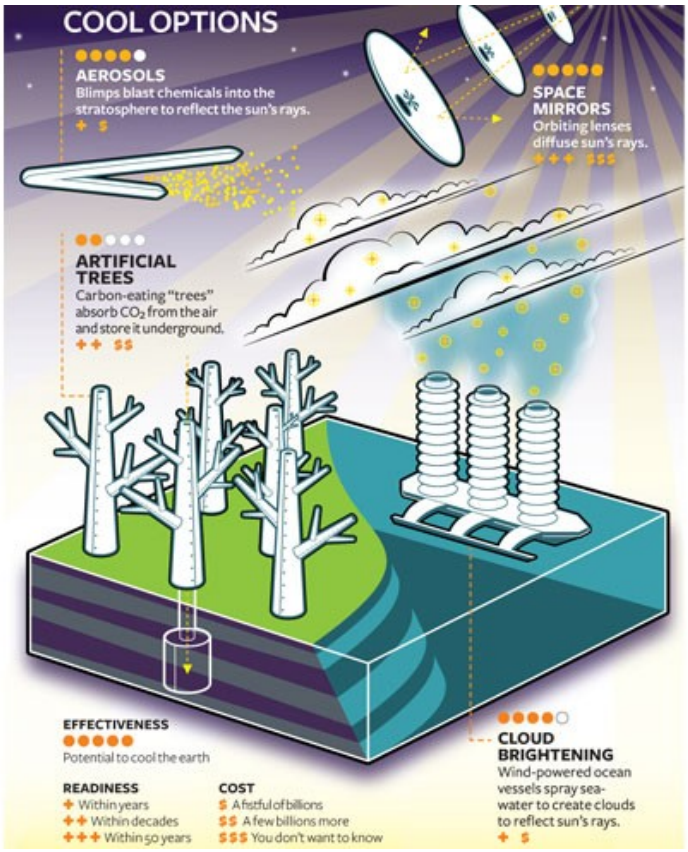


Image from *Reader's Digest*.com (Kuchment, 2010). Is this "geoengineering"?

Dismantling this construction would allow us to examine proposals which would have community, regional, or individual engagement. Local geoengineering is against the definition of geoengineering, but maybe we could think about adjusting this definition: or are we already committed to having birthed this strange chimera of techniques? The media coverage is dominated by a relatively small group of speakers, so I would argue that if there was the will to change the conceptualization of geoengineering, it could be done. Of course, if the international community were together enough to create funding for smaller carbon dioxide removal projects, we wouldn't need to be having this discussion: the sinister thing about the catastrophic-managerial geoengineering story is that it excludes idealism and possibility from the storyline. There may be no alternative. The story is based on the premise that we are in fact *incapable* of positive action. I would like to be absolutely clear that I am not arguing against the science which suggests that we are in a difficult climatic predicament: this is probably true. The focus here is on the narratives—the stories which we create out of this scientific data—and to whom they give authority; the forms of governance they may imply.

The interpretive storylines suggested by the news media could act to encourage public participation (if they position the readers as agents with authority, whose participation is important) or discourage public participation (if they position the audience as subject to the inevitability of geoengineering). At the moment, authority rests with natural scientists, who in many cases don't even want authority. This works for the topic in its nascency, as nobody besides scientists seems to know much about geoengineering. At some point, however, more

actors will be making assertions and wanting to be heard: and then we will have to truly begin the difficult task of figuring out how to reconcile the idea of large-scale geoengineering with notions of democratic consent.

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