

Amsterdam's circular economy at a world-ecological crossroads: postcapitalist degrowth or the next regime of capital accumulation?

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This article conceptualises the circular economy as a space of immaterial, as well as material, metabolic flows mediated by capitalism and planetary urbanisation. World-ecology provides us with the critical lens to view the circular economy as part of an emergent regime of accumulation that may supersede neoliberalism. However, if each regime entails new frontier zones for appropriating cheap natures and dumping wastes, then the circular economy—as a strategy for revalorising waste—presents a possible structural limit to capitalism's further expansion. Moreover, when combined with notions of degrowth and doughnut economics, the circular economy may provide an imaginary and set of prefigurative practices that point towards a postcapitalist economy. Through a case study of Amsterdam—a city aiming to be fully circular by 2050—we examine this contradictory crossroads, problematising the idea of circularity within capitalism and exploring the potential of postcapitalist alternatives within the circular economy.

Keywords: capitalism, circular city, doughnut economics, urban political economy, waste-value dialectic, world-ecology

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Introduction

The circular economy is a discourse conventionally associated with making the wasteful, linear processes of capitalist production and consumption more circular and sustainable through input/output sharing, reuse, repair, recycling and upcycling—increasingly studied as part of critical economic geographies concerned with alterity, diversity and postcapitalist praxis (Ashton et al., 2022; Hobson and Lynch, 2016; Lekan et al., 2021). Recent work argues for extending its remit to encompass immaterial as

well as material flows, notably finance and rent (Webster, 2021). This suggests that any coherent circular economy must include the economy in its entirety, understood as the regulation of our metabolic exchange with the rest of nature, mediated by urbanisation and extended urban infrastructures (Mau, 2023; Moore, 2003; Schafran et al., 2018). Literature on the circular economy, however, has only just begun to attend to the city as a space of more-or-less circular flows (Bassens et al., 2020; Kęłowski et al., 2020). Cities are presented as the 'key entities' of circular

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economy theorising and strategising (Bassens et al., 2020: 894) and yet ‘the urban scale, albeit central in urban metabolism, is remarkably absent in the current academic debate about the CE [circular economy]’, while ‘addressing this gap is crucial for both urban studies and organisation theorists’ (Kębłowski et al., 2020: 143). The challenge, then, remains to *urbanise* the circular economy through a holistic metabolic lens.

This paper takes up this challenge and responds to calls for a more ‘macro-perspective of the circular economy’ (Savini, 2019: 676) within a *global* urban political economy of crisis-ridden, intersectional, uneven capitalist development. It theorises the circular economy through a synthesis of recent Marxian scholarship that conceptualises our present era of financialised neoliberalism as a specific ‘regime of accumulation’ within the historical development of capitalism. Capitalism is conceptualised expansively as a socio-ecological system or world-ecology defined by nature-society relations of appropriation as well as exploitation (Fraser, 2022; Moore, 2015). This literature within Marxist urban political ecology is part of wider attempts—including metabolic rift theory and political-industrial ecology—to understand and map out the social ‘metabolism’ of cities (Newell and Cousins, 2015). Through this lens, we argue that the circular economy can be understood as an economic discourse that reimagines capitalism as a metabolic ecology and signifies an emergent regime of accumulation: ‘the beginning of the capitalist economy’s structural adaptation to problems of waste accumulation and resource scarcity’ (Savini, 2019: 676).

We analyse the scope and scales of urban circularity as well as its limits through the case of Amsterdam—a city at the cutting-edge of circular economic innovation, aiming to be fully circular by 2050. In April 2020, the City of Amsterdam published the ‘Amsterdam City Doughnut’—a collaboration with Kate Raworth, the Oxfam-economist behind ‘Doughnut Economics’ (DEAL, 2020). Doughnut Economics posits the economy as the space between a social foundation ensuring basic human needs are met—the doughnut’s ‘inner ring’—and an ecological ceiling to keep humanity safely within planetary boundaries of Earth systems—the ‘outer ring’ (Raworth, 2017). The City of Amsterdam, a self-acclaimed ‘pioneer’ in circular economic transitions, employs a doughnut frame to ensure that the ‘systemic transformation [...] needed to tackle climate breakdown and ecological collapse’ happens ‘in ways that are socially just’ (DEAL, 2020: 3). At the same time, Amsterdam’s circular economy may prefigure an emergent regime of accumulation, institutionalised by a ‘mode of regulation’—a set of institutions, governing norms, political procedures and policies—cohering around a ‘green growth coalition’ (Savini, 2019, 2021) promoting the circular economy and doughnut economics as overlapping, overarching narrative frames for a spatial fix

to conjunctural crises. Much like the wider movement for which it represents the vanguard, Amsterdam’s circular economy stands at a crossroads: one way pointing towards an emergent regime of capital accumulation; another towards postcapitalist degrowth.

This paper results from two different strands of research coming together. First, a three-year multi-institutional urban-comparative project on the proliferation of ‘post-neoliberal’ policy agendas, notably the foundational economy, across six European cities and regions (see Russell et al., 2022). Second, a doctoral project on the emergence and potential of doughnut economics in Amsterdam. Each employed qualitative methods centred on semi-structured interviews with key stakeholders, from community activists and policy consultants to public officials and a city councillor, aimed at understanding the strategies, developments and tendencies in the emergence of Amsterdam’s doughnut economy. A total of 29 interviews ranging between 45 and 90 minutes were triangulated with documentary analysis and around 55 hours of participant observations at community projects and workshops organised by doughnut activists and the municipality of Amsterdam. The participant observations were conducted through a form of ‘appointment ethnography’ (Verloo, 2020), at closed-door workshops (as an invited researcher-participant), at public events, or at site visits to neighbourhood-based doughnut projects. In the case of the doctoral project, the researcher engaged in a form of ‘researching “back home”’ (Karra and Phillips, 2008) in which she returned to her home country and to an urban, socio-economic context that was partly familiar but also, thanks to the multiplicity of ‘doughnut’ activities, partly defamiliarised.

The process of bringing two distinct datasets and methodological approaches together presented both challenges and opportunities. Each involved ‘thinking with’ research participants with very different positionalities—from the grassroots perspectives of doughnut city activists to more formalised, institutionalised perspectives of powerholders. Bringing these into creative dialogue necessarily entailed the negotiation of tensions and contradictions between standpoints, with the resulting analysis benefitting from triangulation between differing narratives. Adapting Gibson-Graham (2006), we attempt to read for *both* dominance and difference to see complex, contradictory processes through multi-perspectival windows.

Following recent renderings of the circular economy as ‘standing at a crossroads’ (Genovese and Pansera, 2021; Siderius and Zink, 2023), this paper seeks to understand the crossroads at which Amsterdam’s circular economy finds itself and the implications for circular transitions elsewhere. The first part situates both urban and circular economies within a world-ecological reading of capitalism and its ‘waste-value dialectic’. The second part mobilises this world-ecological perspective to investigate how

Amsterdam's circular economy may represent a structurally limited attempt to commodify waste and to transition to a new regime of accumulation. At the same time, the circular economy also gives rise to locally driven forms of economic alterity. To make sense of these contradictory tendencies, we read Amsterdam's circular economy and its mobilisation of a 'doughnut economics' frame for both dominance and difference. In the conclusion, we reflect on what a world-ecological perspective can bring to the study of urban political economy and the alternatives now emerging to contest capital in the current conjuncture.

Part 1: Towards a world-ecological analysis of the circular city

In this section, we take up the challenge of explaining developments in circular thinking presented by dialectical-totalising theorisations of capitalism as not only an economic mode of production but a *world-ecological system*. We build on the work of Nancy Fraser (2014, 2022) and Jason W Moore (2003, 2010, 2015) alongside some of their interpreters (Conroy, 2022; Irvine, 2023) to conceptualise capitalism as a world-ecology within which we then situate the circular city.

Fraser and Moore each articulate an expansive understanding of capitalism as an 'institutionalised social order' (Fraser, 2014: 66) or 'way of organising nature' (Moore, 2015: 14). By conceptualising capitalism as inherently dependent on non-commodified spheres, each convincingly argues that capitalism accounts for only commodified or capitalised value, while disavowing and rendering invisible its externalised yet fundamental taps of unwaged work/energy and sinks for waste/pollution. Surplus value is rendered dependent on an 'ecological surplus', defined as 'the ratio of the system-wide mass of capital to the system-wide appropriation of unpaid work/energy' (Moore, 2015: 101). Since its genesis in the North Atlantic region, capitalism has developed through 'long-waves' of accumulation, whose profitability is propelled by the intensification of labour exploitation and expropriation, as well as the 'discovery' and appropriation of *new frontiers* of cheap natures (see Irvine, 2023: 459).

Neoliberalism is the fourth and latest regime of accumulation for Fraser, following on from mercantile, liberal, and state-managed regimes (see Conroy, 2022). This interpretation, broadly shared by Moore, thus departs from more familiar conceptions of neoliberalism as a *mode of regulation* (Savini, 2019), a hegemonic process of neoliberalisation or, in a Foucauldian register, an 'art of government' (see Haughton et al., 2013). Instead, Moore and Fraser distinguish neoliberalism as the overarching regime of accumulation rooted in neo-colonial commodity frontiers and newly configured forms of gendered, racialised and ecological expropriation. Fraser (2014: 57) calls the latter capitalism's 'background conditions of possi-

bility', enrolled invisibly in the production of value. Moore (2015: 236) describes these commodity frontiers—in food, labour-power, energy, and raw materials—as capitalism's 'Four Cheap Natures'. Each new regime of accumulation is assembled through pioneering political, cultural and scientific technologies for mapping, measuring, enclosing, commanding and dominating cheap natures. As we argue below, the circular economy may constitute such a pioneering technology for coordinating an emerging regime of accumulation following financialised neoliberalism's exhaustion—one refocused on recycling capitalism's waste products within urban spaces.

The urban and the circular within capitalism as world-ecology

In the historical configuration of each new regime, 'the urban' has always played a central role. Moore bases his argument on Braudel's analysis of northwestern Europe's 'agronomic 'choice' for wheat, a soil-exhausting crop that required technological subsidies (animal husbandry) to restore fertility (Braudel, cited in Moore, 2003: 440). Through specific rural-urban contradictions and an inherent reliance on geographical expansion for sufficient, cheap wheat supply, cities such as Amsterdam extracted nutrients from rural areas without returning them. This process disrupted the basic metabolic processes underpinning ecological sustainability—a world-historical shift described by Marx and elaborated by Marxist ecologists such as John Bellamy Foster (2000)—and notably *not* Moore—as the 'metabolic rift' (more on which below). This ultimately depended on cheap grain imports, implying urban-rural configurations and colonial extraction extending across geographies well beyond immediate hinterlands—unfolding the development of capitalism as a world-ecology.

Burgeoning circular city discourses today point to attempts to alter the extractive urban-rural relations that have only deepened as capitalism has expanded. This coincides with surging interest in the concept of urban metabolism to address interrelated questions of urbanisation, production, consumption and sustainability (Newell and Cousins 2015). Evolving out of industrial ecology and extended product life manufacturing in the 1970s and 1980s, the circular economy originated as an idea for reducing waste primarily in production—but increasingly consumption—through closing material loops and transitioning from linear 'cradle-to-grave' to circular 'cradle-to-cradle' product lifecycles (Gregson et al., 2015). The growing circular economy literature has thus far concentrated on material flows within delimited agglomerations, such as industrial eco-parks for input and output sharing between firms, or even city-regions (Bassens et al., 2020; Gregson et al., 2015; Kębłowski et al., 2020; Savini, 2021; Webster, 2021). But, this focus has two shortcomings.

First, it overlooks that material flows are necessarily part of wider circuits of value beyond bounded

agglomerations, extending out along supply chains; that internal circularity is constituted by a bracketed outside. Closed-loop systems in one place depend upon the circulation of materials and residues through global supply chains, such as informal recycling and waste processing networks (Irvine, 2023). The ‘effaced, background labour’ (Corwin and Gidwani, 2021: 2) that invisibly works the waste commodity frontiers both *within* and *beyond* the city makes patent the contradictions of circular urban economics. As waste is increasingly revalorised as a resource stream, and waste work is capitalised as part of industrial strategies to grow the circular economy, the frontier zones of expropriation of non-commodified natures must increase at a faster rate, still, for exploitation of labour to remain profitable and capitalism viable.

The capitalist circular economy is, therefore, no different to unsustainable mineral mining for solar panels or electric car manufacturing, despite its green credentials. So long as its production is coordinated by privately-owned firms that are driven by profitability and competition and integrated into exploitative and extractive planetary supply chains (Mau, 2023), then the circular economy remains dependent on *externalised* appropriation. A truly circular—that is, *internalised*—economy is therefore an impossibility under capitalism. But a circular economy may grow within capitalism due to capital’s hidden abodes and fetishisation of the final commodity, in this case, the recycled or reused product.

The second shortcoming of the circular economy literature is that the more socio-spatial aspects of wellbeing and socio-ecological sufficiency tend to be overlooked; the gap remains, following Lekan et al. (2021), to consider circularity as ‘circuits of value’. In arguing for the expansion of circular economy thinking beyond the material to take in immaterial cycles, too, Webster (2021) presents the intriguing case that debt in the money cycle parallels the role that waste plays in materials and energy cycles: creating financial ‘pollution’ that undermines the health of the economic system, just as waste disposal pollutes ecosystems. Creating a truly circular economy, argues Webster, means closing the loop on extractive and polluting activities, such as rent-seeking and usury, just as it does for materials and energy; while others argue that (capitalist) market mediation in general is responsible for making circular economy trajectories ‘dysfunctional’ (Siderius and Zink, 2023). Such arguments are supported by work in degrowth and Social Ecological Economics, which suggests that unsustainable debt—and the interest-bearing capital generating it—fuels the ‘growth dependencies’ that drive the self-expanding, market-mediated dynamic of capital (Kallis et al., 2012; Schmid, 2023).

A dysfunctional, capitalist circular economy would not aim to reduce debt (immaterial pollution/waste) in absolute or even relative terms, but rather revalorise it as new sources of investment, to recycle debt continually

and exponentially—just as it seeks to do this for actual, material waste. A circular economy must therefore be understood in the expansive terms of what Marx identified as capitalism’s three circuits, as functional moments in an integrated metabolic cycle: the circuit of productive capital (industry); commodity capital (circulation); and money capital (finance) (see Arboleda and Purcell, 2021). By incorporation within these three circuits of capitalism, the circular economy must contend with capital’s contradictory self-valorising dynamics, pushing against notions of circularity towards continual expansion. This raises two critical points.

First, urbanisation or the urban form represents the spatial materialisation of this circuitry through which capital flows for social metabolic exchange with nature. Here, we follow recent developments in economic sector theorising away from the aspatial, stadial and developmentalist paradigm of the three traditional sectors—primary, secondary, tertiary (plus quaternary and quinary)—and towards a spatialised ‘four-sector model’ foregrounding urbanisation and metabolic flows (Schafran et al., 2018). This retheorises economic sectors as materialist spatial moments in the metabolic process of *extracting* and *processing* and then *fixing* and *moving* materials from nature for the production of settlements to fulfil human needs (and accumulate capital). Here, cities represent the nodal points in the metabolic cycles that constitute ‘the economy’.

Second, we might think about these circuits in scalar terms, as comprising different ‘levels’ of economic organisation: the two circuits—urban and global—defined by Santos (1977); or the three circuits outlined by Braudel—the everyday, urban, and global—and taken up by recent ‘foundational economy’ thinking (Bärnthaler et al., 2021; Engelen et al., 2017; Russell et al., 2022). An *urbanised* circular economy moves policy thinking away from the competitive logics of neoliberal entrepreneurialism towards a more grounded, foundational approach (Engelen et al., 2017). This ‘grounded city’ perspective, we suggest, is the geographical analogue to circular economy thinking. The grounded city problematises the unsustainable extraction of raw materials for manufacturing of high-value-added consumables, and questions the entire logic of premising a city’s economic base on export industries for trade in global circuits tied to self-expansionary finance capital (Bärnthaler et al., 2021). This advances the spatial aspects of circular economic thinking: asking how it might be possible for cities to produce foundational goods and services more sustainably and self-sufficiently while still generating innovation and wealth for citizens; challenging Hans Blumenfeld’s classic contention, from 1955, that ‘people cannot live by taking in each other’s washing’ (quoted in Schafran et al., 2018: 1715). For a truly circular economy, people must indeed be able to generate and sustain prosperous livelihoods by taking in each other’s proverbial washing.

The impossibility of a fully circular economy under capitalism

However, capitalism presents a structural limit to circularity conceived in this way. Even within bounded circular economies, the Second Law of Thermodynamics—demonstrating that any physical system based on inputs and outputs is *entropic*, slowly disorganising over time—suggests that a fully circular economy ‘has no relation to reality as revealed by biophysical metabolic analysis’ (Martinez-Alier, 2022: 1182). Indeed, ‘closing the loop’ is extremely difficult even for specific materials in particular sectors, with only slightly imperfect recovery rates for recycling materials creating exponential leakage or wastage over time, compounding with each cycle of recycling (Webster, 2021). This is exacerbated by capitalism’s tendency to ‘transform valuable matter and energy into waste’; and the reliance of this especially wasteful system on displacing or ‘exporting’ rather than resolving its ‘entropy problem’ (Moore, 2015: 84). This has serious implications for a circular discourse concerned with countering entropic wastage and underlines the deeply uneven global geography underpinning circular economy development.

Capitalism’s entropy problem derives from its utter dependency on Cheap Natures, understood as ‘free gifts’ (‘nature-as-tap’) and ‘free garbage’ (‘nature-as-sink’); ‘Every great movement of appropriating new streams of unpaid work/energy’, writes Moore (2015: 279), ‘implies a disproportionately larger volume of waste’, such that ‘[v]alue and waste are dialectically bound’. Gidwani and Maringanti (2016) articulate this bind as the ‘waste-value dialectic’ in which value, as a self-expansionary dynamic, depends upon ‘effaced, background labour’ (Corwin and Gidwani, 2021: 2) to do its ‘dirty work’, as well as upon sinks or dumping grounds for its poisons and pollutants, unwanted products and ‘surplus’ populations. Capital accumulation always relies on ‘sacrifice zones [of] wasted people and wasted places’ (Armiero, 2021: 2, 10). Around 15 million people, or 1% of the world’s urban population toils in informal waste work—mostly women, children, the elderly, and migrants—with an estimated 1 million ‘informal recyclers’ in Europe alone, double the figure employed formally in waste collection and processing (Irvine, 2023). This is ‘infra-structural labour’, both invisible and essential to capital (Corwin and Gidwani, 2021)—one important disavowed source, alongside non-human cheap natures, of capitalism’s continued profitability.

Capitalism’s continued profitability, however, is increasingly difficult to secure. A surge in commodity prices for rare-earth metals and other key raw materials led to the ‘commodity supercycle’ of 2003–7 (Arboleda and Purcell, 2021) and the ‘signal crisis’ (Moore, 2015) of financialised neoliberalism, exacerbating overaccumulation and precipitating the 2007–9 global financial crisis. With new commodity frontiers now either exhausted or increasingly contested, capitalism must turn to alternatives, reinvent

itself, or risk collapse. No surprise, then, that the compelling yet contradictory idea of the ‘zero-waste circular economy’ as a perfect, self-sustaining loop—‘flawlessly circular and absolutely benign’ (Valenzuela and Böhm, 2017: 31)—is gaining ground as a hegemonic imaginary for renewing accumulation in the face of secular stagnation, and as a ‘moral economy’ justifying the EU’s geopolitical efforts to secure rare-earth and scarce resources (Gregson et al., 2015). Just as ‘net zero carbon’ discourses promulgate the fantasy of the decoupling of economic growth from carbon emissions without transforming capitalism itself (Buck 2021), so too does the zero-waste circular economy promote continued capital accumulation through the revalorisation of waste (Valenzuela and Böhm, 2017). Waste, then, becomes capitalism’s next commodity frontier through which the hegemonic project of capital’s indefinite expansion may be realised despite deepening world-ecological contradictions. In this way, the circular economy presents a potential “spatial fix” for neoliberalism’s overaccumulation crises (Conroy, 2022) while simultaneously providing an “urban sustainability fix” (Savini 2019, 2021) that secures cities’ entrepreneurial repositioning within the global economy.

A striking challenge to the zero-waste circular economy is presented by Moore’s world-ecological treatment of the role and function of waste in capitalism. Recently, Moore (2023: 16) has built on Armiero’s (2021) concept of the ‘Wastocene’ to argue that the ‘accumulation of waste is a limit to capital’, perhaps the decisive socio-ecological limit of capitalism. Such a limit is relational rather than substantialist; waste is a dialectical process and site of struggle rather than material substance alone. The Wastocene combines the two principal meanings of waste—‘as commons to be enclosed, as pollutants to be dumped’ (Moore, 2023: 16)—to suggest how capitalism is an unstable system predicated on expanding waste frontiers and ‘sacrifice zones’. These are capitalism’s spatial fix for its entropy problem: ‘These frontiers are not just places where capital shifts’ but also ‘zones where capitalism’s entropy is exported’ (Moore, 2023: 28). Thus, capitalism is an especially entropic, wasteful system only made viable by virtue of its capacity to export entropy from core to periphery through colonial dependencies and uneven development—a kind of thermodynamic imperialism (Moore, 2023: 21, footnote 10).

Thus, the intensification of circularity in one city implies the export of entropic processes and displacement of waste frontiers and sacrifice zones elsewhere (both beyond and within the city). Whilst the aim of Amsterdam’s circular economy is to internalise and make circular—rather than export—its waste frontiers, Amsterdam’s circular industrial strategies for product reuse and recycling, as Savini (2019) has shown, are nonetheless dependent, contradictorily, on ever-increasing material through-flow and rising consumption. In other words, capitalist

circularity is only made viable by a *growing* stream of waste to be processed profitably.¹ If Amsterdam's strategy ever comes close to realising zero-waste circularity—itsself an extremely difficult proposition in the face of thermodynamic reality (Martinez-Alier, 2022)—any entropic wastage would, by definition, have to be exported; it would be compounded by the rising resource inputs required to maintain growth in the circular economy and which could only possibly be sourced, profitably under capitalism, from the wastage of people and places elsewhere.

If circular economy development is to avoid being an imperialist project of exporting entropy from core to periphery, then it must seek to make the entire global economy circular. This would mean the circular economy becoming capitalism's next regime of accumulation centred around the capitalisation of (re)production processes and technologies for revalorising waste—in effect, turning waste frontier into commodity frontier. However, this is structurally limited, if not impossible, by the dialectical relationship Moore (2015) identifies between rising capitalisation and even faster rising appropriation; by 'the centrality of frontier zones in counter-acting the tendency for the rate of profit to decline' (Moore, 2023: 28); by the state-led colonisation of new frontier zones and 'great waves of geographical restructuring' (Moore, 2015: 100) enabling the periodic injection of cheap natures to offset capitalism's falling rate of profit (see also Conroy, 2022).

Capitalism's falling rate of profit and crisis tendencies are not only due to the contradictions between incentives to replace human labour with machines (to increase productivity) and structurally limited efforts to intensify exploitation of labour (the source of surplus value). These tendencies are also rooted in the falling fertility of non-human nature such as soil (the other original source of surplus value) and diminishing Ecological Returns on Investment (EROI) (see Martinez-Alier, 2022). Moore's (2015) dialectical-monist world-ecological 'double internality' of 'humanity-in-nature/nature-in-humanity' can go only so far in explaining this; Foster's (2000) dualist idea, building on Marx, of a 'metabolic rift' in society's exchange with nature helps us understand in clearer terms what's at stake in capital's exhaustion of ecologies and its opening of irreparable and damaging disruptions to social metabolism (for more on metabolic rift theory, see McClintock, 2010 and; Genovesi and Pansera, 2021).

The original metabolic rift in soil fertility forces capitalists to prop up falling EROI with technological subsidies—artificial petrochemical fertilisers, for instance—but which necessitate their own appropriations of cheap natures elsewhere, thereby scaling up and geographically displacing capitalism's metabolic rift, for an expansive ricocheting process of global 'rifts and shifts', from the nitrogen cycle to the carbon cycle (McClintock, 2010). Moreover, technological subsidies produce rising toxifications and mutations, such as superweeds from genetic modification in

industrial agriculture, such that surplus value depends upon 'a disproportionately greater quantum of surplus pollution' (Moore, 2023: 28). Moore's (2023: 22) argument that '[f]or every commodity frontier, there must be a more expansive, and over time, more toxic, waste frontier' suggests that attempts to commodify waste through the circular economy are fraught with paradox, presenting a structural limit to capital's expansion. On the capitalist precepts of expanding surplus value, therefore, the idea of true, sustainable circularity—without entropic exports, toxic spillovers or expanding waste frontiers—flies in the face of material reality.

The fatal combination of rising toxifications and exhaustion of new commodity frontiers for plundering cheap natures—at least on this planet—suggests to Moore (2023: 30) that we are fast approaching 'an epochal crisis of capitalism', which 'will give way to another model – or models – over the next century. Hence the centrality of the new ontological politics – of food sovereignty, climate justice, de-growth, and cognate movements' (Moore, 2015: 29). This intriguing allusion to 'the new ontological politics' suggests another, alternative role for the circular economy: as an imaginary and set of prefigurative practices, alongside degrowth and doughnut economics, pointing towards a postcapitalist society. Moore argues that potentially revolutionary movements to 'reclaim the commons' are today approaching 'a zero-sum contest with the forces of capital', as new frontier zones are exhausted and the urban, agrarian, terrestrial and atmospheric commons are enclosed by capital, with nowhere left to colonise, on planet earth, at the scale required (Moore, 2023: 25). 'Absent new frontiers', writes Moore (2023: 30), 'capital's contradictions turn inwards, yielding an unprecedented onslaught of toxification and violence', thereby escalating 'ecological distribution conflicts' (Martinez-Alier, 2022).

Reflecting the conclusions of similar critiques mounted from different theoretical angles (Genovesi and Pansera, 2021; Siderius and Zink, 2023), all this places the circular economy at a contradictory crossroads, torn between opposing trajectories: one towards commodification, as a spatial fix for uneven capitalist entropy; the other, decommodification, as part of a new ontological politics. Perhaps no other city illustrates this dilemma so acutely as Amsterdam.

Part 2: Interrogating Amsterdam's circular economy

As a city renowned for its liberal progressivism and radical experimentation with new ideas and sustainable practices whilst also a global hub for tourism, financial, logistical and digital and creative industries (Engelen and Musterd, 2010; Savini, 2017; Savini et al., 2016), Amsterdam represents an extraordinary case for studying the dynamics, contradictions and prospects for realising a circular city in

the current conjuncture. Amsterdam benefits from its long history as the economic centre of the once-hegemonic Dutch Republic, 'the head capitalistic nation of the 17th century', as Marx put it (2013[1867]: 526). Moore (2003; 2010) cites Amsterdam as a prime example of the urban-rural antithesis—extracting cheap grains from the Baltic region to develop high-value-added sectors. The city's wealth and power were built on early colonial expansion of extractive commodity frontiers across Europe and, later, into the Americas and Southeast Asia.

Present-day Amsterdam has an economic base that deeply problematises any claims to sustainability or circularity (Engelen and Musterd, 2010; Savini et al., 2016). Its harbour is one of Europe's primary entrepôts for coal, feeding Germany's Ruhr valley. Amsterdam's airport Schiphol, in which the municipality maintains a 20% stake, is the world's second biggest hub for international (connecting) passenger traffic after Dubai, with 52.5m in 2022 (Statistics Netherlands, 2023b). Amsterdam has the largest concentration of data centres in Europe, consuming vast amounts of electricity, playing into national digitalisation strategies promoting the Netherlands as a digital leader (Gemeente Amsterdam, 2020c). The Zuidas—Amsterdam's very own Canary Wharf or La Défense (Swyngedouw et al., 2002)—is core to the city's strategy to be a 'business city' and 'knowledge city' that leverages the 'creative, innovative, entrepreneurial, talented people of Amsterdam'—a core strategic orientation since the early 2000s (Gemeente Amsterdam, 2004, 17–22). The Zuidas is one of the world's largest tax havens, home to accountancy, consultancy, legal, insurance and finance firms specialising in corporate tax avoidance (Berentsen and Polman, 2021). The Netherlands is the world's second biggest exporter of food products, after the USA, for which Amsterdam acts as a nerve-centre. Tourist numbers have more than quadrupled in the last two decades, from 4m in 2000 to 21m by 2019 (Gemeente Amsterdam, 2022). Amsterdam is thus the epitome of a global capitalist city.

Yet Amsterdam is also celebrated for its experimentation with progressive policies and its approximation of 'the just city' (Fainstein, 2010). Since 2018, the City of Amsterdam has been governed by a Green-Left-led coalition characterised as 'new municipalist' (Hamilton-Jones and de Groot, 2021) – an emerging global movement of urban activists aiming to democratise and feminise the local state through citizens' assemblies, and to socialise city-regional economies through commoning, co-ops and remunicipalisation (see Schmid, 2023; Thompson, 2021). Amsterdam aims to become the world's first 'fully circular city' by 2050 and already claims to be the first 'doughnut city', pioneering the application of doughnut economics (Raworth, 2017), based on the prior adoption of circular economy thinking in public policy since as early as 2014 (Cuomo et al., 2020; Savini, 2019, 2021). Diverse local groups are experimenting with commons-based al-

ternatives to capitalism, as part of its Commons Network (Hamilton-Jones and de Groot, 2021); while bottom-up experimentation with doughnut economics is coordinated through the Amsterdam Doughnut Coalition. Amsterdam also hosts explicitly counter-hegemonic alternative policy organisations working to challenge neoliberal globalisation, notably the Transnational Institute (TNI), which feed into growing urban policy debates on circularity alongside remunicipalisation and economic democratisation.

Circularity as an urban sustainability fix

The most recent manifestation of the city's progressive policy agenda is the Amsterdam Circular Strategy 2020–2025—less a systematic programme than an overarching 'narrative frame' for coordinating multiple grassroots projects and public-private-civic partnerships (Cuomo et al., 2020; Savini, 2019, 2021; Savini and Geizen, 2020). This aims to tackle 'the great challenge for the 21st century: to give ourselves and others a fair chance at a good life, while separating economic growth from the pressure on the environment' (Gemeente Amsterdam, 2020b, 11). The City of Amsterdam envisions a combination of top-down and bottom-up interventions that enable achievement of public policy objectives whilst giving room to local circular experiments now proliferating across the city. Bringing together visions for a sharing economy, intelligent monitoring and management of waste streams, innovation and entrepreneurship, Amsterdam is being positioned as a frontrunner to benefit from competitive advantage in a growing international market for green and circular technologies.

Emphasising that '[a] circular economy is not only achieved with nice words and plans', the city authority has formulated 'concrete objectives' to 'reduce the use of primary raw materials by 2030' and 'be 100% circular by 2050' (Gemeente Amsterdam, 2020b, 17). That such objectives remain ambiguous reflects the unchartered territory of transitioning to a circular economy without a 'step-by-step plan that can simply be rolled out up to 2050' (Gemeente Amsterdam, 2020b, 18). Implementation of the circular strategy is said to largely rely on 'learning by doing' and 'scaling up wherever possible' (Gemeente Amsterdam, 2020a: 14; our translation). This is an exploratory, pragmatic, recursive and experimental approach to 'learning by doing', one that ambitiously scales up to the city-region the kinds of practices and theories of change more conventionally deployed by social innovators in urban living labs at the more local level within specific experiments—and Amsterdam has plenty of urban living labs to draw upon for inspiration (Barnett, 2022; Cuomo et al., 2020).

Thus, so far, Amsterdam's circular strategy is closely tied to the interests of what Savini (2019) has identified as its ruling urban regime—a 'green growth coalition'. The learning-by-doing approach represents just one of

the three modalities highlighted by Savini (2019) through which circularity is pursued by the coalition as an ‘urban sustainability fix’ and emergent regime of accumulation. First, ‘regenerative urbanist’ or ‘urban mining’ practices are experimenting with forms of upcycling, reuse, and repair (in bioeconomy, construction, electronics and chemicals) before the need for reprocessing and recycling. This is reflected in the city authority’s ambitions for circular construction of specific buildings, public spaces and, indeed, whole neighbourhoods under development, notably Haven-Stad (Port City), with aims to develop a marketplace for secondary construction materials as well as new data infrastructures to inform circular processes (Gemeente Amsterdam, 2020b).

Second, Savini (2019) observes the shortening of supply chains and restructuring of logistics for industrial recycling and waste processing, so that formerly centralised processes are localised at the city-regional scale, to become coterminous with urban waste streams and metabolisms. This is coupled with ‘reverse logistics’ connecting consumed goods back to producers for revalorisation. The City of Amsterdam aims to establish regional production networks and a large-scale circular agglomeration in its harbour—the Harbour company rebranding itself from a coal/gas port into a ‘circular incubator’ and ‘connector’ of material reuse streams, waste-energy, and e-waste processing—and to develop a marketplace and large-scale plant for hydrogen, Amsterdam’s newest circular strategy (Gemeente Amsterdam, 2020b).

Finally, ‘prosumption’ describes a socio-cultural shift through which consumerist subjectivities and practices are gradually replaced by integrated ‘prosumerist’ practices that collapse the distance between production and consumption through, for instance, sharing platforms, product redesign, and digital fabrication (Savini, 2019). Located primarily at the neighbourhood scale, such practices are a prominent part of Amsterdam’s circular strategy, which documents a wide variety of local bottom-up projects ranging from community composting to repair cafes. Prosumption has spawned an ecological entrepreneurial sub-culture experimenting with circular innovations. From 2013 to 2015, Amsterdam became a hotspot for start-ups in waste recovery and materials reuse, with ten times faster growth than the national economy; a makers industry specialising in repair and reuse is now promoted politically as a ‘new resource economy’ (Savini, 2021: 2126). Homegrown companies such as Metabolic and Circle Economy have quickly gained market share in offering consultancy services to other cities searching for sustainability fixes.

Savini (2019, 2021) argues that this embryonic circular economy is being promoted and developed by the city’s ‘green growth coalition’, which since as early as 2011 has attempted to reorient Amsterdam’s competitive advantage towards circularity. This coalition is backed by

the Amsterdam Economic Board, a powerful network of corporate and governmental actors, as well as privatised infrastructure companies such as Amsterdam Harbour (*Havenbedrijf*) and the city’s water agency (*Waternet*). This is a broad-based urban regime with material stakes in an emerging circular economy driven by the municipality, which has been working with public and private partners to strategically invest in new infrastructure for circularity, including data servers and software platforms for sharing data about material streams, and logistical improvements to connect sectors for waste revalorisation. Waste has become big business in Amsterdam: ‘Garbage is gold’, as a former Alderperson for Economic Affairs put it (Savini, 2021).

But these are not the only actors in the new regime: ‘civil society organisations and motivated Amsterdammers are important ambassadors’ for a circular transition (Gemeente Amsterdam, 2023: 30). Especially with its ‘doughnut lens’ on the circular economy, Amsterdam invites a variety of actors into the transition, many of whom are connected through the Amsterdam Doughnut Coalition.

Seeing the circular city through a doughnut lens

The Amsterdam Doughnut Coalition was founded through a collaboration between the city authority and the Amsterdam University of Applied Science in 2019 with the objective to collect and coordinate bottom-up circular activities in the city. The coalition has been growing since and comprises dozens of cooperatives and grassroots groups as well as circular consultancies such as Metabolic and Circle Economy. It also includes public-private partners with corporate interests such as the Amsterdam Economic Board, Amsterdam Smart City, and, more recently, the employment agency Olympia. The Amsterdam Doughnut Coalition is the first to develop an urban network aimed explicitly at advocating for and implementing doughnut economics at a city scale. The originator of Doughnut Economics, Kate Raworth, was invited to Amsterdam to consult on the development of the Amsterdam City Doughnut by Marieke van Doorninck, an alderperson under the Green Left-led coalition city administration in office between 2018–2022. Since then, *Doughnut Economics* (Raworth, 2017) has become the bible of a fast-growing movement—and, perhaps, cottage industry—that seeks to challenge the growth logic of capitalism through popularising and translating into public policy the familiar ecological economics concepts of planetary ceilings and social floors. Amsterdam Doughnut Coalition is joined by dozens of replicating groups and local networks loosely organised as an international movement and coordinated by Raworth’s UK-based think-and-do-tank Doughnut Economics Action Lab (DEAL).

Raworth (2017) presents the doughnut as an image to guide policy decisions concerning production, consumption and distribution: its inner ring represents the social floor of minimally fulfilling 12 basic human needs distilled from the UN Sustainable Development Goals; its outer ring represents the earth's carrying capacity and ecological ceiling, conceptualised as 9 planetary boundaries. The doughnut thus provides a visual metaphor and epistemological framework for ensuring that all economic activity takes places within 'the safe and just space for humanity' (Raworth, 2017: 45). The idea is 'not to provide a policy recipe but rather to help policymakers and planners identify and redesign network, sectors and economic activities that overshoot' (Wahlund and Hansen, 2022: 175). Importantly, when applied to urban economies, this begins to model a city as an urban *metabolism*, a socio-biophysical system of metabolic flows exchanging materials and energies with hinterlands and wider ecosystems.

To achieve metabolic sustainability, Raworth suggests a set of circular design principles, focused on the redesign of capitalist firms as 'no-growth enterprises' with 'resilient financial returns' to patient investors and with constitutional and governance apparatuses that are 'environmentally regenerative by design' (Raworth, 2017: 197). Gareth Dale (2021: 1242) suggests that for Raworth 'the goals of the economy are not determined principally by social structures but by a paradigm', and so the aim of radical transformation is to 'find the flaws and fix the frame'. The doughnut is an idealist paradigm for guiding decision-making—not a materialist theory of capitalism. As such, it fails to grasp the dialectical relations of value driving capitalism—the labour-capital and waste-value dialectics—and instead sees capitalism as 'one among many possible enterprise designs' (Raworth, 2017: 161), therefore amenable to redesign, fetishised as a machinic apparatus rather than an immanent set of social relations.

Such tensions and shortcomings can be seen in the Amsterdam City Doughnut. Although Amsterdam's claim to becoming the world's first 'doughnut city' has been applauded internationally (see, for example, Nugent, 2021), various critiques have been raised closer to home. First, the strategy has been said to lack any concrete plans for reducing consumption of raw materials—especially problematic in light of the urgent need to construct new housing to tackle the city's housing affordability and access crises (Kok and Savini, 2020). One doughnut organiser contended that, while the circular economy strategy is 'based on resource management', the doughnut model 'goes further than that, on a macroeconomic level' (fieldnotes, invited online workshop organised by the Amsterdam Doughnut Coalition, 2023). It is, however, unclear through what (economic) mechanisms it is to do so. Second, local doughnut activists have lamented that the initial wave of 'doughnut' fame was followed by a radio silence, with few municipal departments and actors occasionally referring to

doughnut economics. This was exacerbated when a new municipal coalition took office in 2022, with the new alderperson for sustainability hesitating to adopt the political narrative of her predecessor, as various neighbourhood-based doughnut activists as well as city officials conveyed to us in interviews.

A related common refrain is the yawning 'implementation gap' between the attractive invitation proffered by the doughnut model—to think and act in more relational, metabolic terms—and the tools required to translate that vision into policy and practice:

Thinking in terms of metabolism, which [...] allows you to look at a city as being embedded in all sorts of activities, networks, linkages which reach far beyond the boundaries of the municipality – that's not a sort of sophistication that I've come across... So, that may well be the case why the doughnut offered by Kate Raworth is perceived to be so attractive because it provides you with some sort of a model which allows you to say something both in terms of diagnosis and analysis, the deficits... It provides you with a potential course of action for addressing those deficits – but then how to do that and how to ensure that your interventions are holistic, systemic, address the whole supply chain...? (interview, economic expert/public intellectual, 2022)

Indeed, contradictions abound between the city authority's commitment to doughnut-inspired degrowth and its direct material interest in strategically leveraging revenues for public programmes through intensive speculative urban development via its municipal ground lease system (see Savini, 2017). The initiator of the 2020-2025 circular strategy and the city doughnut, alderperson Marieke van Doorninck, also directed the portfolios of Spatial Strategy and Urban Development—a possible conflict of interest and difficult circle to square. Power within the municipality of Amsterdam is seen by many officers as highly centralised within departments that control land development and economic policy. This translates into those concerned with delivering sustainability, circular economy, and doughnut strategies having to align their priorities—sometimes counterproductively—with economic imperatives; while doughnut principles are less prominent in the land development and economic departments (interviews, city officials, 2022). The economic interests in the city authority's circular and doughnut ambitions also become clear in the updated circular implementation programme, which, in contrast to the earlier strategies, is co-authored with the Alderperson for Economic Affairs. This document focuses largely on green jobs, the stimulation of circular entrepreneurs and innovation, indicating that the circular strategy is ultimately concerned with growth.

In a setting where doughnut economics is simultaneously pressured and constrained by its (very limited)

capacity to generate growth, citizen groups like the Amsterdam Doughnut Coalition maintain an ambivalent relationship to the green growth coalition, playing a supporting, legitimating, influencing, challenging and contesting role to push for more sustainable or democratic trajectories. The Amsterdam Doughnut Coalition, which the municipality considers crucial for the circular transition, has criticised the municipality for failing to provide it with any substantial support, thus relying largely on volunteers (Roon, 2022). Such voluntarism is problematic: driven by self-starting entrepreneurs and volunteers, self-organised into like-minded groups, the circular transition risks remaining the preserve of a highly-educated milieu of self-ascribed 'progressive vanguards' and 'changemakers' with common values. A dictum of the Amsterdam Doughnut Coalition is to '*go where the energy is!*' – not a reference to renewable electricity but rather social dynamism or 'vibes'. Their theory of change is based on social innovation and entrepreneurship methodologies that privilege the risk-taking entrepreneurial capacities of pioneers and early adopters to make societal change by setting trends for others to follow—citing the 90/9/1 rule: 1% of the population deemed 'creators'; 9% 'followers'; 90% 'lurkers' (fieldnotes, online workshop organised by the Amsterdam Doughnut Coalition workshop, 2022).

Building a broad-based cross-class coalition that can capture the imaginations of electorates for more systemic, hegemonic change thus remains a big challenge for the Amsterdam City Doughnut. Efforts are being made to reach out beyond the usual suspects. The first festival organised for doughnut 'pioneers' to network and celebrate together was hosted in the hyper-gentrified city centre; the second and third in more peripheral communities. There is recognition amongst activists that diversity and inclusion are increasingly important correctives to the strategy of '*go where the energy is!*', which, it's understood, 'leaves some people out' (workshop organised by the Amsterdam Doughnut Coalition, 2023).

This emergent class of doughnut activists and eco-entrepreneurs might point to a local evolution in the creative class hypothesis—Amsterdam's green successor to Richard Florida's original vision (see Peck, 2005). One participant-observer in this process suggested that

it is a rebranding of the creative class but [...] in a way that is fit for the spirit of the time [...] Not IT and smart development as it was two years ago. Now, it's more like wellbeing, congeniality, low tech, sharing and circular economy (interview, degrowth scholar-activist, 2022).

This new green creative class is attracted not only by Amsterdam's liveability and eco-entrepreneurial culture but also through boosterist policy initiatives, such as the 'Amsterdam Made' PR campaign promoting eco-manufacture best-practice, the 2017 'Circular Expo' ex-

hibiting circular design hosted by the municipality, Waag Society workshops on urban mining and 3D printing, as well as doughnut pioneer festivals and Green Deal Circular Festivals as part of 300 'green deals' struck across the Netherlands since 2011. In this light, the Amsterdam City Doughnut can be seen, as various commentators characterised it in interviews, as a sophisticated form of city branding, as 'window dressing' for the circular economy or 'a PR strategy, mobilised to attract attention' by Amsterdam's green growth coalition. Others see the doughnut as 'coming in as a carriage behind the circular economy'; and believe that '...all kinds of green washing stuff ended up in this [Doughnut] deal' (interviews, city officials, doughnut activists, consultants and circular economy experts, 2022). A high-profile critic of Amsterdam's political economy described 'all these progressive discourses' adopted by the green-left coalition government as 'jewels in Amsterdam's crown – and the doughnut is the latest jewel', as the 'the progressive veil hiding a hugely exploitative capitalist machine'.

Amsterdam's circular economy is thus a complexly contradictory discourse—at once a strategy deployed by a green growth coalition to drive forward Amsterdam's transition towards a new regime of accumulation, as an entrepreneurial spatial fix post-2008, and a framing for a just urban sustainability transition, a progressive banner under which activists gather to channel diverse energies into degrowth, the commons, and other prefigurative 'postcapitalist' practices (see Gibson-Graham, 2006). The multiple meanings of Amsterdam's circular economy may be usefully reflected in the light and shadow of—pace Gibson-Graham (2006)—'reading for dominance' and 'reading for difference'. Rather than favouring the latter over the former, this calls for focusing one eye on the differential movements, prefigurative pathways, and transformative trajectories beyond dominance, while keeping the other alert to how discourses and strategies get mobilised for accumulative ends that maintain capitalist-colonial domination over humanity and nature.

Reading Amsterdam's circular economy for dominance and difference

In reading for dominance, Amsterdam's emergent circular economy represents a spatial fix in a double sense: a fix for the city itself, an entrepreneurial strategy for building competitive advantage whilst resolving 'wicked problems' such as urban sustainability (Barnett, 2022); and a fix for capitalism's overaccumulation crisis and exhaustion of cheap natures. However, capitalism's tendency towards rising capitalisation depending upon even greater expansions of appropriation of *non-capitalised* cheap natures (Moore, 2015) radically problematises notions of a spatial fix for sinking over-accumulated capital into new commodity frontiers; for their commodification only exacerbates this dialectical dynamic between capitalisation and

appropriation. This presents a challenge for the capitalisation of Amsterdam's—or any city's—waste streams as a circular economy: suggesting such apparently sustainable circularity depends, ironically enough, on the even greater expansion of externalised sites of linear resource extraction and sacrifice zones for waste disposal.

There are multiple ways in which the further capitalised development of Amsterdam's circular economy must depend upon an even greater expansion of uncapitalised, unvalued, externalised work/energy. Most obviously, planetary supply chains feed Amsterdam's circular economy with *appropriated* labours, energies and materials that construct and maintain the myriad tools, technologies and infrastructures required to revalorise, reuse, recycle and upcycle products and wastes. Further research is needed into Amsterdam's extended supply chains, following studies of how, for example, recycled Dutch plastics pollute Asian oceans through waste leakages (Navarre et al., 2022). Less obviously we might document the voluntarism—countless hours of uncosted labour—underpinning all the experimental 'prosumerism' supporting a circular transition at the grassroots level. Moreover, what about the unwaged work by informal care, repair, maintenance, and waste workers that supports both this activism and the formal circular sector? Although Amsterdam's waste management is formalised to a large degree, there are doughnut-inspired initiatives in parts of the city through which residents collectively collect waste in their neighbourhood, to increase safety and clean up litter. One informant conveyed to us that allegedly, knowing that this initiative takes place on a weekly basis, the municipality scaled down municipal waste services in that area of the city (fieldnotes, workshop organised by doughnut activists, 2023). Besides such informality, appropriation of voluntary labour is evident in the extensive networks of care and non-remunerated forms of citizen participation that Amsterdam's circular strategy relies upon. Future research could usefully follow Irvine (2023) in uncovering and tracing the hidden connections between formal and informal work across capitalism's commodity frontiers—both *within* and *beyond* the city.

But this is only one side of the story. In reading for difference, Amsterdam's circularity strategy also makes room for modelling *immaterial* flows, reflected in attempts to include new kinds of valuations in public decision-making processes. For example, the city authority aims to develop circular accounting standards and new ways of valuing materials; supports the development of a 'true pricing' tool; and aspires to include sustainability and circularity requirements in tenders. Using such tools, the 'Circular Monitor' attempts to track and trace the inputs and outputs that sustain the local economy, though this is far from comprehensive. Similarly, the 'Amsterdam City Doughnut' has pioneered the use of 'city portraits' as a mapping methodology for measuring place-based

under-provision and over-shoot in relation to the social floors and ecological ceilings identified by doughnut economics (Raworth, 2017). However, such maps and monitors have so far produced little progress: 'The latest edition of the Amsterdam Circular Monitor (27 March 2023) shows a worrying picture: material use is not decreasing in Amsterdam' (Gemeente Amsterdam, 2023: 9).

Amsterdam's circular strategy should be read in relation to its commitments to the doughnut, community wealth building, and municipalist democratisation programme. Amsterdam's is a distinctly 'managed' kind of municipalism, driven notably by alderperson Rutger Groot Wassink, and lacking the social movement base or democratic organising evident especially in Spanish municipalist platforms (see Thompson, 2021). Nonetheless, the coupling of Amsterdam's circular strategy with doughnut economics opens up political space for socialising the circular economy, enabling experimentation with neighbourhood-based alternative currencies, consideration of 'neighbourhood value' in urban development projects, and ambitions to pursue 'broad prosperity' rather than merely GDP.² This represents an example of an alternative development ontology that gestures 'beyond GDP' (Crisp et al., 2023).

The majority of such experimentation is undertaken not by the green growth coalition but by the city's grassroots activist groups and eco-entrepreneurs. Concrete socio-spatial innovations in circularity include the citizen-driven Groene Hub (Green Hub), which, in collaboration with the Cocratos foundation, installed community bio-waste digesters connected to the sewage system and energy streams, to enable residents 'to reclaim [their] shit' and 'to get rich shitting' (fieldnotes, public doughnut workshop organised by city officials and community organisers, 2022). This aims at the revaluation of basic everyday waste for community benefit, rather than its commodification. Another grassroots innovation is aimed at reducing energy poverty, with various 'quick fix' approaches to make up for social housing corporations failing to act: cooperative purchasing schemes for infra-red heating panels and workshops about insulating curtains. Renewable-energy cooperatives are developing across the city at various scales: in industrial areas, neighbourhoods, or housing blocks. Activists struggles for community land trust development in the South-East to prevent further gentrification are beginning to make housing, and asset wealth, more circular. Bio-dynamic community gardening is also emerging across the city. Added to these are various initiatives in circular economy workshops, community composting, food rescue, and seed exchange banks organised by, for example, the off-grid mobile urban farm Kaskantine (Green House Canteen). Voedseelpark Amsterdam (Food Park Amsterdam) aims to prevent the transformation of one of the most fertile plots of land (at the outskirts in West) into a large distribution centre, by turning the land in a commons and Food Park/urban farm.

A particularly promising initiative is for ‘circular money’ in the relatively deprived districts of South-East and New-West as part of government-funded community wealth building programmes. Here, activists have been building a coalition of partner local anchor institutions to participate in an innovative scheme for distributing an alternative local currency. The plan was—until very recently, when it was stalled politically—to digitally encrypt euros with conditionalities incentivising users to spend locally, collecting modest interest returns in a community bank for additional local reinvestment. This aimed to make ‘money a means rather than an end in itself’, to enable ‘a shift from efficiency to resilience’ (fieldnotes, public ‘doughnut’ workshop organised by city officials and activists, 2022). The long-term vision is to combine this with a Universal Basic Income (UBI) pilot programme, whereby sufficient UBI payments to all district residents will be made in the circular currency, thereby generating place-based multiplier effects. Such an untested innovation could prove transformative for rethinking the circular economy as ‘immaterial’ (Webster, 2021), as a set of relatively autonomous or self-sufficient—that is, *circular*—‘circuits of value’ (Lekan et al., 2021), potentially capable of challenging capital’s endless self-valorisation through rents, debts and interest (Arboleda and Purcell, 2021). Amsterdam’s grassroots experimentation in doughnut economics is largely dependent on external sources of funding. For instance, the city’s proliferating projects in bio-dynamic community gardening are led by a permaculture consultancy drawing on public subsidies, while the Doughnut Coalition and its festivals are largely funded by the municipality and Amsterdam University of Applied Sciences. Circular money would therefore be an important step in circular economic innovation, understood in immaterial terms as a self-sustaining circuit of value.

Conclusion

In this article, we have argued that the circular economy may be a strategy for transitioning to a potential new regime of accumulation within the unfolding historical development of capitalism—a regime superseding our present era of financialised neoliberalism, as Fraser (2022) and Moore (2015) understand it, but which extends and intensifies the deeply neoliberal logic of marketising nature by valorising waste through entrepreneurial practices. We have drawn on Marxist political economy/ecology to suggest how capitalism—seen expansively as a ‘way of organising nature’—depends on continual new injections of unwaged, unvalued, and disavowed work by human and non-human natures—‘cheap natures’—alongside expanding commodity frontiers for both extracting new resources (taps) and for disposing of wastes (sinks) (Moore, 2015: 14). We have shown how capitalism is a system predicated on an outside, on externalised taps and sinks;

how the labour-capital dialectic constituting the value-form sits within a wider dialectic binding value to waste, the waste-value dialectic (Gidwani and Maringanti, 2016). If we follow Moore’s (2015) logic—that surplus value creation ultimately relies on *additional* non-capitalised frontier zones for the extraction of unvalued resources and sacrifice zones for the dumping of unwanted wastes and toxic pollutants—then the fully-circular ‘zero-waste circular economy’, by attempting to capitalise these frontier and sacrifice zones for the profitable processing of waste, attempts to do the impossible within the coordinates of capitalism. The *capitalist* circular economy is thus a spatially-limited and ultimately self-defeating strategy—unless, that is, it can somehow transcend the social forms of capital and point towards a postcapitalist paradigm for reorganising social metabolism gestured at by degrowth.

Amsterdam’s circular economy, however, is being developed very much *within* capitalist socio-spatial relations. Savini’s (2019, 2021) work shows how the city’s burgeoning circular economy is predicated on rising material throughput, processed by evermore fixed capital and infrastructure, to satisfy the self-expanding value-form of capital (Mau, 2023). For circularity to exist within capitalism, it must facilitate this acceleration of production and consumption, albeit through more-or-less closed rather than linear loops, turning capitalism’s sinks into taps. Reading the circular economy through a world-ecological lens enables us to see this process as a spatially polarised and implicitly imperialist project of reproducing colonial relations of uneven development, of exporting capitalism’s ‘entropy problem’ from core to periphery (Moore, 2023). Amsterdam thus occupies a privileged position within this deeply uneven geographical political economy of capitalist green transition, repositioning itself as a pioneer of circular economic innovation—seeking competitive advantage in revalorising waste streams as commodities, and appearing progressive and green, a clever strategy to attract inward investment and the new creative class of green entrepreneurs and post-growth innovators. These aspects of urban circular economies—class politics and institutional entrepreneurialism—require further investigation. When assessing circularity, we should always ask: *What*, exactly, is made circular? *Who*—and *what*—is doing the (paid and unpaid) work to make this circular? Circular for *whom*? And what and who is *effaced*—and *how*—by this circularity? In thinking through the *who* and *how* questions of circularity in Amsterdam it would be illuminating to further investigate the practices and responsibilities, following Savini and Geizen (2020), of quasi-public infrastructure institutions such as Waternet, Amsterdam Harbour, and Schiphol Airport.³

This article has sought to draw more critical attention within circular economy studies to the central role ‘the urban’ plays as a mediating field through which capitalism (currently) organises our metabolic exchange with nature.

We contend that bringing an expansive world-ecological theorisation into conversation with urban metabolism can generate new insights and fresh perspectives on the (potentially) circular city. This epistemological vantage has enabled us to see the local, circularity-aspiring processes of Amsterdam's embryonic circular economy as intricately interwoven—and insufficiently conceptualised—within the scalar relations of capitalism as an open, dynamic totality, encompassing human metabolism with nature, and held together by, as Dale (2021: 1242) captures it, a 'mechanism of compulsive commensuration that comes into being in a society of generalised commodity relations'. It does not matter whether a local economy aspires to be fully 'circular', merely 'green' or 'agnostic to growth', as doughnut economics proposes (Raworth, 2017: 207); if it relies for goods and services on global supply chains mediated by competitive markets and the value-form of capital, then it will operate under this mechanism of compulsive commensuration, dominated by what Mau (2023), inspired by Marx, characterises as the 'mute compulsion' of capitalism.

However, this conveys only one side of the dual vision we attempted to cast in our analysis—a novel methodological perspective of reading for both dominance and difference, *pace* Gibson-Graham (2006). Whilst keeping one eye alert to the structural contours of the landscape shaping the growth of Amsterdam's circular economy, we trained the other eye on spotting the differential projects emerging to erode or terraform that landscape. In this way, we found multiple *material* experiments—from common ownership of housing through community land trusts to bio-dynamic urban farming and community composting—which, if sufficiently connected, mediated, and coordinated by emerging *immaterial* circular technologies—notably circular money and metabolic data monitoring—may prefigure an integrated provisioning system of circular urban metabolism. Such joining up and scaling up would require political will and public resources—only tentatively provided by Amsterdam's 'municipalist' Green Left administration, owing to its contradictory enmeshment with the city's entrepreneurial green growth coalition. This illustrates both the great potential and immense challenges facing any 'post-growth municipalism' (Schmid, 2023). These alternatives are rooted in practices, subjectivities, and relations at the local scale—only observable and analysable with attention to *difference*—yet they confront the structural, supralocal mechanisms that shape the urban contexts in which such alternatives are situated, thus also requiring analysis in terms of the *dominant* planetary capitalist system.

Future research on the circular economy could usefully attend to the multi-scalar municipal politics that shape urban circular transitions; it might take heed of Conroy's (2022) call for a more *capacious* anti-capitalist politics that seeks to make radically intersectional and globally trans-

national cross-class alliances between cities and with their hinterlands. The current conjuncture is one where cities of the global North have come to have a material stake in the imperial plunder of cheap natures of the global South to compensate for declining living standards and prop up the faltering financialised-neoliberal regime of accumulation. This places political barriers in the way of progressing the already difficult task of developing postcapitalist—and not only post-neoliberal—alternatives such as doughnut economics and circular cities.

Any purportedly circular city such as Amsterdam—at the cutting-edge of both postcapitalist discourses and capitalist accumulation regime transition—must contend with the complex planetary entanglements and interdependencies connecting its apparent circularity to peripheralised waste frontiers and sacrifice zones and must begin to build transnational and intersectional solidarities along the supply chains that materialise the waste-value dialectic. For the circular economy to realise the postcapitalist possibilities invested in it (Ashton et al., 2022; Hobson and Lynch, 2016; Lekan et al., 2021), circularity must be radically reconceived beyond its spatially-bounded, materially-delimited sense, to encompass all the material and immaterial circulations of capital and its counter-movements through planetary circuits of value.

Endnotes

- 1 Recently, this was illustrated by Amsterdam's newest bio-energy facility, which, rather than processing waste from within a 150 km range from Amsterdam as was planned, has come to depend on the import of biomass from abroad to keep the facility running (AEB Amsterdam, 2022).
- 2 This is in line with national efforts around the development of alternative economic and social measures (Statistics Netherlands, 2023a).
- 3 In December 2023, Amsterdam's municipality announced that it will become an activist shareholder of Schiphol; the Alderperson for Air and Sea Port suggested in interview that 'The economy has always been our number one priority, but aren't sustainability, sleep, emissions and working conditions more important?' This has translated into the municipality aiming for 12 percent fewer flights, more than that proposed by the Dutch government (See Stil and Wagemakers, 2023).

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