



## Article

# Not Organic Gardening or Rocket Science: New Metaphors (and a Politics) for Geoengineered Imaginaries

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## Abstract

*Geoengineering refers to large-scale interventions in the global climate system aimed at abating the effects of climate change. While this term is used frequently by scientists and researchers, a range of metaphors and narrative allusions have been invoked to account for the potentiality of further augmentation of the global climate system. This article looks at the metaphors and politics at play within geoengineered imaginaries using Causal Layered Analysis, which takes a layered approach to analysis and, perhaps most importantly, provides a point of entry for surfacing and exploring deep narratives.*

## Keywords

Geoengineering, Politics, Climate Change, Imaginaries, Causal Layered Analysis

## Introduction

In 2007, Russ George intimated to the *New York Times* that his proposed ocean iron fertilization (hereafter OIF) project was “organic gardening, not rocket science” (Richtel 2007). In turning to metaphor, George highlights the means by which narrative enlivens imaginaries that shape norms, condition future(s) potentialities, and, in the case of geoengineering, enlivens an *all-too-familiar* politics (Milojević and Inayatullah 2015; Inayatullah and Milojević 2015). While there are many practices that can and might be enacted to fight climate change, geoengineering has come to refer to large-scale interventions in the global climate system aimed at mitigating the worst effects of climate change, although some models and studies suggest that the overall effects of geoengineering practices are decidedly uncertain (Burns 2011; Robock et al. 2008). As with efforts to limit carbon emissions, geoengineering remains ensconced within, if not has also fallen victim to, the increasingly binary politics of our all-too-modern world. In light of the widespread declaration of a “climate emergency,” increasing calls for geoengineering research, and George’s panache for metaphor, this article deploys Causal Layered Analysis (CLA) to analyze geoengineered imaginaries, which are entangled within a politics that is not only shaping potential research but also prospective governance, particularly regulatory systems.

Arguing that emerging technologies require cautious and careful experimentation, as well as new narrative framings for the policy and regulatory systems surrounding them, Charo writes, “One might say that what we need are more roundabouts, four-way stops, and yellow lights to supplement our red-light, green-light regulatory system (Charo 2015, 385). Taking a layered approach to analysis and creation, CLA is uniquely positioned to foster reframed narratives and, as such, provides an orientation for keeping hope in the face of the worsening climate emergency. In the next section, I map the layers of geoengineered imaginaries as expressed, and enacted, by George, who has, in many ways, come to embody the complexities of geoengineering, particularly its potential research, possible implementation, and prospective governance.

Following my analysis of George’s narrative, I look at the Oxford Principles for geoengineering research, which were put forward as a means to initiate a decidedly regulatory politics for this emerging “techno-fix.” This is where it becomes clear that geoengineering demands moving beyond “strategic foresight” and towards

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transformative foresight, which “[...] changes me and those with me [...]... It is more than being the reflective practitioner—it is opening a space where we all learn and transform with each other” (Inayatullah and Sweeney 2020, 3). I use the conclusion to explore this dynamic further, and I invoke the distinction between strategic versus transformative foresight throughout to highlight the differences between a binary / regulatory versus collective / participatory politics within the context of geoengineered imaginaries, which creates the conditions of possibility for a new guiding metaphor to emerge.

### Greenfinger Does More Than Speak

George’s 2007 experiment ultimately failed to materialize—if only because of pressure from the U.S. Environmental Protection Agency (hereafter EPA) and other concerned parties (Hester 2013, 273). In spite of his detractors, George continued exalting the positive effects of OIF as a means to combat climate change and, perhaps not surprisingly, seed a profitable enterprise. Many, however, within the scientific community are weary of accelerating, or further modifying already stressed, oceanic systems, especially as a number of studies suggest that only a small percentage of the sequestered carbon dioxide (hereafter CO<sub>2</sub>) remains effectively stored and, perhaps most importantly, the overall effects of large-scale OIF interventions on oceanic life systems are, at best, uncertain (Batten and Gower 2014; Bodansky 1996; Bodle et al. 2012; Burns and Strauss 2013; Courvoisier et al. 2018; Fuentes-George 2017; Royal Society 2009; Williamson et al. 2012). By enhancing the ocean’s biological pump, OIF can actually produce carbon-absorbing plankton blooms, which creates a literal sink for carbon dioxide CO<sub>2</sub>, but the outspoken entrepreneur’s promises, as well as candor, was intended primarily to raise funds from investors, as well as a few eyebrows.

Notwithstanding scientific and legal challenges, a recalcitrant George did not waiver from seeking to produce “lucrative carbon credits to trade on international markets” and generating invaluable data to legitimate future experiments (Specter 2012). In 2012, George finally realized his vision, at least in part. Coordinating an effort to dump 100 tons of iron sulfate off the coast of northern British Columbia, George appears to have convinced the Haida Nation to support a “salmon enhancement project” and received \$2.5 million from the First Nations community to carry out his “research” (Lukacs 2012a). While there have been reports that George’s OIF experiment created a plankton bloom of “10,000 square kilometers” (Parson 2012), many were more interested in the region’s record salmon yields that followed, although some contend that it is difficult, if not impossible, to make such causal, or even correlational, linkages (Johnson 2013; Learn 2014). Many, if not most, within both the scientific and environmental protection communities condemned George’s maverick approach to “research” (Hume 2012), but mainstream calls to carry out further geoengineering experiments (Güssow et al. 2013) have surfaced since the 2012 incident, including a call for the U.S. government to put forward \$100 million dollars for “solar geoengineering research” (National Academies of Sciences, 2021).

George appears to have escaped legal penalty, and the Planktos incident illuminates the lack of a comprehensive regulatory framework for research and potential deployment, enforcement obstacles and chasms within international law, and the absence of an overarching governance treaty on geoengineering (Bipartisan Policy Centre Task Force on Climate Remediation Research 2011; Cicerone 2006; Crutzen 2006; Fleming 2010; Hamilton 2013; Horton et al. 2015; House of Commons Science and Technology Committee 2010; Kintisch 2010; Payne et al. 2015; Royal Society 2009; Stilgoe 2015; Stilgoe 2016). In light of his contention that he only works “to restore nature,” George has not shied away from guiding metaphor of *Greenfinger*—a tongue-in-cheek moniker that heightens his *Bond-villain-esque* persona. However, he is quick to point out what he would preferred to be called: “The more common descriptor than Greenfinger is that of Geo-engineer. As a man whose mostly worked in life sciences it is irksome to be called any kind of engineer but if I must be an engineer let me be known as an Eco-engineer” (George 2013). Dubbed the world’s “first geo-vigilante,” George has become more than mere spectacle; he has embodied the complexities of the rising interest in geoengineering and its inherently complex politics (Specter 2012). On his personal blog, George cheerily proclaims, “The work can be done by just 100 villages. To become one of the hundred follow this link, we just need 99 more” (George 2013). His simple invitation conceals a morass of complicated dynamics, and after a brief hiatus, George resurfaced in a 2018 interview with *The Ecologist*, a longstanding and widely read environmental affairs publication. Defending his project and focusing squarely on increased fishing yields, George wistfully opines, “The salmon were the best science result, right?” (Breeze 2018). What becomes clear from George’s nonplussed reflection is that he was, and perhaps remains, content in models of experimentation *upon* rather than experimentation *with*. Channeling

Machiavelli, the ends justify the means for George, which is to say that results (e.g. salmon) trumps any and all ethico-political considerations. As such, George is playing a familiar game and espousing an even more familiar politics. In the next section, I explore further this politics through a CLA analysis of the Oxford Principles, which offer and outline a vision for how geoengineering might be grafted onto contemporary researchers practices and institutions with an eye toward developing a “a sound foundation for developing future regulation” (Rayner et al. 2009, 1). First, however, I situate my engagement with the concept of imaginaries by using CLA to unpack George’s embodiment as *Greenfinger*.

**Geoengineered Imaginaries**

Imaginaries hold a special place within futures studies, which is centered on the analysis, categorization, and even creation of “images of the future” (Dator 2019; Dator et al. 2015; Inayatullah 2004; Polak and Boulding 1973). And yet, imaginaries as a discreet and separate concept has evolved and mutated beyond the field of futures studies (Anderson 1991). As with culture, there are many, and at times opposing, definitions and framings for what can and might constitute, construct, and constrain imaginaries, and it be well beyond the scope of this article to engage in further debate on this topic. As a means of employing this concept, I turn to the work of Marcus and Jasanoff, who theorizes the contours of “technoscientific imaginaries.” According to Marcus, imaginaries operate as “structures of contingency” that shape the very conditions of possibility for a variety of phenomena across a range of contexts (Marcus 1995). At the exact intersection between the actual and perceptual, imaginaries are ultimately assemblages—shared beliefs, desires, fears, hopes, assumptions, and other percepts that manifest as and create norms within various social contexts (Jasanoff 2015).

Functioning as spheres of common reference, imaginaries condition current trajectories and shape future(s) possibilities across and at a variety of scales. Jasanoff and Kim argue that imaginaries are “instrumental and futuristic” as “they project visions of what is good, desirable, and worth attaining for a political community; they articulate feasible futures” (2009, 123). Such language can be found within George’s propensity to wordsmith, and given the “universal human receptiveness to stories and metaphors,” his penchant for framing narratives that downplay the radical potentialities linked to geoengineering should not be surprising (Inayatullah and Milojević 2015, 158). In employing the “organic gardening” metaphor, George intentionally negates the potentially harmful, and ultimately uncertain, side effects of such experiments. Furthermore, George’s reference to “rocket science” pokes at the gap between the public and experts, and, perhaps most importantly, how the public can and might view and perceive such experiments. Below, I have situated statements made by George using CLA.

**Table 1.** George’s statements situated within CLA

<b>Litany</b>	"The work can be done by just 100 villages. To become one of the hundred follow this link, we just need 99 more"
<b>Systems</b>	“The salmon were the best science result, right?”
<b>Worldview</b>	Working to “restore nature”
<b>Metaphor</b>	“Organic gardening, not rocket science”

Given the fallout from the Planktos incident, George’s invitation should raise more questions than answers, especially as he downplays the ethical implications of his “results.” At the systems level, George brings forward only the systemic outcomes and results that suit his metrics and measures for success. In short, George voices the quintessential Machiavellian perspective: the ends justify the means. Indeed, there is no mention of the ruse perpetuated against the Haida Nation and/or the potential implications that the legal entities surrounding the Planktos incident could have faced, if only there were systems in place to govern such undertakings. At the worldview level, George’s work as an “Eco-engineer” justifies *experiment upon*, and the Haida Nation were

merely a means to ensure that his work to “restore nature” could be undertaken. At the heart of this worldview is a decidedly Western, Romantic, and Modernist separation between humans and “nature,” which is precisely what many contend has led to human systems that further alienate and aggravate the life systems of this planet (White, Jr. 1967; Latour 1993; Morton 2007). At the metaphor level, George’s words conceals/reveals an all-too-familiar, binary (“Organic gardening, not rocket science”) politics enabled by and through all-too-familiar imaginaries.

The politics that is concealed/revealed through traditional geoengineered imaginaries does not refer to electoral campaigns and parties but rather factors and forces that imbue and, in the case of George, literally embody *power relations*, which, as Foucault posited, are always dynamically fluid, intrinsically asymmetric, and perpetually resisted (Foucault, 1978). Understood from this lens, the politics of geoengineered imaginaries are not merely discursive but rather enacted and enabled by and through an array of people, practices, and products, including the Oxford Principles. Published in 2013 as part of a special issue of *Climate Change*, they state:

- **Principle 1: Geoengineering to be regulated as a public good.**

While the involvement of the private sector in the delivery of a geoengineering technique should not be prohibited, and may indeed be encouraged to ensure that deployment of a suitable technique can be effected in a timely and efficient manner, regulation of such techniques should be undertaken in the public interest by the appropriate bodies at the state and/or international levels.

- **Principle 2: Public participation in geoengineering decision-making.**

Wherever possible, those conducting geoengineering research should be required to notify, consult, and ideally obtain the prior informed consent of, those affected by the research activities. The identity of affected parties will be dependent on the specific technique which is being researched—for example, a technique which captures carbon dioxide from the air and geologically sequesters it within the territory of a single state will likely require consultation and agreement only at the national or local level, while a technique which involves changing the albedo of the planet by injecting aerosols into the stratosphere will likely require global agreement.

- **Principle 3: Disclosure of geoengineering research and open publication of results.**

There should be complete disclosure of research plans and open publication of results in order to facilitate better understanding of the risks and to reassure the public as to the integrity of the process. It is essential that the results of all research, including negative results, be made publicly available.

- **Principle 4: Independent assessment of impacts.**

An assessment of the impacts of geoengineering research should be conducted by a body independent of those undertaking the research; where techniques are likely to have transboundary impact, such assessment should be carried out through the appropriate regional and/or international bodies. Assessments should address both the environmental and socio-economic impacts of research, including mitigating the risks of lock-in to particular technologies or vested interests.

- **Principle 5: Governance before deployment.**

Any decisions with respect to deployment should only be taken with robust governance structures already in place, using existing rules and institutions wherever possible (Rayner et al. 2009).

While there is an explicit attempt to position “public participation” within geoengineering governance decision-making processes, the Oxford Principles struggle to confront the limits of plausibility, the banality of risk-based approaches, and the failure of traditional institutions to engender creative and critical engagements. In short, they put forward a politics that perpetuates the systems and worldviews that are ultimately responsible for the climate emergency. The principles make no mention of experimentation (either *upon* or *with*), or participatory futures, and one gets the impression that a present-centric *consensus* is precisely what they aim to secure (Ramos et al. 2019). It is certainly surprising that the Oxford Principles make no explicit mention of “future generations” given the increasing attention towards intergenerational fairness and justice, including how such approaches can inform geoengineering research, implementation, and governance (Hourdequin 2019; Svoboda 2016; Tuana et al. 2012). Interestingly, in the framing language for the Principles, the authors explain that “the global climate must be managed jointly, for the benefit of all, and with appropriate consideration for future generations” (Rayner et al. 2009). However, in looking only to current governance models and paradigms, the Oxford Principles ultimately work to perpetuate systems with little, or no, consideration for future generations. Indeed, in suggesting that one should rely on “existing rules and institutions wherever possible,” the Oxford Principles completely overlook past

and present injustices and assume that current systems are suited to the demands of the ongoing climate emergency. In using CLA to analyze the Oxford Principles, I made a point to use the original language for everything other than the metaphor layer, which emerged through a synthesis of my previous analysis.

**Table 2.** Analysis of the Oxford Principles

<b>Litany</b>	Disclosure of research plans and open publication of results; understanding of the risks; integrity of the process; informed consent
<b>Systems</b>	Existing rules and institutions; appropriate regional and/or international bodies; state and/or international actors; robust governance structures
<b>Worldview</b>	Affected parties; publicly available; global agreement
<b>Metaphor</b>	Greenfinger vs. Eco-engineer; “rules of the game”

The “rules of the game” metaphor highlights the lack of transformative foresight at the heart of the Oxford Principles, which clearly have the best of intentions but rely on a “used future” framing to imagine what can and might be (Inayatullah 2008). There is no better mouse trap to be built, and more strategic foresight and/or actionable insights will (and can) not enable transformative change. Bringing back George’s “Greenfinger vs. Eco-engineer” personas into play with the Oxford Principles highlights the traditional, reductionist, and binary worldview and politics that haunts much, if not most, of the geoengineering debate (Corry 2017). In the next section, I use CLA to enliven a new metaphor (and politics) for geoengineered imaginaries.

**Playing a new game**

Politics is not an apomictic science. It proceeds by experimentation, groping in the dark, injection, withdrawal, advances, retreats. (Deleuze and Guattari 1987, 461).

This section uses CLA to generate a new metaphor and politics for geoengineered imaginaries. It is common amongst researchers to provide a modest defense of methodology: why one approach rather than another? To date, there have been few studies that look at the overall narrative landscape, especially with an emphasis on metaphors, of geoengineering proposals and initiatives. One exception is a 2012 study by Nerlich and Jaspal, who note that “the use of metaphors as framing devices remains under-explored in existing social sciences research into geoengineering” (Nerlich and Jaspal 2012). They observe that there have been three recurrent narrative framings in relation to geoengineered imaginaries: the planet is a machine; the planet is a patient; the planet is a body (Nerlich and Jaspal, 2012). In the 10 years since this research was published, there has been a dramatic increase in engagements centered on stakeholder perceptions, public discourse, and perceptions of research, implementation, and governance but little engagement with narrative framings and metaphors (Corner et al. 2012; Pidgeon 2012; Scheer and Red 2014; Cummings et al. 2017; Bellamy et al. 2017; Mahajan et al. 2019). Indeed, recent research looking at “imaginaries in geoengineering” only brought forward a single metaphor: “thermostat of earth needs adjusting” (Augustine et al. 2019).

As a tool for surfacing and analyzing the “deep narratives” that shape and contour, if not hold together and promulgate, imaginaries as forces in the present that shape how we make collective sense of the future, CLA is uniquely positioned to analyze and illicit the narrative framings at play within geoengineered imaginaries. Furthermore, CLA has, at its very core, an ethos aimed at enlivening hope through the framing and reframing of *what-is* as well as *what-can-and-might-be*. There is, at the very heart of CLA, a contention that the present is utterly remarkable, which is canonized in this critical futures studies method’s poststructuralist (i.e. “both-and”) perspective (Inayatullah 2004, 5). Rather than seeing contingency as a constraint, CLA embraces this dynamic to

reveal and make “sense of the underlying, often transparent, cultural forces that motivate discourse” towards enabling alternative imaginings (Bussey 2004, 201-202).

Beyond binaries (for/against research and/or implementation), a new politics for geoengineered imaginaries aims to enact emergent pathways for public, science, and policy spheres to cohabit, cooperate, and ultimately collaborate while being mindful that “the coming about of a particular future is the silencing of other futures” (Inayatullah 2004, 71). As such, it is imperative that *criticality* remains ever-present within how geoengineered imaginaries are interrogated, imagined, and implemented. In this way, I use CLA for *criticism*, but in the strictly Latourian sense. He explains:

The critic is not the one who debunks, but the one who assembles. The critic is not the one who lifts the rugs from under the feet of the naïve believers, but the one who offers the participants arenas in which to gather. [...] The practical problem we face, if we try to go that new route, is to associate the word criticism with a whole set of new positive metaphors, gestures, attitudes, knee-jerk reactions, habits of thoughts (Latour 2004, 246-247).

In assembling layers of meaning, CLA creates spaces where epistemological gathering can emerge. Below, I use CLA to generate a reframed metaphor that speaks to a new politics for geoengineered imaginaries.

**Table 3.** Generating a Reframed Metaphor with CLA

<b>Litany</b>	Experimentation <i>with (not upon)</i> ; experiential threshold
<b>Systems</b>	Participatory futures; speculative evidence
<b>Worldview</b>	Regime of collective experimentation
<b>Metaphor</b>	Joyful Poets; “keep everyone in play”

**Litany**

This reframed litany’s “official unquestioned view of reality” is grounded within the enactment of experimentation with rather than upon (Inayatullah 2004, 1). And, the key challenge here, as with any litany, is forging an awareness that is “visible and obvious, requiring little analytic capability” (Inayatullah 2004, 12). It is here that Candy and Dunagan’s concept of an “experiential threshold” as found within their “Experiential Futures Ladder” (EFL) suggests a model for how litanies can and might be constituted and reconstituted (2017). At the broadest level of the EFL, one finds the setting, which refers to the general context and framing of the future(s). One level down one encounters the scenario, which is a more specific articulation of the future(s), typically in narrative form. At the third level, the situation is where circumstances and/or events are staged so as to elicit an affective response. Finally, stuff has been included to account for the tangible things and artifacts that often form points of entry for such engagements. The “experiential threshold” cuts across scenario and situation and, as such, is situated closer to the pole of “concrete/specific” than “abstract/general,” which (Candy and Dunagan 2016; Candy and Dunagan 2017). Litanies enacted by and through an “experiential threshold” are visible but invite rather than broadcast, which Candy and Dunagan argue necessitates “designing circumstances or situations in which the collective intelligence and imagination of a community can come forth” (Candy and Dunagan, 2016, 15).

**Systems**

In order to break out of the “eternal present” that has come to define the politics of our current era, agencies and institutions of various scope and scale must embrace and enliven participatory futures, which aims to:

- *democratise and encourage long-term thinking; shifting foresight from a traditionally elite occupation to a process of creating collective intelligence that is shared and used by many;*

- *scaffold public imagination; drawing out knowledge and ideas about how the future could be, and developing collective mental images of the futures people want; and*
- *translate collective images of the future into new collective actions and behavior in the present. These prefigurative actions generate agency and offer glimpses of the preferred, better futures (Ramos et al. 2019).*

The prospects for such an approach might seem decidedly utopian given what the Covid-19 crisis has laid bare, and the overall aim of such approaches is to “[...] help raise comprehension of the future’s plasticity [...]” (Ramos et al. 2019). Consequently, the experiential threshold generates “speculative evidence” that confronts the binary, evidence-based approaches of “existing rules and institutions” (Jain 2017). Recently, there has been a turn towards climate assemblies to generate more “active forms of citizen participation and citizen empowerment in the production of science and policy” (Galende-Sánchez & Sorman, 2021). However, these often lack an explicit utilization of futures and foresight tools and methods, although some have considered how “the future” can and might be “in the room” (Harris 2021).

### **Worldview**

Arguing that geoengineering ought to be seen as a verb rather than a monolithic enterprise, Stilgoe writes: “[...] If we see geoengineering as a verb, under a regime of collective experimentation, things become less straightforward. Rather than prioritising freedom from experimental regulation, we might instead consider freedom in a positive sense, as a social licence to experiment. In addition to evaluating likely experimental risks and scales, we might also encourage scrutiny of experimental intentions and the imaginaries that sit behind them” (Stilgoe 2016, 865). He continues, “Collective experimentation would value diversity and criticism as a source of resilience and variety, rather than dismissing dissent as ‘anti-science’, as is often the case in technological controversies” (Stilgoe 2015, 47). In this way, the litany links directly to the guiding metaphor (keeping the futures plural is the infinite game par excellence), participatory futures in the systems layer and collective experimentation in the worldview layer.

### **Metaphor**

At their most basic level, games are structures where one must confront and ultimately overcome obstacles or challenges through a set of rules, limits, and/or constraints. What makes something a game has much to do with the willingness of its players, who often compete in hopes of achieving victory. Although there are many types of games, Carse outlines two archetypal categories—finite and infinite. Finite games are undoubtedly the most familiar as they focus on the achievement of a particular end, usually but not always a well-defined win condition (1986). For many, if not most, this is the aim of competition, but playing with an individual or group whose sole purpose is winning often dampens the gaming experience, which is always an exercise in uncertainty. Indeed, the only thing that is meant to be predictable within such games is that there is an order to play and that the game will inevitably end. While finite games, which have a clear beginning and end, are a common form of play experience, Carse presents another, more dynamic, modality of gaming that brings forward an alternative imagining for play as an embodied practice.

In contrast to a finite game, the purpose of an infinite game is literally to keep it going, which is to say that such games mutate over time and necessitate the inclusion of new players and perhaps even new rules. Consequently, infinite games have a greater degree of elasticity regarding what constitutes play. Comparing the rules of an infinite game to the “grammar of a living language,” Carse argues that the purpose of [an infinite] game is “to keep it from coming to an end, to keep everyone in play” (1986, 6-7). In this way, infinite games are inherently linked with possibility itself—with looking beyond the present and embracing the uncertainty of that which might lie ahead. In invoking the infinite games at the deepest layer of CLA, play becomes a pathway for new epistemological, if not ontological, positionalities for geoengineered imaginaries, which opens a space to reframe the “Eco-engineer” metaphor.

Reflecting on the nature of self-at-play within an infinite game, Carse explains, “Infinite players are not serious actors in any story, but the joyful poets of a story that continues to originate what they cannot finish” (Carse 1986, 149). The first part of Carse’s observation has ramifications for my own practice, which are explored

further in the next section. I also reflect on the journey to create a new metaphor and politics of geoengineered imaginaries, which surfaces broader considerations about my own positionality as a futures and foresight practitioner working within the context of the ongoing climate emergency.

**Conclusion**

Slaughter’s “Farewell Alternative Futures?” offers yet another shot across the bow to the futures and foresight field, which he argues may need to jettison some of its core practices given the “singular macro-future” bearing down on humanity (Slaughter 2020, 12). This future, as Slaughter and many others have noted, is collapsing possibilities and calling forth dystopia not unlike how sycophantic cultists are often depicted summoning a demon from hellish nether-regions in late night B-movies. In this future, however, the climate is not a clumsy villain who inevitably faces defeat; it is, in the recent words of the UN Secretary-General, nothing short of “unlivable” (Becker 2022). In short, game over for alternative and even preferred futures. For some, such thoughts engender “climate trauma,” which is a growing diagnosis and should be monitored closely (Chavara 2015; Woodbury 2019). For others, such imaginings are precisely why geoengineering must move from the realm of data models and research proposals to a tangible mitigation strategy. As the George incident makes clear, however, the critical risks surrounding geoengineering are not merely climate-related, especially if such approaches were used to perpetuate, and perhaps even strengthen, the inequitable systems that brought about the climate emergency, which has and continues to dramatically affect native and indigenous communities (Whyte 2012). Some futures are perpetually silenced in favor of others, and the aim in reframing metaphors and politics of geoengineered imaginaries is to proliferate possibilities in spite of this singular macro-future.

**Table 4.** Reframed Metaphors and Politics

	<b>Traditional</b>	<b>Transformative</b>
<b>Litany</b>	Disclosure of research plans and open publication of results; understanding of the risks; integrity of the process; informed consent	Experimentation <i>with (not upon)</i> ; experiential threshold
<b>Systems</b>	Existing rules and institutions; appropriate regional and/or international bodies; state and/or international actors; robust governance structures	Participatory futures; speculative evidence
<b>Worldview</b>	Affected parties; publicly available; global agreement	Regime of collective experimentation
<b>Metaphor</b>	Greenfinger vs. Eco-engineer; “rules of the game”	Joyful Poets; “keep everyone in play”

One might have the impression from the preceding section, as well as the above side-by-side CLA, that an implicit defense of geoengineering is rather slyly being put forward, as if it is some sort of inevitability and/or panacea—a pill that is difficult to swallow but that must be done so nonetheless, quite the contrary. I personally find the potentiality that geoengineering might 1) actually work; 2) be put forward as an absolute necessity; and 3) be enacted (with the best intentions, hastily, and/or any potential combination thereof) on a global scale to be nothing short of terrifying. And yet, there is an even more loathsome realization that must be confronted: *we are already geoengineering, albeit very poorly*. Of course, this generalized “we” as a placeholder for humanity does little to account for the unequal and disproportionate accountability and responsibility inputs and outputs relative to the climate emergency. In simple terms, those who are the least responsible for anthropogenic climate change are



increasingly those who are facing the worst case scenario. It would be a gross understatement to suggest that the geoengineering debate is multifaceted, complex, and exceedingly technical—for many, if not most, it remains impenetrable.

The meteoric rise of “carbon removal” technologies within the Intergovernmental Panel on Climate Change’s reporting speaks volumes as to the shifting narrative landscape surrounding the climate emergency, which itself mutated from “carbon pollution” to “global warming” to “global climate change” (McKibben 2003; Nuccitelli 2015; Dee 2022). Narratives shift, mutate, evolve, and sometimes transform, but what has not changed is the need for further and deeper engagement on geoengineered imaginaries, which conceal, as well as reveal, politics that can inspire fear, hope, and everything in between. Given the lack of genuine headway on limiting global carbon emissions as well as the range of responses to the ongoing COVID-19 crisis, it might seem difficult to image a truly alternative future and, perhaps most importantly, be foolish enough to speak of hope and preferred futures, as Slaughter notes.

Reflecting on the inherent future(s)-oriented aspects of *hope*, Stengers observes, “[it] is the difference between *probability* and *possibility*” (Stengers and Zournazi 2012, 245). As part of a 1977 interview with the *New York Times*, Mumford was cited as reflecting: “I’m a pessimist about probabilities, I’m an optimist about possibilities” (Winfrey 1977). Few statements encompass more fully my own sense of what it means to do futures and foresight work during an ongoing climate emergency. Faced with playing by “the rules of the game” and doing my utmost to “keep everyone in play,” there seems to be little choice. And yet, continuing to hold open this “possibility space” necessitates more than just a playful attitude; it requires a deep and abiding sensibility that the only game to be played is one in which joyful poets weave unfinished tales for what can and might be.

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