

SDGs and fictional energy utopias: Gauging sustainable energy transitions against *Ecotopia* (1975) and *The Ministry for the Future* (2020)

Daniel Wuebben¹ , Roman Meinhold²
and Giovanni Frigo³

Abstract

Strategic narratives about the transition to sustainable energy systems, including those influenced by the United Nations' sustainable development goals (SDGs), frequently incorporate utopian elements. These ambitious targets encapsulate future-oriented visions and postulate implications of technological advancements; they also often underrepresent or even bypass the multifaceted nature of socioeconomic diversities, planetary constraints, and persistent energy disputes. The genre of utopian science fiction can offer a valuable heuristic to elucidate the heterogeneous and occasionally unsatisfactory projections that emerge from the SDGs. Two seminal novels—Ernest Callenbach's *Ecotopia* (1975) and Kim Stanley Robinson's *The Ministry for the Future* (2020)—which we classify as “fictional energy utopias” (FEUs), present incisive critiques of contemporary energy mechanisms and practices and envisage equitable, resilient, and robust renewable energy systems and socio-technical structures. Through an approach that combines narrative and discourse analyses, these literary works are juxtaposed with selected indicators of three SDGs. The ensuing study underscores the primacy of the topic of energy in policy and its concomitant narratives in fostering collective endeavors toward sustainable development. It also amplifies the pivotal interconnections between SDG 7 “Affordable and Clean Energy,” SDG 13 “Climate Action,” and SDG 16 “Peace, Justice, and Strong Institutions.” Employing FEUs to evaluate sustainability policies can substantially benefit researchers, policy architects, and public

¹Institute for Research in Technology (IIT) and Faculty of Humanities and Social Sciences, Comillas Pontifical University, Madrid, Spain

²MUIC, Mahidol University, Salaya, Nakhon Pathom, Thailand

³Karlsruhe Institute of Technology, Karlsruhe, Germany

Corresponding author:

Daniel Wuebben, Institute for Research in Technology (IIT), Comillas Pontifical University, Santa Cruz de Marcenado 26, Madrid, Spain.

Email: dlewis@comillas.edu

engagement coordinators by highlighting lacunae and limitations within prevailing strategic narratives and proposing potential enhancements to fortify their capacity to motivate collective action.

Keywords

Sustainable development goals, energy humanities, science fiction, strategic narratives, energy and climate policy, narrative analysis, discourse analysis

Key takeaways

1. SDGs are strategic narratives that tend to employ utopian elements
2. Fictional energy utopias provide heuristics for gauging policy implications of SDGs
3. Fictional energy utopias provide powerful strategic narratives that acknowledge climate challenges, show the success of sustainability policies, and envisage desirable energy futures
4. Critical reflections on utopian science fiction can help expand and strengthen future SDG narratives as well as climate and energy policies

Introduction: the strategic narratives of sustainable development

Since its adoption in 2015, the UN 2030 Agenda for Sustainable Development has influenced national and international policies and strategic narratives related to the triple bottom line of people, planet, and prosperity. Such strategic narratives situate speakers and audiences to remind them of where they have been, to understand the forces coalescing in the present, and to envision desirable futures. Sustainable development goal (SDG)-inspired strategic narratives are guided by a normative ethical claim: sustainability in the present begets prosperity in the near and long-term future. The actors in these policy-driven strategic narratives may include any number of diverse stakeholders (e.g., 193 member states, supranational organizations, NGOs, businesses, individuals and groups, nonhuman beings, and even the planet itself) and can follow various plot trajectories and crossovers among the 17 SDGs, their 169 targets, and 231 indicators. Currently, the SDGs provide a centering node for diverse discourses spanning academia, government, media, and industry.¹⁻⁵

Yet current SDG-inspired strategic narratives also mask a troubling gap between the sweeping importance of the goals and the ambition of actions being undertaken to achieve them. Scholars have identified a similar “action gap” between other strategic narratives and energy policy.^{6,7} The fact that many SDGs only seem achievable in theory and not in practice implies they have a utopian character. Indeed, the act of tracing the strategic narratives surrounding the SDGs from their past—the 2015 Sustainable Development Agenda—to a future of 2030, 2050, and beyond is an exercise in utopian thinking. It invites one to imagine an “u-topia,” a “no-place” that seems devoid of characters, conflicts, or resolutions.

Utopian thinking is necessary, even expected when forecasting desirable futures. To achieve a future of sustainable societies and ecosystems, we must be able to imagine them. As Frederic Jameson explains, “Utopia as a form is not the representation of radical alternatives; it is rather simply the imperative to imagine them.”⁸ However, not any imagined plan or vision of a sustainable future will suffice. As we craft sustainable energy narratives, critics will be certain to view our goals and scenarios and cry “utopia!” in the pejorative sense. Such a response seems exemplified by Paul Driessen’s 2011 essay published in *Energy and Environment* titled “The ‘Sustainable Future’ Isn’t Sustainable.” Driessen set scare quotes around a “sustainable future” and claims that a “renewable utopia” based on “bogus claims about melting glaciers and rising sea levels,” and “imaginary or

exaggerated [climate] crises” would provide unfair political and economic advantages to the wind and solar industry at the expense of the U.S. taxpayer and the environment.⁹ While we reject Driessen’s premises and conclusions—that coal, oil, and gas are economically and environmentally superior to renewables—we also recognize that convincing the public to take sustainable development seriously requires more than policy directives or rock-solid scientific evidence. To increase collective support for sustainability goals, we need powerful strategic narratives that can acknowledge ongoing global crises, shape desirable futures, and inspire people to act.

Moreover, many sustainability narratives tacitly assume the myth of techno-optimism, which is the idea that technological innovation alone shall or can determine the pathway to progressive (and, for our purposes) sustainable development.¹⁰ Indeed, fair critiques have been leveraged against the techno-utopian slant of environmental reports,¹¹ and the discourse surrounding smart grids and renewable energy technologies.^{12,13} In advertisements and marketing materials, techno-utopias often follow the rhetorical pattern Sovacool calls the “environmental nirvana,” in which new energy technologies appease environmentalists while generating energy that is “waste-free” and “zero carbon.”¹⁴ Among the many current technologies and systems seen as central to decarbonization, carbon capture utilization and storage (CCUS) seems especially susceptible to techno-optimistic visions.^{15,16} The efficiency and cost of CCUS technology are improving.^{17,18} Yet critics remain unconvinced. Recently more than 400 scientists and activists signed a letter to the Canadian government arguing that deploying CCUS at any climate-relevant scale is still “a pipe dream” and that depending on such technologies merely prolongs our collective dependence on fossil fuels.¹⁹ This is one example of how utopian narratives, particularly those related to marketing a specific technology or industry, generally lean towards techno-optimism; however, broader narratives grounded in current technological readiness levels and anticipated innovations remain necessary to gaining widespread support for climate change mitigation.

Acknowledging the need for more feasible sustainability narratives and the risks of techno-utopianism, this article aims to shorten the aforementioned action gap by analyzing three SDGs alongside more creative energy narratives. To do this, we situate what we call “fictional energy utopias” (FEUs) as part of the broader genre of utopian science fiction and assess how the energy systems and social movements pertaining to socio-technical energy systems are represented in two fictional utopias—Ernest Callenbach’s *Ecotopia* (1975) and Kim Stanley Robinson’s *The Ministry for the Future* (2021). While these novels can also be classified into other genres (near-hard sci-fi, political utopias, climate fiction, etc.), here they are analyzed as FEUs because they include descriptions of sustainable energy systems within narratives of improved societal well-being. Unlike traditional utopias such as Francis Bacon’s *New Atlantis* (1627) or Edward Bellamy’s *Looking Backward* (1888), these other two FEUs also feature starkly dystopian elements, and their reluctant heroes struggle to accept their role in the (utopian) social structure. Both novels open and sharpen the reader’s imagination to possible clean and sustainable energy futures and portray sometimes radical, disruptive, violent, or authoritarian means of achieving these ends. Therefore, these FEUs are reminders that narratives shape perceptions of what energy policy is relevant and how energy policy could or should be deployed in the context of sustainable development. Moreover, they help us imagine the complex needs and desires of the present and their future consequences.

For policymakers and others working to implement the SDGs, narrative analysis and discourse analysis of FEUs can help identify gaps and shortcomings in existing strategic narratives and inspire the creation of more effective strategic narratives within climate and energy policy. Our results show that SDG 7 is critical for business, society, and the environment, and yet it has a contentious relationship with SDG 13 “Climate Action.” For example, SDG 13 calls for “urgent climate action to combat climate change,” and, in these novels, overwhelming anxiety and urgency inspire

ethically ambiguous environmental activism and more radical direct actions, which include attacks on both energy infrastructures and individuals deemed highly responsible for environmental degradation and climate emergencies. It is in this sense that some aspects in these novels, if realized in practice, would threaten SDG16 “Peace, justice and strong institutions.” The inability to achieve the energy objectives of SDG7 could, from a biocentric utilitarian perspective, ethically justify radical environmental actions to achieve SDG 13 but such actions would, in turn, undermine and threaten other SDGs. The comparison suggests that, while the SDGs provide ambitious objectives for the future, adjustments, additions, corrections, and, above all, improved strategic narratives are necessary to make the SDGs more tangible and effective. Constructing more compelling sustainable narratives about the future requires a range of strategic and appealing narratives, including relevant policy lessons learned from FEUs.

Background

Utopian energy policies as strategic narratives

The following background sections expand on the relationship between strategic narratives and sustainability goals, situate our analysis within the broader scholarly studies of energy narratives, and further explain the need to study energy utopias in a moment when climate dystopias are increasingly visible in popular culture.

Many of the recent strategic narratives regarding the past, present, and future of the SDGs have veered toward the extremes of hope or despair. From a hopeful perspective, the SDGs represent one of humanity’s most ambitious and collective efforts to improve the lives of people, other species, and the planet at large by stopping or at least mitigating the impacts of climate change and other pressing environmental issues. Conversations about sustainable development seem to be spinning through capital buildings, board rooms, classrooms, and beyond like that mesmerizing 17-color pinwheel that signifies the SDGs. For example, in the European Union, all research funded under the Horizon Europe framework program must indicate how their outcomes contribute to specific SDGs.²⁰ More businesses are also linking corporate social responsibility (CSR) and environmental social governance (ESG) strategies directly to the SDGs.^{21,22} From this perspective, the fact that government, industry, and academia have given the SDGs such a prominent position in their present agendas reinforces our hope that they can be achieved in the future.

In contrast, more crises-driven strategic narratives seem to invoke a sense of despair. Recent evaluations of SDGs progress show that, collectively, the richest countries are not on track to achieve most of the targets and that vulnerable countries are not likely to achieve any goals.²³ Colorful branding and widespread pledges of support cannot by themselves spark the coordinated action to address, for example, the record amount of CO₂ emitted globally in 2021.²⁴ The UN SDG Report 2022 admits the COVID-19 pandemic unleashed a “reversal of years of progress” on poverty and education and now, due to an increasingly unstable climate, our species’ survival is in “grave danger.”²⁵ Some critics convincingly argue that under current economic models, “sustainable” development cannot be achieved as long as we continue to finance material growth by “liquidating the biophysical systems upon which humanity ultimately depends.”²⁶ The scientific evidence increasingly shows humans’ preposterous pressures on Earth’s ecosystems and the precarity of current and near-future survival of many species around the world. Indeed, a recent publication in *Nature* shows humans have violated 7 of the 8 boundaries for a safe and stable earth system.²⁷ Superseding biophysical limits will unleash catastrophic tipping points and a so-called point of no return for many species and a significant percentage of the human population.

Balancing the evidence and corresponding projections of hope or despair can seem like threading a needle *and* aiming at a moving target. However, one of the reasons that existing strategic narratives about sustainability and the energy transition often seem so ineffective is that they struggle to correspond to common fears, needs, and desires. In other words, claims about “grave danger,” without an identifiable threat makes one’s sense of that danger dissipate. Similarly, when the positivist narrative projects the outcome of accomplishing the goals and indicators, the result often seems wishful and overly ambitious. Therefore, when concrete aspects of the narrative (e.g., a 15-year time frame for enacting massive change) lack specific characters and direct actors, actions, and immediately visible consequences, then overall narrative seems more far-fetched and unrealistic. For example, one could imagine that the UN’s most recent call for a “Decade of Action” is successful and the goals are achieved before 2030. A corresponding narrative could read as follows:

It is 2030. Indicators show all SDG goals and targets have been reached. Extreme poverty is eradicated, and everyone has access to clean water and clean energy. Education and job opportunities have improved, making communities stronger and economies thrive. Climate change has been addressed and wealthier nations have helped more vulnerable ones adapt to ongoing extreme weather events. All member states and multinational corporations have drastically reduced emissions to help avoid passing further climate change tipping points. There are more green jobs and more green spaces, and biodiversity has increased across the planet. International collaborations have created a more just, safe, and equitable world in which young generations look forward to living rich sustainable lives in healthy environments.

This fictional narrative implies inclusive and collective social transformations and can therefore be considered utopian.²⁸ At the same time, it is nondescriptive, static, and flaccid. There are neither characters nor conflicts. It is a vision that does not address any of the potentially violent struggles, ambiguities, inconsistencies, contingencies, and losses incurred in striving for the goals. For example, centuries of colonialism are expunged, the competition between high-income and middle- to low-income countries has been resolved, and corporate decisions to locate polluting industries in middle- to low-income countries abruptly end.

Overall, utopian narratives of SDG success remind us that fear and resentment are often imagined through specifics, while hope is conveyed through bland generalities.

Humanities and social science energy scholars have deconstructed and scrutinized energy and climate policy documents to show how they create socio-technical imaginaries²⁹ and envisage energy futures.^{30,31} Storytelling is ubiquitous in energy transitions. Furthermore, comparisons of narratives underpinning scientific scenarios and contemporary novels fiction have been juxtaposed with five contemporary climate change novels to reveal how fiction “brings the worlds imagined by the SSPs [the five socioeconomic pathways] to life through its particular accounts of agency and focalized perspectives”³² (p. 317). We concur that fiction can help enliven scenarios and the policies they shape, yet the full animations and implications of utopian fiction have not been properly addressed.

Why analyze Utopias when dystopias seem more plausible and realistic?

FEUs provide an important counterbalance to the prevailing dystopian and post-apocalyptic trends of climate fiction.^{33 36} Of course, climate dystopias are important as many either explicitly or implicitly critique the dominant status quo, which tends to generate hopeful and primarily uncritical utopian fantasies of cheap, clean, and abundant energy.

Again, the dystopian trend in climate fiction helps to undercut the hype. Novels such as *Parable of the Sower* (1993), *The Road* (2006), *The Water Knife* (2015), and *The New Wilderness* (2020) each include protagonists struggling to survive in environments ravaged by climate change. A new essay collection, *American Energy Cinema* (2023)³⁷ analyzes films like *Tulsa* (1949), *The Formula* (1980), and *There Will be Blood* (2007) that deal primarily with the damaging social impact of fossil fuels and others such as *Where Were You When the Lights Went Out?* (1968) and *The China Syndrome* (1979) that deal with sudden, catastrophic energy breakdowns. The first feature-length climate change film, *Don't Look Up* (2021), presented a satirical take on climate denial and delay and concludes with the sudden and violent eradication of all life on earth. This dystopian strain of climate fiction and film feeds into a broader cultural desire to be entertained by disaster and to feel the cathartic release of knowing our present situation is not that bad...yet.

Dystopias can tap into our collective fears and may even bring readers to change their behavior when linked to action-oriented strategic narratives.³⁸ An empirical study by Schneider-Mayerson et al.³⁹ suggests climate fiction can have an immediate impact on readers' beliefs and attitudes about climate change, but the observed impact of the reading experience diminished after about a month. If climate fiction only or predominately paints dystopian futures, it could limit our ability to imagine possible futures in which society avoids ecological and humanitarian collapse. As Amitav Ghosh explains, fiction provides the necessary means conceptualizing a future shaped by climate change because it helps *avoid* thinking, "about the world only as it is" which, in its current state, "amounts to a formula for collective suicide"⁴⁰ (p. 128). Alternatively, FEUs can provide reasonable counter-narratives to the regular onslaught of unfolding and impending climate doom. Furthermore, these thought experiments can help readers contemplate that similar energy structural changes might be enacted in real-world scenarios.

Methods

Selection procedure and methods of narrative and discourse analysis

To further highlight the coactions and discrepancies between FEUs and SDGs, we searched for fictional texts whose narratives concern energy, sustainability, and climate change and which discuss policy responses to those concerns. The initial search was guided by three criteria: (1) science fiction that features environmentally sustainable and realistic energy technologies; (2) literary fiction that narrates the successful implementation of energy and sustainability policy and thereby gains real-life policy relevance (i.e., they provide blueprints for near-term policy implementation); and (3) fictional energy utopias that have been analyzed in existing literary scholarly research. Our search for texts that satisfied all three criteria was limited to English publications only. As the intention was to locate fiction engaging energy *and* environmental sustainability, we did not include "petrofiction."⁴¹ Neither did we address novels related to the extraction, shipment, or burning of fossil fuels,^{42 45} or the conversion of nuclear fissile materials as featured in Isaac Asimov's *Foundation* trilogy.⁴⁶ Nor did we consider energy-related science fiction films and television shows that may include utopian elements.^{47,48}

Eventually, we identified the two seminal novels that met all three criteria: Ernest Callenbach's *Ecotopia* (1975) and Kim Stanley Robinson's *The Ministry for the Future* (2020). We then subjected these novels to narrative analysis and discourse analysis.⁴⁹ Narrative analysis addresses how a text creates meaning through specific scenarios and events. Narrative analysis presupposes immediacy, structure, and sequence and narrative analysts examine what language does and its

effects. Narrative analysis methods have been applied before to energy, environment, and climate communications.^{50,51} When applied to fiction, narrative analyses may highlight how the plot or characters shape the story, creating conflicts or tensions that influence and may be resolved by subsequent actions.

Discourse analysis, by contrast, examines the ideological framework which gives broader meaning to the text. Specific terms and corresponding ideas, such as poverty, inequality, or environmental degradation can be subjected to discourse analysis to understand how specific speakers, communities, genres, or historical forces impact these terms' meaning and use. Discourse analysis is broader than narrative analysis and is the most common method used for understanding the meanings and uses of the SDGs.^{52,53} For example, the discourse analysis and qualitative assessments conducted by Castor et al.⁵⁴ reveal some of the trade-offs and synergies between SDG 7 and other SDGs within the context of two specific ongoing energy projects: the Grand Ethiopian Renaissance Dam (GERD) and the Hinkley Point C (HPC) Nuclear Power Station. While the novel *Ecotopia* predates the UN SDGs by four decades, SDG-relevant policy implications can be identified via narrative and discourse analysis.

For our purposes, both narrative analysis and discourse analysis reveal how FEUs create a series of actions or consequences related to energy and how they indirectly critique real-world policy issues, which for our purposes, are those specifically related to SDG 7, SDG 13, and SDG 16. Juxtaposing how fictional plots show the impact of “climate action” and how this term is further framed by the SDGs offer another indication of how sustainable transition narratives are, or could be, constructed.

Limitations to our findings include the relatively small sample size of two novels and the scope of the discourse analysis. For example, the historical context of the energy crises of the 1970s likely shaped contemporaneous responses to Callenbach's novel just as the UN Climate Conference of Parties and the rise of blockchain technologies frame readings of *MFF*. Secondly, an extension of this analysis could connect fictional energy utopias to other sustainable policy measures, such as SDG 15: Life on Land and its claim that “We are all part of the planet's ecosystem and we have caused severe damage to it through deforestation, loss of natural habitats, and land degradation.”⁵⁵ However, our focus is to understand how FEUs reveal constraints in our current energy systems and practices and their alignment with SDGs, in particular environmental sustainability.

Summaries of the novels and themes of sustainability

The two selected novels share the utopian elements of imagining a more sustainable, equitable, and fair society. They are also types of “near” and “hard” science fiction in that they present scenarios of the near future—within one or two generations—and the technologies they represent are each already implemented (but not yet large scale or mainstream), close to implementation or scientifically possible in the near future. Carbon-free or renewable energy sources are a crucial part of broader efforts to live in harmony with the natural environment, reduce inequality, and promote social justice.

Callenbach's *Ecotopia* is set in the year 1999. There has been a violent secession of states in the Pacific Northwest region of the United States leading to the creation of Ecotopia, an independent nation-state that cuts off ties with most nations. The novel is written in the form of a travelogue, with the narrator, journalist William Weston, sent undercover on behalf of the United States government to describe his experiences and observations and potentially undermine the Ecotopian government. During his tour of Ecotopia, Weston observes the inhabitants' commitment to environmentalism and sustainability and their rejection of industrial civilization. Ecotopia has

given up “worldwide communications network and jet travel” to focus on “small, culturally homogenous groupings” (p. 151). They build power systems around solar, wind, and tidal energy sources which can be “tapped indefinitely without affecting even the local biosphere” (p. 103). Therefore, massive solar farms the “size of a major airport” generate enough power “for a chain of mini-cities” (p. 104). Weston claims that, in Ecotopia, gas, and electricity prices are “inordinately expensive” as they are about three times as expensive as they are in the United States. However, one Ecotopian explains to Weston that their “stable state system” (which today would likely be called a “social-ecological circular economy”) is cheaper when “all the costs” are compiled and the “internalization of external effects” is considered (p. 18). For the Ecotopians, the external costs of the American capitalist system “are ignored or passed on through subterfuge to posterity or the general public” (p. 18). The novel raises important questions about A) free markets’ (in)ability to incorporate externalities, leaving consequences for the public and future generations to address, and B) the costs and the benefits of different energy systems, including the trade-offs that societies must make in their pursuit of a more sustainable future.

The Ministry for the Future (MFF) begins in the not-too-distant future when a sustained and extreme heat wave across southeast Asia causes wet-bulb temperatures in Uttar Pradesh, India to rise well over the lethal limit of 35°C. In less than a week, 20 million people die of heat exhaustion and hyperthermia. One of the lone survivors, American volunteer Frank May, is traumatized and eventually radicalized. When May recovers from his injuries, he “wanted to kill one of the people killing the world” (p. 93). May kidnaps the other main protagonist, Mary Murphy, to demand she and other politicians do more to combat climate change. Murphy leads the “Ministry for the Future,” a UN agency working to implement international climate goals in the wake of the catastrophic heat wave. Murphy’s greatest achievement is convincing the world’s major economies, oil producers, and consumers—China, the United States, the European Union, Brazil, and the OPEC countries—to adopt a digital “carbon coin” currency that helps underwrite adaptation and mitigation efforts, replace stranded fossil assets, and finance the deployment of clean energy systems. Meanwhile, the rest of the Ministry supports massive experimental geoengineering efforts such as pumping water from beneath sliding icebergs to help freeze ice caps and slow basal sliding, and the development of rewilding corridors. As these and other initiatives are implemented, societies transition to innovative global shipping and transportation—“blimps now flew carbon negative, as the solar panels on their top sides collected more electricity than needed for the flight” (p. 369). Furthermore, the massive buildout of renewable technologies means global production of clean energy meets demand, and that surplus clean energy can be used for desalination and air carbon capture. Together, these interventions create a world, not of plenty, but of “enough” which features in several of the proselytizing passages, such as the aversion that “all the necessities for a good life are abundant enough that everyone alive could have them. Food, water, shelter, clothing, health, care, education” (p. 58). A vision in which “everyone” enjoys “enough” comfort while maintaining environmental sustainability offers an equally utopian vision as the SDGs, but Robinson’s narrative includes caveats to achieving such a utopia.

Discussion of results

SDG 7 and fictional energy utopias

SDG 7 envisions affordable, reliable, and sustainable energy for all. In *Ecotopia*, energy is more expensive because *all* external effects (i.e., externalities) are accounted for in terms of resource extraction and emissions (p. 18); however, energy remains still affordable and widely accessible.

The electric grid is decentralized as they find “something unnatural in processes that concentrate gigantic quantities of energy at any one point” (p. 102). Nevertheless, Weston is surprised to learn that Ecotopians use far more energy than he imagined because “its sources and its uses tend to be diffused, concealed, and novel” (p. 102). Innovative energy systems include a geothermal power plant at Punta Gordo, massive solar farms, homemade waterwheel devices that generate 24-volt power (p. 105), and rooftop wind turbines that produce “childish delight” in their owners (p. 103). All fossil fuel power plants have been permanently shut down; for the time being some nuclear-fission plants have been retained. They also have very limited international trading which allows them to secure “enough metal to replace what is used in the exported electric motors and other metal parts” (p. 25). In *Ecotopia*, the government plays a crucial role in collecting funds to cover the full costs of the damage to the landscape and climate of energy production.

In *MFF*, the presentation of affordable and clean energy is multifaceted and frequently addresses the political and economic challenges of phasing out fossil fuels and transitioning to sustainable energy sources. Frank May joins the 2000-Watt Society, suggesting citizens that voluntarily and consciously want to limit their energy footprint to 2 kWh. Meanwhile, the Ministry supports global interventions like the open-source social network “YourLock” and the new international “Carbon Coin” currency. At the same time, India becomes a leader in several energy transition domains, a “fully recycling solar powerhouse, a green power” (p. 142), which includes nationalized “clean electrification of the country” with the help of “massive solar power arrays,” hydrogen technology, and a “refurbished national grid” (p. 126). For increased carbon sink India regrew forests, which also provided timber for construction and bio-char burners (p. 142). Farmers utilized natural herbicides and grew plants for biofuels and bioplastics (p. 142). In addition, the Ministry leads the way in energy generation innovation, collecting funds to cover its full economic costs and promoting international collaborations.

Our results show that, in both FEU narratives, energy systems are more decentralized, democratic, and synergistic than the current real-world large-scale, centralized systems operating in most developed economies. In *Ecotopia* the decentralized energy systems includes local hand-crafted low-tech solutions supplemented by innovative high-tech energy systems. In *MFF* developing countries, such as India, with high solar exposure, play a vital role as forerunner of sustainable renewable energy systems. The external effects of energy conversion are minimized in both novels’ narratives, but *MFF* explicitly “warns” readers that traumatized survivors of environmental emergencies and climate catastrophes could go to such extent and kill those “killing the world” (p. 93) which, as discussed in the next section, is a form of radical environmentalism that gestures towards “urgent” climate action (Table 1).

SDG 13: urgent climate action

The goal of SDG 13 is to take urgent action to combat climate change and its impacts. Although narrative and discourse analysis reveals implicit connections between *Ecotopia*’s energy systems and the SDG 13 target to “strengthen resilience and adaptive capacity,”⁵³ the specific impacts of rising global temperatures are not part of the SDGs predating novel’s plot. However, the “urgency” of environmental action is a major feature in the novel’s discourse. When *Ecotopia* achieves independence, the founders learn that public pressure alone will not stop the major polluters. Therefore, new, environmental laws “proliferated in the obsessive attempt to shape all agricultural and industrial enterprise into stable-state, recycling forms” (p. 86). Many companies and sectors (such as fossil fuels corporations) are wiped out, others are helped through the transition by the “system of financial risk-spreading” (p. 87) such that, reviewing the actions in hindsight, Weston concludes Ecotopians are “adept at using moderate and gradual change-overs to reach extreme goals” (p. 88).

Table I. SDG 7 indicators and themes explored in each novel.

Indicators for SDG 7 (by 2030)	<i>Ecotopia</i>	<i>The Ministry for the Future</i> (MFF)
7.1 Universal access to affordable, reliable, and modern energy services	Decentralization of energy conversion systems, including small-scale household and community energy systems.	Diversification of different renewable energy conversion systems (solar, hydrogen, biofuels) and electricity-storing facilities. After the deadly heatwave, India emerges as a global leader in the clean energy transition by nationalizing all energy companies and decommissioning all coal-fired power plants.
7.2 Substantially increase the share of renewable energy worldwide	Ecotopia has transitioned to carbon-free energy and renewable power systems, but the economy does not participate in any international collaboration.	Combination of several different sustainable energy conversion technologies (solar, hydrogen, biofuels) calibrated within one system.
7.3 Global doubling of energy efficiency	Ecotopia is committed to environmental efficiency and circular economy, yet the narrator, Weston, deems many energy processes in Ecotopia “inefficient” because they are geared toward limiting environmental impact rather than industrial efficiency.	Energy efficiency is likened to an oxbow in a river that slows down the system but is good for retaining resources.
7.a Enhance international cooperation to facilitate access to clean energy research and technology and promote investment in clean energy technology and infrastructure	Except for the export of electric cars and the import of metals to produce the motors, Ecotopia is economically and politically autonomous	International collaboration for the implementation, promotion, and maintenance of the carbon coin. Airships microwaving not utilized electricity to earth and corresponding surface receivers around the globe requires international collaboration.
7.b Expand and upgrade sustainable energy infrastructure and technology for all in developing countries	Not applicable because in Ecotopia they are aware of but not directly involved with any international energy infrastructure collaborations/	India leads a post-green revolution, and the hope is that its policies are scaled in other places across the world.

More explicit links can be drawn from *MFF* to SDG 13. The novel opens with the apocalyptic, climate-induced heat wave and, from that moment forward, Robinson invites readers to reflect on the potential impact of climate policy and citizen responses. In this sense, the narrative of *MFF* offers scenarios of what might occur if climate action is not successful. If SDGs 7 and 13 are not seriously and urgently addressed, policymakers could be confronted with more radical consequences. In short, the characters in the novel adopt a form of biocentric utilitarianism to justify their targeted violent acts. Readers are shown that, for these characters, violence motivated by

ecosystemic preservation leads to greater aggregated utility, life expectancy, and environmental health. Current SDG discourse does not readily entertain such possibilities, but it stands to reason that the strong, just, and peaceful institutions envisioned by SDG 16 can only be maintained (as some of the dystopias render), if we can mitigate climate change (SDG 13). In turn, climate change can only be properly addressed if energy conversion systems (SDG 7) are made sustainable and compatible with environmental challenges while enhancing human development.

These intricate relationships between SDGs 7, 13 and 16 and tensions are implied and clarified in *MFF*, as the cycle of climate, finance, and political causes and impacts reveal and are prompted by another threat: energy or climate terrorism. In response to the rising toll on developing countries, the climate terror organization “Children of Kali” orchestrated “Crash Day” and exploded bombs on 60 passenger jets. They also inject cows with mad cow disease (p. 226) and release a manifesto demanding the termination of all fossil-fuel-burning transportation systems and a severe reduction in red meat consumption (p. 226). Crash Day sparks a worldwide crash of financial markets, in particular international trade and the stock market (pp. 226, 275). In *MFF*, the collective impact of the ethically ambiguous and revolutionary violence is positive, and yet, the protagonist and director of the ministry, Mary Murphy, is understandably hesitant to lend explicit support.

While these violent strategies might be defensible as a “last resort” in the context of applying just war theory to SDG 13, they also represent direct threats to protecting SDG 16. Sovacool and Dunlap recently offered a taxonomy made of three overlapping categories of tactics and strategies: (1) civil disobedience, (2) anti-authoritarian resistance, and (3) militant, insurgent, and guerilla action.⁵⁶ The kind of actions described in *MFF* are coherent with the framing of all three and especially the third category; however, the fictional portrayals contradict both the content and the attainment of SDG 16. Overall, both the scholarly inventory of climate tactics and those discussed in different kinds of energy utopias (including eu-topias and dys-topias) represent “an opportunity not only to change practices but also challenge our thinking about what practices are even possible or desirable.”⁵⁶ (p. 15). While the eco-terrorist actions of Frank May and Children of Kali are certainly not desirable, the novel shows they are possible. In other words, the novel shows how the real-life “flight shaming” of Fridays for Future⁵⁷ could mutate into the flight bombing fictionalized in *MFF* (Table 2).

SDG 16: peace, justice and strong institutions

Strong institutions are a core assumption of the SDGs and their achievement. In *Ecotopia*, peace has been achieved after a green revolution leading to Ecotopia’s political and national separation from the USA. After this historical, political, economic, and ecological transition, governmental institutions, and NGOs in Ecotopia became stable, also because of a well-functioning democracy in which citizens vote directly via a remote ICT system accessible via household TVs. For Ecotopians, sustainable peace is achieved by accepting humans’ embeddedness in and interrelatedness with the ecosystem and environment, not by focusing on fulfilling economic and industry targets.

Robinson’s *MFF* alerts its readers that if citizens of the least developed economies become victims of heatwaves and other climate disasters violence and death will increase. The fictional UN institution, the “Ministry for the Future” drives a comprehensive energy transition across the globe, leading to improved ecosystem health and higher climate change resilience. In other words, *MFF* highlights crucial relationships between SDGs 7, 13, and 16. SDG 13 cannot be achieved without sustainably sourcing affordable clean energy. Achieving the targets of SDG 7 and SDG 13 are necessary conditions for achieving the targets of SDG 16, especially SDG target 16.1 “Significantly reduce all forms of violence and related death rates everywhere.” While it seems that tugging at the threads of the SDGS related to energy and climate SDGs—7

Table 2. SDG 13 indicators most relevant to themes explored in the novels.

Selected indicators from SDG 13 (by 2030)	Ecotopia	The Ministry for the Future (MFF)
<p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</p>	<p>Ecotopia becomes more resilient on its own and makes indirect contributions to reducing total global emissions by reforestation programs and exporting electric vehicles. Crossborder reductions in emissions could alleviate hazards and natural disasters in other countries.</p>	<p>Global climate and international geoengineering projects feature prominently in the MFF's plot. The scientific purpose and engineering methods supporting the pumping of melted ice back onto the polar plateau is discussed.</p>
<p>13.2 Integrate climate change measures into national policies, strategies and planning</p>	<p>National policies in Ecotopia are geared toward environmental protection and sustainability but they also have implications for mitigating climate change, such as strict policies and long-term strategies regarding the utilization of timber and lumber.</p>	<p>The Ministry's most ambitious and strategic climate policy is the implementation of a "carbon coin." This blockchain digital currency denominates sequestered carbon and is backed by long-term bonds with guaranteed rates of return, jointly endorsed by the world's central banks.</p>
<p>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<p>Environmental awareness and human impact on ecosystems is taught at all educational levels and permeates each sector so that environmental awareness and protection are central to Ecotopia's lifestyle and culture.</p>	<p>The Geneva based UN institution, the Ministry for the Future (lending the book its title), represents future generations and current society's responsibilities to them. Nevertheless, the radical environmentalists claim the Ministry is neither sufficiently efficient nor effective enough to halt global warming and its catastrophic impacts. Therefore, environmental terrorist force awareness-raising on climate change mitigation and climate policy improvements by violence.</p>
<p>13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed [...] and marginalized communities</p>	<p>Ecotopia focuses on national self-sufficiency; however, within ecotopia, even remote villages are connected to an efficient and free electric public transportation system that indirectly contributes to the mitigation of climate change.</p>	<p>Especially India is presented as a forerunner for developing economies, making a serious contribution for tackling climate change by becoming a photovoltaic superpower.</p>

Table 3. Showing the applicable SDG 16 indicators and the relevant themes explored in each novel.

SDG 16 (by 2030)	<i>Ecotopia</i>	<i>The Ministry for the Future</i> (MFF)
16.1 Significantly reduce all forms of violence and related death rates everywhere	While in Ecotopia life expectancy is higher because of healthy lifestyles, temporal and spatially limited violence is encouraged in the “war games” an annual ritual, which contributes to limiting violence in everyday occasions.	The novel begins with a mass death event. Then ecoterrorists kill people who significantly contribute to global warming, they at the same time contribute to saving lives that are not lost due to heat waves.
16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime	While Ecotopians were able to secure and weaponize nuclear warheads, which they use to threaten the United States, they seem to have little to no crime within Ecotopia.	Developed nations struggle with the illicit flow of arms (including weaponized drones) and the Ministry itself seems to implicitly condone and possibly provide soft support for ecoterrorism.
16.6 Develop effective, accountable and transparent institutions at all levels	Ecotopian politicians are scrutinized and evaluated by citizens via television and an instant democratic voting systems in which they make decisions about items such as new laws or funding for projects.	The Ministry appears to be transparent in its dealings with finance and development of the carbon coin and geoengineering efforts. However, it seems some members of the ministry have ties to ecoterrorists.
16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	Teledemocratic participation of all adult citizens and the local and national government are “continually visible on TV: hearings, committee meetings, debates.”	The Ministry represents future communities’ interests at national and international levels.
16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance	While Ecotopian journalists are aware of and stand in solidarity with Brazil as it seems to repel U.S. backed regime change, Ecotopia does not participate in global governance.	The eco-terrorist organization “Children of Kali,” and “Defenders of Mother Earth” represent so far neglected environmental and climate interests of developing economies’ interests by force, especially where the Ministry is not sufficiently successful.

and 13—could unravel our institutional fabric, SDG 17 (“Partnership for the goals”) does seem to offer a generalized blueprint for keeping reinforcing the seams, so to speak (Table 3).

Conclusion

This article analyzes the SDGs alongside fictional energy utopias (FEUs) to bridge the gap between strategic narratives and the widespread support for, and action toward, internationally relevant sustainability objectives. Examination of the two novels in relation to specific SDGs highlights how

various indicators relate to compelling sustainability narratives. FEUs, as we have shown, can help give voice to desirable futures which can, in turn, help develop and define climate and energy policy directives.

Juxtaposing FEUs with SDGs can be an effective method to: (1) imagine positive (eu-topian) energy futures and (2) sense the potential dangers of radical actions for several stakeholders (e.g., violent climate activism, radical environmentalism). Further research is needed to show how other FEUs, including films, may have similar functions. Empirical studies could show which and how FEUs impact public engagement efforts regarding energy utopias and “practical utopias.”⁵⁸ While the use of narratives and storytelling is central to many transdisciplinary activities that aim to interface academics and the public,⁵⁹ ⁶¹ discussing FEUs could add a precise interest in concrete issues pertaining to energy systems and energy policies. Both novels envisage how equitable, powerful, and stable renewable energy systems can be imagined in a compatible way with environmental sustainability.

The time for carefully crafting strategic narratives seems to be evaporating. Humanity is facing the dilemma of increasing energy demand and environmental tipping points that suggest we are on the verge of a climate point of no return. The increased energy demand can be linked to a growing population as well as to a range of actors (including developing economies) and modern technologies such as electric vehicles, cryptocurrencies, and artificial intelligence. These novels contemplate societies in which clean energy has become mainstream, accessible, and affordable. However, the fictional energy scenarios are emphatically not abundant. Unlike previous utopias (or cornucopias) of energy abundance, these narratives stress sufficiency.⁶² Increased affordability and access allow for *sufficient* consumption and strict regulations and social norms limit the freedoms of individuals and groups who might otherwise consume in abundance and thereby make a disproportionate contribution to overshoot earth’s boundaries/limitations.⁶³

The novels do not always make clear how the clean energy system might relate to other complex social problems including hunger, poverty, and education, yet we argue that only if and when SDG 7 (Affordable and Clean Energy) is pursued vigorously and successfully can SDG 13 also be achieved. SDG 16 is at stake, if the other two SDGs remain merely utopian, and especially if SDG 13 is neglected.

Finally, while individual SDGs provide opportunities for societal improvements and increased *synergies* of interlinked SDGs, our analysis also highlights current, interconnected *crises*. On the one hand, these concern primarily the gaps and differences among and within nations in terms of clean energy affordability and security. On the other hand, the crises are interlinked as they relate to the fundamental and often unsustainable connections between the well-being of socio-ecological systems and anthropogenic demands on natural ecosystems.

The fictional energy utopias analyzed here do not offer a storybook for “happy” endings, but they do encourage us to seek tangible solutions beyond policy-driven strategic narratives and even academic discourse. As *MFF* concludes, there are conferences where “all the posters, and the various organizational tables, and the panel discussions and plenary talks, described good things being done”; however; Robinson reminds us, this has always been true, such meetings are “utopian gatherings, spaces of hope” (p. 476). The work invested in this article—wrestling with lofty ideas, engaging with peer review, and publishing in academic journals—is a start towards our specific desire to avoid mass extinction; it is a movement into a sustainable future as a step towards an accomplished goal.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Daniel Wuebben  <https://orcid.org/0000-0002-1776-0036>

References

1. Smith TB, Vacca R, Mantegazza L, et al. Natural language processing and network analysis provide novel insights on policy and scientific discourse around sustainable development goals. *Sci Reports* 2021; 11: 1–10.
2. Halvorsen T and Higgins J. Growth or solidarity? The discourse of the SDGs. In: Ramutsindela M and Mickler D (eds) *Africa and the sustainable development goals*. Switzerland: Springer, 2020, pp.13–21.
3. de Jong E and Vijge MJ. From millennium to sustainable development goals: evolving discourses and their reflection in policy coherence for development. *Earth Syst Gov* 2021; 7: 100087.
4. Cummings S, Seferiadis AA and de Haan L. Getting down to business? Critical discourse analysis of perspectives on the private sector in sustainable development. *Sustain Dev* 2020; 28: 759–771.
5. Janoušková S, Hák T, Nečas V, et al. Sustainable development—a poorly communicated concept by mass media. Another challenge for SDGs? *Sustainability* 2019; 11: 3181.
6. Bushell S, Buisson GS, Workman M, et al. Strategic narratives in climate change: towards a unifying narrative to address the action gap on climate change. *Energy Res Soc Sci* 2017; 28: 39–49.
7. Bevan LD, Colley T and Workman M. Climate change strategic narratives in the United Kingdom: emergency, extinction, effectiveness. *Energy Res Soc Sci* 2020; 69: 101580.
8. Jameson F. *Archeologies of the future: the desire called Utopia and other science fictions*. New York: Verso, 2005.
9. Driessen P. The «sustainable future» isn't sustainable. *Energy Environ* 2011; 22: 757–759.
10. Königs P. What is techno-optimism? *Philos Technol* 2022; 35: 1–5.
11. Feller WV. Blue skies, green industry: corporate environmental reports as Utopian narratives. In: *The environmental communication yearbook*. New York: Routledge, 2004, pp.57–76.
12. Darani ZH, Taheri Demne M, Zanjirani DM, et al. Conceptualization of a new generation of smart energy systems and the transition toward them using anticipatory systems. *Eur J Futur Res* 2021; 9: 1–17.
13. Hudlet-Vazquez K, Bollman M, Craigg J, et al.. Utopias and dystopias of renewable energy imaginaries *Energy Democracy for Sustainable Futur*. London: Academic Press, 2023, pp.31–40.
14. Sovacool BK. *Visions of energy futures: imagining and innovating low-carbon transitions*. London: Routledge, 2019, Epub ahead of print 2019. DOI: 10.4324/9780367135171.
15. Asayama S. Threshold, budget and deadline: beyond the discourse of climate scarcity and control. *Clim Change* 2021; 167: 1–16.
16. Mercedes Maroto-Valer M and Robert Buchan Chair F. The role of CCS: from dystopia to Utopia or somewhere in between. *Greenh Gases Sci Technol* 2017; 7: 582–584.
17. Wilberforce T, Olabi AG, Sayed ET, et al. Progress in carbon capture technologies. *Sci Total Environ* 2021; 761: 143203.
18. Hong WY. A techno-economic review on carbon capture, utilisation and storage systems for achieving a net-zero CO₂ emissions future. *Carbon Capture Sci Technol* 2022; 3: 100044.
19. Environmental Defence Canada. *Submission to Finance Canada CCUS Consultation*; 2021. <https://environmentaldefence.ca/report/canadas-oil-and-gas-challenge/>.

20. Campos A and Codina L. Communication, dissemination and exploitation strategy analysis in Horizon 2020: keys to multiply the impact of European projects. *Prism Soc* 2021; 32: 293–319.
21. ElAlfy A, Palaschuk N, El-Bassiouny D, et al. Scoping the evolution of corporate social responsibility (CSR) research in the sustainable development goals (SDGS) era. *Sustainability (Switzerland)* 2020; 12(14): 1–21. <https://doi.org/10.3390/su12145544>
22. Litvinenko V, Bowbrick I, Naumov I, et al. Global guidelines and requirements for professional competencies of natural resource extraction engineers: Implications for ESG principles and sustainable development goals. *J Cleaner Prod* 2022; 338: 130530. <https://doi.org/10.1016/j.jclepro.2022.130530>
23. Moyer JD and Hedden S. Are we on the right path to achieve the sustainable development goals? *World Dev* 2020; 127: 104749. <https://doi.org/10.1016/j.worlddev.2019.104749>
24. IEA. *Global energy review: CO2 emissions in 2021*, 2022. International Energy Agency: Paris. <https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2> (2022, accessed 19 January 2023).
25. United Nation's. *The sustainable development goals report 2022*; 2022.
26. Rees WE. Ecological economics for humanity's plague phase. *Ecol Econ* 2020; 169: 106519.
27. Rockström J, Gupta J, Qin D, et al. Safe and just Earth system boundaries. *Nature* 2023: 1–10. <https://doi.org/10.1038/s41586-023-06083-8>
28. Segal HP. *Utopias: a brief history from ancient writings to virtual communities*. West Sussex: Wiley-Blackwell, 2012.
29. Jasanoff S and Kim S-H. Sociotechnical imaginaries and national energy policies. *Sci Cult (Lond)* 2013; 22: 189–196.
30. Sovacool BK and Brossmann B. The rhetorical fantasy of energy transitions: implications for energy policy and analysis. *Technol Anal Strateg Manag* 2014; 26: 837–854.
31. Moezzi M, Janda KB and Rotmann S. Using stories, narratives, and storytelling in energy and climate change research. *Energy Res Soc Sci* 2017; 31: 1–10.
32. Nikoleris A, Stripple J and Tenngart P. Narrating climate futures: shared socioeconomic pathways and literary fiction. *Clim Change* 2017; 143: 307–319.
33. Schneider-Mayerson M. Whose odds? The absence of climate justice in American climate fiction novels. *ISLE Interdiscip Stud Lit Environ* 2019; 26: 944–967.
34. Smith J, Butler R, Day RJ, et al. Gathering around stories: interdisciplinary experiments in support of energy system transitions. *Energy Res Soc Sci* 2017; 31: 284–294.
35. Goodbody A and Johns-Putra A. The rise of the climate change novel. In: Johns-Putra A (ed.) *Climate and literature*. Cambridge: Cambridge University Press, 2019, pp.229–245.
36. Whiteley A, Chiang A and Einsiedel E. Climate change imaginaries? Examining expectation narratives in Cli-Fi novels. *Bull Sci Technol Soc* 2016; 36: 28–37.
37. Lifset R, Lutz R and Stanford-McIntyre S (eds). *American Energy Cinema*. Morgantown, WV: West Virginia University Press, 2023. <https://wvupressonline.com/node/918> (2023, accessed 29 December 2022).
38. Bailey AJ, Wills CM and Mitchem J. Attitudes towards climate change and scientific stories. *J Environ Stud Sci* 2022; 12: 714–726.
39. Schneider-Mayerson M, Gustafson A, Leiserowitz A, et al. Environmental literature as persuasion: an experimental test of the effects of reading climate fiction. *Environ Commun* 2023; 17(1): 35–50. <https://doi.org/10.1080/17524032.2020.1814377>
40. Ghosh A. *The great derangement*. Chicago, IL: University of Chicago Press, 2018.
41. Szeman I. Introduction to focus: petrofictions. *Am B Rev* 2012; 33: 3.
42. Jones CF. Petromyopia: oil and the energy humanities. *Humanit* 2016; 5: 36.
43. Tanaka S. Fossil fuel fiction and the geologies of race. *PMLA* 2022; 137: 36–51.
44. Grubert E and Algee-Hewitt M. Villainous or valiant? Depictions of oil and coal in American fiction and nonfiction narratives. *Energy Res Soc Sci* 2017; 31: 100–110.
45. Malm A. “This is the hell that i have heard of”: some dialectical images in fossil fuel fiction. *Forum Mod Lang Stud* 2017; 53: 121–141.
46. Elkins C. Isaac asimov's «foundation» novels: historical materialism distorted into cyclical psycho-history. *Sci Fict Stud* 1976; 3: 26–36.

47. Örsler MM and Peschke L. 'It's a bird... It's a plane... It's a fusion reactor': representation of energy in superhero movies. *Q Rev Film Video* 2022; 1–15. <https://doi.org/10.1080/10509208.2022.2069978>
48. Abohela I. The narrative of renewable sources of energy in science fiction films. *Appl Mathematics Inf Sci* 2019; 13: 471–480.
49. Hermwille L. The role of narratives in socio-technical transitions—Fukushima and the energy regimes of Japan, Germany, and the United Kingdom. *Energy Res Soc Sci* 2016; 11(11): 237–246. <https://doi.org/10.1016/j.erss.2015.11.001>
50. Korstanje ME. Climate change and storytelling: narratives and cultural meaning in environmental communication. *Disaster Prev Manag An Int J* 2018; 27: 363–366.
51. Fløttum K and Gjerstad Ø. Narratives in climate change discourse. *Wiley Interdiscip Rev Clim Chang* 2017; 8: e429.
52. Cummings S, Regeer B, de Haan L, et al. Critical discourse analysis of perspectives on knowledge and the knowledge society within the sustainable development goals. *Dev Policy Rev* 2018; 36: 727–742.
53. Briant Carant J. Unheard voices: a critical discourse analysis of the millennium development goals' evolution into the sustainable development goals. *Third World Q* 2017; 38: 16–41.
54. Castor J, Bacha K and Fuso Nerini F. SDGs in action: a novel framework for assessing energy projects against the sustainable development goals. *Energy Res Soc Sci* 2020; 68: 101556.
55. United Nations. Goal 13: Take urgent action to combat climate change and its impacts, <https://sdgs.un.org/goals/goal13> (accessed 11 May 2023).
56. Sovacool BK and Dunlap A. Anarchy, war, or revolt? Radical perspectives for climate protection, insurgency and civil disobedience in a low-carbon era. *Energy Res Soc Sci* 2022; 86: 102416.
57. Gössling S, Humpe A and Bausch T. Does 'flight shame' affect social norms? Changing perspectives on the desirability of air travel in Germany. *J Clean Prod* 2020; 266: 122015.
58. Atwood M. Practical Utopias. In: Thunberg G (eds) *The climate book*. London: Penguin, 2022, pp. 408–411 .
59. Smith J, Butler R, Day RJ, et al. Gathering around stories: interdisciplinary experiments in support of energy system transitions. *Energy Res Soc Sci* 2017; 31: 284–294.
60. Richter A, Sieber A, Siebert J, et al. Storytelling for narrative approaches in citizen science: towards a generalized model. *J Sci Commun* 2019; 18: 1–24.
61. Skains RL, Rudd JA, Horry R, et al. Playing for change: teens' attitudes towards climate change action as expressed through interactive digital narrative play. *Front Commun* 2022; 6: 289.
62. van Uffelen N, et al. Energy Utopias in transition: from the myth of energy abundance to energy sufficiency. *Energy Res Soc Sci*. 2023. Under Review.
63. Fanning AL, O'Neill DW, Hickel J, et al. The social shortfall and ecological overshoot of nations. *Nat Sustain* 2021; 5: 26–36.