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<ct>‘The shadow of the future made all the difference’: sustainability  
in Kim Stanley Robinson’s Science in the Capital trilogy

<au>*Chris Pak*

<fo>Anthropogenic climate change and the approach of the peak-oil moment has encouraged many to think about alternative energy regimes that would provide a solution to the threat of economic collapse. While there is consensus amongst climate scientists that climate change is happening, contemporary thought about its specificities and solutions is subject to much debate. Fred Polak argues in *The Image of the Future* (1973) that societies shape themselves partly through the utopian potential of the images of the future that they construct. Science fiction (sf) has portrayed a variety of images of the future, from post-apocalyptic narratives of decline, techno-utopian futures and ecotopian images of sustainable societies. These narratives explore many instances of sustainable and unsustainable practices, but issues of energy, oil, water and the extraction of other resources have been persistent themes. Through portrayals of future worlds and societies that explore the embeddedness of individuals and communities in the realities of their physical and socio-political environments, sf helps us imagine sustainability in a multitude of ways: by presenting specific technological innovations that might support sustainability, by exploring cause-and-effect relationships or the complexity of non-linear dynamic feedback systems, by portraying unsustainable practices and societies that should be avoided, and by depicting characters whose lives are influenced by (un)sustainable practices and who reflect upon and navigate these worlds.

Sustainability science, futures studies, and sf all engage in different ways and for different purposes in speculating about the future. Sf cannot offer predictions but it can, as Dominic Boyer and Imre Szeman claim, act as ‘a forerunner researching the cultural landscape around us and imagining the future relationship between energy and society that we need to strive toward’ (2014).

Sf has portrayed a vast array of ecological images of the future. These narratives offer to futures studies an archive for reflection: a resource of scenarios amenable to a variety of analytical approaches and, sometimes, a commentary on the process of future forecasting itself. Ian Miles notes that ‘many futurists are sf aficionados ... and that sf often informs their research’ (1993: 1). Karlheinz Steinmüller, a physicist, sf author and scientific director of the foresight company Z-Punkt, argues that sf is not aimed at prediction, but he does call sf ‘a kind of fictional technology assessment’ (2003: 176) and notes that ‘SF constructs future scenarios in a similar way to futurology’ (178). This should come as no surprise to anyone familiar with either discipline, for the origins of both can be traced back to the same sources: commentators such as I. F. Clarke (1971) and Eddie Blass (2003), for example, locate their origin in utopian thought. Although ‘futuresology’ was coined in 1943 by Ossip K. Flechtheim (Butler 2014: 513), sf writer Jack Williamson argues that H. G. Wells, in his 1902 lecture *The Discovery of the Future* (1913), invented modern futurology and began from that point to depart from writing sf to propagandising for the realisation of his image of the future (McCaffery 1991). Hugo Gernsback founded the first American sf pulp magazine *Amazing Stories* in 1926 and later coined the term ‘science fiction’. His first editorial bore the motto ‘Extravagant Fiction Today – Cold Fact Tomorrow!’, and he praised the predictive power of writers such as Edgar Allan Poe, Jules Verne, Wells, and Edward Bellamy, claiming that ‘[p]rophecies made in many of their most amazing stories are being realized – and have been realized’ (Gernsback 1926: 3).

Williamson argues in ‘Scientifiction, Searchlight of Science’ that ‘SF was futurology, testing new ideas before scientists got around to them’ (1928: 435), but has since revised this bold claim to argue that, in sf, the priorities of fiction take precedence (McCaffery 1991). As Andrew M. Butler explains,

<q>the readerly encounter with SF involves experiences of sublimity or estrangement through its invocation of imagined (future) environments. By contrast, futurology, Futurism, and futures studies are methods of future *prediction*, with varying needs to persuade an audience into taking or avoiding particular actions; it is much more overtly tendentious than SF, advocating for (rather than merely evoking) potential futures. (Butler 2014: 522)</q>

<fo>Futurology, or futures studies, is directed towards imagining futures that could be instantiated. Sf, by contrast, is a heterogeneous artistic mode that draws from a wide variety of traditions. While there are examples of sf that fail or do not attempt to imagine the future (time travel narratives and alternative histories, for example, may be more concerned with the past and parallel presents), sf as a mode is oriented towards imagining futures extrapolated from elements of the contemporary world or with modelling images of the future that reflect back upon the present. In *Green Speculations*, Eric Otto explores the shape of a form of radical ecology he calls transformative environmentalism, which combines influences from a diverse range of oppositional politics that emerged since the 1960s: the science of ecology, environmental philosophy, deep ecology, ecofeminism and ecosocialism. Arguing that ‘estrangement, extrapolation, and sense of wonder constitute an ecorhetorical strategy for works of fiction and nonfiction whose interests lie in questioning deep-seated cultural paradigms’ (2012: 16–17), Otto identifies capitalism and its logic of limitless growth as the

agent of this environmental degradation and the target of transformative environmentalism's critique. Sf is not futurology. Williamson argues that '[p]eople, of course, had always been concerned with understanding and predicting the future; but SF writers, relying on Darwinian insights, have been able to construct fictional visions of the future that are much better based' (McCaffery 1991). Sf is concerned with constructing fictional worlds, for which adherence to facts or truth (relative to our understanding of the physical laws of the universe or the present constitution of elements of the 'real world') is not a useful measure for thinking about the mode; the predictions that futures studies posits, however, can be productively assessed in terms of their veracity and efficacy for risk assessment.

Butler and Williamson accede to what is frequently reiterated in sf scholarship and fandom: that sf is not meant as prediction. Ian Miles, for instance, notes that while many sf writers have 'forecasted ... ideas such as nuclear weaponry and spaceflight – and this list could easily be extended – these treatments remained shoddy until their actuality began to be realised' (1990: 85). Stanislaw Lem, an acclaimed writer of sf and philosophical essays, futurological articles and a member of the committee for Poland 2000 (which attempted to anticipate future trends from its vantage in the late 1970s), has consistently explored the limits of futurology in his fiction and non-fiction, warning in his essay 'Metafuturology' (1986) against the over-specialisation of futurology and for its practice in every discipline. Lem's profound critique of the limits of human knowledge threatens to paralyse attempts at imagining any future. Lem, however, continued to write about the future even when he stopped writing fiction. For him, the practice of future speculation remained valuable even when he believed he had nothing further to contribute to sf. His critique of futurology as a discipline should not be taken as a prohibition against thinking about the future, but as a warning that all such images are provisional, pending the irruption of the unknown.

Sf and futures studies are therefore bound in a relationship that sf writer and editor Frederik Pohl calls ‘a pretty amiable symbiosis’ (1996: 8). Many writers, such as Arthur C. Clarke, Isaac Asimov, Robert A. Heinlein and John Brunner have been hailed as successful prophets of sf. More recently, figures such as Gregory Benford, David Brin, Cory Doctorow, Karl Schroeder and Kim Stanley Robinson have continued to connect these two ways of thinking about the future. Brin and Schroeder in particular are futurists: Schroeder, for example, was commissioned by the Canadian army to write a narrative of future trends in conflict situations. The result, *Crisis in Zefra* (2005), uses the fictional African city of Zefra to explore future technological and strategic military innovations and to assess their potential risk and competition in a part of the world afflicted by resource scarcity. While Andrew Milner notes that sf may be value-free in the sense that the genre does not imply *a priori* political, ethical or aesthetic values, he does insist that it is value-relevant in that specific texts often do speak to these concerns: ‘the future story can be used as a kind of futurology. SF of this kind is intended to be politically or morally effective, that is, to be socially useful’ (2012: 180). Futures studies is a utopian discipline and an allied formation to sf. Its influence on writers prompts them to connect fiction to a praxis of speculation and scenario building. If futures studies offer scenarios for structuring prediction based on possibility, fictional narratives build worlds based upon an accumulation of contingencies that are driven by the demands of the form. Sf constructs images of the future from the perspective of actors embedded in their fictional environments. The images sf constructs are not models to guide action, but imaginative spaces for testing ideas and values and (in many cases) a vehicle for encouraging socially engaged reflection on a variety of issues. This requires sf to test scientific and historical facts within the space of their fictional environments, but not necessarily to adhere to them. Sf bears a different relationship to their images of the future

from that of futures studies, offering a heterogeneous library of narratives to help think about sustainability.

### **<A>Sustainability science and Sf**

<fo>Like futures studies, sustainability science is based on the extrapolation of the physical parameters of global or local systems and often draws on predictive modelling and scenario building. Physical systems are the object of their study, but so are the practices, behaviours, values and myths of a society or community, along with the ways these orientations affect sustainability practices. Kim Stanley Robinson has consistently imagined ecological futures that address the relationship between politics, society and science, and has explored ideas related to sustainability, climate change, terraforming, geoengineering and biotechnology. Robinson sees the work of understanding the present as ‘a mix of historical work and science fictional speculation’ (Davis and Yaszek 2012: 189), while Roger Luckhurst notes that Robinson ‘has always regarded science fiction as an inverted form of the historical novel’ (2009: 172). For Robinson, historical fiction and sf are related modes of imagining the present through constructed images of the past and future, as is attested by his alternate history about a world where the European population is eradicated by the Black Death, *The Years of Rice and Salt* (2003), and his recent prehistoric novel, *Shaman: A Novel of the Ice Age* (2013). The images of the past and of the future in these works of sf are historical constructs that tell us more about their contemporary moment than they do about either the past or the future.

Robinson has long been concerned with sustainable and unsustainable futures. His Orange County trilogy explores three alternate Californias: *The Wild Shore* (1984) imagines a post-apocalyptic pastoral enclave, *The Gold Coast* (1989) a dystopian, high-capitalist

‘autopia’ and *Pacific Edge* (1990) portrays a sustainable ecotopian future. Robinson’s acclaimed Mars trilogy, comprising *Red Mars* (1996a), *Green Mars* (1996b) and *Blue Mars* (1996c), along with its companion collection of short stories, *The Martians* (2000), locates his thinking about sustainability in the extreme environment of a colonised Mars undergoing terraformation. *Antarctica* (1997), informed by a trip to the eponymous continent that was funded by the National Science Foundation (NSF), is set in and around McMurdo Station and involves characters who would later appear in the Science in the Capital trilogy. Robinson’s *2312* (2012) extends his thinking about sustainability by imagining a far future society that has terraformed and colonised the solar system. In his Science in the Capital trilogy, comprising *Forty Signs of Rain* (2005), *Fifty Degrees Below* (2007a) and *Sixty Days and Counting* (2007b), he explores the relationship between science and policy in a near-future scenario where extreme weather events – a consequence of a carbon-based energy regime – realise the predicted effects of climate change. In the rest of this chapter I examine how the Science in the Capital trilogy combines ‘proleptic realism’ and the ‘structural comedy’ to identify and analyse the problems associated with addressing the climate crisis. I explore how the trilogy considers the radically transformative potential of sustainable alternatives and ask how it accounts for the failure to adequately address climate change in the trilogy.

## **<A>Science in the Capital**

<fo>In contrast to the futures he had previously depicted, Robinson chose to situate the Science in the Capital trilogy closer to the time of its writing in a future that Luckhurst identifies with the George W. Bush administration (2009: 171). By aligning without identifying this fictional president with Bush, and the narrative’s Senator Phil Chase to Al



Gore, Robinson imagines how America might re-orient itself in relation to an alternative, sustainable vision of the future. Adeline Johns-Putra argues that '[t]he dramatic and emotional contours of climate change have to do with the future, not the past or present' (2010: 749), and that Robinson's narrative of abrupt climate change allows him to bring these concerns to bear in a near-future setting located so close to the present that it could stand in for the now. Luckhurst labels the style of those moments where the trilogy remains wedded to a mimetic representation of the present day 'proleptic realism', a contrast to Robinson's previous experiments with ecologically oriented sf that imagines sustainable and unsustainable futures on worlds recognisably different from our own. In this trilogy, speculation about the future is firmly grounded in a fictional world that is clearly and plausibly connected to our contemporary real world, thus bringing it closer – though not completely aligning it with – the project of futurological speculation. This allows Robinson to call into question the assumptions, institutions and practices that retard a movement towards sustainability. Climate change often evokes catastrophic images of the future that might be avoided if alternatives to current polluting practices are instituted. The extreme weather events that are imagined in the trilogy threaten the integrity of the environment and the cohesion of society; it is an image of the future that insistently presses upon the now and calls for immediate action to mitigate its effects. Although it is an important strategy that informs the trilogy, Robinson does not present us with a futurological extrapolation, but with a fictional assessment of the actions that chart a movement towards an imagined future, one that cannot be clearly traced from the initial conditions of the real-world contemporary to the text's publication.

In addition to its proleptic realism, Luckhurst and several other commentators have considered the trilogy's status as comedy, a mode that Robinson also mobilised in his Orange County and Mars trilogies. Robert Markley (2012), for example, points to features such as the

concluding marriage between President Phil Chase and the director of the NSF, Diane Chang, as a symbol for the union between politics and science. Markley notes that '[c]omedy invokes generically both a movement towards the restoration of a disturbed social order and the generational continuity typically symbolized by marriage' (2012: 12). As Douglas De Witt Kilgore explains, the trilogy avoids the trope of catastrophe and survivalist recovery, offering instead a 'structural comedy' 'in which the world is reimagined, but preserved in its current social complexity' (2012: 101). Depicting these characters' negotiation of social and political structures and relations allows Robinson to build a fictional world that models one vision of techno-social change, along with the plurality of modes of awareness and agency from which this change emerges. Comedy frames the imagination of possibilities for a restoration of social relations and a movement towards sustainability that allows the narrative to explore the implications of inspiring and enacting change. While narratives involving catastrophe or survivalist recovery focus attention on the conditions of a post-catastrophe environment, Robinson's use of comedy to explore the imbrication of action by individuals directs attention to the sustainable future that the trilogy's characters attempt to instantiate in lieu of a seemingly inevitable apocalypse.

Central to Robinson's structural comedy is the representation of the bureaucratic process, which allows Robinson to explore the values that substrate two broad positions on climate change. The US administration's official position on climate change at the beginning of the trilogy is based on ameliorating both the implications of increased carbon dioxide and the scientific methods used to calculate the impact of high emissions, tracked at 600ppm in the narrative as compared to the real-world figure of 400ppm in December 2014. In an impromptu meeting with the president and his scientific advisor, Dr Zacharius Strengloft, Charlie Quibler finds himself defending the efficacy of measurements by ecological footprint and of acceding to the precautionary principle against Strengloft's accusation that 'those

concepts are not good science' (Robinson 2005: 160). Stengloft and the president inconsistently emphasise both debate and appeals to 'good' science in order to maintain the current system of carbon use that underpins the American economy. In defence of his views, Stengloft suggests that '[y]ou need a diversity of opinions to get good advice' (Robinson 2005: 156) – a statement that the administration's actual practice belies. Stengloft's appointment as the president's scientific advisor reflects the administration's desire to replace the previous advisor precisely to eliminate debate; his predecessor's view is that 'global warming might be real and not only that, amenable to human mitigations' (Robinson 2005: 155). In response to Charlie's assessment of the widespread agreement regarding climate change, Stengloft counters with the circumlocution '[w]e've agreed that there is general agreement that the observed warming is real' (Robinson 2005: 159), and he dismisses these indexes by comparing them to less conventional measures of a country's success: '[n]ext you'll be wanting us to use Bhutan's Gross Domestic Happiness' (Robinson 2005: 161). While there are good bases for questioning the measures used to assess economic growth and its impact on society, Stengloft and the administration's assessment derives from a sense of American exceptionalism that makes them subject to different criteria. Stengloft argues that 'we can't use little countries' indexes, they don't do the job. We're the hyperpower,' and he frames 'the anticarbon-dioxide crowd' as 'a special interest lobby in itself', thus marginalising their dominant voice in a debate whose parameters are established in narrow conformity to one image of economics (Robinson 2005: 161).

At the heart of this resistance to adopting the precautionary principle and reducing emissions is the way in which carbon is intertwined with the American economy and its infrastructure: 'everything would have to change, the power generation system, cars, a shift from hydrocarbons to helium or something, they didn't know, and they didn't own patents or already existing infrastructure for that kind of new thing' (Robinson 2005: 156). The energy

and transport sectors' reliance on carbon ensures that the larger economic and infrastructural system is so inflexible that any modifications that might impinge upon the interests of business and industry are precluded. Robinson's reworking of comedy, with its attention to the everyday realities of individuals in their techno-social contexts, encourages this focus on infrastructural systems and the social implications of their transformation towards sustainability. Uncertainty about the future is the most rhetorically effective argument marshalled against attempts to modify the current system. The president maintains, 'we don't know for sure if any of that [global environmental degradation] is the result of human activity. Isn't that a fact?' (Robinson 2005: 159). The administration emphasises uncertainty because it provides the economic justification for supporting ineffective measures to address climate change. The system of reason that underlies economic forecasting requires complete certainty in order for business to ground their projections of growth. This simplification of reality mistakes the work of forecasting, which operates not on certainty, but possibility; climate change science offers scenarios or images of the future that are intended to inform current action through an assessment of possibility and risk. The complexity of Robinson's use of structural comedy counters these economic simplifications to explore the social ramifications involved in creating a new image of the future to strive for. The administration's answer to Charlie's competing image of the future is an attempt to restrict the imagination of the future. The president argues that '[y]ou've got to stick to the common sense idea that sustainable economic growth is the key to environmental progress' (Robinson 2005: 165); in other words, it is '[e]asier to destroy the world than to change capitalism even one little bit' (Robinson 2005: 156).

This notion of sustainable economic growth, like many of the devices used to frame the climate debate, is used to redirect the administration's approach to the advice of the majority of organisations and scientists who highlight the environmental and social impacts of climate

change. This concept shifts the value of ‘sustainable’, from one denoting a future where resources are able to circulate within a feedback system as close to indefinitely as possible, to one where expansion becomes the object that must be sustained. It introduces a system of calculation in which the negative costs associated with the use of carbon are consistently measured against the projected profits of the expansion of a carbon-based economic system. Because these calculations are grounded in an assessment of the present costs and profits associated with growth, and because any uncertainty closes debate regarding the value of those costs and profits when projected into the future, sustainable economic growth can effectively be used to delay a constriction of the carbon economy.

Phil Chase, the newly elected president of *Sixty Days and Counting* and a character who echoes Al Gore’s position on climate change, offers an assessment of why capitalism is unable to address the climate crisis effectively:

<q>It isn’t the easiest money yet. Capital always picks the low-hanging fruit first, as being the best rate of return at that moment. Maximum profit is usually found in the path of least resistance. And right now there are still lots of hungry undeveloped places. And we haven’t yet run out of fossil carbon to burn. Heck, you know the reasons – it would be a bit more expensive to do the start-up work on this country called sustainability, so the profit margin is low at first, and since only the next quarter matters to the system, it doesn’t get done. (Robinson 2007b: 378)</q>

<fo>Like the crude oil that is pumped along pipelines around the world, profit is imagined as liquid, flowing along the most convenient channels and accumulating as capital for further corporate expansion. In contrast to Robinson’s portrayals of sustainable systems on other

planets in his Mars trilogy and *2312*, Chase inherits a system whose infrastructure sets conditions on the costs of change, necessitating a recalibration of the meaning of growth and sustainability. History, by way of the ecological and socio-political systems that regulate economic and industrial growth, determines the possible actions that characters are able to initiate. In response to an image of the future to which the past and present are projected, Chase offers a pastoral, utopian image of a ‘country called sustainability’, a place that has no extension in space and which is arguably eternally deferred (Robinson 2007b: 378). This image draws on the utopianism of a new Eden on Earth, one that promises instantiation through a transformative will and combined effort. In contrast to the US administration’s refusal to recognise the climate crisis, this image embeds value into the future and so attempts to orient society towards its creation by offering an image of the potential environmental restoration that could be achieved. Robinson’s focus on structural complexity is thus central to the text’s project of outlining the considerations necessary to address the correspondingly complex nature of climate change. Yet this image operates as a simplification, as an ideal to continually work towards rather than a warning about the future, and it relies on the possibility of recalibrating present conceptions of economics and growth. It is an image of the future that inspires individuals to engage actively in its creation, and not a prediction based on the initial conditions of the present day. Carbon-based capitalism is motivated by short-term goals and profits; the failure to recognise adequately the current limits to the integrity of this system can be traced to the pre-established imbrication of social, economic and geopolitical networks that exclude many of those countries identified as economically undeveloped from engaging with the decision-making process that maintains the flow of capital.

The failure to widen the sustainability debate to include previously marginalised voices is dramatically represented by the Khembalis, Tibetan Buddhists in exile on an island

threatened by rising sea levels. They establish an embassy and become friends and allies of Anna and Charlie Quibler, Frank Vanderwal and Phil Chase, who assist them in their efforts to raise awareness of their plight and the ways in which Buddhism can complement scientific inquiry so as to reach that ‘country called sustainability’. Markley suggests that the Khembalis function as ‘a chorus for the efforts of Frank, Charlie, Anna, Phil, and Diane as they struggle to resacralize humankind’s relationship to a natural world that is very different from the one described by Emerson and Thoreau’ and that ‘[i]t is only through a collective rethinking of history, science, and Nature that a new civilization can begin to emerge’ (2012: 10). Kilgore points to another role that the Khembalis play in re-forming the perception of the place of science for society, whereby ‘an ethical dimension is claimed for science that goes beyond its role of providing a Verne-like catalog of nature’s wonders’ (2012: 98). Rather than a system of rationality that supports economic reason, the Khembali ambassador Rudra Cakrin reframes science in Buddhist terms as a way to develop compassion for a species; Robinson, Kilgore argues, ‘is calling for its [science’s] reformulation from within a regime that requires reason only to be profitable to a new dispensation in which it is part of a more generous common good’ (2012: 98–9). In other words, sustainable economic growth is based on a narrow range of beneficiaries – those with interests in the ongoing system of carbon capitalism. By representing their interests and by recontextualising the role of science for society, the Khembalis widen the pool of interests that any attempt to address climate change must take into account.

Reflecting the social complexity of the structural comedy, the *Science in the Capital* trilogy follows the actions of policy-makers, political advisors and scientists who are engaged in the work of reimagining and recalibrating the relationship between politics and science. It attempts to give voice to these alternatives through the subjectivity of its characters as they negotiate a new landscape brought about by premonitory disasters that index an image of a

climate-stricken future. The extreme weather events – the flood at the end of *Forty Signs of Rain*, the cold snap and storms of *Fifty Degrees Below*, and the heatwaves of *Sixty Days and Counting* – bring the image of the future insistently to the fore as the protagonists attempt to formulate policies to avert the worst-case climate scenarios. In *Forty Signs of Rain*, regular blackouts bring the ‘shadow of the future’ (Robinson 2005: 126) to the forefront; Frank predicts that ‘[t]his is what it’s going to be like all the time ... We might as well get used to it’ (Robinson 2005: 328). The possible scenarios that emerge from the present make adaptation inevitable. Anna, reflecting on the future her son Joe would inherit, wonders, ‘[w]hat was worry, after all, but a kind of fear? It was fear for the future. And in fact the future was bound to bring its share of bad things, there was no avoiding that’ (Robinson 2007a: 245). In contrast to Frank’s gloom, she philosophises that worry ‘was an anticipation of grief, a nightmare of the future. A species of fear; and she was determined not to be afraid’ (Robinson 2007a: 246). The shadow of the future compels change in response to the realities of the physical world. It does not imply a single orientation but evokes both fearful and pragmatic responses that are connected to a generational perspective. Anna refuses to succumb to an apocalyptic image of climate instability; rather she connects her efforts to the optimism and utopian energy embodied by the later president, Phil Chase’s, approach to climate adaptation and mitigation.

Charlie attempts to shift the notion of sustainable growth as tuned to the maintenance of a carbon economy by presenting climate rectification and bioinfrastructure mitigation as new industries that offer modes of economic expansion better suited to the meaning of ‘sustainability’ as ‘enduring’ and ‘capable of long-term maintenance’. In his meeting with Strengloft and the unnamed president at the beginning of the trilogy, Charlie portrays these areas as ‘a growth industry with uncharted potential. It’s the future no matter which way you look at it’ (Robinson 2005: 164). Charlie’s policies underpin the public’s view of Phil Chase



as a prophet of climate change, despite Chase's pragmatic dismantling of Charlie's proposed legislation at the beginning of *Fifty Degrees Below*. When he is elected president and begins in *Sixty Days and Counting* to enact a wide-ranging, environmentally conscious platform, he commits the American people to a programme of sustainability based on three pillars: 'technology, environment, and social justice' (Robinson 2007b: 92). Technological solutions based on clean energy are central to this movement towards a sustainable future, but social justice – especially for women and children around the world – is essential, too, to address exponential population growth and its effects on maintaining a sustainable culture: 'So this is one of those situations in which what we do for good in one area, helps us again in another. It is a positive feedback loop with the most profound implications' (Robinson 2007b: 92). Conceptualising society in terms of these three pillars characterises it as a non-linear dynamic feedback system, a structure that draws on complexity theory and which Robinson aligns with the structural comedy. The trilogy is able to explore the relationships between ecological systems, climate change and climate mitigation by hybridising sf with the structural comedy to portray a fictional future in all its socio-political complexity.

In a series of blog posts that Chase addresses to the American people, he frames this movement towards sustainability as the creation of a permaculture, a dynamic culture that is able to adapt to change but which maintains the goal of long-term sustainability for future generations. Chase's utopian vision of a sustainable country displaced into the future is an attempt to re-orient American values by introducing an element of universality in space and in time; the work of creating a sustainable permaculture is dependent upon assistance to developing countries and an expansion of these values to the globe:

<q>Eventually I think what will happen is that we will build a culture in which no one is without a job, or shelter, or health care, or education, or the rights to their

own life. Taking care of the Earth and its miraculous biological splendor will then become the long-term work of our species. We'll share the world with all the other creatures. It will be an ongoing project that will never end. People worry about living life without purpose or meaning, and rightfully so, but really there is no need for concern: inventing a sustainable culture is the meaning, right there always before us. (Robinson 2007b: 516)

In contrast to carbon capitalism, which depends on unemployment in order to limit wage increases, this sustainable image of the future imagines an ongoing project of social justice, environmental stewardship and a responsibility to future generations. Because it is an ongoing process, the goal of reaching a sustainable future country is eternally deferred. It instead provides a constant motivating image to direct intervention in the present. Chase's platform is informed by the work of the NSF as they re-orient their practices around the project of developing a permaculture. Central to this vision of a feedback system between techno-science, politics and a concern for the biosphere is the project to establish science itself as a political actor embodied by practising scientists. Led by Frank, several members of the NSF establish the 'Social Science Experiment in Elective Politics', or SSEEP, which aims to institute a scientifically informed approach to interventions in society and politics.

Fundamental to the Science in the Capital trilogy is this bridging between science and politics and the orientation of this alliance towards the development of a permaculture. Despite the criticism levelled at the NSF for attempting to close the traditional divide between science and politics a divide that Frank traces to the alliance between science and the military during World War II and the formal separation of the military from the political sphere – he argues that '[s]cience isn't like the military. It's the solution, not the problem. And so it has to insist

on itself ... we have the only methods there are to deal with these global environmental problems' (Robinson 2005: 325).

The NSF's exploration of sustainable alternatives to the current carbon economy involves a broad-based approach and an interaction between several economic and scientific disciplines, but 'energy was at the heart of their problem' (Robinson 2007b: 237). Edgardo, a scientist centrally involved in drafting the SSEEP, identifies the system of foreign policy that ties carbon extraction, war and the arming of foreign nations and groups into a feedback system that underpins the contemporary global economy: 'we blew the fossil-fuel surplus on wars, and lost the chance to use a onetime surplus to construct a Utopian scientific society' (Robinson 2007a: 530). Rather than using the capital extracted from this system to bootstrap America towards a sustainable society, it was used to sustain an expansion of global markets to further increase the accumulation of capital. The NSF SSEEP committee reflect on an internal document commissioned by Andrew W. Marshall of the Pentagon, 'Imagining the Unthinkable', which outlines possible future scenarios in the event of abrupt climate change caused by the stalling the Gulf Stream (Schwartz and Randall 2003). This real-world Pentagon report exemplifies the use of future scenarios for risk assessment. The impact of this image of the future, however, does not extend to addressing the potential climate crisis. According to Edgardo's assessment,

<q>The World Bank's Extractive Industries Review Commission had recommended they cut off all future investment in fossil fuels, and move that same money into clean renewables. But in the end the World Bank board voted to keep their investment pattern the same, which was ninety-four percent to fossil fuels and six percent to renewables. (Robinson 2007a: 81)</q>

<fo>Their task is clear: in the face of the evidence of abrupt climate change, they must overcome the infighting between agencies with interests in different forms of energy production in order to harness new technologies – ‘some combination of sunlight, wind, wave, tide, currents, nuclear, and geothermal power’ (Robinson 2007b: 243) – to shift the economy from its carbon base to a flexible portfolio of types and degrees of clean energy.

Much of the NSF’s activity to address abrupt climate change involves building an infrastructure that would link disparate research groups engaged in various aspects of the movement towards a permaculture. This top-level organisation of scientific approaches to the climate crisis is an essential element of the NSF’s re-orientation towards political intervention. Anna’s approach to sustainability is focused on evaluating specific scientific projects aimed at addressing various aspects of the climate crisis, in marked distinction to Chase’s broad-based appeal to the American public, yet both are organised around an empowering utopian image of progress towards a sustainable future. Anna delves into the large number of projects that had previously been instituted, but which were unable for several reasons to sustain their inquiry: she ‘was finding the fossil remnants of various foreign-aid programs that had been focused on science infrastructural proliferation, as she called it. Some of these were inactive because they were funding starved; others had been discontinued’ (Robinson 2007a: 529). Much of the work of developing a permaculture need not be invented *ex nihilo*, but rather a judicious delving into the library of scientific research and infrastructure management, along with the stitching together of a series of approaches in response to the image of the future that Chase inaugurates and that the NSF constructs, offers an avenue for the willed effort that the creation of a permaculture requires.

This delving into the library of past projects is part of an experimental approach to technological methods for addressing climate change. The most extensive series of interventions imagined include several geoengineering projects that bring the principles of

terraforming that Robinson explores in the Mars trilogy to Earth. The implications of geoengineering as a form of climate rectification and mitigation – the fact that these approaches offer direct intervention with the climate but are also experimental and potentially disastrous – is made immediate by locating them on Earth. Such large-scale efforts at direct climate mitigation are displaced into the future in the form of proposed research projects, such as Frank’s suggestion for the modification of patterns of precipitation by ‘flooding the world’s desertified lake basins’, a task with ‘[u]ltimate effects [that are] impossible to predict’ (Robinson 2007b: 242). One exception is the restarting of the stalled Gulf Stream, unusual for being one of the few problems amenable to direct intervention in this narrative, and in that sense it is ‘an anomaly’ (Robinson 2007a: 623). Similar to the co-opting of capitalism to bootstrap towards a new energy economy based on renewables, Frank draws on the skills of the American Army Corps of Engineers as one of few organisations with the resources and the capability to enact these large-scale engineering projects. Frank reflects that:

<q>The world was their sandbox. Castles and moats, dams and bulwarks ... they had drained and then rehydrated the Everglades, they kept New Orleans dry, they had rerouted all the major rivers, irrigated the West, moved mountains. You could see all that right there on the general’s happy face. Stewardship, sustainability – fine! Rack but not ruin! Working for the long haul just meant no end, ever, to their sandbox games.

‘No deep ecologists in the U.S. Army Corps of Engineers, I guess.’ (Robinson 2007a: 215)</q>

The 2005 Hurricane Katrina and the failure to address its material, social and economic impact in the immediate aftermath of the disaster highlights limits to the army's capacity to mitigate the effects of extreme weather events and adds an additional unintended resonance to the army's effectiveness in future scenarios. Katherine Buse has explored how *Sixty Days and Counting* responds to Hurricane Katrina and the threat that it poses for American conceptions of the Nation, pointing out that 'Americans saw the conditions caused by the storm and recognized the conditions of the Global South, the conditions of the anti-progressive swamp, on American soil' (2011: 46). Portrayals of landscapes undergoing change highlight the traditional system of value that such environments are made to represent. Transformations to these environments are accompanied by a shift of socio-cultural values that illustrates the networked relationships between culture and the environment. Stewardship and sustainability provide a new rationale for the extension of the view of Earth as a sandbox for manipulation. In *Sixty Days and Counting*, General Wracke explains that '[t]he Corps has always done things on a big scale. Huge scale. Sometimes with huge blunders', and optimistically claims that '[l]ots of things are reversible, in the long run. Hopefully this time around we'll be working with better science. But, you know, it's an iterative process' (Robinson 2007b: 214).

In discussion with the Office of Management and Budget, Frank discovers that, according to their costing, 'they could swap out the electricity-generating infrastructure for about three hundred billion dollars—an astonishing bargain' (Robinson 2007b: 339). More affordable, however, is an image of a geoengineered future based on sustainable agriculture. This project is framed as a new expansion into the American West and one possible answer to rising unemployment: '[i]n other words they needed more cowboys, incredible though that seemed ... [t]he emptying high plains – you could repopulate a region where too few people meant the end of town after town. Landscape restoration – habitat – buffalo biome – wolves

and bears. Grizzly bears. Cost, about fifty billion dollars' (Robinson 2007b: 339). Landscape restoration and the rewilding of the American wilderness, along with the possibility of reviving images from a Romantic past, are linked to sustainability. Characteristically, despite the resistance and conflict between government agencies, Frank's involvement in the imagining of new images of the future leads him to discover many possible alternatives to the challenges climate change brings. Phil Chase is central to the reframing of these challenges, not according to catastrophic images of the future, but in terms of a striving towards a utopian goal that is, in Wracke's words, 'an iterative process' (Robinson 2007b: 214). This utopia of process depends on coupling science and politics and thus giving those who practise science the ability to contribute effectively to establishing an informed approach to policy. The goal of reaching that 'country called sustainability' involves a process that Diane summarises as 'first finding bridge technologies, moving away from what they had now while still using it – then the next real thing, the next iteration on the way to a completely sustainable technology' (Robinson 2007b: 237).<sup>1</sup> The past, then, is yoked to an image of the future that gives it new shape, allowing transformations that answer to the needs of a present undergoing severe change. Yet the 'next iteration' towards sustainability cannot be imagined. Instead, the inspiring image of a country called sustainability substitutes a clear path towards that ideal for an image of the future that operates as a guiding principle and a conceptual contrast to contemporary approaches to climate change and sustainability.

Robinson's *Science in the Capital* trilogy continues the inquiry into environmentalism, ecopolitics, and sustainability that his groundbreaking *Mars* trilogy engages. Considering the impact of the future on science, society and politics on Earth allows Robinson to reconnect many of the issues explored in that trilogy directly to the infrastructure – the life-support system – of Earth. The *Science in the Capital* trilogy imagines a future that gestures towards clean energies as a replacement for carbon capital as a foundation for a new

economic system. The depiction in this sf narrative of an alternative approach to climate change helps clarify the demands that contemporary images of the future place upon our societies and on us as individuals. It also helps us think around the complexity of sustainability through a narrative form that translates speculation about the future into an imagined experience of living in the immediacy of abrupt climate change and of working towards the goal of sustainability. In many cases, the strategies and policies explored in these texts are stop-gaps, bridges towards sustainability that aim to preserve a life-support system that is basic to nurturing survival but which requires the management and transformation of an inherited economic system based on carbon.

The trilogy depicts many reflections on oil and on ways to sequester and manage atmospheric carbon. These technological considerations are given a utopian cast through the ‘Contract with America’ that Chase adopts, itself a reformulation of the SSEEP. The blog posts that Chase publishes signify an alliance between science and a socially-minded politics that presents itself as truly accountable to the public. Diane and Frank’s growing politicisation over the course of the trilogy allows them to create an infrastructure to deal with climate change through a deliberate overhaul of funding practices and the sifting through the library of old scientific programmes. The ‘Contract with America’ is a vision of a permaculture that expresses the administration and the NSF’s political values. It helps to direct their actions in their efforts to re-orient society toward a sustainable future. The *Science in the Capital*’s approach to sustainability is rooted in the celebratory and fearful responses to societal change that the image of a catastrophically-damaged future biosphere portends. Through an exploration of the social and technological complexity involved in addressing the climate crisis, Robinson does not offer a prediction so much as an image around which society might circle in an ongoing, iterative process of environmentally oriented socio-political transformation. This socially conscious element is symbolised by an



image of a future country called sustainability that exceeds strictly national boundaries. It instead mobilises the structural comedy in order to gesture to a future in which society is restored by virtue of a shared movement towards sustainability.

## <A>Notes

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<sup>1</sup> The discourse of transitional, bridge technologies is an important feature of the debate surrounding fracking and represents an application of sustainable images of the future to preserve an untenable carbon-based infrastructure. While the discourse of a transition to a sustainable future is now an accepted element of American governmental policy – as recognised by the COP 21 Paris Agreement – the political, social and scientific approach to developing truly sustainable solutions to climate change outlined in the *Science in the Capital* trilogy provides an implicit critique of the COP 21 process, which excluded oppositional voices and thus narrowed the range of beneficiaries factored into solutions for climate change. Article 14, which states that assistance should be given to countries in the Global South disproportionately affected by climate change, was shifted to the preamble of the agreement, thus making it non-binding and thus ameliorating the effectiveness of the agreement for tackling climate change at a global level.

## <A>References

Blass, Eddie 2003. 'Researching the Future: Method or Madness?' *Futures* 35: 1041–54.

Boyer, Dominic and Imre Szeman 2014. 'The Rise of Energy Humanities: Breaking the Impasse'. *University Affairs*. 12 February. [www.universityaffairs.ca/opinion/in-my-opinion/the-rise-of-energy-humanities/](http://www.universityaffairs.ca/opinion/in-my-opinion/the-rise-of-energy-humanities/). Accessed 20 February 2017.

- Buse, Katherine 2011. “It is Our Fate to Stay Out Here:” America from Swamp to Savannah and Back Again’. Undergraduate dissertation. Durham, NC: Duke University. Accessed 18 June 2015.
- Butler, Andrew 2014. ‘Futurology’. In *The Oxford Handbook of Science Fiction*. Ed. Rob Latham. Oxford: Oxford University Press, 513–23.
- Clarke, I. F. 1971. ‘Prophets and Predictors: 1: The Utility of Utopia’, *Futures* 3 (4): 196–401.
- Davis, Doug and Lisa Yaszek 2012. ‘Science’s Consciousness: An Interview with Kim Stanley Robinson’, *Configurations* 20 (1/2) (Winter–Spring): 187–94.
- Gernsback, Hugo 1926. ‘A New Sort of Magazine’, *Amazing Stories* 1 (1): 3.
- Johns-Putra, Adeline 2010. ‘Ecocriticism, Genre, and Climate Change: Reading the Utopian Vision of Kim Stanley Robinson’s Science in the Capital Trilogy’, *English Studies* 91 (7): 744–60.
- Kilgore, Douglas De Witt 2012. ‘Making Huckleberries: Reforming Science and Whiteness in Science in the Capital’, *Configurations* 20 (1/2): 89–108.
- Lem, Stanislaw 1986. ‘Metafuturology’, *Science Fiction Studies* 13: 261–71.
- Luckhurst, Roger 2009. ‘The Politics of the Network: The Science in the Capital Trilogy’. In *Kim Stanley Robinson Maps the Unimaginable: Critical Essays*. Ed. William J. Burling. North Carolina: McFarland, 170–80.
- McCaffery, Larry 1991. ‘An Interview with Jack Williamson’, *Science Fiction Studies* 54.18 (2). [www.depauw.edu/sfs/interviews/williamson54interview.htm](http://www.depauw.edu/sfs/interviews/williamson54interview.htm). Accessed 20 February 2017.
- Markley, Robert 2012. “How to Go Forward”: Catastrophe and Comedy in Kim Stanley Robinson’s Science in the Capital Trilogy’, *Configurations* 20 (1/2): 7–21.
- Miles, Ian 1990. ‘Fiction and Forecasting’, *Futures* (January/February): 83–91.

- Miles, Ian 1993. 'Stranger than Fiction: How Important is Science Fiction for Futures Studies?' *Futures* (April): 315–21.
- Milner, Andrew 2012. *Locating Science Fiction*. Liverpool: Liverpool University Press.
- Otto, Eric 2012. *Green Speculations: Science Fiction and Transformative Environmentalism*. Columbus: Ohio State University Press.
- Pohl, Frederik 1996. 'Thinking about the Future', *The Futurist* (September-October): 8–12.
- Polak, Fred 1973. *The Image of the Future*. New York: Elsevier.
- Robinson, Kim Stanley 1984. *The Wild Shore*. New York: Tom Doherty.
- Robinson, Kim Stanley 1989. *The Gold Coast*. London: Futura.
- Robinson, Kim Stanley 1990. *Pacific Edge*. London: Unwin Hyman.
- Robinson, Kim Stanley 1996a. *Red Mars*. London: Voyager.
- Robinson, Kim Stanley 1996b. *Green Mars*. London: Voyager.
- Robinson, Kim Stanley 1996c. *Blue Mars*. London: Voyager.
- Robinson, Kim Stanley 1997. *Antarctica*. London: Voyager.
- Robinson, Kim Stanley 2000. *The Martians*. London: Voyager.
- Robinson, Kim Stanley 2003. *The Years of Rice and Salt*. London: HarperCollins.
- Robinson, Kim Stanley 2005. *Forty Signs of Rain*. New York: Bantam.
- Robinson, Kim Stanley 2007a. *Fifty Degrees Below*. New York: Bantam.
- Robinson, Kim Stanley 2007b. *Sixty Days and Counting*. New York: Bantam.
- Robinson, Kim Stanley 2012. *2312: A Novel*. London: Orbit.
- Robinson, Kim Stanley 2013. *Shaman: A Novel of the Ice Age*. London: Orbit.
- Schroeder, Karl 2005. *Crisis in Zefra*. Department of National Defence: Ontario.
- [www.kschroeder.com/foresight-consulting/crisis-in-zefra/Crisis-in-Zefra-e.pdf](http://www.kschroeder.com/foresight-consulting/crisis-in-zefra/Crisis-in-Zefra-e.pdf).
- Accessed 20 February 2017.

Schwartz, Peter and Doug Randall 2003. 'An Abrupt Climate Change Scenario and its Implications for United States National Security'. Climate Institute.

<https://fas.org/irp/agency/dod/schwartz.pdf>. Accessed 18 June 2015.

Steinmüller, Karlheinz 2003. 'The Uses and Abuses of Science Fiction', *Interdisciplinary Science Reviews* 28 (3): 175–8.

Wells, H. G. 1913. *The Discovery of the Future*. New York: B. W. Huebsch.

[www.gutenberg.org/cache/epub/44867/pg44867.txt](http://www.gutenberg.org/cache/epub/44867/pg44867.txt). Accessed 20 February 2017.

Williamson, Jack 1928. 'Scientifiction, Searchlight of Science', *Amazing Stories Quarterly* 1 (4): 435.