

## **Between Hope and Despair: Communicating Climate Change**

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*In recent years, as advocates, agencies, and governments have grappled with the problem of how to respond to the climate crisis, scholars and journalists have undertaken a debate over the most effective means to persuade the general public that a concerted response is needed—a debate, that is, over climate rhetoric. From one perspective comes the argument that citizens need to be confronted with the imminent devastation of climate change, and so jarred from their complacencies and doubts. From another comes the rejoinder that an emphasis on threats and dangers is inherently immobilizing, and that audiences should instead be empowered through an optimistic, hopeful message. This essay considers a prominent example of each approach, endorsing their dual utility before emphasizing the greater importance of individual efficacy.*

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If we were to identify and list important turning points in the national conversation on climate change over the past two decades, one of these would likely fall on July 9, 2017, with the online publication of David Wallace-Wells’ “The Uninhabitable Earth” in *New York* magazine. Widely shared on the internet and soon to be reprised as a bestselling 2019 book, this essay examined an array of worst-case scenarios, asking just how bad the climate crisis *could* get if global carbon emission continues apace. Though much climate discourse tends to focus on a range of 1.5 to 2 degrees of warming by the end of this century, Wallace-Wells observed that these figures represent the *floor* of projected change, and that *there is no ceiling*. Global warming is likely to pass two degrees over preindustrial levels well before 2100, and will not stop there simply because the calendar flips. To take the climate threat seriously is therefore to examine what may happen if the temperature continues to climb, as it surely will, if global governments fail to act. Wallace-Wells imagined three degrees of warming, then four, five, six, and upward, watching as it becomes unsafe out of doors and millions of equatorial refugees migrate toward the poles, as agricultural systems break down and food becomes scarce, as air becomes unbreathable and plagues arise and spread, as economies collapse, as wars are waged, as oceans die, and, ultimately, as the earth is left uninhabitable.

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Though Wallace-Wells' essay contained plenty of fodder for those who charge the climate movement with alarmism and hysteria, the most interesting dissent came from within the community itself. Writing at *Vox*, David Roberts (2017) cataloged critical responses from climate scientists and writers who charged Wallace-Wells with sowing the seeds of despair. Perhaps the most prominent of these came from Penn State professor Michael Mann, who took to Facebook to critique what he called the essay's "doomist framing." In the *Atlantic*, Robinson Meyer (2017) echoed Mann, writing that, "Over the past decade, most researchers have trended away from climate doomsdayism. They cite research suggesting that people respond better to hopeful messages, not fatalistic ones; and they meticulously fact-check public descriptions of global warming, as watchful for unsupported exaggeration as they are for climate-change denial." At the *New Republic*, Emily Atkin (2017) summarized the criticism with the assertion that, "doom-and-gloom is unpersuasive and discouraging." She then quoted Rutgers professor Jennifer Francis to that effect. "My own experience in speaking to public audiences is that doomsday stories such as this article are so depressing that people shut down and stop listening," she wrote. "If there is no hope, there will be no action, and goodness knows we need a lot more action to rein in greenhouse gas emissions right now."

On Twitter, climate scientist and Project Drawdown director Jonathan Foley called the essay "deeply irresponsible," charging that Wallace-Wells had been "cherry-picking doomsday scenarios." Zach Labe, of the Department of Earth System Science at the University of California-Irvine, wrote that, "we can reach a much broader audience by talking about impacts and solutions rather than hyperboles." Climate activist Alec Steffen wrote that, "Despair is never helpful," and that the piece was "essentially one long council of despair." *Intercept* climate writer Kate Aronoff concurred that the essay was not "helpful," instead exemplifying a troubling proneness to "nihilism" on the activist left. And finally, technologist Ramez Naam critiqued the essay as being "incredibly bleak," concluding that, "through a combination of exaggeration and hopelessness, it turns away those in the middle that we need to persuade." Indeed, "it makes action harder" (Roberts, 2017).

In response to these objections, Wallace-Wells suggested that his approach offers an important counterweight to what he considered the too-rosy tenor of mainstream climate discourse. Asked by an interviewer from the *Gothamist* whether there was any

hope, Wallace-Wells responded:

Oh, I would say there's quite a lot of hope. The conceit of the piece was to survey worst case scenarios in order to ultimately motivate people to action. But one of the things that I worried about as I put it together was that readers would have a fatalistic response to it and I don't really think that that's appropriate. At some point in the piece, I talk about almost all of the damage that we've done to the planet, in the sense that global warming has occurred over the course of the lifespan of the Greatest Generation. So ultimately, I think, this could be as short a story as a story of two generations. But at the very least we have another lifespan to figure it out, and to take the necessary actions to forestall at least the gruesome worst-case scenarios that I sketched out in the piece (Fishbein, 2017).

For his part, Roberts (2017) agreed, observing that Wallace-Wells' emphasis on worst case scenarios functions as a glass of cold water thrown in the face of those focused too narrowly on positive outcomes. He wrote that the popular belief that "Things [will] stay roughly as they are" is every bit as improbable as Wallace-Wells' worst-case scenario, yet it is believed by vastly more people. "Part of that is because envisioning the best-case scenario is easy," Roberts wrote, "it looks just like now! — while envisioning the worst-case scenario is very difficult. It's especially difficult because the worst-case scenario is treated by the very few people who understand it as a kind of forbidden occult knowledge to which ordinary people cannot survive exposure. Nobody can talk about it without getting scolded by the hope police." In other words, if it is in fact a problem that too many people are taking climate change too seriously, it remains an exponentially greater problem that too few people are taking climate change half as seriously as they should.

For our purposes, it is worth emphasizing that this specialized conversation is less about climate science *per se* than about climate science *rhetoric*—the appeals, arguments, and evidences that are best calibrated to persuade the public on a matter of great importance. Indeed, Roberts notes that even Michael Mann—who led the initial charge against Wallace-Wells and was subsequently quoted in just about every other response—raised factual objections only to one or two of the several dozen claims made in the essay. Aside from these, his critique—like those he inspired—was almost entirely concerned with *rhetorical effect*.

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How would this message be received by this audience? Would it inspire action, or justify indifference? Are the mass of people even equipped with the intellectual and emotional tools necessary to deal with these disturbing realities?

The resultant discussion centered on how to communicate climate change; on where to position the discourse between the opposed inflections of hope and despair. This essay introduces the debate with attention to three of its elements: the rhetorical situation (with help from Lloyd Bitzer), the problem with hope (with help from David Wallace-Wells), and the correspondent problem with despair (with help from Katharine Hayhoe), closing then with conclusions about the rhetorical orientation of the problem and the ongoing development of a fitting response to it. I suggest that the fitting response to the climate problem is likely focused doggedly on solutions while founded squarely in legitimate fear, and I call upon rhetorical scholars to commit their expertise to developing a response productive of individual *efficacy*. I recommend the En-ROADS Climate Simulator as a valuable resource in this effort. If ever rhetoric mattered to public affairs, it is now, when an all-encompassing global crisis threatens the well-being of all living things and casts the future of billions into precarity and doubt. As a discipline, we have a unique skill set to offer and a moral imperative to offer it.

### A Rhetorical Situation

The climate crisis constitutes a rhetorical situation in at least two senses. In the first of these, the situation is rhetorical in that it is concerned with rhetoric—with language, argument, evidence, and ultimately, *persuasion*. It is public, controversial, and fraught with discourse, playing host to a veritable hurricane of messages and conflicting claims, each joining with, subtly altering, and so constituting the larger body of information that weighs upon minds within an audience of billions. In this sense the issue is not unique, except perhaps for its scale. Indeed, as a discursive matter, climate change is applicable to a conceptual library dating all the way back to ancient Greece, the time and place to which we trace *rhetorike* itself. Insofar as it concerns the general public, for instance, climate change is a matter for deliberation by the *demos*, or the people, especially in societies that imagine themselves *democratic*; it invites a careful examination of contradictory arguments, or *dissoi logoi*; it demands the differentiation of *epistemic* truth from the *doxa* of mere opinion; it calls for carefully reasoned argument (*logos*) issuing from credible and trustwor-

thy figures (*ethos*) with an appropriate degree of emotional resonance (*pathos*). And importantly, now more than ever, it requires public spokesmen with an ear for *kairos*, or the opportune moment, the ability to say exactly the right thing at exactly the right time to inspire exactly the right reaction in an audience of citizens. Where the global climate is concerned, this problem is attached to unusually high stakes, which helps explain the consternation expressed by those who find a given message unsuitable to the moment.

In the second sense, the climate crisis constitutes a rhetorical situation as the term was coined by Lloyd Bitzer (1968), with his focus upon exigency, audience, and constraints. In the present example the exigence—which Bitzer defined as “an imperfection marked by urgency” (p. 6)—is globally distributed, highly variegated, and potentially severe. The audience—“persons who are capable of being influenced by discourse and of being mediators of change” (p. 8)—is also global, extremely diverse and unevenly implicated in that some people are far more vulnerable than others to climate disruption, with those most at risk heavily concentrated among those least culpable for global carbon emission. By contrast, the world’s greatest emitters tend to be concentrated among its most wealthy, who tend also to be most insulated from climate effects and so least amenable to climate action. This potent mix of exigence and audience yields an assortment of difficult constraints—“persons, events, objects, and relations” with “the power to constrain decision and action” (p. 8)—including time (of which we have little), economic disincentives (of which we have many), viral disinformation (of which there is much), and political obstruction (of which more later).

Furthermore, Bitzer observed that, while any given combination of exigence, audience, and constraints may yield millions of unique replies, there is always somewhere amid these the one single most *fitting response*, the theoretically perfect message that best addresses the exigency while best identifying with the audience and most skillfully navigating the constraints (p. 10). As the examples above demonstrate, climate scientists, journalists, and advocates have all invested themselves in the search for such a response, their attempts and revisions accumulating now into the widening base of a movement literature. In the sections that follow, I wade through some of the scholarly work on appeals to fear and to hope, acknowledging both but privileging neither before arriving finally at a preference for those messages that best produce an informed and determined *efficacy*.

### The Problem with Hope

Though *The Uninhabitable Earth* inspired and animated the most recent round of debate over the rhetorical utility of fear appeals, it seems important to note that Wallace-Wells does not frame his work around any explicit attempt to scare people. In both his initial article (2017) and his book (2019), as well as his subsequent writing (2022), he positions himself as a journalist rather than an advocate, bound by a journalistic imperative to report the facts of the matter and to help his audience understand the situation. If those facts and that situation happen to be dire, then the reporting may stir reader fears. If the situation truly is hopeless, then the journalist will say so, regardless of the feelings such a report may arouse. Because Wallace-Wells is committed to factual description rather than strategic advocacy, the critiques of his work cited above seem to land somewhat beyond or beside the point. But since he does plainly believe that his writing will prompt readers to understand and respond to the climate crisis, and given how influential his efforts have been to date, it is worth inquiring as to whether or not his message constitutes a fitting response.

Such an inquiry should be sensitive to at least two assumptions, each of which seems to inform Wallace-Wells' journalism. The first is that fear has motivating potential—or as he put it, that an accurate survey of worst-case scenarios may “motivate people to action” (Fishbein, 2017). Communication scholars have been interested in this question for a very long time. For example, Kim Witte (1992) has argued that fear appeals can change established behavior patterns, especially if the fears aroused are channeled toward efficacious means of response. She and Mike Allen (2000) later analyzed data from 100 different studies on fear appeals in health communication and concluded that such appeals were especially effective when moderated, noting that subjects experiencing intense fear were prone to resist and reject the message. A later analysis by Natascha de Hoog and her colleagues (2007) challenged this finding somewhat, suggesting a positive correlation between the severity of the threat and the urgency of the response. More recently still, Melanie B. Tannenbaum and her colleagues (2015) found—with striking emphasis—that fear appeals are generally good at changing behavior, that there are few circumstances under which they are not, and that they typically do not backfire.

Fear appeals have been found effective—and indeed, unavoidable—in reference to climate change as well. Both Laura Johnson

(2009) and Robin Globus Veldman (2012) have acknowledged the centrality of fearful, “apocalyptic” narratives to environmental and climate change activism, each drawing on and extending the earlier work of M. Jimmie Killingsworth and Jacqueline Palmer (1996), as well as that of Ted Norhaus and Michael Shellenberger (2007). Joseph P. Reser and Graham L. Bradley (2017) have added that, despite a clear trend toward climate optimism in the scholarly literature, the empirical evidence does not validate a uniformly hopeful posture. In fact, they conclude, any honest description of the climate crisis is bound to entail a certain degree of fear appeal. Alison McQueen (2021) concurs, rebuffing hope appeals in favor of an Aristotelian “civic fear” that marshals concern toward coordinated social action. Employing a “functionalist” approach to emotional appeal and behavior change, Katharine A. Williamson and Erik Thulin (2022) place fear among a cast of emotions that can be harnessed productively when understood as rhetorical means to practical ends. These studies seem to confirm that a myopic insistence on hopefulness in climate discourse jettisons an important persuasive component and may deny important context to audiences trying to understand the situation in good faith.

This matter directs us to the second, ancillary assumption informing Wallace-Wells’ work, as articulated by David Roberts (2017)—that optimism has *demotivating* potential. Or as he put it, “the ranks of the under-alarmed outnumber the over-alarmed by many multitudes.” There is scholarly support for this view as well. Matthew J. Hornsey and Kelly S. Fielding (2016) have argued that optimistic messages focusing on progress in carbon emission reductions are likely to inspire complacency in audiences by relaxing their sense of urgency. Jennifer R. Marlon and her colleagues (2019) add that appeals to “constructive hope” should be paired with appeals to “constructive doubt,” pointing audiences toward tangible means of action, grounded always upon the precarity of the situation. These and other scholars concur that fear appeals are appropriate components of a message if fear is an appropriate response to the exigency, and the climate emergency clearly warrants a degree of motivating fear.

Wallace-Wells’ deployment of fear appeals is straightforward and seemingly effortless, the content of his study lending itself willingly to the form. The chapter titles in *The Uninhabitable Earth* (2019) tell the tale: “Heat Death,” “Hunger,” “Drowning,” “Wildfire,” “Disasters No Longer Natural,” “Freshwater Drain,” “Dying Oceans,” “Unbreathable Air,” “Plagues of Warming,”

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“Economic Collapse,” and “Climate Conflict,” among others. The back cover blurbs use descriptors like “terrifying,” “provocative,” “horror,” “gripping,” “nightmare,” and “crisis.” The opening sentence of the text is as concise as it is concerning: “It is worse, much worse, than you think” (p. 3). Though Wallace-Wells does not know you or your politics or your familiarity with climate science, he is comfortable assuming that, whoever you are, you do not appreciate the severity of the crisis we face. In page after page of terse but data-heavy sentences, he drives the point quietly and brutally home. For readers of a certain bent or curiosity, it has all the makings of a revelation. In 2019 the book moved me like nothing else I had ever read on climate change, driving the issue from the close periphery of my concern to the front and center. I suspect I am not the only reader for whom the experience of the text presaged the validation of the scholarly sources cited above.

It seems worth noting that the rhetorical utility of fear may be enmeshed with that of related emotions, like anger and resentment. Recognizing the legitimate danger associated with a problem may also prompt one to identify and malign the cause, and to assign blame to those responsible for its creation and maintenance, constituting thereby a form of *epideictic* rhetoric. It is among the more dispiriting aspects of the climate crisis, for example, that the overwhelming evidence of its urgency is persistently countered by the concerted opposition of interested parties and industries—as Naomi Oreskes and Erik M. Conway (2011) have famously documented. This oppositional discourse is produced by well-funded think tanks, funneled through allied political figures and PACs, featured regularly on cable news networks, and distributed widely on social media posts and the opinion page of local newspapers. The misinformation campaign is sophisticated and broadly successful, strategically propagating an unrealistic climate contrarianism in a rhetoric of hard, “small government” realism, often via the three main avenues of what economist Albert O. Hirschman (1991) once called “the rhetoric of reaction.” Specifically, climate skepticism as practiced by industrial messaging machines and their spokesmen on the political right no longer trades solely in outright denial. Rather, it frequently employs the techniques that Hirschman categorized under the headings of *futility*, *perversity*, and *jeopardy*, each acknowledging the reality of climate change while discouraging collaborative efforts to stop it. Expressed according to the futility thesis, for example, the severity of climate change is first recognized and then cited as insurmountable, meaning that any attempt



to address it is doomed to fail. According to the perversity thesis, the severity of climate change is first recognized and then cited as insurmountable, meaning that any attempt to address it is only going to make the problem worse. And according to the jeopardy thesis, the severity of climate change is first recognized and then cited as insurmountable, meaning that the costs required to fight the problem are too great to bear, and may actually threaten other achievements that citizens also value. For those truly alarmed by the climate crisis, these bad faith arguments are likely to activate angry and vengeful emotions of the sort that may be productively channeled toward activism. With so much on the line, when time is of the essence, strong emotions seem like a terrible resource to waste. In that sense, fear appeals likely have a role to play in the fitting response.

### **The Problem with Despair**

Still, if there is a case to be made for arguments that frighten audiences in the era of climate change, there remains a legitimate concern that such arguments, made too well, may push audiences toward an ineffectual, catatonic despair. That concern animates Katharine Hayhoe's (2021) book, *Saving Us: A Climate Scientist's Case for Hope and Healing in a Divided World*. Like her TED talk, her YouTube channel, and her frequent public speeches, Hayhoe's book is decidedly upbeat and encouraging, relaying scary data via a smiling determination. Her consistent message is that individual citizens do have a role to play in the climate cause, and that anyone can join up. Her trademark slogan, that "the most important thing anyone can do to fight climate change is to talk about it" (p. xi), makes individual contribution feel feasible. A tireless campaigner interested in and committed to best practices, Hayhoe approaches her rhetorical work according to the communication scholarship.

This much is evidenced by her early endorsement of the audience-centered classification system developed by Tony Leiserowitz and Ed Maibach (2022). Known as "Global Warming's Six Americas," the model sorts attitudes on climate change into six categories, ranging from the *Alarmed* on one end to the *Dismissive* on the other (by way of the *Concerned*, the *Cautious*, the *Disengaged*, and the *Doubtful*). Hayhoe suggests that climate advocates begin by ignoring the extremes, granting that those on one end are already convinced and those at the other are unpersuadable from the start. Though Dismissives, in particular, have won outsized attention in the public debate for several decades,

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they account for only about 7 percent of all American adults, leaving the remaining 93 percent available to varying degrees of persuasion (p. 8). Thus advocates need not worry about convincing audiences that climate change *exists*. Instead, they should free themselves to make its impacts relevant to these audiences based on their mindset, shared interests, location, etc. They should analyze each audience and adapt to its persuasive needs—as all rhetors must.

Hayhoe’s method acknowledges these realities across all of her various media, and with good reason. There is scholarly support for the idea that hopeful and empowering messages, tailored to audience, have the potential to motivate listeners to action—and that fear appeals may have less. Saffron O’Neill and Sophie Nicholson-Cole (2009) have argued that, while a fear appeal may be effective at grabbing attention, it may also have unintended rhetorical effects, such as creating the impression that climate change is “a distant issue in time and space.” Instead, they recommend linking the concern to impacts in the audiences’ immediate sphere, which Hayhoe does as a matter of course. Such an approach jettisons disciplinary jargon and judgment along with the prevailing capitalist and consumer interests, replacing these with the sort of personalized identification and connection lauded by Betsey L. Verhoeven (2011) as requisite for committed action. It is consistent with the findings of Emma Frances Bloomfield and her colleagues (2020), who note the importance of “intimacy and consubstantiality” in climate messaging, and those of Dylan Degeling and Ruud Koolen (2022), who stress the utility of local framing. Its preference for emotional resonance over hard facts and figures finds support from Gabrielle Wong-Parodi and Irina Feygina (2021), who tout the persuasive utility of emotional appeals in general, and Chris Skurka and colleagues (2022), who found that audiences tend to prefer humorous appeals to the scary or purely informative. Helena Bilandzic and her colleagues (2017) found that hopeful appeals like Hayhoe’s were associated with “gain-positive” messages that encouraged productive action on climate change, though such messages may also decrease auditors’ willingness to make personal sacrifices. Finally, Robin L. Nabi and her colleagues (2018) tested the utility of hopefulness in climate change rhetoric, finding that hope wielded “significant influence” on the relevant psychological processes, and “messages that evoked the most hope were associated with more supportive attitudes and advocacy” (p. 460). Aside from her careful attention to audience—or, rather, as corollary to it—Hayhoe’s focus on personal experiences and interests

is the major strength of her approach, especially since it allows her to forego an emphasis on scientific data and evidence which, she notes, does not work (p. 51). Though there are obvious reasons why scientists and advocates would want to impress upon listeners the charts and graphs that document the climate crisis and its myriad effects, there are even more reasons—ranging from political polarization to cognitive overload—that listeners may be inclined to reject these out of hand (pp. 49-61). As frustrating as this is for experts with evidence, public-facing scholars of all stripes must necessarily concern themselves with the human psychology at work and navigate the constraints that it intrudes—at least if they really want to construct a fitting response. Hayhoe understands this and adapts well. In pressing for hopeful, empowering arguments, she never waivers from the supportive posture that finds and meets her listeners where they are.

There is also a notable moment in *Saving Us* when Hayhoe addresses the Wallace-Wells method directly for purposes of compare-and-contrast. When she interviewed Wallace-Wells at a Climate One event in 2019, he explained that his own fears about climate change drove him to research and write both his article and book. “But here’s where the critical step occurred,” Hayhoe writes, “rather than curling up in the fetal position, he was motivated to use his skills as a journalist to tell the story, so that other people would have the same reaction” (p. 67). There was no guarantee that they would, of course, and Hayhoe notes that fear appeals are only productive of efficacy if readers or auditors already have a clear understanding of what they can and should do. Those who do not have such an understanding may be inclined toward despair, like the elderly man she saw reading *The Uninhabitable Earth* on a train. Asked what he thought of the book, he replied, “Extraordinary. Even if you are liberal and know about climate change, you realize how uninformed you are.” Asked then how it made him feel, he said, “Hopeless, because we’re not going to stop it” (p. 68). For Hayhoe, the crucial inflection of climate advocacy at this stage in the discourse is not intellectual, but relational—it requires rhetors to connect with auditors as human beings and to connect their awareness to their agency. This is the “healing” element in her rhetoric, intent on bringing people back together and moving them as one toward a brighter future.

### **The Promise of Efficacy**

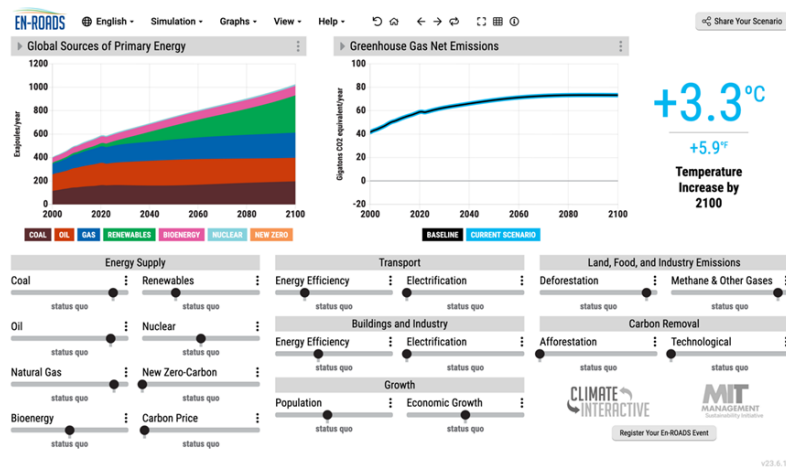
In recent years the climate discourse—or the *Twitter* climate discourse, anyway—has invested no small amount of time and ener-

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gy in a circular discussion about just which words to use and which postures to adopt to persuade the general public that climate change warrants their attention and concern. I have suggested, so far, that David Wallace-Wells has been a primary contributor to one side of this discussion, and Katharine Hayhoe is broadly representative of the other. As we have seen, each side has its merits and either can cite scholarly sources in support. Ultimately, though, I feel some affinity with David Roberts (2017), who has tired of the exchange. Instead, since about 2018, I have directed more and more of my own advocacy work toward organized groups—especially the Citizens’ Climate Lobby—and to pursuing their stated goals via their established strategies. At some point I concluded that, of all the steps that individual citizens can take to address the climate crisis, joining together in relationship and solidarity with others may be most effective at allaying fears and creating hope—in other words, at crafting the sense of individual *efficacy* touted by Lauren Feldman and P. Sol Hart (2016), who found that appeals to political efficacy increase participation, even among political conservatives. If fear without action is despair, and hope without action is delusion, then each or either is secondary to the cultivation of informed and determined activists with a grasp for policy. The fitting response thus demands a means to prepare and motivate citizens to act.

One such means is readily available in the En-ROADS Climate Simulator, developed by researchers at Climate Interactive and the Sloan Sustainability Initiative at MIT. A clunky acronym for “Energy Rapid Overview and Decision Support,” En-ROADS is committed neither to a hopeful nor a fearful posture. Instead, it is simply a powerful modeling tool that allows users to consider an array of policy levers and their projected impacts on important variables—greenhouse gas emissions, global temperature increase, energy costs, market supply and demand, sea level rise, and others—across a 100-year window between 2000 and 2100. The simulator offers these eighteen levers and a host of charts and graphs to place users in the policymaking chair and to task them with creating scenarios for limiting global warming to 1.5 or 2 degrees Celsius, consistent with Paris Agreement targets. Simply by sliding the levers, users can analyze the projected effectiveness of policies like carbon pricing, subsidies for renewables and nuclear, electrification and efficiency of transport and buildings, deforestation and afforestation, methane leak reduction, and technological carbon removal, among others. As the policies are adjusted, the graphs and projections move in real time, allowing for examination, analysis, and understanding,

based on trial, error, and correction. The assumptions guiding these projections are accessible via a pull-down menu, and are manipulable as well—subject to change by knowledgeable users who may find any particular assumption too conservative or too aggressive. The simulator is available on the internet for free, to be used by individuals and groups, or demonstrated in workshops led by certified “En-ROADS Ambassadors.” (I completed my own certification in January, 2023.) To date, Climate Interactive has recorded nearly 10,000 such events across 158 countries with just over 300,000 participants (*Our Impact*, 2023). These presentations, delivered by competent speakers to attentive and interactive audiences, are intended to motivate and equip citizens for climate action.

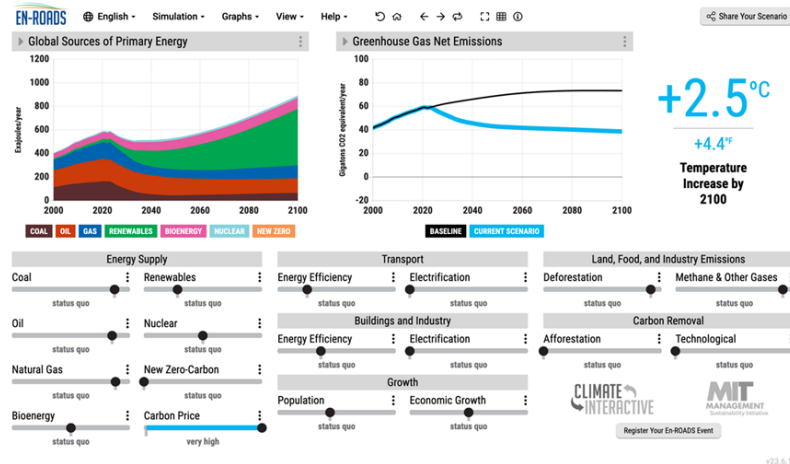


This interactive approach, whereby a moderator invites input and experimentation from an audience, has been found effective with lay audiences, institutions, and climate scientists themselves. As they developed and refined the simulator, many of the scholars associated with MIT and Climate Interactive began conducting and publishing studies on its effectiveness. For example, Juliette N. Rooney-Varga and her colleagues (2019) have used pre- and post-demonstration surveys to show that En-ROADS climate simulations can increase participant knowledge about and emotional engagement with climate change. Rooney-Varga (2021) is also lead author on a study that found climate simulations useful for consensus building. Florian Kapmeier and his colleagues (2021) have documented how En-ROADS helps corporations, including HSBC Bank, to develop long-term sustainability strategies. Felix Creutzig and Kapmeier (2020) have also used En-ROADS to demonstrate that interactivity facilitates active learn-

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ing more likely to translate to climate action. These studies confirm earlier findings from John Sterman and his colleagues (2015) about the pedagogical and persuasive utility of climate simulations.

The value of hands-on interactivity during En-ROADS demonstrations—as opposed to the unilateral delivery of a speech or lecture—is easy to identify. Consider carbon pricing, for example. As users quickly learn, the simulator projects that placing a steep price on carbon emission is the single most effective policy option on the board because it depresses fossil fuel demand most abruptly, ensuring that existing coal, oil, and gas reserves remain quickly and securely sequestered. But given the extent of the problem, even the most effective policy measure can be only so effective overall. At present the simulator projects that the average global surface temperature will have increased by 3.3C by 2100, and the speedy implementation of a \$250 per ton price on carbon would only lower that projection to 2.5C. That nearly one degree of difference would make a huge contribution, to be sure, but it is clearly only one piece in a larger mitigation puzzle. When the carbon pricing lever is pulled all the way to \$250, the distribution of energy demand on the “Global Sources of Primary Energy” graph shifts abruptly, as the bottom three layers are squashed and renewable sources expand to pick up the slack. The “Greenhouse Gas Emissions” line dips sharply as well, and the temperature projection declines simultaneously:



Though the sharp decrease in temperature illustrates the obvious benefit of carbon pricing, the simulator is interested in tradeoffs as well. En-ROADS was designed by “systems thinking” special-

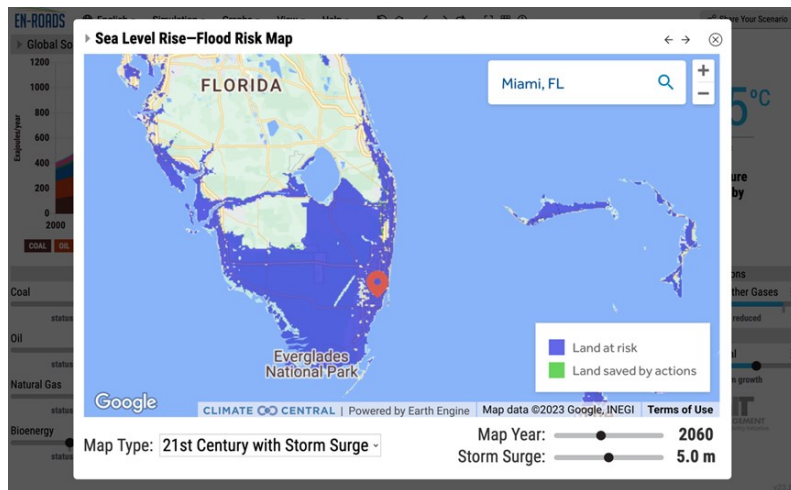
ists, with attention to how policy changes impact a variety of sectors and stakeholders. If the demonstrator or the user clicks over to the graph set marked “Financial,” for example, they may observe that the sharp increase in carbon price has corresponded to a spike in “Cost of Energy,” as well as a pronounced uptick under “Revenue.” If they continue to manipulate the scenario by subsidizing renewables, electrifying transport and buildings, and raising efficiency standards, they will observe a long-term decline in energy costs, harkening toward a future in which energy is both much cleaner and much cheaper than it is now. But getting there would require several decades of very expensive heat and light, which would create a significant equity concern and a political obstacle—to say nothing of opposition from corporate lawyers and lobbies. Maybe the user then decides to implement a fee-and-dividend program to help citizens cover their rising utility rates. But then the government revenues would be lost, replaced instead with ever larger deficits and debt. These are the sorts of questions with which policymakers must grapple, and here in the simulator citizens have a chance to think through these matters as well.



En-ROADS also provides opportunities to think about how renewable energy sources may compete with one another for market share, how electrification without renewable subsidies may increase demand for coal, how afforestation is constrained by the limited availability of arable and undeveloped land, how technological approaches like nuclear, fusion, and direct air capture are subject to costly implementation delays, how economic and population growth are (and are not) related to increases in carbon emissions, how the growth of carbon emissions over time is distinct from the rate of carbon emission annually, and other im-

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portant systems questions. After working through these difficult process concerns, users can then click over to the “Impacts” tab to consider the products of their labor, by way of visuals that assess the results of their adjustments relative to the status quo. These include temperature change and greenhouse gas concentration, obviously, but also ocean acidification, air pollution, probability of an ice-free Arctic summer, decrease in crop yield, decrease in GDP, additional deaths from extreme heat events, species loss, and, notably, flood risk associated with sea level rise. This last feature allows users to survey a global map to assess risks across the 21<sup>st</sup> century, in calm seas or with varying heights of storm surge. For those living in coastal areas, especially, the exercise is illuminating:



In these ways and others, En-ROADS empowers users to confront and grapple with the climate crisis, at their own pace or through their own questions and conjectures, meeting them where they are and granting them a significant measure of control. It allows users to peruse the best available policy options, to evaluate benefits and tradeoffs, to see firsthand just how much leverage each policy lever is likely to wield, and to appreciate how vital all—or at least *most*—of these will be in crafting an overall approach to mitigation. Conversely, the simulator disabuses them of the notion that any one approach can function as a panacea. In giving users a more sophisticated understanding of the problem and the interplay among available responses, En-ROADS leaves them with both a stronger grasp of the challenge and an enhanced sense of personal efficacy—qualities far more valuable than either hope or fear. Directed, then, to an organization like the Citi-



zens' Climate Lobby, users may find organized avenues for effective activism—especially lobbying their Member of Congress for carbon pricing legislation.

### **Conclusion**

In the foregoing sections I have tried to summarize an important recent debate in the climate advocacy community regarding the strategic deployment of appeals to hope and to fear. This sort of concern has occupied many climate scientists, journalists, and advocates over the previous decade, as these have searched frantically for the right words or the winning argument to mobilize the public in response to the climate emergency. Given the apparent utility of both fear and hope—as well as that recommending a variety of other emotions—and given the mixed messages relayed in the scholarly literature on such appeals, I have declined to take a side in that fight. Instead, I have observed the apparent agreement across these studies that fear and/or hope are only rhetorically useful if they produce a sense of personal *efficacy*, and I have recommended the En-ROADs simulator as a resource for that production. I will close by encouraging rhetorical scholars to take the important responsibility of persuading their friends and neighbors to act.

Though my own experience is likely unrepresentative in many respects, I do believe that the evolution of my attitude toward climate change suggests a productive path for others to pursue. After years of indistinct but persistent anxiety about the problem, I began to seek out sources that might give me a sense of hopefulness, perhaps as a curative for my own creeping despair. But as I began to learn more about climate change, and especially after I learned to use En-ROADs, the question of whether or not to hope for a future ceased to compel me in the way that it had before. Instead, I came to understand climate change as a physical problem with political, religious, economic, social, and ethical dimensions—a more variegated view that pulled my interest away from my own emotions and directed it outward toward the textured aspects of the problem. It has remained there since, evaluating the crisis and our developing response in terms of their adequacy, and replacing the dichotomy of hope and despair with a more intricate measure of degree. (Thereby avoiding the conflict that Shannon Osaka (2023) and others have recast as an opposition between “doomers” and “deniers.”) Climate change, after all, is a matter of degrees. Every reduction counts, every fraction matters, and regardless of what happens to human beings in

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the end, the moral imperatives now are about as clear as they can be. Those of us with training in rhetoric carry an obligation to help spread that message by whatever means we find most effective. I have suggested that the En-ROADS simulator may be useful to that effort. It was inspired in part by a sentiment from Buckminster Fuller, who said that, “If you want to teach people a new way of thinking, don’t bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking” (Reed, 2019). My experience has persuaded me that he was right, and several years of processing all of this have led me to endorse such a technical, tactile—and I think, *fitting*—response.

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