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POWERING THE FUTURE: ENERGY RESOURCES IN SCIENCE FICTION AND FANTASY

Oil and Calories: Energy Paradigms in Paolo Bacigalupi's *Ship Breaker* and 'The Calorie Man'

Karl Kristian Swane Bambini

Independent scholar, NO

kksbambini@gmail.com

This article applies an energy lens to Paolo Bacigalupi's *Ship Breaker* (2010) and 'The Calorie Man' (2005), relying on contemporary environmental readings of Marx to explore their unsustainable metabolic relationship with nature. Situating these texts as critical dystopias, this article maps the dystopian and utopian extrapolations Bacigalupi deploys in his future post-oil society, specifically relating to the infrastructure of late energy transport and energy-related commodities. While Bacigalupi utilises ecologically-oriented genetic and industrial technologies in these texts, his work emphasises that technological solutions alone will not be able to heal our unsustainable metabolism of nature. Bacigalupi enters into cultural debates on the Anthropocene and the Great Acceleration by cognitively estranging animal and human labour, ecological ships, and genetically modified crops, while simultaneously highlighting the exploitation of both people and the environment in late capitalism. This article also explores the resultant metabolic rifts evident in both texts, drawing specific attention to the destabilised aspects of nature that elude capitalistic control and trouble spaces of production and profit, including genetically modified creatures like cheshires, and more 'natural' elements like storms and sea-level rise due to global warming. The article ultimately seeks to prove that *Ship Breaker* and 'The Calorie Man' mobilise a dystopian framework to highlight the imbalanced metabolism of energy production under capitalism, moving the reader towards a more realisable social, as opposed to technological, change.

Introduction

As part of an ‘environmental turn’, scholars have in recent years returned to Marx’s writings on metabolism (*Stoffwechsel*) to describe how our material relationship with nature occurs at numerous sites of entanglement in the environmentally unsustainable era of neoliberal capitalism (WReC, 2015; DeLoughrey, Didur & Carrigan, 2015; Foster, Clark & York, 2010; White, Rudy & Gareau, 2016). Combined with discussions of contemporary capitalism’s ecological imperialism and accelerated degradation of environmental systems, species-life, and ‘natural’ resources, scholarly readings of metabolic rift have returned to a Marxist vocabulary via debates concerning fossil fuel dependence and questions of resource limits. Thus far, however, discussions have had a limited traction in speculative literary studies and this article sets out to offer a reading of energy paradigms in Paolo Bacigalupi’s *Ship Breaker* (2010) and ‘The Calorie Man’ (2005)¹ in order to consider what such works have to contribute to the discussion concerning our metabolic relationship with nature. These texts, I will argue, cognitively estrange our relationship to energy resources today principally by exploring the post-oil society of tomorrow. Their post-oil setting provides each text with a unique energy-related focus. Both texts represent the uneven and conflicting infrastructure of ‘late oil’ energy transport, with ‘The Calorie Man’ depicting a society that produces and exports ‘calorific’ energy and *Ship Breaker* portraying a world of derelict oil tankers and ecological clipper ships. In such a fashion both texts often blur the energetic boundaries of utopian and dystopian possibilities, with capitalism – especially late-oil capitalism – often represented as the corrupting mode of production. While *Ship Breaker* is a young adult novel and ‘The Calorie Man’ a short story, both texts are set in the future United States, restricting and localising the analysis to one geographic area.

This article suggests a re-reading of Bacigalupi’s texts via an energy lens, contributing to a small but growing set of scholarly readings of Bacigalupi’s developing oeuvre.² As I will argue, Bacigalupi’s dystopian estrangements move us

¹ Both texts will subsequently be referred to as (*SB*) and (*CM*) respectively.

² For scholarship on *The Windup Girl*, see Hageman (2012), Donnelly (2014), Selisker (2015), King (2016) and Schmeink (2016); for scholarly analysis of *Ship Breaker*, see Pirzadeh (2015) and Hicks (2016).

beyond linear critiques of environmental exploitation into more complex debates of how capitalism can create, as well as simultaneously usurp, utopian hopes of social and technological advancement in a world beyond oil. Focussing on Bacigalupi's representation of the relationship between animal and human labour, alongside ecological ships and genetically modified (GM) crops, I will demonstrate that what Darko Suvin calls the 'cognitive estrangement' (Suvin, 1979: 4) of science fiction (SF) narratives, which he argues gives the genre its uniquely political cast,³ is effected through a reconsideration of metabolic relations. Specifically, Bacigalupi's depiction of various kinds of rifts – massive storms, sea level rises, and other by-products of human tinkering such as bioengineered animal hybrids – are devastating consequences of late capitalism's ongoing exploitation of ecological, as well as social, systems.

This article is not the first to study energy in relation to Bacigalupi's fiction. Sean Donnelly's peak-oil reading of *The Windup Girl* (2009), for example, emphasises our inability to imagine a bright future beyond petro-capitalism. Heather J. Hicks has offered up an energy-related reading of *Ship Breaker* as a *bildungsroman* that navigates between 'petromodernity' and what she calls 'retromodernity', a period based on 19th-century inequalities merged with the hopefulness of green technologies (Hicks, 2016: 139). By extending such recent scholarly attention to paradigms of energy production and transport in *Ship Breaker* and 'The Calorie Man', I hope to demonstrate that Bacigalupi's dystopian imaginaries can be identified as locating a potentially positive post-oil future beyond capitalism's ecocatastrophic ravages; but that in order to imagine such a future, the reader is – somewhat paradoxically – encouraged to reflect upon the impossibility of petro-capitalism as the dominant mode of production. In *Ship Breaker* and 'The Calorie Man', Bacigalupi establishes a dystopian framework to highlight the imbalanced metabolism of energy production

³ We should note that Suvin's term remains both influential within SF studies, as well as controversial; in part, because of his insistence that SF is the 'literature of cognitive estrangement' which uses estrangement to effect a political critique of its own socio-political moment, as opposed to the politically conservative sub-genres of fantasy and myth. Whilst I acknowledge criticisms of Suvin's privileging of SF over fantasy – such as Miéville (2009) and Williams (2014) – in this article, I will adopt a broadly Suvinian reading in the tradition of Moylan (1986, 2000, 2003) and Freedman (2000).

under capitalism, indicating a reorientation of utopian possibility towards the question of social, as opposed to technological, change.

The first section of the article situates *Ship Breaker* and 'The Calorie Man' as critical dystopias, which Tom Moylan defines as 'anti-capitalist, democratically socialist, and radically ecological in [their] overall stance' (Moylan, 2000: 190). I will then consider how these two texts draw attention to broader emergent debates on the Anthropocene and the Great Acceleration; debates which remind us that as a mode of production solely focussed on the endless extraction of surplus value, capitalism places men into conflict with both themselves and with nature (as outlined in Marx's analysis of alienation in the *Economic and Philosophic Manuscripts of 1844*). In my third section, I will apply recent environmental readings of Marx's conception of metabolism to Bacigalupi's texts, specifically considering how these texts discuss the exploitation of both labour and the environment under capitalism. My fourth section will consider some of the genetic and industrial technologies Bacigalupi uses in both texts, showing that technological solutions alone will not be able to heal the rifts in our metabolism of nature. Finally, the last section will examine points of ecological resistance that our reading of metabolic relations can help to uncover in these two works by Bacigalupi, which reveals how each text acts as a speculative near-future foil to the smooth flow of twenty-first-century capitalist accumulation, concluding with a brief discussion of each text's ambiguous, or 'critical' (Moylan, 1986: 10) utopian ending.

1. Dystopian Settings and Utopian Horizons

In *Archaeologies of the Future* (2005), Fredric Jameson details three categories of dystopia: the anti-utopia, the critical dystopia, and the apocalypse. While several critics have applied the 'critical dystopia' label to Bacigalupi's work (including Donnelly [2014: 158] and King [2016: 6]), few have considered his work in light of apocalypse and anti-utopia; a fruitful kinship worth exploring. As Bacigalupi's oeuvre to date repeatedly depicts dramatic ecological and social devastation, it is tempting to read his works as apocalyptic. However, as Jameson states, the original Apocalypse 'includes both catastrophe and fulfillment, the end of the world and

the inauguration of the reign of Christ on earth, Utopia and the extinction of the human race all at once' (Jameson, 2005: 199). Jameson's reminder of the biblical origins of Apocalypse in the vision of John in Revelation reminds us of the twin processes of both catastrophe as well as revelation that the biblical Apocalypse combines: something that Bacigalupi's work arguably fails to achieve in its focus on the more modern, secularised understanding of apocalypticism as destruction and catastrophe (DiTommaso, 2014: 480). Hicks does refer to *Ship Breaker* as an Apocalypse, but only so far as to show that the Biblical rebirth leads to 'retromodernity', a period categorised by both green technologies and large economic inequalities (2016: 151, 161). As I will discuss below, if there is a revelation taking place, then it is symbolically based around a recovering, if radically altered, ecology. Put bluntly, there is no better human society looming on the post-apocalyptic horizons of Bacigalupi's narratives.

Jameson's second type of dystopia, the anti-utopia, might be a more productive analytical category to bring to bear on Bacigalupi's works, given its function as revealing the flaws in utopian planning and 'warn[ing] against Utopian programs in the political realm' (Jameson, 2005: 199). Classic SF novels like Zamyatin's *We* (1921) and Orwell's *Nineteen Eighty-Four* (1949) fall into this category as they immerse the reader in supposedly utopian worlds, only to quickly strip the illusion away and reveal manipulative totalitarian states. While capitalism does serve as the political framework from which select utopian ecological technologies emerge, particularly relating to post-oil adaptability, reading Bacigalupi's work as anti-utopian is problematic as capitalism has no pretensions to universal equality but, rather, pits competitive individuals in a context of environmental precarity and resource scarcity against one another. However, capitalism is still laced with a strong utopian imaginary in *Ship Breaker* and 'The Calorie Man', and while it only truly benefits the wealthiest corporate members of either society, the working classes are very much influenced by the hope of material advancement, a theme both texts seek to critique.

Jameson's third category of the 'critical dystopia' names a corpus of dystopian texts that also, paradoxically, offer readers a 'politically enabling stance' based on

'Utopian ideals' (Jameson, 2005: 198). Unlike the anti-utopia, the critical dystopia contains utopian elements within the storyworld that glimmer with utopian possibility. In defining the critical dystopia, Jameson acknowledges the significance of Tom Moylan's definitive analysis of this sub-genre in *Scraps of the Untainted Sky* (2000), as well as the collected essays in Raffaella Baccolini and Moylan's edited volume, *Dark Horizons* (2003). In *Dark Horizons*, Baccolini and Moylan state that critical dystopias have a 'utopian impulse' and are 'self-reflexively critical as they retrieve the progressive possibilities inherent in dystopian narrative' (Baccolini & Moylan, 2003: 7–8). This utopian impulse can be identified in a range of different narrative properties, including utopian enclaves (defined as 'oppositional vector[s] within and against the dystopian society' [Moylan, 2003: 141]), broader collective or political resistance to the storyworld's status quo, the formal ambiguity of open endings, and the utopian possibilities 'lurking in the iconic details of their alternative worlds' (Moylan, 2000: 199). As Moylan states, critical dystopias thus 'adopt a militant stance that is informed and empowered by a utopian horizon that appears in the text—or at least shimmers just beyond its pages' (Moylan, 2000: 196). Bacigalupi's work, I would argue, mobilises such a shimmering horizon in its green politics, which can be identified as distinctly utopian when contrasted against the ecological devastation of his settings. He achieves this utopian effect without crossing the line into utopian programming or apocalyptic rebirth. Rather, these works utilise a recognisably dystopian generic framework as a backdrop, precisely in order to highlight the ecological and social possibilities that become possible once the narrative world is understood to be dystopian; that is, once Bacigalupi's novels enact their Suvinian 'cognitive estrangement' from the real-world dystopia of late capitalist exploitation that is Bacigalupi's, and his contemporary reader's, own lived present.

In 'The Calorie Man', the central cognitive estrangement is the replacement of food (calories) for oil as the dominant global energy source, being used to power everything from human labour to boat engines and factories. The story's dystopian setting is made visible through endless fields of genetically engineered monoculture

crops, all of which are factory farmed and tightly controlled for maximum profit.⁴ The narrative is set in a post-oil world that has endured a complete financial and production collapse, with the economy reconfigured around the exchange of calories and the strict regulation of food production. GM crops are developed to produce large amounts of caloric energy: a patented biotechnology jealously guarded by the corporations that developed it. The narrative focuses on Lalji, whose attempt to smuggle a geneticist out of one of the agricultural corporations reveals a secret agricultural utopia, in which 'pirated' monoculture crops have been hacked by politicised geneticists ('genehackers') to reverse seed sterility and reintroduce plant reproduction. Lalji discovers that these seeds could be used to break the major calorie monopolies. When Lalji and his companion Creo first discover the geneticist Charlie Bowman, the 'calorie man' of the story, they are therefore introduced to a polycultural mode of farming involving many different crops, some long thought extinct. This farm functions as a utopian enclave, or as Moylan defines it, an anti-corporate 'oppositional vector', hidden among the monoculture fields. Lalji and Creo gasp in amazement as:

Sunflowers waved over their heads. A jungle of broad squash leaves hugged their knees. Dry corn stalks rattled in the wind. Bowman looked back at their surprise, and his smile, so hesitant and testing at first, broadened with unrestrained pleasure. He laughed and waved them onward, floundering through a garden of flowers and weeds and produce, catching his torn hemp cloth on the dried stems of cabbage gone to seed and the cling of cantaloupe vines. Creo and Lalji picked their way through the tangle, wending around purple lengths of eggplants, red orb tomatoes, and dangling orange ornament chillies. Bees buzzed heavily between the sunflowers, burdened with saddlebags of pollen. (*CM*, 16)

⁴ For a reading of gene modification in *The Windup Girl*, see Selisker (2015) and Schmeink (2016); for gene modification relating specifically to agriculture in *The Windup Girl* and 'The Calorie Man', see King (2016).

With its plant variety, the sunflowers, squashes, corn, cabbages, cantaloupes, tomatoes and chillies of Bowman's farm reveal a vision of ecological alterity: in contradistinction to the bioengineered sterility of the industrial-scale GM agribusiness, the calorie man's hacking defiantly subverts the dystopian status quo that is the post-oil capitalist energy hegemony in the world of the story.

In *Ship Breaker*, Bacigalupi imagines a different kind of post-oil future that is no less dystopian in its corporatic logic. Nailer and Pima work as scavengers on Bright Sands Beach, breaking down oil-burning ships and oil tankers in abysmal working conditions. After a massive storm, they encounter the sole survivor of a wrecked clipper, the rich corporate heiress Nita, who is fleeing from her corrupt uncle. With the warrior 'half-man' (a dog/man hybrid) Tool, Nailer, and Nita travel to the Orleans to reunite Nita with her father. However, on arrival Nita is captured and Nailer joins a piratical voyage to save her, ultimately joining her social circle at the end. The novel offers the 'deeply negative portrayal of the brave new world of late-twentieth-century capitalism' that Moylan ascribes as the privileged function of the critical dystopia (Moylan, 2000: 197) and contrasts this with a utopian horizon: the clean technology embodied in advanced clippers (sailing ships). Nailer's astonishment at their utopian potential is evidenced in his survey of a wrecked clipper after a massive storm. The clipper lacked both the soot and rust of older ships, and had not 'a drop of oil leaking, despite the shattered hull' (*SB*, 80). Nailer describes it as a 'machine angels had built'. As Hicks argues (2016: 150–1), Bacigalupi's ecological critique is unambiguously established in the utopian counterpoint of the sleek lines and spotless hull of this clipper, which is contrasted with the older oil-burning ships:

Back at the ship-breaking yards, the old tankers and freighters were nothing in comparison, just rusting dinosaurs. Useless without the precious oil that had once fueled them. Now they were nothing but great wallowing brutes leaking their grime and toxins into the water. Reeking and destructive when they'd been created in the Accelerated Age and still destructive even after they were dead. (*SB*, 80)

The ships of the novel's petro-capitalist 'Accelerated Age' are described as clunky, polluting, and outdated, particularly unsuited for a world without oil. The juxtaposition of ecological ships against a polluted dystopian background thus reinforces the utopian nature of clean wind energy and emphasises the hope of an ecologically adaptable and sustainable future.

Extrapolation plays a key role in Bacigalupi's dystopian fiction because it implies a historical and often causal connection between the writer's present and the hypothetical future of the SF text. As Darko Suvin states, extrapolative estrangement 'has come to be considered as starting from certain cognitive hypotheses and ideas incarnated in the fictional framework and nucleus of the tale' and 'seems based on direct, temporal extrapolation and centered on sociological (that is utopian and anti-utopian) modeling' (Suvin, 1979: 40–1). Both *Ship Breaker* and 'The Calorie Man' are motivated by the dystopian extrapolation of environmental catastrophe that has been caused by unimpeded, fossil-driven capitalism. In this sense, both texts hypothesise a tipping point in society's future where the ecological impacts of global warming move from existential threat to concrete reality; including sea-level rise, temperature increases, melted icecaps, and massive storms.

These weather-related dystopian extrapolations incorporate Bacigalupi into a growing body of literature preoccupied with climate change, now commonly known as 'cli-fi'. As Sarah Stankorb explains, '[cli-fi] offers a peek into the (often not so distant) future; by entering a fictional, altered world and imagining everyday life in a hotter, more politically fractious, extreme planet, readers can come to grips with climate change in ways that extend beyond data and charts' (Stankorb, 2016). Bacigalupi's incorporation into this new sub-genre places him alongside authors like Hamish McDonald, Julie Bertagna, Kim Stanley Robinson, Saci Lloyd, and Margaret Atwood, among others. These are all authors that warn against climate-related catastrophe by tying their dystopian settings to concrete human actions in the narrative past (the writer's/reader's present), which have led to their catastrophic narrative present (the writer's/reader's near-or distant-future).

2. The Great Acceleration – Self-interest vs. Sustainability

Bacigalupi's usage of the term 'Accelerated Age' to describe the era of heavy industrialisation in *Ship Breaker* names a central concept in his dystopian settings and a logical part of his broader project of extrapolation. The idea crops up in most of his dystopian work and is referred to as the 'Expansion' in 'The Calorie Man'. Both the Accelerated Age and the Expansion reference the period of time prior to the narrative setting, when oil was a prolific commodity and key driver of global growth. These terms are a specific cultural reference to a very real idea, namely the 'Great Acceleration'. This is historicised as a period of rapid socio-economic development from the 1950s onwards; a period we still live in today. In *Facing the Anthropocene: Fossil Capitalism and the Crisis of the Earth System* (2016), Ian Angus observes that '[t]he term Great Acceleration quickly caught on among Earth System scientists as a descriptive name for the period of unprecedented economic growth and environmental devastation since World War II' (Angus, 2016: 43). First appearing as a term used in a 2005 meeting of environmental historians, the Great Acceleration expresses two correlational trends: unprecedented global economic growth and the acceleration of ecological damage, including major coral reef loss, dam building, deforestation, increased CO₂ atmospheric concentration, mass extinction, over-use of fertilisers, and the explosion in fossil fuel use (Angus, 2016: 39–43).

Bacigalupi's dystopian setting is, in many ways, a direct extrapolation of the Great Acceleration. One of the most significant extrapolations in *Ship Breaker* and 'The Calorie Man' is the continued extraction and use of oil, which has been almost entirely consumed by the near-future time in which both stories are set. In 'The Calorie Man', oil's decline as a cheap energy source leads to mass social unrest and anger, with multinational oil companies like Conoco being 'subjected to the angry mobs of the energy Contraction' (*CM*, 13). The 'energy Contraction' marks the imagined end of the Great Acceleration where cheap oil can no longer fuel global growth. This is, finally, the predicted outcome of the 'peak oil' moment formalised in the 1970s, an outcome continually deferred in the era of unconventional, or 'tough' oil that followed (which we still inhabit), where oil becomes scarcer, harder to extract,

costlier to produce, and eventually runs dry. In his essay on *The Windup Girl*, Donnelly states that Bacigalupi's text 'foregrounds peak oil anxiety in its imagining of a world bereft of oil as an available global resource, while also envisioning a tentative revival of the geopolitical dynamics of petro-capitalism, enacted by corporations which attempt to regain the American hegemony lost during the "petroleum Contraction"' (2014: 158). Our current continuing reliance on fossil fuels, then, remains at the heart of a cultural debate, into which Bacigalupi's fiction seeks to intervene. His texts unambiguously comment upon the conflict between the societal urge for economic growth and the calamitous ecological effects of a fossil fuel economy. As Angus puts it: 'The Great Acceleration would not have been possible without cheap oil—as a commodity in its own right, as the raw material for plastics and other petrochemicals, as the enabler for high-energy manufacturing processes, and above all as the fuel for hundreds of millions of cars, trucks, ships, and planes' (2016: 148). Bacigalupi's fiction takes a firm stance in this debate, warning against trends that fail to confront the ongoing global consequences of the Great Acceleration.

The treatment of Lalji's companion Creo in the 'The Calorie Man' exemplifies this stance. Creo yearns for the good old days of the Expansion: 'If I was lucky, I would have been born during the Expansion and we'd still be using gasoline' (*CM*, 8). His wish for an easy and powerful gasoline engine to carry both himself and Lalji upstream registers contemporary society's ecologically toxic reliance on easy access to oil. Bacigalupi's narrative extends this correlation by portraying Creo as a relatively uncritical consumer (e.g. he prefers to eat 'SoyPRO' over normal fruit [*CM*, 17]) and as uncaring of animal welfare (he shoots cheshire cats, a GM species that has gone feral, for money [*CM*, 15]). With his dubious morals and self-interest-edness, Bacigalupi invites the reader to feel uneasy about Creo and consequently question the character's support for Expansionist trends. If we understand the Great Acceleration and peak oil as elements of a larger debate about the Anthropocene, then Bacigalupi enters it by causally imbricating his dystopian settings within the sphere of human activity. In *Ship Breaker*, there exist 'Siberian and Inuit pirates' that are 'bitter enemies of the trading fleets and perfectly willing to kill or sink an entire

cargo as revenge for the drowning of their own ancestral lands' (*SB*, 257). This is a world where the icecaps have melted and polar bears no longer exist. The narrative lays the root blame firmly at the feet of human agency and globalised capital, as opposed to genre staples of some ecocatastrophic narratives that focus on single event drama such as a freak meteor strike or volcanic eruption. The latter tend to overshadow Anthropogenic readings of human activity as enacting such shifts in the planet's geologic development.

Read in relation to the growing sub-genre of cli-fi, Bacigalupi's critical dystopian texts can be identified as contributing a valuable speculative imaginary in which to visualise the worst fears of Anthropocenic change, understood as a new age of human involvement with the planet. While we can isolate certain ecological warnings and utopian hopes in Bacigalupi's fiction, poverty and economic disparity also feature strongly in his work, often serving as a corollary to anthropogenic climate change. Some examples include climate refugees in 'The Tamarisk Hunter' (2006), 'Shooting the Apocalypse' (2014), and *The Water Knife* (2015), to the slums of Bangkok as depicted in 'Yellow Card Man' (2006) and *The Windup Girl*. Characters that live in poverty often have personal or economic interests that come into conflict with environmental concerns (like the tamarisk hunter's job of poisoning tamarisks), complicating any clear distinctions between ultimate goods or dystopian evils. Creo's nostalgic yearning for a gasoline engine (discussed above) may set the personal interests of one character in conflict with a broader consideration of the environment, for example, but in so doing recognises the multiple interconnections between social and environmental actions. While industrial capitalism and monoculture farming are easy targets of dystopian writing, both *Ship Breaker* and 'The Calorie Man' also detail concerns of how capitalism subordinates people into roles that work against environmental sustainability, either via ideologies of consumerism or economic necessity. These roles are often exposed by the expression of selfish hopes or even naïve wishes for the future, which can be considered more as individually-projected 'utopias' framed against a broader dystopian backdrop. In this sense, the environmental critique of Bacigalupi's dystopian fiction is bound up with broader

warnings against capitalism *in totem*, understood as a socio-political and ecological system that exploits both humans and nature.

In *Ship Breaker*, oil's continuing role as an energy commodity highlights this exploitation. Despite oil being the immediate source of broad ecological collapse in the narrative world of *Ship Breaker*, its social value makes it a highly valuable resource and it is still one of the most sought-after commodities to be salvaged from the ageing vessels. At the start of the novel, Nailer almost suffocates after falling into an oil-filled chamber deep inside an old oil tanker. Despite the dangers of asphyxiation, he still appreciates the value of the oil around him: '*I'm going to drown in goddamn money*' (*SB*, 26, emphasis in original). Nailer's discovery is considered a 'lucky strike' and represents a huge financial boon. The idea of a 'lucky strike' is embodied by the actual character 'Lucky Strike', whose backstory depicts him discovering oil in a wreck and sneaking 'it out bucket by bucket until he had enough to buy out his indenture and burn off his work tattoos' (*SB*, 26). Lucky Strike's discovery allows him to become a labour broker and a wealthy man in the ship breaking community. As Lucky Strike's affluence and Nailer's situation demonstrate, the discovery of oil retains a utopian impulse even in this 'tough oil' narrative world: a taste of freedom and possibility not unlike the mythos surrounding early discoveries of oil in American history and the drilling for 'liquid gold'.

A particularly competitive form of late capitalism, or, as Hicks refers to it, 'retromodernity', is the socio-economic reason for Nailer's risk-taking in his work as a salvager of old oil-powered ships. He has paid to join a crew and needs this work in order to feed himself and to take care of his delinquent and abusive father. There are few alternatives for work outside of ship breaking and plenty of surplus labour from which crews can recruit. As Saba Pirzadeh argues in her ecocritical reading of *Ship Breaker*, Nailer (and his community) are subject to an economic form of environmental racism, as they are forced to work in polluted and unsafe environments (Pirzadeh, 2015: 210–11). It might be salvaging refuse and scrap, rather than the production of new materials, but in this economic system Nailer's labour remains unquestionably commodified: '[d]ragging the old world's flesh up the beach to the

scrap weighing scales and the recycling smelters that burned 24–7 for the profit of Lawson & Carlson, the company that made all the cash from the blood and sweat of the ship breakers' (*SB*, 7). The concept of a 'lucky strike' is important not just because it represents increased comfort and consumption, but also because it represents a means of escape from economic slavery. The ecological consequences of burning oil, then, take a significant back seat to Nailer's basic survival. In this sense, Bacigalupi's text suggests that the utopian impulse itself is an ambiguous desire (rather than any final, settled state or location) and can be ascribed to something as basic as attaining the secure means of subsistence (food, health, or home). If we read Nailer's embodied struggle for survival and economic security as an individualised utopian desire, we can see how the ideological logic of *Ship Breaker* pits individual success against a collective ecology, and leads to devastating social-ecological consequences.

The desire for a better life, for any life at all, trickles down to all the workers on Bright Sands Beach, pitting them against one another. When Nailer first falls into the tanker's hidden room of oil, for example, a member of his crew called Sloth makes a harsh decision; taking the measured risk of sacrificing him in the hope of profiting from the 'lucky strike' herself. Economic-inequality and competitive labour conditions overpower the morality of her light crew code. As Nailer states, 'he knew the calculations she was making, her clever mind working the angles, sensing the great pool of wealth, the secret stash she might pillage later, if Fates and the Rust Saint worked in her favor' (*SB*, 28). She chooses personal economic freedom over Nailer's life, a decision she is subsequently punished for with banishment from her crew and any future work thereafter. In her defence, and tracing the problematic logic of utopian individualism that the novel raises, we might argue that Sloth herself was chasing a utopian horizon; but, as the crew's collective action demonstrates, this is what utopian philosopher Ernst Bloch would refer to as a 'false' rather than a 'genuine' utopian impulse (Zipes, 1997: 11), in which Sloth's grim individualism reveals an economic logic that traduces societal possibility, bending it into ever more extreme forms of capitalism. Nailer is forced with a similar decision himself later in the novel when he decides not to kill Nita for her wealth. The decision to

resist society's compulsion towards greed and accumulation is positively reinforced through his improved economic position at the end of the novel. In contrast, Sloth's self-serving action functions as a warning against greed and the character is ultimately forgotten.

These brutal living conditions cannot be tied to ecological catastrophe alone. Bacigalupi's fiction speculates on how any system of capitalism that fetishises oil is unstable and conflict-ridden, especially when confronted by a tough-oil world, highlighting stark economic inequalities between characters as a result of such exploitation. In *Ship Breaker* Nita's wealth represents the indissoluble economic divide between the affluent and those struggling to survive: as embodied in her private clipper, silver tableware, expensive china, oil paintings, and carved furniture, with Nita herself bedecked in gold and diamonds (*SB*, 86–91). She is the daughter of a corporate executive at 'Patel Global Transit', the very people who indirectly employ and exploit ship breakers. Likewise, in 'The Calorie Man' Lalji reflects upon a meeting with an AgriGen executive, who traded 'more than an entire smuggled cargo of HiGro' for an old sign from ConocoPhillips (*CM*, 13). Whether private ships or barges of grain, the economic disparity on display here emphasises that Bacigalupi's fictional world is not an energy poor world at all, it is just a terribly unequal one. Crucially, his fiction encourages readers to reflect upon the notion that ecological catastrophe alone is not responsible for this poverty; rather it is the social organisation of future energy relations within capitalism that causes such recognisably unbalanced distributions to persist.

3. Exploring Metabolic Rift

In *The Ecological Rift: Capitalism's War on the Earth* (2010), John Bellamy Foster, Brett Clark and Richard York emphasise that our ecological and social problems cannot be solved through our current socio-economic system. As they state, '[c]apitalists pursue their own interests to maximize profit, above and beyond any other interests, subsuming all natural and social relationships to the drive to accumulate capital' (Foster, Clark & York, 2010: 75). They emphasise that capitalism's inherent drive towards profitability and accumulation exploits both man and nature simultaneously,

creating what Marx considered to be 'rifts' in the metabolism of nature and society. Marx's ideas about metabolism figure prominently in these analyses, particularly the conception of 'metabolic rift', a term coined by Foster in an essay published in 1999. Marx's comments on the environment have experienced a revival in leftist circles, specifically his references to capitalist agriculture where he discusses the 'metabolic rift' that occurs when people move from agricultural villages to work in densely packed urban industrial communities. With increasing urban density, crops must be carted further afield to reach these growing areas of consumption. The distance between town and country leads, according to Marx, to a 'rift' where waste products that traditionally fertilise agricultural fields (such as night soil) never find their way back to agricultural fields. As Marx explains in a chapter on 'Large-Scale Industry and Agriculture' in *Capital, Vol. 1*: 'Capitalist production collects the population together in great centres' which 'disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil' (Marx, 1992: 637). Instead of fertilising agricultural fields, human waste often polluted city rivers instead; hence valuable fertilisers like guano needed to be harvested and shipped in from distant places like Peru as a replacement. This process was detailed by German chemist Justus von Liebig, who was followed closely by Marx (Foster, Clark & York, 2010: 349–51).

As Marx emphasises, both human labour and the soil's natural fertility are exploited under this mode of production. Non-native fertilisers like guano allowed for larger cities with increased industrial production and pollution, leading to a simultaneous exploitation of humans and the environment, creating a 'metabolic rift' in natural and social cycles. As Marx explains:

all progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress toward ruining the more long-lasting sources of that fertility. [. . .] Capitalist production, therefore, only develops the techniques and the degree of combination of the social

process of production by simultaneously undermining the original sources of all wealth – the soil and the worker. (Marx, 1992: 638)

In Marx's time this short-sighted 'robbing of the soil' led to global social and ecological rifts, including warfare over the Peruvian Chincha Islands and the exploitation of 'coolie' workers brought in from China to harvest guano deposits (Foster, Clark & York, 2010: 353–62). Of 90,000 Chinese workers, about 9,700 died just in transport; the native birds were dispersed and the islands themselves were stripped of thousands of years of accumulated fertiliser within just 40 years (Ibid: 360, 357). The twentieth century's prolific use of fossil fuels in producing not only contemporary fertilisers, but also an entire spectrum of industrial and consumer products, has fostered more modern and dangerous metabolic rifts involving carbon cycles and warfare over petroleum resources. The developed world's rapid burning of fossil fuels (which were naturally accumulated, compressed, and refined as stored solar energy over millions of years) is representative of the largest metabolic rift affecting our times.

Marx's conception, as mediated by scholars such as Bellamy Foster, helps us identify ongoing and potential future rifts in the social and agricultural production of food and, more broadly, to reconsider capitalism's relationship to labour and the environment in general. With its emphasis on the fragile balance of environmental resources, agricultural products, and human migration, it also offers a useful point of entry into an energy-informed analysis of Bacigalupi's *Ship Breaker* and 'The Calorie Man'. As we never see any returning waste moving back up the Mississippi in either *Ship Breaker* or 'The Calorie Man', we can assume that both geographical settings suffer from increasing metabolic rift, with the soil being slowly impoverished and genetic engineering/fertilisers being used to compensate for decreasing crop yields. Echoing Marx's reading of industrialisation's damaging metabolic effects in the population movements from the countryside to the rapidly expanding cities, both *Ship Breaker* and 'The Calorie Man' depict agricultural products being shipped across vast distances in globally distributed trade networks, linking industrial farmlands to distant cities. In 'The Calorie Man', for instance, the narrator describes a

GM commodity frontier, where ‘the whole of the Mississippi would fill with calories pouring downstream [. . .]. Barges would clot the arterial flow of the river system’ and ‘float to New Orleans where the great calorie companies’ clippers and dirigibles would be loaded with the precious grains’ (*CM*, 7). While set in different fictional universes, New Orleans functions as a trade hub in both ‘The Calorie Man’ and *Ship Breaker*, with clippers functioning as the main cargo haulers. In *Ship Breaker*, we see a similar unidirectional movement of products from the American core to a global periphery, as ‘the mouth of the Mississippi still poured down through the center of the continent with its great barges of food and whatever manufactured objects came from the northern cities’ (*SB*, 232).

Reading ‘The Calorie Man’ and *Ship Breaker* in light of metabolic rift helps us expand our understanding of some of the dystopian extrapolations shared by both texts; particularly the globalised patterns of production, distribution, and ultimate consumption of food as a crucial energy resource in each narrative world. In ‘The Calorie Man’, GM crops are grown specifically to generate private wealth via ‘global’ consumption, leading to a global rift in the metabolism of agricultural production. Calorie companies maintain a monopolistic stranglehold on the global food supply and tout their crops as ‘[e]nergy for the world’ (*CM*, 22). These companies are based in the old American agricultural heartland, which is described as:

Close to the accountants who calculated burn quotas for the world. [. . .]
Close to the men who balanced price stability against margins of error and protectively managed energy markets against a flood of food. Close to those small gods with more power than Kali to destroy the world. (*CM*, 16)

This quote reads like an anti-utopian critique of free-market capitalism: corporations can, and do, produce vast ‘floods’ of food, but the lack of federal regulation leads to monopolies and price-fixing (as opposed to the increased competition and lower prices expected by proponents of *laissez faire* economics), leaving this same food unavailable to the people who need it most. Echoing OPEC’s control of oil resources today, food supply in ‘The Calorie Man’ is controlled by American corporations

to produce a form of global scarcity, essentially driving up prices and generating increased profits.

Like the character of Sloth in *Ship Breaker*, Bacigalupi also mobilises characters in 'The Calorie Man' that express a symbolic self-interest that stands in conflict with broader society or environmental good. As Lalji remembers of an AgriGen executive, for example: 'She'd said the word [global] with an almost sexual yearning' (*CM*, 13). Her desire for profit lends a libidinal urge to capitalism's workings. The executive serves as a marker of corporate greed and her 'yearning' references the neo-liberal utopian wish for unregulated global markets and unimpeded capital flows. Produced by companies like AgriGen, Midwest Growers Group, and PurCal, these high-calorie crops are meant to power the industrial and consumer world in the wake of peak oil.

While 'The Calorie Man' discusses the extrapolated and cognitively estranged future of energy production, *Ship Breaker* explores the consequences of its trade. The rusting oil tankers on Bright Sands Beach are the 'old' means of transportation and depict the infrastructure of globalisation as recognisable to contemporary readers, while the advanced ecological clippers are the primary cargo haulers in *Ship Breaker*, carrying goods like genetically engineered crops, scrap metal salvage, illegal oil from tar-sands, and military 'windup' slaves. Ships facilitate the accelerated metabolism of nature by continuing to open up global markets to trade and exploitation.

These two texts, then, represent complimentary sides of Marx's conception of metabolic rift, where goods are produced and shipped at great ecological cost, only to fuel further social inequalities both at home and abroad. As its title suggests, *Ship Breaker* also explores one of the more neglected consequences of globalised trade, namely the ecological and social costs of ship breaking. In the real world, ships function as mobile capital in a globalised society, flagged in countries like Bermuda, Panama, and Liberia to evade taxes, scrutiny, and national jurisdictions.⁵

⁵ For more information on the shipping industry, particularly container transport, see Marc Levinson's *The Box* (2006), Rose George's *Ninety Percent of Everything* (2013), and the documentary *Freightened: The Real Price of Shipping* (Delestrac, 2016).

Despite their importance, the relative invisibility of container ships and oil tankers in consumer-driven culture maintains a cognitive disconnection, removing them from the consequences of their use and eventual disposal. A neoliberalised global market in itself, ship breaking is both by-product and enabler of metabolic rift, occurring when ships outlive their useful lifespans. Frontline, the world's largest operator of oil tankers, states in their 2015 annual report that oil tankers sold for scrappage are sent to one of 'the three main recycling markets (Far East, Indian sub-continent and Bangladesh)' (Frontline, 2015: 39). The use of the word 'recycling' here is classic corporate greenwash, leading investors to associate it with cola-cans and glass bottles, lending a clean conscience and a sense of even cleaner machinery.

In *Ship Breaker*, Nita uses the term in a similar way, referring to salvaging as 'a corporate priority . . . to source from recycled materials vendors' (*SB*, 129). These 'recycled materials vendors' include Bright Sands Beach, the yard that Nailer works at. However, as Maruf Hossain and Mohammad Mahmudul Islam describe in their work on sustainable management, ship breaking conditions in places like Bangladesh are usually horrendous, with child labour, scarce safety equipment, and an average of one person dying every week (Hossain & Islam, 2016: 35, 12–14). Drawing attention to the brutal reality of ship breaking yards and undermining Nita's glossy images of corporate responsibility, Nailer states that: 'Lawson & Carlson won't even supply filter masks because they say they've got to keep costs low' (*SB*, 129). Here, Bacigalupi's text works to encourage readers to identify the dystopian world of their own present, in which, as Hossain and Islam emphasise, yard owners treat workers as 'replaceable instruments' (2006: 14). This replaceability is echoed by Nailer's boss who states, 'You think I can't get a hundred other licebiters to take your place?' (*SB*, 14).

Hossain and Islam's report also discusses the ecological costs of ship breaking, outlining lists of pollutants that leak into the water and infiltrate the marine food chain, including POPs, PCBs, asbestos, heavy metals, and oil pollution (2006: 18–32). Pirzadeh's ecocritical reading of *Ship Breaker* demonstrates that Nita's attitude and ignorance of social labour concerns highlight the ethical considerations in environmental policy, where ecological recycling might come with strong social costs

(Pirzadeh, 2016: 209). While this might be true, Pirzadeh fails to discuss the ecological costs that also underlie the corporate meaning of the term 'recycling' in ship breaking. As Hossain and Islam's report testifies, and as the novel demonstrates, ship breaking not only requires immense human capital and sacrifice, but also causes significant ecological damage in the process, facts little emphasised on consumer products or in corporate earnings reports.

Ship Breaker draws attention to this relationship, both via the dystopian working conditions and through the shipyard's setting. Bright Sands Beach is caught in a representative irony, where an occupation once only associated with some of the world's poorest people (such as the coastal zone of Chittagong, Bangladesh) is now spatially located in America. America is here crafted from a 'third world' perspective: depicted in the grim business of dismantling the rusting relics of the oil industry as the Bangladeshi economy is engaged in doing today. In relocating the world's ship breaking yards to Bright Sands Beach, Bacigalupi thus enacts a spatial inversion of the industry whilst also reminding his readers of the oil industry's American origins in modern petro-capitalism. This speculative relocation thus enacts a kind of regression: in depicting a near-future world of salvaging and reclamation, Bacigalupi's novel decisively breaks the teleology of technology's progress during the period of oil-driven modernity and the resulting social devolution converts the 'drying' America of today into the novel's past historical utopia. The novel's core setting thus functions as a nexus of cultural anxiety about America's role in the global economy, particularly from a worker's perspective. That 'Chinese red cash' has a higher value than the American dollar only reinforces this socio-political inversion (*SB*, 192). These are all confrontations that may echo through the reader's mind when they first encounter the rusting oil tanker at the start of *Ship Breaker*, emphasising the stark causality of anthropogenic climate change and extensive metabolic rift.

4. Green Energy – The Expropriation of Hope

While metabolic rifts, as the previous section has demonstrated, may be considered a decisively dystopian aspect in Bacigalupi's work, many of the new technologies mobilised in these texts, including high-calorie crops and ecological clippers, have a

utopian possibility at their core. Sustainably grown, high-calorie crops transported by ecological clippers are an environmentally friendly way of feeding the world's population. However, embedding these technological advancements in a future where a capitalist mode of production persists shows their ability to actually exacerbate metabolic rift, thereby undermining their utopian nature. Foster, Clark and York address this issue in a chapter titled 'Capitalism in Wonderland', writing that:

Orthodox economists assume that the resource problems of today will force prices up tomorrow and that these higher prices will force the creation of new technology. [. . .] These analyses tend to be big on the wonders of technology and the market, while setting aside issues of physics, ecology, the contradictions of accumulation, and social relations. (Foster, Clark & York, 2010: 104–5)

In Bacigalupi's work, the removal of oil as a cheap fuel of global production is a thought experiment in post-oil adaptability, testing the role of technological progression in ecological sustainability. However, as I will argue below, capitalism's forced conversion to green energy only serves to heighten its exploitative nature, particularly of animals, humans, and nature. In 'The Calorie Man', as I suggested above, the central cognitive estrangement is the replacement of food (calories) for oil as the dominant global energy source, being used to power everything from human labour to boat engines and factories. This recalls Donnelly's reading of *The Windup Girl*, where he notes that corporate monopolies have had their defining commodity shift from 'petroleum to "calories"' (Donnelly, 2016: 161). Whereas Donnelly does briefly discuss industrial agriculture's new role as a global energy supplier, his analysis stops short of considering the utopian implications in the mobilisation of calories as a new global fuel source. The task before us, then, is to decipher the function of calories within the dystopian narrative world of these fictions. To do this, we need to trace the movement away from fossil fuels in Bacigalupi's narrative worlds and consider the combination of utopian pastoral ideal and dystopian technological regression.

Both animals and humans in 'The Calorie Man' burn calorie energy in order to provide society's productive power and labour needs. This particular form of kinetic energy use is something, as Ian Angus notes, that predates modern industrial capitalism: 'When capitalism first arose in the 1400s, the principal sources of energy were wood, wind, water, and human or animal muscle' (2016: 128). By giving his work a primarily 'muscle driven' economy akin to a pre-capitalist society, Bacigalupi lends energy production and consumption in this future world a provincial, 'retro' kind of presence:

Around them, the town was nearly silent in the afternoon heat. A few dunga-reed farmers led mulies toward the fields. [. . .] At the far end of the narrow street, the lush sprawl of SoyPRO and HiGro began, a waving rustling growth that rolled into the blue-sky distance. (*CM*, 1)

Bacigalupi's story establishes the premise for an ecological utopia, one where technologically innovative crops help society negotiate beyond the end of fossil fuels. This ideal, however, is ultimately corrupted by society's inability to wean itself from capitalism. The story's establishment of a poverty theme is made explicit from the beginning, with the introduction of an urchin beggar-child. The narrative's opening rustic idyll is also quickly stripped away with the mention of 'intellectual property dues' and the shipping of calories further downriver (*CM*, 1). However, the idea of a 'muscle driven' economy is worth exploring here, as it conceals strong utopian possibilities. Tasks once relegated to oil-driven machines are performed by genetically engineered animals. Estranged mules ('mulies') and mammoths ('megodonts') expend energy directly through physical labour or, indirectly, by charging biological batteries ('kink springs'). Kink springs power much of the remaining electrical and mechanical machinery in Bacigalupi's world. This industrial capacity gives calories an analogical connection to petroleum's role as a global fuel source today. The ability to maintain an industrial infrastructure on calorie energy has a definite utopian and ecological impulse. Calorie energy is both environmentally clean (relative to oil) and sustainable, if harnessed correctly.

Despite the pastoral ideal lurking at the edges of this narrative world, animal labour is also quickly revealed to be dystopian: 'Generippers had honed them [megodonts] to a perfect balance of musculature and hunger for a single purpose: to inhale calories and do terrible labours without complaint' (*CM*, 10). This bioengineering reduces animal labour to the status of machinery, negating some carbon-based rifts caused by the fossil-fuel industry, but opening up other arguably worse social rifts. Instead of moving towards a mode of production focused on reducing metabolic rifts, society in 'The Calorie Man' developed a new technology that could replace the power of fossil-fuel production. By resurrecting mammoths as a new industrial force, instead of addressing the underlying social issues, Bacigalupi's society simply perpetuates the resource depletion and ownership structures of petro-capitalism today, shifting the ecological exploitation from increased carbon pollution to soil depletion. Capitalised agriculture in 'The Calorie Man' thus cognitively estranges the ethics of energy production not only by estranging the crops themselves (that is, rendering them strange, modified, bioengineered), but also by estranging the animal labour that consumes them. These animals are simultaneously considered to be mere machines, and yet the inescapable fact of their animal life (or, to use Marx's term, their 'species being') (1959: n. pag.) refocuses the reader's gaze back onto the energy of labour itself, lending it an uncanny vitality by breathing life into typically industrial, formerly automated work. The mulies even seem aware of their exploitation, 'eye[ing] Lalji with resentful near-intelligence' (*CM*, 3). As humans and animal labour compete for the same energetic resource (calories/cash crops), one can see associations with biofuels today and the ethics of contemporary resource management.

In 'The Calorie Man', then, we see society under capitalism doomed to repeat itself in endless cycles of energy exploitation and consumption. The new 'calorie' economy, like the 'old' oil economy, is rooted in control, unethical exploitation, and unevenly distributed profits. These crops are guarded by water locks, stamps, private police forces, and patents. Patents are economically enforced through genetically-manipulated 'terminator seeds', a technology that causes sterility in second generation seeds and creates a dependency on 'foreign' GM seed stock. Lalji, whose family

was devastated by AgriGen's sterile seeds in India, understands that 'no one except the calorie companies can grow the plants' (*CM*, 23). Interrupting the natural metabolism of crops to reproduce themselves, the GM control over agribusiness simultaneously interrupts the social metabolism of the farmer to sustain himself from his own labour, creating further metabolic rifts. Lalji's inability to generate a successful life as a farmer in India ultimately leads to his flight to America and the likely death of his family back home. In this sense, Bacigalupi connects the utopian with the dystopian in uneasy combination: the potentially utopian GM innovation of high-calorie crops is overridden by enforced sterility and capitalism's drive towards privatisation and profitability. Green technologies that could potentially stabilise and reverse metabolic rifts are instead abused, with the direct GM exploitation of animals and crops in the production of food leading to further exploitation in the rest of the world. As Foster, Clark and York state: 'The idea that technology can solve the global environmental problem, as a kind of *deus ex machina* without changes in social relations, belongs to the area of fantasy and science fiction' (2010: 116). While economists and politicians tout the utopian potential of technology to enforce the current socio-economic system, Bacigalupi's extrapolative SF draws the reader's attention to the fact that the propagation of our current social-energetic relations can only lead to ecological catastrophe, regardless of the quality of technological innovation. In his texts, technology not only fails to heal metabolic rifts, it often exacerbates them.

In *Ship Breaker*, Bacigalupi moves away from his exploration of calorie production to a larger focus on ships and human labour. The economy is still 'green', being primarily muscle- and wind-driven, yet the text is full of dystopian animalistic references. We see insect representations applied to the ship breakers, called alternately 'ants', 'flies', and 'fleas' (*SB*, 5, 6, 62). These are portrayed in kinetic terms, 'swarming' about or 'chewing away at [the] iron meat and bones' of the ships (*SB*, 5–6). The ships, meanwhile, are depicted in animalistic terms, their component parts atomised into various meat derivatives: 'bones', 'fish', 'corpses', 'meat' and 'flesh' (*SB*, 5–7). Even in the drowned Orleans, the text emphasises how 'coolie people swarmed' around cargo from the city (*SB*, 214). These animal metaphors and similes are meant to represent

and reinforce the idea of naturalistic scavenging, yet they also establish an inverted hierarchy in which human labour is placed at the bottom of the typical food chain, feeding on larger objects from the past. While these animalistic references lend a distinctly dystopian flavour to labour conditions we can, however, trace some alternative utopian possibilities in the ships themselves. As Nailer states:

The only thing that had ever seemed truly beautiful to him were these ships with their carbon-fiber hulls and fast sails and hydrofoils that cut the ocean like knives as they crossed the great oceans or made their way over the pole. (SB, 233)

The ship Nailer rides at the end of the novel is called the *Dauntless*, a merchant vessel designed for hauling cargo. The ship is fully automated, with electric winches, hydraulic systems, and a Buckell cannon for catching high-altitude winds, all powered by sails converted into solar sheets (SB, 258). While ecologically utopian, these ships also contain more dystopian technologies, like weapons for fighting off pirates (and each other), including pistols, missiles, and 'chemical rounds' for burning sails (SB, 285). In such cases, the utopian possibilities of green technology become hamstrung and converted to more selfish uses like exploitative trade, warfare, and the protection of private property.

We see a similar interplay between utopian and dystopian possibility in the representation of GM humans, which are referred to in *Ship Breaker* as 'half-men'. Half-men are slaves, sold as guards, and used to wage war. Like the IP police of 'The Calorie Man', they enforce private interests and maintain the capitalist mode of production. Half-men are genetically modified to have an extreme loyalty to their masters and die when their masters die. This removes their individual agency and controls supply by preventing further circulation. Tool, a recurring character in Bacigalupi's narratives, is crafted from the DNA of humans, dogs, tigers, and hyenas, with a 'huge muscled form' and 'doglike muzzle' (SB, 248, 70). He is, as his name suggests, a tool, a product of biological engineering, but one that rebels against the society that created and sought to use him. Tool's oppositional agency lies in

his avoidance of taking a master, a singular exception to the genetic conditioning affecting others of his kind. He chooses whom he wishes to work for, whether it be Lucky Strike, Richard Lopez, Sadna, or Nailer, ending his service at his discretion. As an engineered, hybrid human Tool is an important character in considering the metabolic rifts at work in Bacigalupi's narrative world. Tool represents a broader class of workers whose instrumental exploitation accrues surplus value for their capitalist employers. His resistance is symbolic, and he takes control of his own physical resources (notably his capacity for violence) for his own benefit. This is an idea further explored in Bacigalupi's follow-up novels, *The Drowned Cities* (2012) and *Tool of War* (2017), in which Tool's agency increases as he sets out to control a whole militaristic society and craft it in his own image (whether utopian or dystopian is up for debate, but the society is certainly one based in alterity and a violent resistance to the now).

Conclusion: Disrupting Capitalism – Utopian Resistance

Tool's agency and social development is a small part of the broader resistance to capitalism taking place in Bacigalupi's interconnected and intratextual narrative worlds. He is part of a world of frightening growth and acceleration; albeit of a form that is inimical to human consumption. One clear example of this growth is the cheshire cat from 'The Calorie Man'. Appearing in several of Bacigalupi's texts, cheshires are an inter-textual reference to Lewis Carroll's *Alice's Adventures in Wonderland* (1865).⁶ While initially created for '[a] few wealthy patrons', cheshires escape into the wild and become a global invasive species (*CM*, 23). Stealthy, fecund, and hungry, they are both 'pests' because they have killed most of the global songbird population and 'made [. . .] too perfectly' because they spread and adapt so well (*CM*, 23, 15). They represent another creation that has assumed its own agency, albeit in a more biological sense than Tool. Cheshires thus embody a violent resistance to capitalist norms partly due to their uncontrollability and partly due to their role as a human

⁶ For a reading of cheshires in *The Windup Girl* as a technoscientific animal 'other', inciting both hostility and hospitality, see Hageman (2012: 296–7).

hindrance; in this sense, they represent a non-harvestable, and consequently useless, fertility.

As my reading of the energy paradigms in his texts has argued, the mediation between utopian and dystopian imaginaries in these works encourages Bacigalupi's readers to reflect upon not only energy production, but also its specific form under capitalism. The extrapolated post-oil future and the continuing quest for capital accumulation thus comes to stand in for a series of what I have identified as metabolic rifts in the narrative worlds of *Ship Breaker* and 'The Calorie Man'. These future rifts are in fact a recognisable feature of historical capitalism. Friedrich Engels emphasised in his *Dialectics of Nature* (1883), that the abuse of natural systems can have unforeseen consequences. Engels insisted we should not flatter ourselves over 'our human conquest over nature. For each such conquest takes its revenge on us' (Engels, 1934: n. pag.). In speculative fiction such as 'The Calorie Man', *The Windup Girl*, *Ship Breaker*, and *The Drowned Cities*, animals like cheshires and rebellious characters like Tool may seem an unexpected result of humanity's 'conquest over nature' but, are in fact 'natural' consequences of capitalism's attempt to control and modify nature for surplus value. In interfering with nature's ability to reproduce itself, cheshires have propagated from capitalism's technological history, conquering spaces reserved for profit and accumulation. Their beauty adds an interesting dynamic to their cognitive estrangement, creating a form of aesthetic sympathy: 'More cheshires flitted amongst the ruins, their smoky shimmer shapes pulsing across the sunlight and passing into shadows' (*CM*, 13). Despite their origins in bioengineering, they have become a part of the natural environment, splashes of vitality, colour, and affect against the sterile monoculture farmlands they inhabit.

The cheshires help foreshadow an uncontrollably utopian moment in energy production in the story. Bowman wants to end the calorie monopolies with a new strain of seed that can breed naturally again. He works independently, burning his stored fat and his 'calories on computer cycles' to crack controlled plant infertility (*CM*, 23). As he states: 'We now pay for a privilege that once nature provided willingly, for just a little labor' (*CM*, 22). His seeds would be '[r]ipe, fat with breeding

potential. [. . .] [S]eeds lusting to breed, lusting to produce their own fine offspring' (*CM*, 23). Miming the natural success of cheshires, Bowman wants his seeds to spread throughout the world, a fertility of such power that capital loses control of both nature and labour. Fearing this, the corporate IP police kill Bowman and he becomes a Christ-like/sādhu figure in the story. Bowman used his expertise and risked his life to unleash a new mode of production. As Derrick King states, 'The Calorie Man' ends 'with an authentically utopian moment in which genetically engineered (GE) seeds can become a part of the global common. Bacigalupi's fiction thus uses the dystopian form to imagine the possibilities for an alternative, post-capitalist future for biogenetics' (2016: 5). Symbolically, Bowman's utopian dream is representative of a fertile polycultural diversity capable of harnessing production in favour of 'the global common', with the broader point being that an unalienated humanity can more sustainably metabolise agricultural production.

In Bacigalupi's work, nature is not just a commodity for man, but is also utilised as a symbol of resistance to global growth and progressive ideals. Within both texts, Bacigalupi uses nature as a utopian force to reclaim and disrupt capitalistic spaces and processes. In *Ship Breaker*, the Orleans have been gradually reclaimed by forests, with roads sprouting trees and growing into 'flat fern and moss-choked paths' (*SB*, 199). Forest reclamation exemplifies the return of a much-needed carbon sink and represents a slow healing of carbon-based metabolic rifts. The destruction of roads is another jab at petroculture, shutting down the paths of vehicular mobility and opening up avenues for greener forms of more collective (if, problematically, elite) transportation, like trains, blimps, and ships. Flooding due to global warming also represents a symbolic form of natural reclamation, with the Orleans partially submerged and Bright Sands Beach featuring the jagged remains of a city deep underwater (*SB*, 202, 74–5).

Of these natural disruptions, the regular city-killer storms are arguably the most violent; 'sometimes a surge could move the coastline inland as much as a mile, [. . .] the new ragged line of rising sea levels. A big blow could easily move the hulks of the ships as well' (*SB*, 63–4). *Ship Breaker* explicitly links these storms to a history

of oil extraction and use. As Nita states: 'They got [oil] from everywhere. [. . .] From the far side of the world. From the bottom of the sea. [. . .] They used to drill out there, too, in the Gulf. Cut up the islands. It's why the city killers are so bad. There used to be barrier islands, but they cut them up for their gas drilling' (*SB*, 199). These are obvious references to offshore drilling in general, but also, more specifically, to storms like Hurricane Katrina, historicising ecological catastrophes through the three failed virtualisations of Orleans: I, II, and III (MissMet being the third). While Pirzadeh (2015: 212) rightly argues that these storms highlight the vulnerability of economically marginalised groups, I believe that they also express utopian potential. In this sense, we might productively read increasing storm severity as a cognitively estranged form of planetary feedback that hinders further human expansion and exploitation of natural resources. Quoting István Mészáros, Foster, Clark and York state:

When the social metabolic order of capital confronts limits, "its destructive constituents come to the fore with a vengeance, activating the spectre of total uncontrollability in a form that foreshadows self-destruction both for unique social reproductive system itself and for humanity in general". (Foster, Clark & York, 2010: 413)

Whether flooding cities, expanding forests, or violent storms, Bacigalupi uses nature to symbolically erase the memory of past human exploitation, returning the planet to a more balanced, if radically altered, state. As Nailer observes after the storm: 'The soot was gone, the oil in the waters, everything shone brightly [. . .] The beach was cleaner than he'd ever seen in his life' (*SB*, 69). In considering the utopian potential of these storms, Hicks states that '[t]his newly cleansed environment recalls the beauty of New Jerusalem in the aftermath of the Christian apocalypse and gestures to the utopian possibilities that might accompany oil depletion' (2016: 151). Hicks's reading and the above examples recall Jameson's conception of the apocalypse genre. While *Ship Breaker* is not a true apocalypse, it is interesting to consider the

idea of revelation in Bacigalupi's work taking an ecological, rather than social, form following the end of oil.

While neither of Bacigalupi's stories show conclusive solutions to the historical extrapolations of ecological catastrophe or labour abuses, they both end on hopeful notes, a feature of critical dystopias. This formal and ideological openness, as Baccolini and Moylan state, allows readers and protagonists to hope by resisting closure: 'the ambiguous, open endings of these novels maintain the utopian impulse *within* the work' (2003: 7, emphasis in original). At the end of 'The Calorie Man', Lalji can plant the modified seeds in the hopes of breaking the calorie monopolies, thereby establishing a more ecological metabolism of energy production. At the end of *Ship Breaker*, Nailer can take Pima and Sadna away with him from Bright Sands Beach, with a further promise from Nita of possibly bettering the working conditions for the rest of the ship breakers. Yet these endings are by no means ideal and their utopian possibility remains provisional and compromised. Bowman's engineered seeds still represent man's tinkering at the top of a biological hierarchy, one that can lead to further unforeseen metabolic rifts. Likewise, Nailer's final inclusion into Nita's elite social circle is, in one way, a sad capitulation to the capitalist mode of production, more representative of escapism than critical thought. Regarding Nita's promise, should even Nailer's beach turn professional, with dry docks and safety equipment, this does not prevent ship breaking from taking place in other locations; desperate labour beckons for work ever elsewhere. Capitalism's race to the bottom remains the same. In the final instance, Bacigalupi's endings lack closure, but their ambiguity, as well as their extrapolation, leaves readers pondering utopian possibilities.

Competing Interests

The author has no competing interests to declare.

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