2023
volume 20 | issue 2

ENQ
The ARCC Journal for Architectural Research

Toward an Anti-Antiutopia: Solarpunk Cities and the Precarity of Our Urban Future

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Abstract

This paper examines Darko Suvin's and Kim Stanley Robinson's assertion that the late-stage capitalism and neoliberalism of our world can be understood as an "antiutopia" that actively works to suppress the imagination of better futures. It argues that the relatively new science fiction sub-genre of solarpunk—which sets itself in direct opposition to the dystopian visions of the more well-known subgenre cyberpunk and imagines worlds that focus on the community rather than the individual, on environmental sustainability rather than environmental degradation, on social justice rather than subjugation and inequality, and on optimism rather than nihilism—offers some of the most promising paths toward the rejection of this antiutopia in favor of an anti-antiutopian (and therefore utopian) approach that actively works to bring about a better future. The paper suggests that the solarpunk futures currently emerging in literature, art, and online communities offer architects, landscape architects, and urban designers powerful inspiration for the future of our increasingly urban world. It examines a selection of short stories, novels, films, and other media—as well as innovative projects of urbanism—for examples of how embracing the practical utopianism of solarpunk can provide both visions of better worlds and potential paths for achieving them.

Keywords: solarpunk, utopia, urbanism, science fiction.

No one can stop us from imagining another kind of future, one which departs from the terrible cataclysm of violent conflict, of hateful divisions, poverty and suffering. Let us begin to imagine the worlds we would like to inhabit, the long lives we will share, and the many futures in our hands.

—Susan Griffin (2013)

What lies ahead? Remaking the world. Only that.

—Arundhati Roy (2020a, 9)

INTRODUCTION

War in Ukraine. Wild fires in Australia and the American West. Earthquakes in Haiti. Record-breaking tropical storm seasons year after year. Violence against Black, Brown, and women's bodies. Structural social and economic inequality and injustice against marginalized communities. And, of course, an ongoing global pandemic that, at last count, has resulted in more than six million deaths. We already live in precarious and increasingly dangerous times. Meanwhile, the most recent report of the Intergovernmental Panel on Climate Change

Stable URL: https://arcc-journal.org/index.php/arccjournal/article/view/1159
DOI 10.17831/enq:arcc.v18i1.1159

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(IPCC) makes it clear that things will only get worse for the foreseeable future as we become subject to what Kathryn Bowen, one of the report's lead authors, calls "cascading and compounding impacts" (United Nations 2022). The report tells us that 3.45 billion people (or approximately 45 percent of the world's population) are "highly vulnerable" to the impacts of climate change, with as much as 76 percent of the world's population being exposed to deadly heat stress by the end of the century. As David Wallace-Wells (2017) states in *The Uninhabitable Earth*—a clarion call for action to avoid the existential catastrophes associated with the climate crisis—"It is, I promise, worse than you think." Yet despite repeated warnings about the perils of the climate crisis, as a society we have largely failed to act with forethought, instead opting to react to disasters as they happen rather than acting preemptively to avoid them.

But why?

In *The Optimist's Telescope*, Bina Venkataraman (2019, 5) suggests that we find it difficult to act for the sake of the future because "we can't smell, touch, or hear the future. The future is an idea we have to conjure in our minds, not something that we perceive with our senses." Similarly, psychologists Paul A. M. Van Lange and Brock Bastian (2019) suggest that the abstract nature of the science of climate change, along with the long time scales at work, make it difficult to enact change because "humans are naturally prone to making short-term decisions … as opposed to pursuing longer-term collective interests." When we're constantly bombarded with issues needing immediate attention it can be difficult to escape short-term thinking.

Maybe the failure to act isn't all that surprising. It may very well be a *feature* of our global economic system rather than a bug. Both literary critic Darko Suvin (2022) and science fiction novelist Kim Stanley Robinson (2018b) have described our current neo-liberal, capitalism-fueled world as an "antiutopia." For Suvin, antiutopia is the natural consequence of what he has termed the "Capitalocene" and represents "a targeted ideologico-political use of a closed horizon not simply to refute or ridicule, but to *render unthinkable* both the utopia of a better possible world and the dystopia as awful warning about the writer's and readers' "present tendencies." One prominent example of this tendency to stifle change is former British Prime Minister Margaret Thatcher's popular slogan, "There is no alternative," frequently simply abbreviated to TINA, which she used to suggest that free-market capitalism was the only viable economic system. This is echoed by Fredric Jameson (2003), who frequently suggested that "it is easier to imagine the end of the world than to imagine the end of capitalism." More recently, during her 2019 campaign for president then Senator Kamala Harris stated that "science fact not science fiction" was needed to address climate change. This prompted science fiction author Charlie Jane Anders (2019) to reply in a *Washington Post* opinion piece that "the truth is, we need both," explaining that "science fiction has an important role to play in rescuing the future from the huge challenges we're facing." These are but a few examples of how, according to Suvin and Robinson, the antiutopia of the Capitalocene exists to reinforce the status quo and thus disempowers vast swaths of society. Why bother to act when the mere possibility of a better future is squashed by the powers-that-be that "stifle the right to dissent and to strive for radical novelty" while simultaneously "dismantl[ing] any possibility of plebeian democracy" (Suvin 2022)?

But perhaps, oddly enough, the COVID-19 pandemic and our collective responses to it suggest that there is a small sliver of hope. In April 2020, novelist, essayist, and political activist Arundhati Roy (who also happened to train as an architect) suggested that the pandemic is a "portal, a gateway between one world and the next." She described how the early days of the pandemic brought "the engine of capitalism to a juddering halt. Temporarily perhaps, but at least long enough for us to examine its parts, make an assessment and decide whether we want to help fix it, or look for a better engine." Roy closes her essay by referring to the pandemic as a "rupture" that "offers us a chance to rethink the doomsday machine we have built for ourselves." She suggests that rather than walking through the portal "dragging the carcasses of our prejudice and hatred, our avarice, our data banks and dead ideas, our dead rivers and smoky skies behind us" that we might instead "walk through lightly, with little luggage, ready to imagine another world. And ready to fight for it" (Roy 2020b).

This call to fight for a better future as we (hopefully) emerge from the pandemic begs the questions: What type of world do we want to live in? What do we want to strive for in the face of an accelerating climate crisis? Much of the current discourse about the impacts of climate change on cities centers around the notion of resilience. However, resilience suggests a "rebounding or bouncing back": a return to the status quo after a disaster ("Resilience" n.d.). Why would we want to return to a situation that simply isn't working—or is downright life threatening—for so many people? As Roy (2020b) emphatically concludes: "Nothing could be worse than a return to normality."

UTOPIA, DYSTOPIA, ANTIUTOPIA, AND ANTI-ANTIUTOPIA

So, if we are to avoid returning to a pre-pandemic normalcy of capitalist hegemony, then it is imperative

to counter the dominance of the antiutopia. With this in mind it is important to note that the opposite of utopia is not dystopia, because, as preeminent scholar of utopian studies Tom Moylan (2018) points out, many dystopian narratives maintain a utopian impulse through their criticism of the status quo. Instead, it is the antiutopia that attempts to squelch the imagining of alternative futures in dangerous ways. However, Ruth Levitas (2014, 111) points out that while "the critical dystopia can be a vehicle of resistance, it is much less able to register transformation and redemption. It may point to the exit, but it does not suggest what we might find, or make, when we leave."

In his essay "Dystopias Now!" Robinson (2018b) describes the prevalence of dystopian narratives as a "kind of late-capitalist, advanced-nation schadenfreude" that revels in the misfortune of fictional characters whose lives are worse than our own. For this reason he argues that dystopias are "fashionable, perhaps lazy, maybe even complacent" because they remind us that things could always get worse. Dystopias create what Robinson calls a "crisis of representation" in which "no one anywhere feels properly represented by their government, no matter which style of government it is." As a result, Robinson concludes, "dystopia is part of our all-encompassing hopelessness."

And therein lies the problem. If we can't *imagine* a better future then we can't *create* a better future. As Alex Evans (2017) suggests in *The Myth Gap*, "Stories are powerful things: they create our reality as much as they explain it. The futures we envision, be they positive or futures of collapse, make us much more likely to respond to events in the world in a way that helps create that future." Therefore, it becomes clear that we must adopt an anti-antiutopian approach so that we can continue to imagine better worlds while diligently working to bring them into existence. As Robinson (2018b) makes clear—echoing his doctoral dissertation advisor Fredric Jameson—"it is important to oppose political attacks on the idea of utopia, as these are usually reactionary statements on the behalf of the currently powerful."

This is where architecture, urban design, and the other creative disciplines come in. As Fred Polak (1973, 8)—one of the founders of the field of futures studies—explains in *The Image of the Future*, our collective future "lies concealed in today's images of the future." There is therefore an opportunity to undergo a theoretical regrounding of the discourses of architecture and urbanism as they relate to a world in crisis by way of the imagination. We, as designers, can help will a new, better, more sustainable future into existence through both speculative design proposals and concrete interventions in the world.

ANTI-ANTIUTOPIA AND SOLARPUNK

Over the past decade or so, a growing body of work—both academic and popular—has called for a renewed emphasis on the utopian imaginary as a tool for pushing the world toward a better future. One of the first examples of this was Project Hieroglyph, an effort through which science fiction author Neal Stephenson (2014) called for a "conscious throwback to the practical techno-optimism of the Golden Age" of 1950s science fiction. Stephenson called for a return to big ideas and solving important problems. Project Hieroglyph was later taken up by Arizona State University's Center for Science and the Imagination, which conducts interdisciplinary workshops that bring together scientists, engineers, artists, authors, designers, etc. to develop collaborative visions of positive futures.

One of the most persistent and visible proponents of the power of hope is author and historian Rebecca Solnit, whose 2004 book *Hope in the Dark* argues that hope should be thought of as "an axe you break down doors with in an emergency." Solnit's recent Not Too Late Project—and the related book—counteracts the overwhelming sense of doom and gloom associated with the climate crisis by focusing on the positive steps that have already been made and recognizing that climate action can only be made if we manage to not lose hope.

The relatively new science fiction sub-genre known as solarpunk has emerged out of this milieu, embracing a hopeful approach and offering some of today's most promising roadmaps towards an anti-antiutopian future. It is perhaps easiest to understand what solarpunk is by

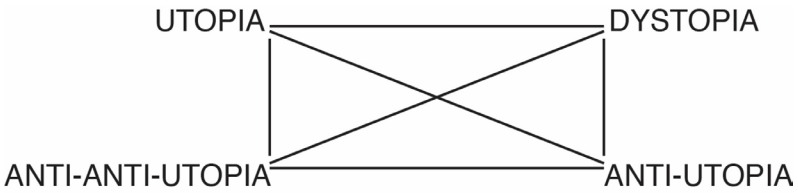

Figure 1: Greimas rectangle illustrating the relationship between utopia, dystopia, anti-utopia, and anti-anti-utopia by the author based upon Kim Stanley Robinson's discussion in "Dystopias Now!"

Figure 2: (L) Dystopian/Cyberpunk view of the Golden Gate Bridge from Altered Carbon, showing it taken over by an informal settlement of shipping containers. Credit: Altered Carbon, Virago Productions, 2018. (R) Utopian/Solarpunk view of the Golden Gate Bridge from Star Trek: Picard, showing it covered in photovoltaic cells for clean energy production. Credit: Star Trek: Picard, CBS Studios, 2020.

comparing it to the much more well-known genre of cyberpunk, which has been the dominant mode of envisioning science-fictional urban futures, particularly in film, for decades. (Fig. 2) Cyberpunk narratives—like those depicted in the *Blade Runner* films, the Netflix original series *Altered Carbon*, and the video game *Cyberpunk 2077*—offer what *Blade Runner* director Ridley Scott calls "tangible futures" in which "the poor get poorer and the wealthy get wealthier" by highlighting the degradation of the environment, the prevalence of corporate greed, income inequality, and the stratification of society by race and class (Sammon 1996, 93). In contrast, solarpunk narratives imagine worlds that focus on the community rather than the individual, on environmental sustainability rather than environmental degradation, on social justice rather than subjugation and inequality, and on optimism rather than nihilism. As Cat Sparks (2020), editor of *Ecopunk!: Speculative Tales of Radical Futures*, states, solarpunk attempts to "reboot and refurnish our collective imaginations to construct fresh ideas about the future and pathways about how to get there from here" through what she calls a "practical eco-futurist utopianism."

Kim Stanley Robinson can, in many ways, be considered the éminence grise of solarpunk literature. He has contributed forewords, short stories, and non-fiction essays to several solarpunk and solarpunk-adjacent collections. In addition, his non-fiction essays about the role of utopian science fiction—some of which are referenced here—and his public pleas for climate action—including as a guest speaker at the COP26 conference held in Glasgow, Scotland in November 2021—are an inspiration for the emerging generation of utopian science fiction authors. While Robinson is most famous for his multiple award-winning *Mars* trilogy, which in many ways can be read as a parable about climate change and geo-engineering, his most recent novels—especially *New York 2140* and *The Ministry for the Future*—take place in the relatively near future and imagine what the transition toward a post-carbon world might be like. *New York 2140* in particular has raised Robinson's prominence within the fields of architecture and urbanism largely due to his careful attention to detail in world building, leading to collaborations with architects including Bjarke Ingels (whose Big U project for Manhattan receives multiple mentions in the novel) and Usman Haque. However, architecture's engagement with Robinson's work has been largely superficial, tending to ignore his anti-capitalist politics and calls for significant societal changes. A prominent example of this is Ingels's formulation of what he calls "hedonistic sustainability," which can be seen in BIG's CopenHill and Oceanix City projects. These projects engage in notions of climate resilience while remaining firmly rooted in the neoliberal status quo that believes that we can simply design our way out of the climate crisis. The same can be said of many contemporary works of eco-urbanity like those associated with the Rebuild by Design and Resilient by Design programs through which hundreds of millions of dollars in federal funding have been distributed for climate resilience projects. (See Billy Fleming's essay "Design and the Green New Deal" for a comprehensive critique of these programs.) The problem with most of these projects is that they attempt to build our way out of the problem without engaging in a significant reimagining of the economic and societal status quo. In fact, the breaching of "Bjarke's Wall" in *New York 2140* can be read as a damning critique of this particular brand of technocratic solutions to the climate crisis. The lesson here is that without a significant reconceptualization of how we exist within the world any attempt to stem the tide of climate change will eventually be toppled.

It is also important to recognize that decarbonizing our cities is not simply a matter of replacing carbon-burning technologies with cleaner ones. We must overhaul the entire exploitative and colonizing socio-technological

Figure 3: A film still from the "Dear Alice" commercial produced by the Line Studio for Chobani, depicting a solarpunk future powered by sustainable energy sources. Credit: "Dear Alice" by The Line is licensed under CC BY-NC-SA 3.0.

systems that have developed alongside them. Clark A. Miller suggests that one important step towards this is a shift from a focus on efficiency to one of generativity:

> Efficiency is getting the same output for less input. … Generativity is the flip side. It means getting more output for the same amount of input. … Efficiency is a problem of standardization, of colonizing people to become elements of the system, to do what the system needs them to do. Generativity is a problem of creativity and individuality, of shaping life along lines that matter to those living them, of creating systems that serve diversity. (Miller 2021)

This is where the value of thoroughly engaging with solarpunk narratives, including those of Robinson, lies for designers. They encourage us to look beyond the technological solutions to the problems of climate change and thus imagine a wholesale reconceptualization of the future. By focusing on the possibilities for ecological and social transformation through collective action and innovative design, solarpunk cities offer a compelling vision for an anti-antiutopian future. One that is not simply the negation of dystopia but a positive and achievable alternative. Ultimately, this paper aims to contribute to ongoing debates on urban sustainability and resilience by exploring the potential of solarpunk as a transformative and inspirational vision for the future of our cities.

This paper draws from solarpunk narratives as primary source material, deriving a series of themes that enable us to understand the paradigm shifts necessary to rethink the design of cities amongst our precarious future. It links the principles derived from narrative sources to real-world examples, revealing that the paradigm shift may already be underway, at least in nascent and unrecognized ways.

So, what does a solarpunk future look like? As I'll show briefly below, solarpunk cities are diverse in a variety of ways. They center the human experience, rather than being overtly technological. They are in balance with nature. And, perhaps most importantly, they are cooperative and collaborative.

SOLARPUNK CITIES ARE DIVERSE

One of the most comprehensive visual depictions of a solarpunk future can be seen—ironically enough—in an advertisement for Greek yogurt by the American company Chobani. (Fig. 3) This commercial, "Dear Alice," was produced by The Line Animation Studio and included solarpunk artist Jessica Woulfe on the creative team. In it we see the integration of technology with the natural world, featuring an artificial weather system that provides irrigation for a garden, peach-picking robots, and—perhaps most importantly—a meal with people diverse in age and race sitting around a communal table

Figure 4: (L) A film still from the Chobani Oat Milk commercial produced by the Line Studio. Credit: "Chobani Oat Milk" by The Line is licensed under CC BY-NC-SA 3.0. (R) Photograph of Stefano Boeri Architetti's Vertical Forest 01. Credit: Chris Barbalis licensed under CC0 1.0 Universal (CC0 1.0) Public Domain Dedication.

(The Line 2021). While the commercial foregrounds life on a cooperative rural farming homestead, a high-density city supported by sustainable energy technologies including solar photovoltaics and buoyant airborne turbines appears in the not-too-distant background of several scenes, indicating that there is a symbiotic relationship between the urban and the rural in this future world.

The urban condition of this world is briefly explored in other commercials produced by the same team for Chobani Oat Milk and Chobani Probiotics. In the Chobani Oat Milk commercial we once again see a community diverse in age, race, and even body type living in high-rise residential towers replete with lush green balconies, which closely resemble Stefano Boeri's series of Vertical Forest projects. (Fig. 4)

Boeri's first Vertical Forest project, completed in Milan in 2014, consists of two towers that support the growth of 800 trees, 5,000 shrubs, and 15,000 other plants. Boeri (2018) claims that this provides "an amount of vegetation equivalent to 30,000 square meters of woodland and undergrowth, concentrated on 3,000 square meters of urban surface." The diversity of nearly one hundred different plant species in turn supports a large community of insects and more than twenty species of birds that have been found nesting on the trees and bushes of the Vertical Forest.

Paolo Bacigalupi's (2021) short story "Efficiency"—which is featured in the *Cities of Light* collection published by Arizona State University's Center for Science and the Imagination—emphasizes diversity in a different way: through a mixed approach to sustainable energy production. Bacigalupi contrasts the large-scale, centralized sustainable energy infrastructure of Great Lakes Amalgamated (GLA)—the fictional future electric utility in Chicago—with the small-scale, distributed energy production of protagonist Avery Brown's HoodElectric micro-grids on the South Side of Chicago. While most of the story is a battle of wits between GLA's "Large Utility Calibrated Yield AI," or LUCY, and the fiercely-independent Avery Brown, the story's open-ended conclusion suggests the possibility of a productive marriage between the top-down search for optimized efficiency by LUCY and the bottom-up focus on providing increased resiliency and economic benefits to a marginalized community by Brown. Brown's neighborhood-scale cooperative also operates a fleet of autonomous electric buses that provide alternative mobility options for residents, while also supplanting private vehicles on many neighborhood streets.

A micro-grid similar to that described in Bacigalupi's story has recently been completed by Commonwealth Edison (ComEd) in the Bronzeville neighborhood on the South Side of Chicago. The Bronzeville Community Microgrid (BCM) consists of 750 kW of photovoltaic power generation and a 500 kW/2 MWh battery energy storage system that can power the microgrid for four hours in the event of a utility outage. (Fig. 5) In addition, the BCM is interconnected with the Illinois Institute of Technology's (IIT) microgrid, allowing them to share power and "island" themselves from the larger utility grid. According to Mohammad Shahidehpour, director of the Robert W. Galvin Center for Electricity Innovation at IIT, the ability to send power back onto the utility grid has saved the institution between $200,000 and $1 million annually (Cohn 2022). This suggests that the development of neighborhood-scaled microgrids can not only increase resiliency, but can also potentially provide significant economic benefits to traditionally underserved and marginalized communities if the systems are designed so that the gains accrue to the community rather than large utility conglomerates.

Figure 5: Aerial view of the Dearborn Homes community in Chicago, showing roofs covered in photovoltaic panels that help power the Bronzeville Community Microgrid. Credit: "Connecting Bronzeville in Chicago to a Smart Microgrid" by TEDx Talks is licensed by CC BY-NC-ND 4.0.

Figure 6: A film still from Black Panther showing a street scene in Wakanda featuring a pedestrian scale and multiple modes of mass transit. Credit: Black Panther, Marvel Studios, 2018.

Figure 7: View of the Mountain Towers of the Sen̓áḵw project set in a car-free landscape. Credit: Revery Architecture.

Solarpunk stories like Bacigalupi's show us ways in which this might be done.

SOLARPUNK CITIES ARE ABOUT PEOPLE

Solarpunk also reexamines our relationship to nature and technology by centering the human experience. According to Andrew Dana Hudson (2020), a solarpunk author and scholar, technology within solarpunk narratives seeks to "de-abstract our relationships with material reality" which in turn allows us "to have better relationships with the climate, food, water, the land, and other non-human beings and ecosystems."

Birnin Zana, the capital city of Wakanda in Ryan Coogler's 2018 film version of *Black Panther*, exemplifies a city in which technology and nature are carefully integrated. Rather than making reference to the sleek, neon-drenched urbanism of Tokyo like so many other futuristic science-fictional cities, the solarpunk and afro-futurist city of Birnin Zana includes human-scaled streets, multiple modes of mass transit, and a more informal aesthetic inspired by indigenous and vernacular forms of architecture. (Fig. 6) For Hannah Beachler (2018), the Academy Award-winning production designer of *Black Panther*, the focus was on creating a "symbiotic balance" between the built and natural environment. This, importantly, began by thinking primarily about the *people* of Wakanda: "When I designed Wakanda, the first thing I researched were people. It wasn't about technology. I needed to understand the people. … Tradition over technology. People over technology. Technology is there to serve our lives, not for us to serve technology." Beachler was searching for a place that focused on "the connectivity of people, not the connectivity of users."

The Sen̓áḵw project—designed by Revery Architecture and developed by a partnership between the Squamish Nation and private developer Westbank—in central Vancouver is an example of a forward-thinking project that places an emphasis on benefiting the indigenous community that was displaced from its site at the turn of the twentieth century. When completed it will be the largest net-zero residential project in Canada, bringing 6,000 new rental homes—including 1,200 affordable units—to a city with a severe housing shortage. While the density of the district will reach more than 500 units per acre, there is a focus on providing a cohesive public realm, including underneath the Burrard Street Bridge which slices through the 10.5 acre site. Furthermore, the project will discourage the use of automobiles by only supplying parking for 10 percent of the housing units, allowing for the creation of a nature-filled public realm that places a priority on the people who will use the site rather than on the storage and movement of vehicles. (Fig. 7)

The economic opportunities created by this project, both during construction and after completion, will help to address high rates of unemployment and underemployment among Indigenous communities in the region. Furthermore, according to the Squamish Nation, the economic benefits accrued by this development "will allow our community to meet its housing, education, and social service needs" while also delivering "improved health care, culture, language, arts and … opportunities for member housing, that will help ensure the success and well-being of membership far into the future" (Nch'Kay West 2020). The Sen̓áḵw project also represents an important opportunity for the Squamish Nation to express their sovereignty on land that was taken from them, similar in some ways to

Wakanda's struggle to remain untainted by the forces of Western colonialism.

SOLARPUNK CITIES ARE IN BALANCE WITH NATURE

The COVID-19 pandemic has made it painfully clear just how intertwined and interdependent humanity is with the more-than-human natural world. *Multispecies Cities: Solarpunk Urban Futures*, a 2021 collection of solarpunk short stories, examines "the myriad ways plants, animals, microbes, rivers, and other more-than-human actors on this planet shape their environments with ingenuity and resourcefulness," and urges us to develop alliances with them in reconsidering the cities of the future (Rupprecht et al. 2021, 2).

Similarly, Becky Chambers's (2021) novella *A Psalm for the Wild-Built* and its sequel *A Prayer for the Crown Shy* are set on the small moon of Panga in which humans have relinquished half of the world to wilderness, allowing nature to heal itself by rewilding while also allowing a society of sentient robots to proliferate without human interference. Here, Chambers's world-building takes biologist E.O. Wilson's (2016) Half-Earth Project as its starting point, embracing Wilson's suggestion that, "Only by committing half of the planet's surface to nature can we hope to save the immensity of life-forms that compose it." This approach to rewilding can also be seen in a number of Kim Stanley Robinson's science fiction novels, including *The Ministry for the Future* and *2312*, each of which include large-scale climate restoration projects as major plot points. Echoing Wilson, Robinson (2018a) suggests:

> If we managed urbanization properly, we could nearly remove ourselves from a considerable percentage of the planet's surface. That would be good for many of the threatened species we share this planet with, which in turn would be good for us, because we are completely enmeshed in Earth's web of life.

In December 2022, the Conference of Parties to the UN Convention on Biological Diversity took substantial steps toward this goal when it adopted the Kunming-Montreal Global Biodiversity Framework (GBF), which—through a series of four goals and twenty-three targets—aims to conserve, restore, and protect 30 percent of land and water by 2030. Importantly for the future of high-density cities, target twelve of the GBF requires parties to the agreement to:

> Significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature and contributing to inclusive and sustainable urbanization and the provision of ecosystem functions and services. (Convention on Biological Diversity 2022)

The GBF builds upon important work that has already been completed by Singapore, which has firmly established itself as a global leader in rewilding. What began as an aesthetic tree-planting campaign under then Prime Minister Lee Kuan Yew has evolved into a comprehensive approach to increasing urban biodiversity through the development of an interconnected series of parks and more than ninety miles of "nature ways" that connect parks throughout the city. (Fig.8) The result is that 50 percent of the city is now covered by tree canopy.

According to Desmond Lee, Singapore's Minister of State for National Development, the decision to set aside significant areas for nature reserves and parks was a conscious one "which is never easy, especially when you consider the competing uses for housing, industry, defense and transport infrastructure. We consciously do so for the benefit of all Singaporeans, because a connection to nature is a must-have, not a good-to-have (Chua 2015)." This global leadership has extended to the development of the Singapore Index on Cities' Biodiversity, which has been used by more than eighty cities around the world—ranging from Edmonton, Canada to Curitiba, Brazil—as "a self-assessment tool for cities to benchmark and monitor the progress of their biodiversity conservation efforts" (Chan et al. 2014).

Similarly in December 2021, Mayor of London Sadiq Khan, announced a plan for rewilding London that "will help restore London's most precious wildlife sites and create more natural habitats for plants and animals to thrive." The project will include improving nineteen hectares of green and blue space, converting one hectare of paved areas to green space, and planting 4,000 trees. The projects announced as part of this plan prioritize areas of high climate risk and with poor access to green space. As described by environmentalist Ben Goldsmith, the plan operates at multiple scales: "From green rooftops to pocket parks, nest boxes for peregrines and swifts, rewiggling streams and reintroducing long lost native species, our plan is to weave wild nature back through the very fabric of our city" (Mayor of London 2021). Projects like these have myriad benefits for urban areas, including decreased flooding, reduced heat island effect, improved air quality, and increased biodiversity.

Figure 8: Aerial view of Bishan-Ang Mo Kim Park in Singapore, designed by Ramboll Studio Dreiseitl, which includes a renaturalized river that has helped increase biodiversity on the site by 30 percent. Credit: "Singapore Bishan Park Aerial.jpg" by Atelierdreiseitl is licensed under CC BY-SA 3.0.

SOLARPUNK CIITES ARE COOPERATIVE

Finally, and perhaps most importantly, solarpunk futures are collaborative and cooperative. This is important because, while fossil fuel companies like BP would have us believe that stopping climate change is a matter of personal responsibility and lowering the carbon footprints of individuals, we cannot rely on the virtue of individual citizens to save the world from climate disaster (Solnit 2021; Kaufman 2020). We must act in a holistic and comprehensive way and at a civilization-wide scale.

Kim Stanley Robinson's (2021) latest novel, the aforementioned *The Ministry for the Future,* is told through a polyphony of voices—what Bahktin has called a heteroglossia—acknowledging the imperative that any movement toward avoiding climate disaster will require worldwide cooperation and collective action rather than a sole hero figure. Similarly, Andrew Dana Hudson (2020) describes his award-winning solarpunk short story "Sunshine State" (Hudson and Flynn 2016) as being "about negotiation and bringing communities together" while featuring "no singular heroes."

This communal spirit can be seen clearly in both S.B. Divya's (2021) "Things That Bend, But Don't Break" and Deji Bryce Olukotun's (2021) "The Scent of the Freetails," which each imagine communities that have developed battery co-operatives that store solar energy collected during the day for use during the night. But they also recognize that the transition to a future powered by renewable energy sources cannot be achieved by technology alone. In both of these stories people have adopted new rhythms and patterns of daily life by moving energy-intensive activities to times of peak solar production and allowing the evening hours to become time for reflection and community building.

Recent research in New Zealand (Mair et al. 2021) suggests that the types of solar battery collectives described in these stories can result in significant savings when compared to individual battery ownership. The study compared how two groups of twenty houses were able to use batteries to assist in "load smoothing," or keeping the grid's power generation requirements consistent over time, and "peak shaving," keeping the amount of energy pulled from the grid at times of maximum use under a predetermined cap. Aggregating

the batteries together into a collective system resulted in a 50 percent reduction in battery size for load smoothing and a 93 percent reduction for peak shaving. This type of battery sharing could be accomplished by connecting individual houses to a large battery at the scale of a street or neighborhood—as is the case in the Bronzeville Community Microgrid discussed above—or by interconnecting smaller household batteries in a way that would allow residents to lend and borrow power as needed. This emphasizes the idea that collective action and cooperative social organizations, which are central to almost all solarpunk narratives, are essential ingredients of a future that rejects the rugged individualism of Suvin's antiutopian Capitalocene.

FROM HETEROTOPIAS TO WHOLE SOCIETIES

It is important to note, however, that if we are ever to reach a truly sustainable, decarbonized future, the worlds depicted in the solarpunk narratives discussed here must become more than heterotopic enclaves like the self-contained oases of Olukotun's La Estrella, Divya's La Granja, Hudson's The Myth, and *Black Panther*'s Birnin Zana. While each of these futures illustrate possible revolutionary paths forward, eventually these visions must shed their countercultural impulses—the punk aspects of solarpunk—and reach the status of mainstream normalcy or their optimism will end up being misplaced.

CONCLUSIONS

In conclusion, I want to echo Antonio Gramsci's (2010) famous call—which he originally borrowed from Romain Rolland—for "pessimism of the intellect, optimism of the will." It isn't difficult to justify a pessimism of the intellect. We're living on the cusp of several "planetary boundaries," which, if crossed, have the potential to render portions of our planet uninhabitable. Frequently today we also see what the absence of an optimism of the will looks like. This is seen in Suvin's explication of the Capitalocene as an antiutopia, in which the mere possibility of imagining a better future is seen as naive. This is why developing narratives and visions of better futures is so important. We must imagine what a decarbonized world will look like and what it will feel like to live there. By marrying the bottom-up, grassroots ethic of much of solarpunk culture with the significant top-down action necessary to save the planet from climate disaster we can play a leading role in both imagining and bringing into being a better future. Architects, landscape architects, and urban designers literally give form to the future through the design of new places. The design disciplines are, like science fiction, inherently speculative in that they imagine things that do not yet exist. By embracing the bold and imaginative ideas of solarpunk narratives we can bring forth alternative urban futures and offer visions of a more sustainable and just world. This is the essential anti-antiutopian work that is required of us as designers, writers, thinkers, educators, and people who care about the future of life on earth. Optimism and hope are hard. But there is no alternative, because the only alternative is giving up.

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