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Local Environment

The International Journal of Justice and Sustainability

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cloe20

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**To cite this article:** Martin Calisto Friant, Katie Reid, Peppi Boesler, Walter J. V. Vermeulen & Roberta Salomone (2023) Sustainable circular cities? Analysing urban circular economy policies in Amsterdam, Glasgow, and Copenhagen, Local Environment, 28:10, 1331-1369, DOI: 10.1080/13549839.2023.2206643

**To link to this article:** https://doi.org/10.1080/13549839.2023.2206643

LOCAL ENVIRONMENT
2023, VOL. 28, NO. 10, 1331–1369
https://doi.org/10.1080/13549839.2023.2206643

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# Sustainable circular cities? Analysing urban circular economy policies in Amsterdam, Glasgow, and Copenhagen

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**ABSTRACT**

Cities play a central role in the circular economy (CE) as they are important centres of production and consumption, responsible for 80% of global GDP. European cities are particularly important due to their position of power in the global economy as major markets, and places of industrial and social innovation. Yet urban CE policies and discourses remain poorly researched and understood. This paper addresses this research gap by analysing and comparing the CE policies and discourses in different European cities to draw critical insights and recommendations. It does so by first reviewing academic literature on urban CE policies to develop a new conceptual framework to analyse CE discourses and policies. This framework is then used to analyse and compare the CE policies of three European cities: Glasgow, Amsterdam, and Copenhagen. Results show that technocentric approaches to CE are dominant in the three cities. Moreover, they have very limited social justice policies for a fair distribution of the costs and benefits of a CE transition. Key policy recommendations to address these shortcomings are thus proposed. The insights brought about by this paper are valuable for both practitioners and academics seeking to improve urban CE policies.

**ARTICLE HISTORY**
Received 16 August 2022
Accepted 19 April 2023

**KEYWORDS**
Circular economy; policy analysis; discourse analysis; degrowth; sustainability; circular city; circular society

## 1. Key policy highlights

- CE strategies in Amsterdam, Glasgow and Copenhagen focus on economic competitiveness and technological innovation and thus fail to address the full social, political, and ecological implications of a CE transition.
- To improve social justice outcomes, circular cities should encourage policies that redistribute unused building stock (e.g. through speculation and vacancy taxes) and promote non-profit cooperatives (e.g. through public procurement practices).
- To improve ecological outcomes, circular cities should establish policies that create compact multi-functional neighbourhoods and reduce the need for motorised transport, as well as policies that conserve and restore biodiversity.
- To improve political legitimacy and equity, circular cities should democratise decision-making through various mechanisms, such as participatory budgeting processes and deliberative assemblies, that can determine the course of the circularity transition in an inclusive manner.

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/13549839.2023.2206643.

## 1. Introduction

Global consumption rates have increased tenfold in the past 100 years and are expected to triple by 2050 (Haas et al. 2020). This unsustainable use of natural resources is leading to the overshoot of key planetary boundaries and the critical weakening of the life-sustaining functions of the biosphere (Folke et al. 2021; Marín-Beltrán et al. 2022; Wiedmann et al. 2020). The Circular Economy (CE) concept has recently become a central discourse to address those socio-ecological challenges through various resource conservation, and recovery strategies such as refuse, reduce, reuse, remanufacture, refurbish and recycle (Temesgen, Storsletten, and Jakobsen 2019; Reike, Vermeulen, and Witjes 2018; McDowall et al. 2017). However, the CE concept is still contested, often unclear and ill-defined, thus, its practical implementation remains a significant societal challenge (Korhonen et al. 2018; Lazarevic and Valve 2017; D'Amato et al. 2019).

Cities[1] play a crucial role for the CE as they are key centres of resource use and transformation, responsible for around 80% of global GDP (World Bank 2021). Cities currently consume approximately 80% of global natural resources, produce 50% of global waste, and 75% of greenhouse gas emissions (Williams 2019). As urban populations are expected to increase significantly in the next decades, these figures will only continue to grow. Moreover, cities are directly responsible for essential sustainability and CE-related policies, such as waste management, water and energy provision, transportation, housing, and industrial development. Urban circular economy policies thus have a crucial impact on the metabolic stocks and flows of resources, waste, capital, labour, knowledge, energy, and materials that societies process (the so-called Urban metabolism[2]) (Lucertini and Musco 2020; Feiferytė-Skirienė and Stasiškienė 2021; Venkata Mohan, Amulya, and Annie Modestra 2020). Furthermore, cities face key socio-economic issues such as income inequality, social injustice, unemployment, financial austerity, and housing shortages (Williams 2021; Bassens, Kębłowski, and Lambert 2020).

It is important to acknowledge the main limits ad opportunities that cities have in the development and implementation of CE actions and policies. On the one hand, cities are limited due to the territorial and regional contexts in which they are located. They are thus constrained by the policies and regulations established at provincial, national, and international levels, such as recycling and greenhouse gas emission targets, property relations, taxation policies, trade and investment treaties, etc. (Savini 2019; Castán Broto, Allen, and Rapoport 2012; Paiho et al. 2020). Cities thus face intense competitive pressures from global capitalist economic relations and rising constraints due to fiscal austerity. These pressures often push municipal governments to adopt growth-driven policies, which can have significant negative socio-ecological impacts in terms of gentrification, social exclusion, and environmental degradation (Kębłowski, Lambert, and Bassens 2020). On the other hand, cities are historically spaces of deep political contestation, protest, social change, and technological innovation (Harvey 2012; Fung and Wright 2001). Cities can thus experiment with policies, strategies and approaches which are often much more radical and innovative than what is possible at other governance levels.

European cities are particularly important for CE as they occupy a position of power in the global economy as centres of consumption, capital accumulation and social and industrial innovation. Moreover, European cities are frontrunners in CE implementation, especially since the implementation of the European Union's (EU) 2015 CE action plan (Fratini, Georg, and Jørgensen 2019; Kębłowski, Lambert, and Bassens 2020; Petit-Boix and Leipold 2018; Prendeville, Cherim, and Bocken 2018). European cities will thus strongly influence the overall understanding of the CE and can shape the discourse[3] and future implementation of urban CE policies in the rest of the world. Yet, their diverse and often contrasting CE policies remain poorly researched, compared and understood (Vanhuyse, Haddaway, and Henrysson 2021; Paiho et al. 2020; Marin and De Meulder 2018). This paper addresses the above research gap by asking the following questions: *How can urban circularity policies and discourses be critically analysed and compared? And what discourses are advanced by the circular economy strategies of different European cities?*

To answer these questions, this paper first conducts an academic literature review to develop a CE policy-discourse framework. This framework is then applied to 3 case studies in Europe (Glasgow, Copenhagen, and Amsterdam) to explore and compare how CE manifests in different cities. Results from this research lead to valuable insights on the strengths and limitations of current CE policies in European cities. The discussion section then critically compares our findings to develop key policy recommendations, which can help academics and practitioners better design and implement CE interventions at the city scale.

## 2. Theoretical and conceptual background

This section is divided into two parts, the first (2.1) overviews the diversity and contested nature of different CE approaches and presents the discourse typology, which will be used to analyse the CE strategies of this paper's selected case studies. The second part of this section (2.2) will examine the concept of circular cities by reviewing how the idea of CE has thus far been conceptualised and implemented in urban areas.

### *2.1. The diversity and contested nature of circularity discourses*

There has been an exponential rise in the use of the CE concept in the last decade, with many governments, corporations and NGOs implementing CE policies and a parallel rise in academic and grey literature on the topic (McDowall et al. 2017; Schöggl, Stumpf, and Baumgartner 2020; Ghisellini, Cialani, and Ulgiati 2016). While the use of the term CE as such is relatively recent, the theoretical underpinnings of the concept have existed since at least the mid-twentieth century (Gregson et al. 2015; Geissdoerfer et al. 2017; Blomsma and Brennan 2017). Indeed, the CE can best be seen as an umbrella concept that includes a variety of different ideas and visions from the global north and south alike (Homrich et al. 2018; Calisto Friant, Vermeulen, and Salomone 2020). As such, the CE is still very much a contested concept, with various different interpretations and definitions emanating from a wide range of different academic, public and private actors (Lazarevic and Valve 2017; Korhonen et al. 2018).

Research has shown that mainstream CE discourses tend to focus on a green-growth path to circularity through technological innovations and new business models, such as leasing, servicing, remanufacturing, refurbishing, recycling, urban mining and energy recovery (Calisto Friant, Vermeulen, and Salomone 2021; Ortega Alvarado et al. 2021; Melles 2021; Repo et al. 2018; Millar, McLaughlin, and Börger 2019). However, these approaches have been criticised by many academics because they lack social justice and political considerations and might thus replicate and exacerbate current patterns in terms of gender, racial, ethnic, and class inequality and exploitation (Moreau et al. 2017; Temesgen, Storsletten, and Jakobsen 2019; Rask 2022; Berry et al. 2021; Schröder et al. 2019). These mainstream CE approaches have also been criticised due to their focus on technical solutions that would enable the decoupling of economic growth from environmental degradation despite the widespread evidence that decoupling is neither happening nor likely to happen on a scale sufficient to prevent climate breakdown, resource scarcity, and ecological collapse (Parrique et al. 2019; Giampietro 2019; Hickel and Kallis 2019; Skene 2018; Rammelt and Crisp 2014).

Some academics have argued that this growth-centric and techno-focused approach to circularity was created to foster a depoliticised ecological transition that could maintain current power structures, corporate interests, and business practices (Giampietro and Funtowicz 2020; Mah 2021; Valenzuela and Böhm 2017). In contrast to this mainstream perspective on CE, many scholars have developed alternative approaches calling for a "circular society" (Calisto Friant 2022b; Jaeger-Erben et al. 2021), a "circular humansphere" (Schröder, Lemille, and Desmond 2020), a "social circular economy" (Clube and Tennant 2023), a "degrowth oriented CE" (Bauwens 2021), a "convivial CE" (Genovese and Pansera 2020), a "careful circularity" (Morrow and Davies 2021), a "sustainable circular society" (Velenturf and Purnell 2021), a "permacircular economy" (Arnsperger and Bourg 2017) or a

CE in "circles of social life" (James 2022). The above alternatives include many social and political justice elements and seek to maintain humanity within the ecological limits of the biosphere with a focus on sufficiency, frugality, and conviviality rather than resource-efficiency alone.

To better evaluate, understand, and navigate all these contrasting CE visions and understandings, this research uses the discourse typology developed by Calisto Friant, Vermeulen, and Salomone (2020). The typology is based on extensive research on CE and its related concepts and has been used in many other studies to analyse CE discourses in Norway (Hermann and Pansera 2020; Ortega Alvarado et al. 2021), CE policies in Quebec (Ziegler et al. 2023), CE discourses in Australia (Melles 2021), Dutch CE policies in the plastic sector (Calisto Friant et al. 2022), urban living labs in the City of Tampere, Finland (Särkilahti et al. 2021), CE policies at the EU level (Calisto Friant, Vermeulen, and Salomone 2021), and the EU plastics strategy (Palm et al. 2021).

The typology differentiates CE discourses based on two core criteria (see Figure 1). First, whether they are optimist or sceptical regarding the possibility that technological innovation can prevent an ecological collapse by decoupling economic growth from environmental degradation. Second, whether they are holistic by integrating the social justice and political empowerment elements in their vision of circularity or segmented by focusing on economic aspects of circularity such as new business models and resource-efficiency. The combination of the above criteria leads to four circularity discourses types: *Reformist Circular Society* (*optimist* and *holistic*), *Technocentric Circular Economy* (*optimist* and *segmented*), *Transformational Circular Society* (*sceptical* and *holistic*), and *Fortress Circular Economy* (*sceptical* and *segmented*), which are further described below (based on Calisto Friant, Vermeulen, and Salomone 2020; Calisto Friant 2022b; Calisto Friant et al. 2022; Calisto Friant, Vermeulen, and Salomone 2021; Calisto Friant 2020, 2022a).

*Technocentric Circular Economy* (TCE) discourses aim to reconcile economic growth with environmental degradation through CE innovations, technologies and business models that create efficient and regenerative resource loops and thereby prevent resource scarcity and ecological harm. *Technocentric Circular Economy* discourses promote a wide range of technical solutions, which are often inspired by nature, such as industrial symbiosis, biomimicry, industrial ecology, bio-economy, and eco-design. They also promote many market-oriented approaches to environmental problems, such as extended producer responsibility, public-private partnerships, eco-labelling, and product service systems. While they include and acknowledge various CE strategies and value retention options, they often focus on industrial end-of-loop strategies such as refurbishing, remanufacturing, recycling, and energy recovery, as they can generate economic and environmental value without requiring significant changes to current societal structures of power. Hence, this discourse type does not include social and political justice considerations, which it often finds to be beyond its scope, and prefers to focus on business and technological solutions.

*Reformist Circular Society* (RCS) discourses seek a sustainable, fair, democratic, and prosperous future for all, achieved through technological advancements, alternative business models and social-cultural innovations. This discourse believes that whilst greater public participation and social inclusion are crucial, these changes are possible within a reformed capitalist system. Therefore, *Reformist Circular Society* discourses believe that economic growth and prosperity can be reconciled with social and environmental outcomes, especially thanks to the many innovative technologies, business models, and nature-based solutions brought by CE strategies. *Reformist Circular Society* discourses often build on the so-called "three pillars" of sustainable development (environmental, economic, and social) to create triple-bottom-line practices and business models. They often advocate for improved stakeholder participation and collaboration in developing and implementing CE policies and strategies. *Reformist Circular Society* discourses typically focus on medium-value-retention CE strategies, such as repair, reuse, repropose, eco-design, remanufacture, replace, and refurbish. All in all, these discourses seek to create a more humane form of capitalism that can operate in a socially inclusive and ecologically respectful manner through multiple virtuous and regenerative resource loops and cycles.

| | | Approach to social, economic, environmental, and political considerations | |
|---|---|---|---|
| | | **Holistic** | **Segmented** |
| **Technological innovation and ecological collapse** | **Optimist** | **Reformist Circular Society**<br><br>- **Assumptions**: reformed form of capitalism is compatible with sustainability and socio-technical innovations can enable eco-economic decoupling to prevent ecological collapse.<br>- **Goal**: human prosperity and well-being within the biophysical boundaries of the earth.<br>- **Means**: technological breakthroughs and social policies that benefit humanity and natural ecosystems.<br>- **Example concepts**: natural capitalism, cradle to cradle, the performance economy, the natural step, the blue economy, regenerative design, sound material-cycle society, doughnut economics.<br>- **Proponents**: various international organizations, academics, large foundations, and some governments. | **Technocentric Circular Economy**<br><br>- **Assumptions**: capitalism is compatible with sustainability and technological innovation can enable eco-economic decoupling to prevent ecological collapse.<br>- **Goal**: economic prosperity and development without negative environmental externalities.<br>- **Means**: economic innovations, new business models, and unprecedented breakthroughs in CE technologies-<br>- **Example concepts**: industrial ecology, reverse logistics, biomimicry, industrial symbiosis, extended producer responsibility, cleaner production, bioeconomy.<br>- **Proponents**: some academics, many corporations, various national and city governments, and international organizations. |
| | **Sceptical** | **Transformational Circular Society**<br><br>- **Assumptions**: capitalism is incompatible with sustainability, and socio-technical innovations cannot bring absolute eco-economic decoupling to prevent ecological collapse.<br>- **Goals**: a world of conviviality and frugal abundance for all, while fairly distributing the biophysical resources of the earth.<br>**Means:** complete reconfiguration of the current socio-political system and a shift away from productivist and anthropocentric worldviews.<br>- **Example concepts**: conviviality, steady-state economics, permacircular economy, degrowth, eco-anarchism, Buddhist economics, buen vivir, ubuntu.<br>- **Proponents**: many academics, social movements, bottom-up circular initiatives, and indigenous peoples. | **Fortress Circular Economy**<br><br>- **Assumptions**: there is no alternative to capitalism and socio-technical innovation cannot bring absolute eco-economic decoupling to prevent ecological collapse.<br>- **Goal**: maintain geostrategic resource security in global conditions where widespread resource scarcity and human overpopulation cannot provide for all.<br>- **Means**: innovative technologies and business models combined with rationalized resource use and migration and population controls.<br>- **Example concepts**: the tragedy of the commons, the population bomb, overshoot, disaster capitalism, capitalist catastrophism.<br>- **Proponents**: survivalists, a few academics, some geostrategic think tanks, and state policies. |

**Figure 1.** Circularity discourse typology (adapted from Calisto Friant, Vermeulen, and Salomone 2020).

*Transformational Circular Society* (TCS) discourses seek a fair, democratic, and planned economic downscaling so humanity can live within planetary boundaries. Since economic growth cannot be decoupled from environmental impacts, they envision a transition to a post-capitalist society that could function without economic growth. To do so, they believe technology will not be enough and thus aspire to democratise and redistribute global power and wealth to ensure a decent life for all within the biophysical boundaries of the earth. They hence focus on high-value-retention CE strategies such as refuse, reduce, reuse, and a general shift away from the current anthropocentric and materialistic ethos. A philosophy of sufficiency and solidarity is thus promoted, leading to slower and more convivial ways of life. *Transformational Circular Society* discourses emphasise local autonomy and self-sufficiency through social and solidarity economies. They, therefore, advocate the creation of multiple community-based networks of repair, reuse, composting, gardening, sharing etc. They also promote open-source innovations and technologies with a focus on low-tech solutions. Furthermore, they strongly emphasise the democratisation of society, both in

the economic sphere through worker-owned cooperatives as well as in the political sphere through bottom-up governance mechanisms and deliberative democratic institutions.

*Fortress Circular Economy* (FCE) discourses have a vision of the future in which resources will be scarce, and the overshoot of biophysical limits and human overpopulation will require substantial cohesive measures. Rather than proposing a utopic or socially inclusive future that might work for human and planetary wellbeing, these discourses don't believe we will be able to reverse current trends and prevent socioecological collapse. *Fortress Circular Economy* discourses thus often have a somewhat cynical vision of the future, acknowledging that economic growth cannot be decoupled from environmental impacts but also being pessimistic about any possibility of positively transforming current systemic conditions (or even trying to take advantage of socio-ecological crisis). These discourses hence seek to secure natural resource availability, resilience, geopolitical stability, economic development, and survival, despite widespread resource shortages and climate disruptions. To do so, they advocate a wide range of strategies such as strict resource efficiency measures, top-down population and migration controls, imposed sufficiency policies, risk protection infrastructure, and the latest CE innovations (often including controversial technologies such as geoengineering, genetically modified organisms, biofuels, and carbon capture and storage/utilization).

### 2.2. Circular cities

Similar to CE, there is no single definition of a "circular city", with different framings of circularity in cities leading to different interpretations, agendas and policies (Kębłowski, Lambert, and Bassens 2020; Marin and De Meulder 2018). There is a rising trend for cities to adopt CE policies or strategies, with various small and large cities such as Turin, Vancouver, Ghent, Paris, and Porto expressing their desire to become circular through a wide range of different approaches (Fratini, Georg, and Jørgensen 2019; Petit-Boix and Leipold 2018). However, despite its rising popularity amongst governments and policymakers, CE in cities is only starting to be addressed within the academic literature, with scholars now researching and discussing how CE should be understood and operationalised at the city level (Prendeville, Cherim, and Bocken 2018; Williams 2021).

Recent reviews of circular city literature have evidenced and developed a wide range of different circular city definitions and conceptualizations with many diverse approaches that often include holistic elements such as human wellbeing, social justice, livability, resilience, sufficiency, and ecological boundaries (Vanhuyse, Haddaway, and Henrysson 2021; Paiho et al. 2020; Lakatos et al. 2021; Feiferytė-Skirienė and Stasiškienė 2021; Carrière et al. 2020). Yet, these and other reviews of urban CE literature also found that end-of-loop practices such as recycling, refurbishing and recovering energy dominated the type of circular city actions that are currently most researched and implemented (Vanhuyse et al. 2021; Petit-Boix and Leipold 2018; Fratini, Georg, and Jørgensen 2019; Prendeville, Cherim, and Bocken 2018). Thus, transformative urban CE strategies related to sufficiency and consumption reduction, as well as crucial social justice aspects regarding the distribution of power, technologies, ownership structures, and socio-ecological costs and benefits, remain understudied and implemented (Vanhuyse et al. 2021; Wuyts and Marjanović 2022; Lekan and Rogers 2020). The dominance of growth-optimist technocratic approaches to circularity that is widespread in CE literature and practice, in general, seems to also occur with circular city discourses and practices.

In many circular city strategies, CE seems to be used interchangeably with sustainability, and many new urban CE policies involve the reframing and repackaging of already existing waste-management, climate, eco-city, or low-carbon policies rather than changing the urban policy agenda in transformative manners (Kębłowski, Lambert, and Bassens 2020; Prendeville, Cherim, and Bocken 2018). Moreover, what exactly is sustainable about new or reframed CE policies remains unclear, with many circular city policies focusing on circularity as an avenue to generate new business innovation and economic competitiveness rather than actually reducing their socio-ecological footprints in a fair and sustainable manner (Savini 2019; Hobson and Lynch 2016; Fratini, Georg, and Jørgensen 2019). Indeed, analysis of circular city strategies thus far has found that CE has been chiefly used as a

way of boosting economic growth in the waste management and recovery sectors without disrupting incumbent unsustainable industries nor seriously considering environmental impacts, social justice considerations, and participatory processes (Rask 2022; Gravagnuolo, Angrisano, and Girard 2019; Savini 2021a; Prendeville, Cherim, and Bocken 2018).

On the other hand, the transition towards circularity in cities may provide opportunities for tackling complex socio-ecological problems such as income inequality, biodiversity collapse, overconsumption, unemployment, financial austerity, and housing and transport issues (Petit-Boix and Leipold 2018; Feiferytė-Skirienė and Stasiškienė 2021; Vanhuyse et al. 2021). Indeed, inclusive and democratic urban CE policies can bring many ecological, economic, and social benefits. For example, regenerative actions can restore urban biodiversity and thereby enhance human and ecosystem health; under-used infrastructures and buildings can be refurbished and reused for social housing or other socio-ecological purposes; new employment opportunities can be created through the re-localisation of production and consumption activities; and local community projects such as food cooperatives, sharing hubs and repair cafés can help reuse valuable resources and strengthen social bonds and networks (Williams 2021; Hobson 2019; Pla-Julián and Guevara 2019; Carrière et al. 2020). However, despite a diversity of approaches to circular cities, with a plurality of holistic and transformative proposals for urban CE development, what we see in practice thus far, is a narrow focus on a small techno-optimist part of this potentiality.

## 3. Methods

This research was carried out in 4 stages, presented schematically in Figure 2. The first 2 stages build upon the circularity discourse typology to develop a policy-discourse framework which serves as a critical tool to analyse and compare the plurality of CE policies and the associated discourses at the city level. In the third stage, case studies were selected amongst European cities, and in the fourth stage, the policy-discourse framework was applied to analyse those case studies.

### *3.1. Step 1: academic literature review*

The first step in building the policy-discourse framework was to conduct a literature review to identify what circular policies at the city level are proposed and discussed in the academic literature. The search for academic articles in this review was based on the circular discourse typology presented earlier (Calisto Friant, Vermeulen, and Salomone 2020). This typology found 72 concepts and ideas historically related to CE and divided them into 4 discourse types (see Figure 1). We selected 26 of these concepts as keywords for article searches across the 4 circularity discourse types based on relevance and availability of literature relating to urban policies.[4] We thereby reviewed 2–6 articles for each concept depending on the number of search results we found on Scopus.

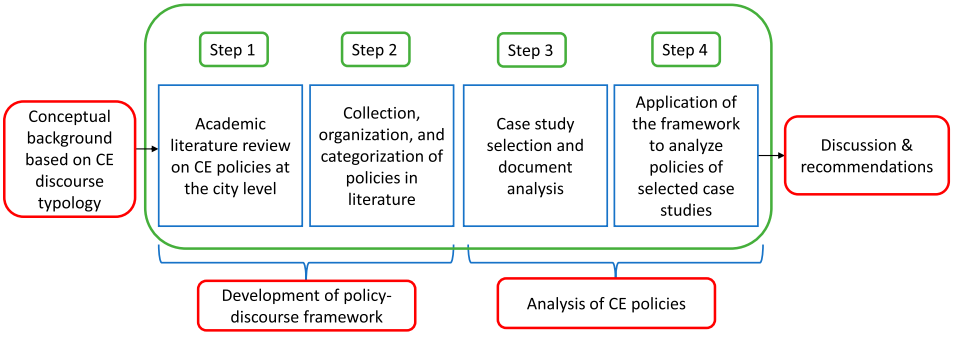


**Figure 2.** Methodological steps.

**Table 1.** Search terms used to identify the relevant articles.

| Discourse type | Concept | No. of Scopus search results on 11/1/2021 | No. of articles reviewed |
|---|---|---|---|
| General | Circular Economy | 153 | 17 |
| Reformist Circular Society | Sharing Economy | 91 | 4 |
| | Cradle to Cradle | 36 | 3 |
| | Natural Capitalism | 6 | 2 |
| | Regenerative Design | 60 | 3 |
| | Cyclical Economy | 3 | 1 |
| | The Natural Step | 4 | 1 |
| | Material Efficiency | 39 | 2 |
| Technocentric Circular Economy | Industrial Ecology | 128 | 3 |
| | Biomimicry | 65 | 3 |
| | Bioeconomy | 64 | 3 |
| | Industrial Symbiosis | 38 | 2 |
| | Eco-industrial Parks | 93 | 3 |
| | Product Service Systems | 12 | 1 |
| | Cleaner Production | 63 | 3 |
| Transformational circular society | Ecofeminism | 28 | 2 |
| | Deep Ecology | 17 | 2 |
| | Social Ecology | 37 | 2 |
| | Radical pluralism | 7 | 1 |
| | Transition Towns | 31 | 4 |
| | Degrowth | 62 | 6 |
| | Buen Vivir | 19 | 4 |
| | Permaculture | 33 | 3 |
| | Ubuntu | 6 | 1 |
| | Ecological Civilisation | 70 | 3 |
| Fortress Circular Economy | Disaster Capitalism | 23 | 6 |
| | Fortress Europe | 10 | 3 |

Articles were chosen based on their relevance regarding the studied topic, that is, whether they discussed urban policies in their respective conceptual areas. In total, 88 academic articles were thus reviewed (see Table 1 and supplementary materials). All articles were found via Scopus searches, except for *buen vivir* articles, as there was a lack of relevant search results on Scopus. Indeed, Scopus has an over-representation of literature in English (Morrison et al. 2012; Albarillo 2014), yet most literature on *buen vivir* is in Spanish, so it was necessary to complement the results with Google Scholar.

### 3.2. Step 2: collection, organisation, and categorisation of policies

The next step involved the careful review of each article and the collection of all the urban circularity policies which they mentioned. This led to an initial list of 114 different policies. These policies were then refined and combined to reduce redundancies and inconsistencies, resulting in a final list of 48 policies. We then divided these into 12 policy areas and 3 policy categories (see Table 2). Subsequently, the identified policies were assigned to one of the four circularity discourse types based on the extent to which each policy would reflect and reproduce one of these discourses.

### 3.3. Step 3: case-study selection and document analysis

To select case studies, we first created an initial sample by searching circular cities mentioned in academic literature, circular city alliances, as well as practitioner organisations such as the Circular City Declaration, the ICLEI Circulars leading circular city list, the Ellen McArthur Foundation (EMF) circular city examples, and the OECD circular city case-studies.[5] This led to an initial list of 48 European cities.

Within this set of cities, we only chose cities with explicit CE strategies or action plans rather than those with general green, sustainable, low-carbon or any other non-explicitly CE-related

**Table 2.** Policy areas identified in the literature review.

| Policy category | Policy area | No. of policies | No. of policies per discourse type* | | | |
|---|---|---|---|---|---|---|
| | | | TCE | RCS | TCS | FCE |
| Socio-Political Structure | Economic & Industrial Policy | 5 | 2 | 0 | 2 | 1 |
| | Governance & Municipal Operations | 5 | 3 | 2 | 0 | 0 |
| | Education & Knowledge Development | 4 | 1 | 2 | 1 | 0 |
| | Social Justice & Livelihoods | 4 | 0 | 1 | 3 | 0 |
| Waste, Energy & Material Resource Flows | Renewable Energy | 2 | 1 | 1 | 0 | 0 |
| | Waste Management | 6 | 5 | 1 | 0 | 0 |
| | Water Management | 3 | 2 | 0 | 1 | 0 |
| | Food & Organic Waste Streams | 4 | 1 | 2 | 1 | 0 |
| Built Environment & Spatial Planning | Transport & Mobility | 4 | 1 | 3 | 0 | 0 |
| | Green Buildings | 5 | 2 | 2 | 1 | 0 |
| | Urban Form & Territorial Planning | 4 | 1 | 1 | 1 | 1 |
| | Ecosystems & Nature-Based Solutions | 2 | 0 | 1 | 1 | 0 |

*TCE: Technocentric Circular Economy, RCS: Reformist Circular Society, FCE: Fortress Circular Economy, TCS: Transformational Circular Society

strategy. This was essential to ensure a homogenous and comparable sample of cities that use the same terminology. Moreover, by examining what each city chose to include or exclude in their explicit CE strategies, we can precisely analyse what discourse and vision of CE they propose.

Secondly, we selected only cities with CE strategies published in 2018 or later. This is key since the CE discourse is continuously evolving; we thus sought to review relatively recent CE policies to ensure our research investigates the present discourse and vision of the topic. This also allows us to avoid redundancies with previously published research on earlier circular city strategies and policies.

Thirdly, we focused on European cities, as they are in a position of geopolitical power and discursive leadership on CE, especially since the EU established its first CE action plan in 2015. The CE discourses and policies applied by European cities will thus likely influence the discourse on urban CE policies beyond their borders.

Finally, due to language restrictions, only cases with policy documents in Portuguese, Spanish, French, Danish, and English were selected. Only Amsterdam, Glasgow, and Copenhagen fit all the above criteria and were thus chosen as case studies for this research.[6]

Once our case studies were chosen, their CE strategies and directly associated policy documents were qualitatively reviewed and analysed to establish a critical understanding of the cities' visions of CE, including their main goals, targets, definitions, assumptions, and governance mechanisms. The policy documents analysed included the main CE action plans or strategies and other directly associated documents published by the local city governments or their partners in the initiative (see Table 3).

### *3.4. Step 4 application of the policy-discourse framework*

The policy discourse framework is summarised in Table 4 (see supplementary materials for a detailed version).

The policy-discourse framework measures the strength of the relationship between each city's CE strategy and the four circularity discourse types, as well as the level of commitment each city has to the 48 policies, 12 policy areas, and 3 policy categories of the framework.

To calculate each city's commitment level to each of the 48 policies in the policy-discourse framework, we use a scale of 1–5 (Table 5).

The total number of points available for the 4 circularity discourse types and 12 policy areas was calculated by multiplying the total number of possible policies in each policy area or discourse type

**Table 3.** Data sources for policy analysis and policy-discourse framework.

| Publisher | Date published | Document |
|---|---|---|
| Municipality of Amsterdam | 2020 | Amsterdam Circular 2020–2025 Strategy |
| | 2020 | Amsterdam Circular Monitor |
| | 2020 | The Amsterdam City Doughnut: A Tool for Transformative Action |
| | 2020 | Amsterdam Circular 2020–2025 Innovation and Implementation Programme (*Innovatie- en Uitvoeringsprogramma)* 2020–2021 |
| Glasgow City Council | 2020 | Circular Economy Route Map for Glasgow |
| | 2020 | Circular Economy Route Map for Glasgow Committee Document |
| Copenhagen Municipality | 2019 | Circular Copenhagen: Resource and Waste Management Plan 2024 |

by 5 (the maximum value on the scale). Tables 6 and 7 note the number of policies per discourse type and policy area and the total number of points available. As there are an unequal number of policies per discourse type and per policy area, the strength of the commitment to the discourse types and different policy areas was calculated as a percentage using the following equations to allow for direct comparison[7]:

$$\text{Committment to policy area X (\%)} = \frac{\textit{Number of points}}{\textit{Total no. of points available in policy area X}} \cdot 100$$

$$\text{Strength of relationship to discourse type X (\%)} = \frac{\textit{Number of points}}{\textit{Total no. of points available for discourse type X}} \cdot 100$$

The abovementioned coding and grading system of the policy-discourse framework was applied to all case studies to analyse and critically compare their CE strategies in a systematic and consistent manner. This comparative case study approach allows for a rich and detailed analysis of the topic (Stewart 2012) that can be replicated across other contexts and circumstances (Mills, Durepos, and Wiebe 2012). Moreover, this type of comparative case study is well suited to developing policy insights and recommendations (Stake 2005; Løkke and Sørensen 2014).

## 4. Results

### *4.1. Amsterdam's circularity approach*

In 2016, the Dutch government released the government-wide programme "A Circular Economy in the Netherlands by 2050", intending to reduce the use of primary raw materials by 50% by 2030 and to establish a fully circular economy by 2050 (Government of the Netherlands 2016). At a local level, Amsterdam developed its first circular action plan in 2012 and its first circular strategy in 2016 (Fratini, Georg, and Jørgensen 2019; Campbell-Johnston et al. 2019). In 2020, the municipal government published its most recent CE policy: the "Amsterdam Circular Strategy 2020–2025" (Municipality of Amsterdam 2020c). Amsterdam's CE strategy was developed with the support of Circle Economy and used Kate Raworth's Doughnut Economics as a guiding model (Municipality of Amsterdam 2020b).[8]

Amsterdam's circular strategy places the transition towards a CE in the context of the ecological crisis and the need for social justice. The strategy acknowledges the socio-ecological impact of the city's unsustainable consumption practices on people and ecosystems in the Global South. It states its overall goal as follows:

> "Amsterdam desires broad prosperity. By this we mean that material wealth is not the only measure for a good life. It also involves things like wellbeing, sufficient leisure time, good health, a pleasant living environment and

**Table 4.** Summarised policy-discourse framework.

| Policy Category | Policy Area | Policy | Discourse type* |
|---|---|---|---|
| Socio-political Structure | Economic & Industrial policy | Supporting CE businesses, entrepreneurs, and start-ups. | TCE |
| | | Deregulating to foster innovation and foreign investment. | TCE |
| | | Supporting local cooperatives and the social and solidarity economy. | TCS |
| | | Creating capacity for deindustrialisation and low-tech self-sufficiency. | TCS |
| | | Shifting public services to the private sector. | FCE |
| | Governance & Municipal Operations | Creating bottom-up participatory governance. | RCS |
| | | Facilitating collaborative partnerships with private sector. | TCE |
| | | Establishing digital monitoring and evaluation systems. | TCE |
| | | Creating or improving environmental standards. | TCE |
| | | Circular procurement and management of municipal goods and infrastructure. | RCS |
| | Education & Knowledge development | Communication initiatives to encourage resource recovery and recycling. | TCE |
| | | Cultural transformation towards slower, healthier, and more convivial ways of life. | TCS |
| | | Training and capacity building to spread CE technical skills and knowledge. | RCS |
| | | Collaborative research and knowledge development on CE. | RCS |
| | Social Justice & Livelihoods | Social inclusivity and equality in access to urban infrastructure and services. | TCS |
| | | Housing cooperatives, community housing and social housing. | TCS |
| | | Local currencies and cooperative banking. | TCS |
| | | Supporting community-based and cooperative sharing economy activities and projects. | RCS |
| Waste, Energy, & Material Resource Flows | Renewable Energy | Centralised renewable energy production. | TCE |
| | | Decentralised, community-owned renewable energy production. | RCS |
| | Waste Management | Improving waste recovery and recycling infrastructure and technologies. | TCE |
| | | Creating and/or supporting secondary materials market. | TCE |
| | | Economic incentives to reduce non-recyclable waste generation. | TCE |
| | | Fostering urban mining activities (material and energy recovery from landfills). | TCE |
| | | Restricting single-use packaging and encouraging reusable packaging. | RCS |
| | | Promoting industrial and urban symbiosis and establishing eco-industrial parks. | TCE |
| | Water Management | Recovery and recycling of resources from wastewater. | TCE |
| | | Increasing the efficiency of water provision. | TCE |
| | | Establishing progressive incentives to reduce water consumption. | TCS |
| | Food & Organic Waste Streams | Supporting and promoting urban and peri-urban agriculture. | RCS |
| | | Promoting household and community composting of bio-waste. | TCS |
| | | Establishing centralised bio-waste recycling systems. | TCE |
| | | Reducing food waste and encouraging sustainable diets. | RCS |
| | Transport & Mobility | Improving and encouraging shared mobility (bike-sharing, ridesharing etc.). | RCS |
| Built Environment and Spatial Planning | | Improving public transport infrastructure and promoting its use. | RCS |
| | | Improving active transport (walking, cycling) infrastructure and promoting it. | RCS |
| | | Promoting private green transportation technologies (electric cars etc.). | TCE |
| | Green Buildings | Setting circular construction standards and regulations. | TCE |
| | | Fostering circular recovery of demolition materials. | TCE |
| | | Infrastructure refurbishment, rehabilitation, renovation, and repurposing. | RCS |

(*Continued*)

**Table 4.** Continued.

| Policy Category | Policy Area | Policy | Discourse type* |
|---|---|---|---|
| | | Redistributing unused buildings and preventing unfair accumulation of housing. | TCS |
| | | Promoting shared building uses such as shared workspaces and co-housing. | RCS |
| | Urban Form & Territorial Planning | Construction of private conflict and disaster protection infrastructure. | FCE |
| | | Planning compact multi-functional and convivial neighbourhoods. | RCS |
| | | Building infrastructure for city-wide climate resilience and adaptation. | TCE |
| | | Fostering urban-rural symbiosis and supporting rural livelihoods. | TCS |
| | Ecosystems & Nature-Based Solutions | Providing and maintaining ecosystem services by creating green infrastructure. | RCS |
| | | Strictly conserving, restoring, and protecting biodiversity to create harmony between social and natural ecosystems. | TCS |

*TCE: Technocentric Circular Economy, RCS: Reformist Circular Society, FCE: Fortress Circular Economy, TCS: Transformational Circular Society

**Table 5.** Assessment scale for policy-discourse framework.

| Scale | Explanation |
|---|---|
| 0 = The policy is not mentioned in the CE route map/strategy | The city government doesn't mention or address this policy area at all. |
| 1 = The policy just mentioned in the plan or very little action is taken | Policies in the area are mentioned but no specific actions or commitments are taken (for example, a city might mention the importance of renewable energies but have no project to actually improve renewable energy generation) or the actions involve only small research project(s) with no concrete impact on the policy area. |
| 2 = Limited action is taken | One or more limited actions or projects are established but a rather limited impact can be expected from their implementation, and much more could be done in that policy area. |
| 3 = Some action is taken but more could be done | One or more actions and projects are developed, which would have some impact on the target policy area, but they remain limited in many ways. |
| 4 = Strong action is taken | Strong policies are developed and supported by the city government in a consistent manner, yet a few more actions could still be envisaged in this area to be fully effective. |
| 5 = Very strong action is taken | Would entail the city government strongly committing to the respective policy area with impactful actions, regulations, and/or measures that can bring about significant change in the area. |

> space for personal growth. We want to be a modern, thriving and inclusive city for everyone, taking into account the boundaries that the planet imposes on us. Amsterdam is aware of the impact of its consumption and production, both within and far beyond its own city limits." (Municipality of Amsterdam 2020a, 17)

Following the doughnut model, the CE is positioned within a framework that fosters social wellbeing within planetary boundaries (Municipality of Amsterdam 2020d). Thus, at the outset, Amsterdam takes a more holistic definition of the CE, which aligns with the *Reformist Circular Society* discourse. However, within the strategy, there seems to be a contradiction in the Municipality's discursive position on economic growth and decoupling. The strategy states that:

> "Every year, we see more extraction of raw materials, higher energy consumption and increasing greenhouse gas emissions. These trends are in line with the growth of the global economy and population." (Municipality of Amsterdam 2020a, 10)

Hence, the municipality clearly links economic growth to the socio-ecological problems of the twenty-first century. Yet, in another segment, the Municipality notes that decoupling economic

**Table 6.** Number of policies per policy area and the total number of points available.

| Policy category | Policy area | No. of policies | No. of points available in each policy area |
|---|---|---|---|
| Socio-Political Structure | Economic & Industrial Policy | 5 | 25 |
| | Governance & Municipal Operations | 5 | 25 |
| | Education & Knowledge Development | 4 | 20 |
| | Social Justice & Livelihoods | 4 | 20 |
| Waste, Energy, & Material Resource Flows | Renewable Energy | 2 | 10 |
| | Waste Management | 6 | 30 |
| | Water Management | 3 | 15 |
| | Food & Organic Waste Streams | 4 | 20 |
| Built Environment & Spatial Planning | Transport & Mobility | 4 | 20 |
| | Green Buildings | 5 | 25 |
| | Urban Form & Territorial Planning | 4 | 20 |
| | Ecosystems & Nature-Based Solutions | 2 | 10 |

**Table 7.** Number of policies per discourse type and total number of points available.

| Discourse Type* | No. of policies | No. of points available in each discourse type |
|---|---|---|
| TCE | 19 | 95 |
| RCS | 16 | 80 |
| TCS | 11 | 55 |
| FCE | 2 | 10 |

*TCE: Technocentric Circular Economy, RCS: Reformist Circular Society, FCE: Fortress Circular Economy, TCS: Transformational Circular Society

growth and environmental pressures will be possible and the way forward to approach these challenges:

> "All things considered, this is the great challenge for the twenty-first century: to give ourselves and others a fair chance at a good life, while separating economic growth from the pressure on the environment." (Municipality of Amsterdam 2020a, 11)

Despite this clear problematization of the socio-ecological impacts of current consumption and production patterns, the conceptualisation of the CE in Amsterdam is predominantly defined as a method of waste prevention, promoting resource efficiency, economic development, and reduced emissions. The municipality's overarching targets are for Amsterdam to reduce $CO_2$ emissions by 55% by 2030 and by 95% by 2050, to halve the use of new raw materials by 2030, and to become fully circular by 2050 (Municipality of Amsterdam 2020a). Therefore, only material and energy efficiency goals are measured with clear targets. Regarding societal concerns, there are only broad overarching visions for the future of Amsterdam as a progressive and prosperous city, with no tangible targets to measure their progress in this regard. Nonetheless, it is worth noting that the municipality has acknowledged this limitation and is still in the process of developing a system for modelling social wellbeing and prosperity (Municipality of Amsterdam 2020a).

All in all, the discourses used by the Municipality of Amsterdam align with *Reformist Circular Society*; supporting the idea that one must enable a reformed form of capitalism where eco-economic decoupling is possible, and technological innovations can enhance ecological health, prosperity and wellbeing for all.

### *4.1.1. Circularity policies*

Applying the conceptual framework to Amsterdam's CE policies (see sections 3.3 and 3.4), our results show that the strongest actions are taken in the policy areas of *governance and municipal operations (72%), education, and knowledge development (65%), food and organic waste streams (70%),* and *waste*

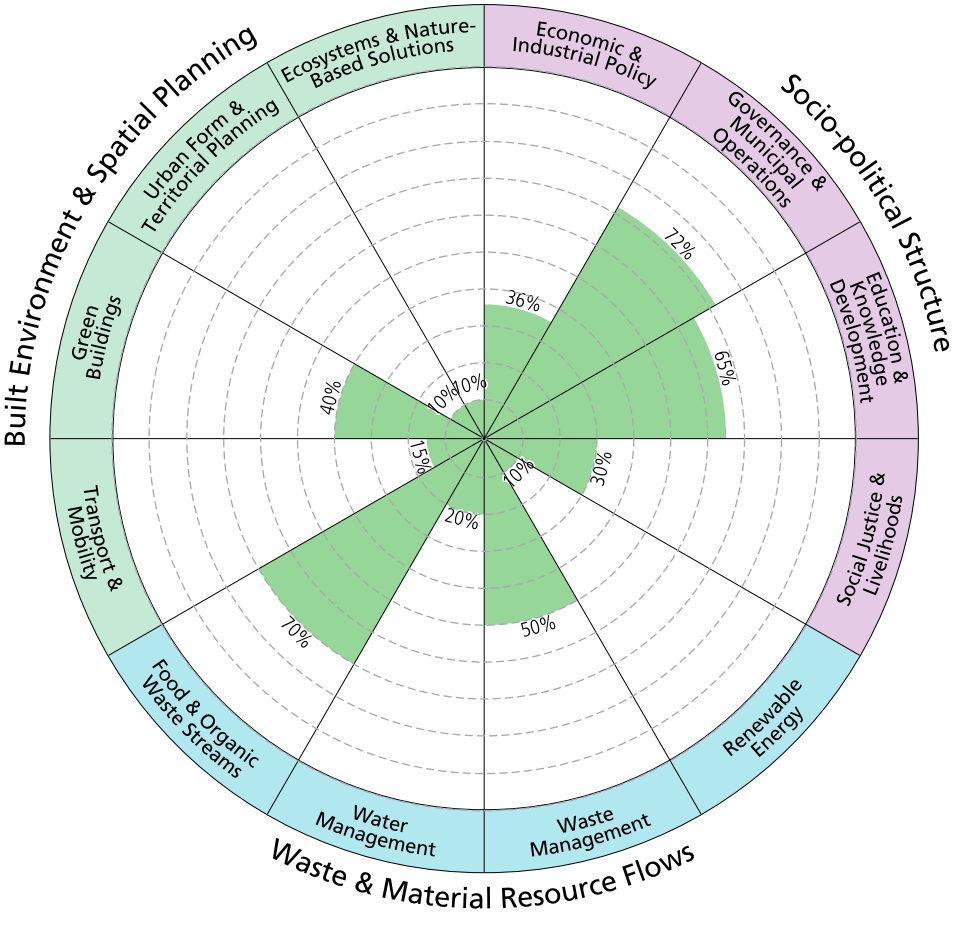


**Figure 3.** Policy areas addressed in Amsterdam's CE strategy.

*management (50%)*. On the contrary, there is a lack of consideration for *nature-based solutions (10%), urban form and territorial planning (10%), renewable energy (10%),* and *transport and mobility (15%)* (see Figure 3).

***4.1.1.1. Waste, energy, & material resource flows.*** Amsterdam takes many actions in the policy area of *food and organic waste streams (70%)*. The municipality promotes urban agriculture and locally grown food consumption by fostering regional food hubs. Moreover, the city aims to encourage both household composting and bio-digestion as well as centralised bio-waste management systems through the deployment of collection containers. The strategy also encourages citizens to adopt plant-based diets through the Amsterdam Healthy Weight Programme.

The Municipality of Amsterdam is also committed to tackling *waste management and recycling (50%)*, by improving waste collection and recycling, and by fostering the creation of secondary materials markets thanks to digital tools and technologies. The municipality also plans to support urban industrial symbiosis through research programmes and experiments and the creation of circular material depots.

Few actions are taken on *water management (20%)* and *renewable energy (10%)* as only minor research projects are carried out on the recovery and recycling of wastewater, the efficiency of water provision in swimming pools and green hydrogen production.

***4.1.1.2. Built environment & spatial planning.*** There is a general lack of focus on the built environment and spatial planning. *Ecosystems and nature-based solutions (10%)* are only included through an experimental food forest project. Regarding *urban form and territorial planning (10%)* policies, the municipality is only focused on fostering urban-rural symbiosis through its participation in a European research project. Furthermore, around *transport and mobility (15%)*, the city only supports the circular construction of an extension to the north–south railway line.

Commitments in the area of *green buildings (40%)* are stronger, with policies to improve the environmental performance standards of buildings by working with developers and other municipal partners to establish minimum circularity and sustainability requirements such as adaptive design, modular construction, and reduced energy consumption. Furthermore, the Municipality of Amsterdam has many pilot projects, on the circular recovery of demolition waste and on the repurposing and renovation of old buildings and infrastructure to increase material and energy efficiency. With these policies, Amsterdam seeks that by 2025, 50% of all building renovation and maintenance activities follow principles of circular construction.

***4.1.1.3. Socio-political structure.*** The municipality is most committed to policies regarding *governance and municipal operations (72%)*. It is establishing and participating in over 20 public-private partnerships to improve circular innovations in various economic sectors. The municipality also places a significant focus on circular public procurement and public infrastructure to encourage businesses to adopt more circular models. With these policies, the city aims for 100% circular procurement and a 20% reduction in public consumption by 2030. Furthermore, the municipality is creating a monitoring and evaluating system and a data platform to investigate waste streams throughout the city. Amsterdam also has a few participatory projects to obtain residents' perspectives to make some neighbourhoods more circular.

Regarding *education and knowledge development (65%)* policies, the municipality is engaging in many communication initiatives to raise awareness of circularity and change behaviours, particularly regarding sustainable diets and product sharing and reuse. Furthermore, the city is supporting projects to reskill and educate citizens on the CE and is working with universities and research facilities to carry out various research projects and urban living labs.

Concerning *economic and industrial (36%)* policies, Amsterdam supports CE initiatives and start-ups with a plethora of research programmes to develop and assess technological innovations for the CE transition. The municipality also supports deregulation and liberalisation to foster innovation and foreign investment in new CE initiatives. Moreover, the city promotes the local production and consumption of goods through initiatives such as Amsterdam Made.

Lastly, in terms of *social justice and livelihoods (30%)* policies, the municipality predominantly focused on promoting sharing economy activities by establishing a circular second-hand depot and training facility to make sharing more accessible. Beyond the sharing economy, however, there is no substantial commitment to fostering inclusivity, and social justice and only a small research project is being carried out on community land trusts (see supplementary materials for further details on all the circularity policies established by the city of Amsterdam).

### *4.1.2. Policy-discourse type*

Overall, based on the policies proposed within its CE strategy, Amsterdam is aligned with both the *Technocentric Circular Economy* (51.58%) and *Reformist Circular Society* (45%) discourses (Figure 4). These results indicate a strong level of optimism about the role of technological innovation in preventing economic collapse and a relative concern for the integration of social justice elements into its CE transition.

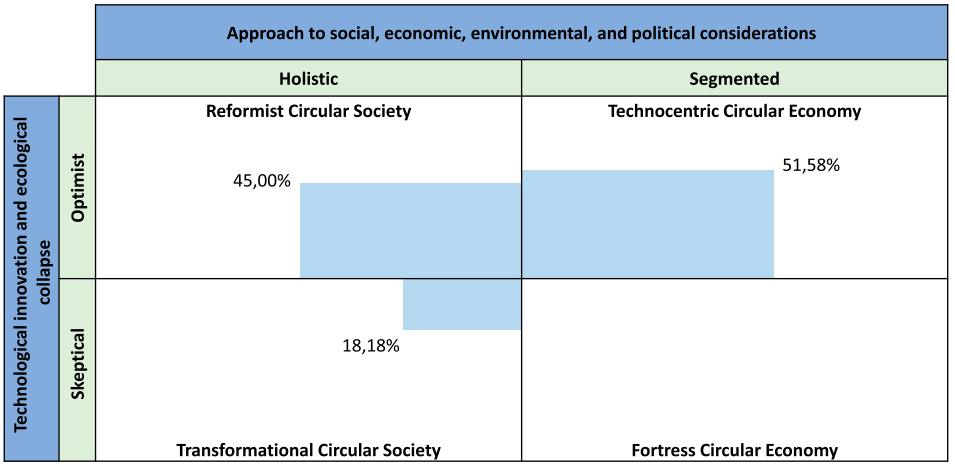


**Figure 4.** Presence of the four circularity discourse types in Amsterdam.

### *4.2. Glasgow's circularity approach*

CE policy in Scotland was first set out in the "Making Things Last" strategy in 2016 to develop a comprehensive approach to extended producer responsibility and to address and expose the costs of recycling and disposal in the region (Scottish Government 2016). Overall, the CE strategy in Scotland is heavily focused on the management of material and resource flows (Scottish Government 2016). Within Glasgow, the transition towards a CE began in 2016, when the Glasgow Chamber of Commerce (GCC), Zero Waste Scotland, and the Glasgow City Council published "Circular Glasgow" (GCC 2019). This laid the groundwork for the creation of Glasgow's CE route map, which was developed and published by Glasgow City Council in October 2020 (Glasgow City Council 2020a).

The city of Glasgow situates the transition to a CE within the context of various overlapping and complex social and environmental problems. The city council provides an extensive critique of the current linear system noting that:

> "the forty year globalised neo-liberal project to reduce government, the chronic depletion of essential public services throughout the UK, to prioritise GDP, and promote consumer capitalism has presented us with a set of disastrous outcomes." (Glasgow City Council 2020a, 16)

Neoliberal capitalism is thus seen as the source of various socio-ecological challenges such as inequality, poverty, and climate change (Glasgow City Council 2020a). The COVID-19 pandemic has, according to the council, highlighted the fragility of hyper-globalization and its complex international supply chains and the need to return to a more localised and equitable economic system (Glasgow City Council 2020b). Hence, the City Council intends a vision for the CE route map aiming to …

> " … promote a message of considered consumption and provide a challenge to the current wasteful consumerist practices(…)". (Glasgow City Council 2020b, 2)

To change consumption practices, according to the council, there must be a paradigm shift in consumer culture and a significant commitment to changing production practices and business models (Glasgow City Council 2020a). Moreover, The City Council sees the need to address deprivation and social exclusion as essential elements in the transition to a CE (Glasgow City Council 2020a).

The Council defines the CE according to the concept of Cradle to Cradle (C2C), which is based on the idea of "the economy being restorative and regenerative – that is, economic activities

should strengthen rather than break down social and environmental resources" (McDonough and Braungart 2002 cited in Glasgow City Council 2020a). Moreover, while benefiting the environment, the City Council notes that the CE will also support job creation and provide economic opportunities for deprived and unemployed communities (Glasgow City Council 2020a). The Glasgow City Council also follows the Ellen MacArthur Foundation's understanding of CE (which echoes C2C rhetoric), noting that the transition towards a CE should take a systemic approach to economic development, benefitting the environment, society, and businesses and lead to the gradual decoupling of economic growth from resource consumption (Glasgow City Council 2020a).

Overall, Glasgow's CE route map shows a strong awareness of the socio-environmental impacts related to the overconsumption of resources and the overshoot of ecological boundaries. Moreover, it gives key importance to social justice, fairness, and equity considerations. However, it does not view the CE transition as a way to radically transform its economic and political system beyond capitalism, but rather to stimulate change within the boundaries of capitalism by transitioning away from its dominant neoliberal form. It thereby seeks strong social, technical and economic innovations that enable eco-economic decoupling. Glasgow City Council's understanding of the CE is, hence very much in line with the *Reformist Circular Society* discourse type.

#### *4.2.1. Circularity policies*

Applying the conceptual framework to Glasgows's CE route map (see sections 3.3 and 3.4) demonstrate that the main policy actions are taken in the areas of *education and knowledge development (75%), governance and municipal operations (72%),* and *transport and mobility (45%)*. The policy areas least explored within Glasgow's CE route map are *water management (0%), urban form and territorial planning (10%)*, and *social justice and livelihoods (15%)* (Figure 5).

***4.2.1.1. Waste, energy, & material resource flows.*** There is a minimal commitment from the Glasgow City Council concerning waste and material resource flow policies. There are no *water management (0%)* policies included in the CE route map; however, there are some *waste management (27%)* policies. For instance, Glasgow City Council is highly committed to supporting the creation of a secondary materials market. To do so, it is creating a municipal material passport that would help coordinate and catalogue all materials in construction projects in Glasgow. Moreover, the Glasgow City Council is creating a virtual business exchange platform to match up waste streams and material inputs and an online material-sharing hub to connect citizens and organisations.

Within *food and organic waste stream (30%)* policies, Glasgow runs city-wide schemes to support businesses using sustainable, healthy, plant-based, low-carbon, and local produce. Through the Glasgow food growing strategy, the council is also helping citizens access community agriculture opportunities, including land, allotments, and financial resources.

Regarding *renewable energy (30%),* Glasgow seeks to support decentralised renewable energy production and explores opportunities to establish local and district heating networks and assist the uptake of community energy projects.

***4.2.1.2. Built environment & spatial planning.*** Within the *transport and mobility (45%)* policy area, the City Council is expanding the current bike and electric car hire services, widening pavements for pedestrians, expanding bike lanes, supporting the Glasgow metro initiative to improve public transport infrastructure, and even exploring the possibility of developing a public transport system that is free of charge. Within *urban form and territorial planning (10%)*, the City Council wants to create a 20-minute city through its Liveable Neighbourhoods programme. However, progress is in its early stages and is, thus far, relying on change being driven by and within communities.

Regarding *green buildings (40%),* Glasgow City Council seeks to upscale the adoption of circular construction techniques such as modular construction and design for disassembly. It also encourages the retrofitting, rehabilitation, and renovation of buildings to improve energy and

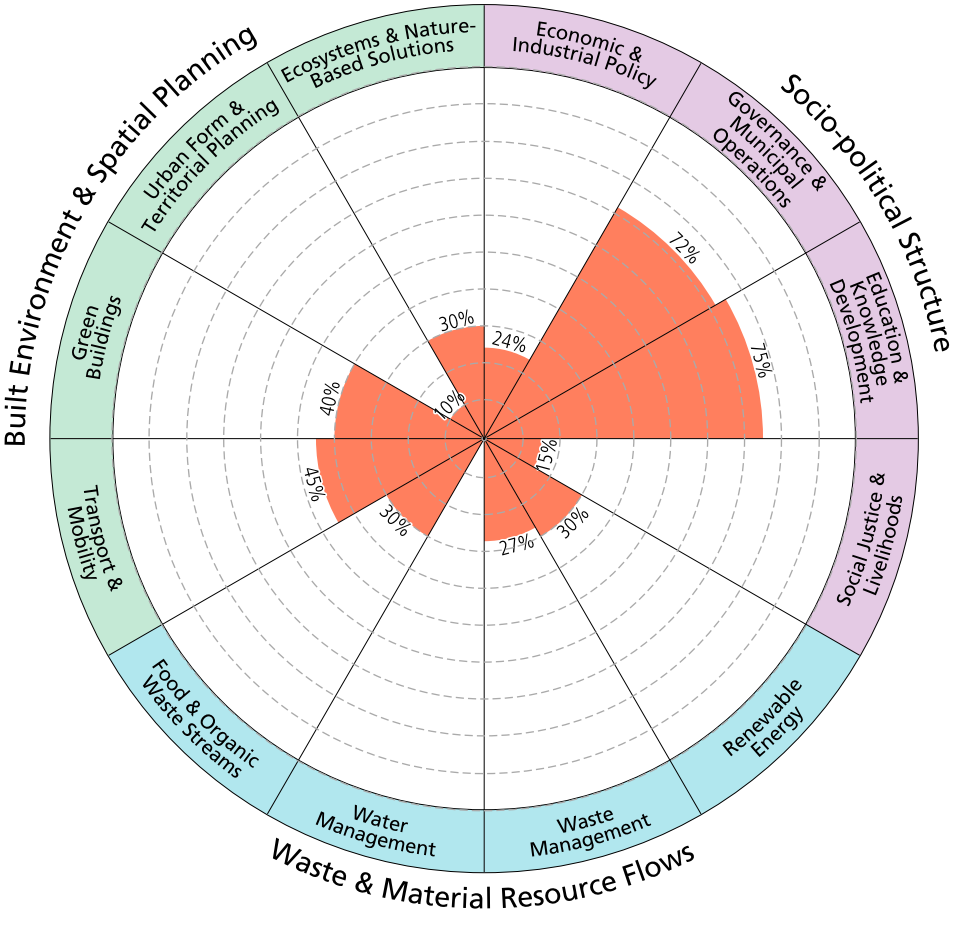


**Figure 5.** Policy areas addressed within Glasgow's CE route map.

resource efficiency, and it aims to repurpose vacant council units to create incubator co-working facilities for circular businesses.

Lastly, with *ecosystems and nature-based solutions (30%)* policies, Glasgow is looking to open-up unused vacant land to provide more green spaces in the city and make room for community gardening.

***4.2.1.3. Socio-political structure.*** In terms of *social justice and livelihood (15%)* policies, the council focuses on promoting sharing and repair activities, predominantly through partnerships and pilot projects with local CSOs, repair networks, and local thrift stores.

The City Council is committed to various *governance and municipal operations (72%)* policies. For example, the City Council is prioritising circular practices, business models, and eco-design within its procurement and tender processes. It is also working to make local schools, clinics, and hospitals more circular. Furthermore, Glasgow is participating in various public-private partnerships and collaborating and connecting with other circular cities around the world to share findings, insights and innovations. In terms of creating or improving environmental standards, the city council has established a low-emissions zone for vehicles. Moreover, the city is engaged in various monitoring schemes to better evaluate waste streams and establish social and ecological boundaries.

Glasgow is committed to various *education and knowledge development (75%)* policies, for example, implementing a CE communications strategy to influence consumer behaviour and

promote the reuse, repair, and sharing of goods. Moreover, the City Council is partnering with various reskilling and upskilling programmes to foster capacity building and knowledge development. It also seeks to embed teaching on the CE within nursery and primary school curriculums.

Lastly, with *economic and industrial (24%)* policies, Glasgow shows significant commitment to supporting CE initiatives, entrepreneurs, and start-ups. For example, the City Council is supporting circular innovation and start-ups by establishing a circular Kickstarter fund, which will provide financial resources and support knowledge development, give rent reductions, and create the possibility of occupying vacant council buildings free of charge (see supplementary materials for further details on all the circularity policies established by the city of Glasgow). Glasgow also discusses various ideas to support the social and solidarity economy within the CE route map. However, no tangible policy actions were taken to promote local production and build cooperative structures.

### *4.2.2. Policy-discourse type*

Overall, based on the policies proposed within the CE route map, Glasgow is most strongly aligned with the *Reformist Circular Society* discourse (60%) and is to some degree aligned with the *Technocentric Circular Economy* discourse (35.79%). These results indicate a high level of optimism about the role of technological innovation in preventing economic collapse and a relatively strong inclusion of socio-political concerns within CE policies (Figure 6).

## *4.3. Copenhagen's circularity approach*

In Denmark, the CE concept rose to prominence in 2015 when the Ellen MacArthur Foundation conducted a case study on CE policymaking and its opportunities in the country (EMF 2015). In 2018, based on recommendations of various Danish CEOs, the Danish government launched its "Strategy for Circular Economy". Overall, the CE strategy in Denmark is heavily focused on promoting "green growth", increasing resource productivity, and waste prevention (Advisory Board for CE 2017; Ministry of Environment and Food of Denmark 2018). Based on its "Resource and Waste Management Plan 2018", the City of Copenhagen launched its first circular strategy in 2019, termed "Circular Copenhagen: Resource and Waste Management Plan 2024" (Municipality of Copenhagen 2019).

The Municipality of Copenhagen does not explore in detail the socio-ecological problems that its CE plan seeks to address. Yet, the preface of the plan states that:

> "Denmark and Copenhagen are ranked twice as high as the EU average when it comes to resource consumption per capita. This means that we use enormous amounts of raw materials and energy to produce a lot of products

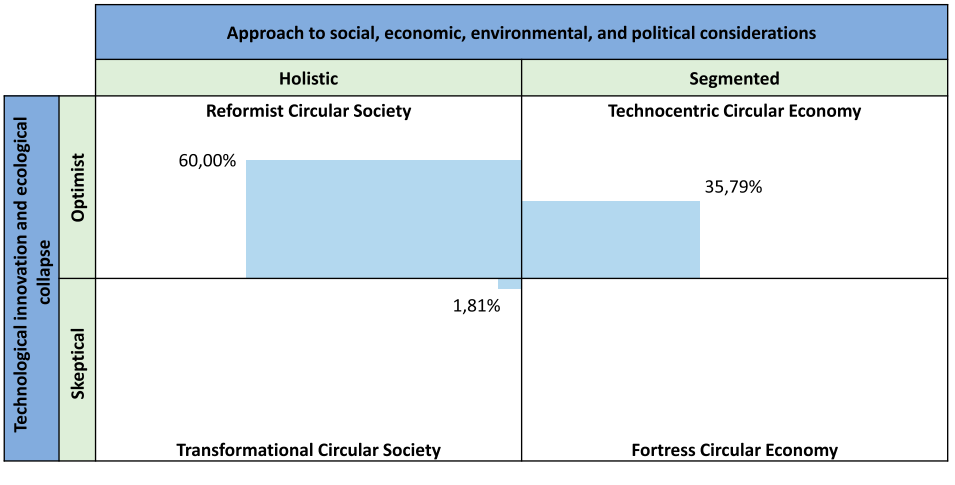


**Figure 6.** Presence of the four circularity discourse types in Glasgow.

> that end up as waste far too fast. It also means that in reality, we take more from the Earth than most people. And it means that we lose resources that we could have used." (Municipality of Copenhagen 2019, 5) [author translation from Danish]

The municipality acknowledges its disproportionate and unsustainable resource consumption and, indirectly, the Danish people's above-average contribution to excess resource extraction. However, consumption in itself is not regarded as an overarching problem but rather the fact that consumption waste is not properly cycled back into the economy.

The subtitle to the CE Plan: "Resource and Waste Management Plan", already indicates the municipality's strong focus on wastes and resources, and this becomes even clearer in the municipality's stated main aim:

> "to give the option to all Copenhageners to act in a resource-aware manner, turning it into a natural everyday habit. The Plan will make it possible to sort your waste at source (…) [and] to make it easier to choose products that are made from e.g. recycled resources". (Municipality of Copenhagen 2019, 5) [author translation from Danish]

The CE plan does not address social and environmental justice issues, nor does it engage in critical discussions on overconsumption and its implications for the planet, nature, and human livelihoods. Instead, it focuses on improving recycling and reuse schemes to foster resource efficiency and reduce CO2 emissions.

The municipality of Copenhagen defines the CE in opposition to the linear economy and identifies CE as an integral part of its carbon neutrality strategy, stating that:

> "materials can circulate for decades and centuries – and thanks to renewable energy this can happen without emitting more CO2." (Municipality of Copenhagen 2019, 6) [author translation from Danish]

While decoupling as a concept is not mentioned in the plan, the plan regularly advocates its contribution to carbon neutrality and the CE's opportunities for "green growth". Overall, the plan introduces three measurable targets, which include the recycling of 70% of household and light industrial and commercial waste, the reduction of 59,000 tonnes of CO2 emissions, and a tripling in the number of reused items.

Due to a complete omission of the social implications of CE and the optimist approach towards "green growth" with a focus on technological innovation, Copenhagen's CE plan falls clearly within the *Technocentric Circular Economy* discourse type.

### *4.3.1. Circularity policies*

Applying the conceptual framework to Copenhagen's circular strategy CE (see sections 3.3 and 3.4) demonstrates that the city takes relatively few actions in all 12 policy areas (Figure 7). The main policy areas addressed by Copenhagen are *waste management (27%), education and knowledge development (27%)*, and *governance and municipal operations (24%)*.

***4.3.1.1. Waste, energy, & material resource flows.*** Copenhagen's CE plan strongly focuses on waste management and resource efficiency. Within *waste management and recycling (27%)*, Copenhagen dedicates 13 policies (out of 28 policies in its entire action plan) to improve the separation, collection, processing, and recycling of waste. Concerning industrial symbiosis, the municipality proposes one concrete option for recycling nappies in collaboration with nursery homes, elderly homes, and other businesses. Overall, the measures show a very narrow focus on industrial ecology and a strong focus on improving recycling schemes. The Municipality of Copenhagen is also, to some extent, involved in improving *food and organic waste streams (20%)*, intending to establish a biogas plant to produce natural gas and fertilisers to enhance organic waste management structures in the city. The plan does not contain policies in the areas of water management *(0%)* and *renewable energy (0%)*.

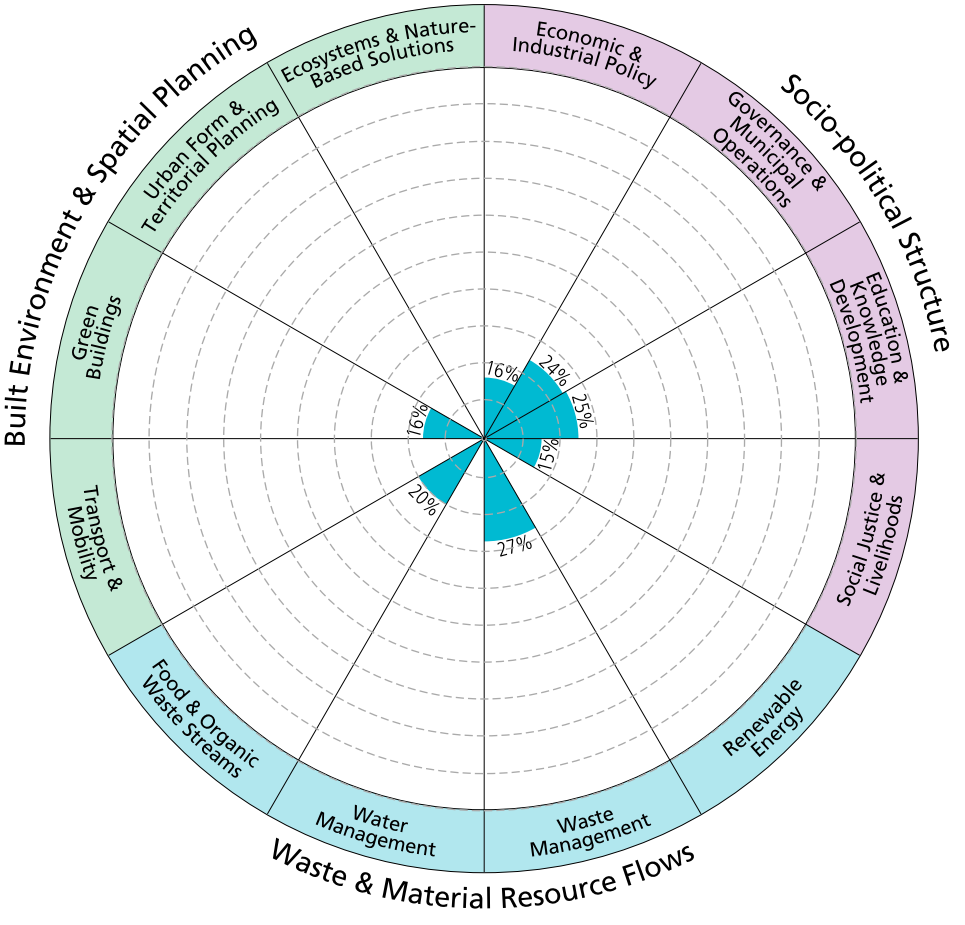


**Figure 7.** Policy areas addressed within Copenhagen's CE plan.

***4.3.1.2. Built environment & spatial planning.*** There is a general lack of policies in the built environment and spatial planning. Only a few measures are proposed in the policy area of *green buildings (16%)*. The plan aims to improve the recycling and reuse of construction materials by assisting developers in the demolition process and creating a storage facility for acquiring usable materials which have recently been recovered from old municipal buildings. Moreover, the municipality plans to set the reuse of construction materials as a criterion in tender documents. Copenhagen has no policy measures in the areas of *ecosystems and nature-based solutions (0%)*, *transport and mobility (0%)*, and *urban form and territorial planning (0%)*.

***4.3.1.3. Socio-political structure.*** Regarding *social justice and livelihood (15%)* policies, the municipality wants to promote sharing economy activities by aiming to provide and support the establishment of resident-operated repair and workshop facilities. Moreover, Copenhagen Municipality seeks to support the development of swap, barter and reuse options. In the policy area of *governance and municipal operations (24%)*, Copenhagen wants to promote public-private partnerships and stakeholder collaboration to create new solutions to increase the quality of materials circulating within the economy and specifically recycle higher-quality plastics. Concerning *education and knowledge development (25%)*, the city aims to educate Copenhagen's citizens on recycling and increase their motivation for sorting. The municipality additionally promotes the labelling of circular products with information on product repairability and recyclability. However, no clear implementation

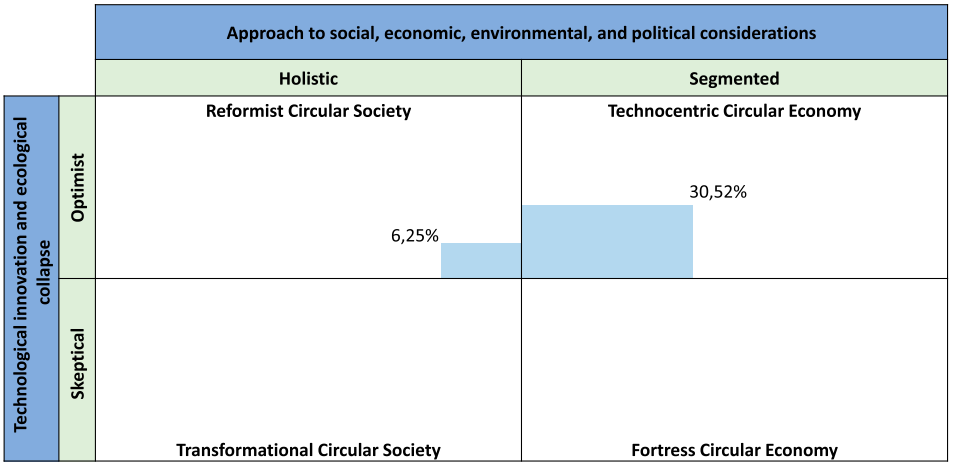


**Figure 8.** Presence of the four circularity discourse types in Copenhagen.

scheme exists for this yet. Regarding *economic and industrial (16%)* policies, the municipality plans to establish a "resource lab" and an "innovation platform". Both facilities are geared toward developing new business concepts within the recycling and resource efficiency sectors (see supplementary materials for further details on all the circularity policies established by the city of Copenhagen).

#### *4.3.2. Policy-discourse type*

Overall, based on the policies proposed within the CE plan, Copenhagen is heavily aligned with the *Technocentric Circular Economy* discourse (30.52%) and has some marginal with *Reformist Circular Society* elements (6.25%). These results indicate a strong level of optimism about the role of technological innovation in preventing economic collapse and little to no focus on socio-political concerns (Figure 8).

## 5. Discussion

### *5.1. Comparative analysis*

Our results demonstrate that *Reformist Circular Society* and *Technocentric Circular Economy* discourses dominate in Amsterdam's and Glasgow's CE policies, whereas *Technocentric Circular Economy* discourses dominate in Copenhagen. They also show that our case studies have overwhelmingly focused on policies related to economic and industrial policy, governance, waste management, green buildings, food, and education, while other policy areas were seldomly addressed, such as ecosystems, social justice, and urban form and territorial planning (Figure 9 and Table 8 as well as table D in supplementary materials).

Our findings for Amsterdam are very much aligned with those of previous research in the area. For instance, Maldini (2021) found that, while Amsterdam Circular 2020–2025 Strategy's discourse is quite holistic and progressive, its implementation is "incipient and limited" as it does not include any explicit measures and targets to reduce citizens' overconsumption in a socially equitable manner. Cramer (2020a, 2020b) analysed Amsterdam's previous CE programme (implemented from 2015 to 2019), concluding that it only brings about preliminary progress towards CE as it fails to challenge sector behaviours or product chains. Savini (2019, 2021a) looked at the Amsterdam city-region's waste markets from 2000 to 2019 finding that Amsterdam promotes a contradictory approach to the CE where attempts to reduce consumption are undermined by the expansion of waste recovery infrastructures that necessitate constant inputs of waste. Campbell-Johnston et al.

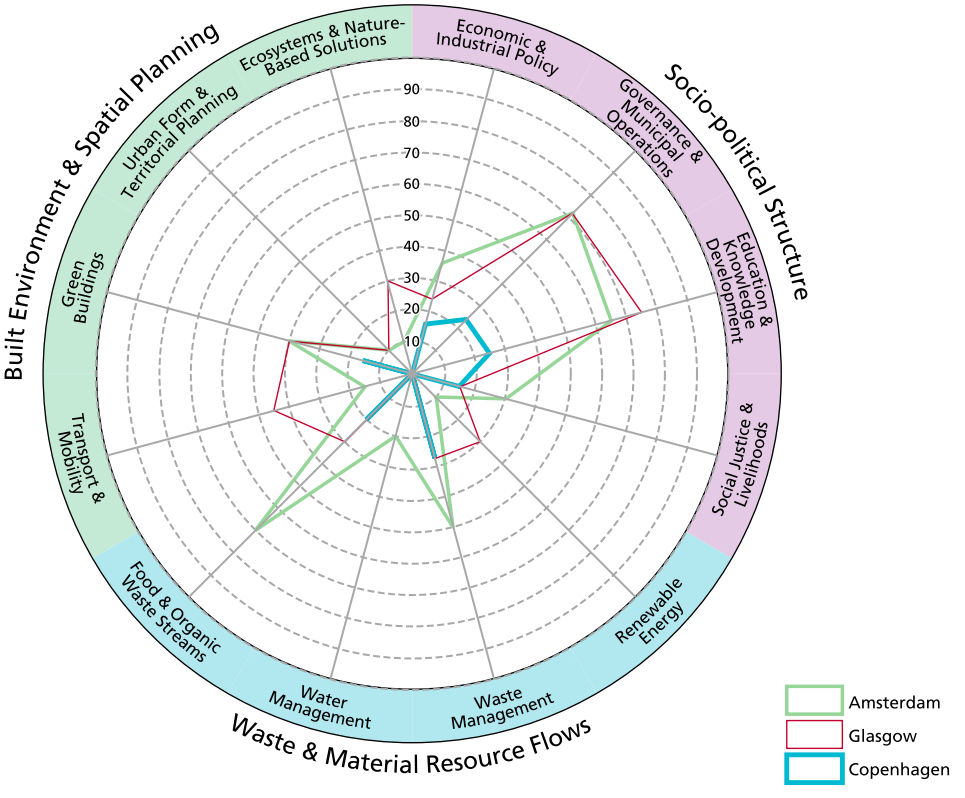


**Figure 9.** Comparative visualisation of the policy areas addressed in the three cities' CE strategies.

(2019) and Fratini, Georg, and Jørgensen (2019) also have similar results regarding Amsterdam's previous CE strategy, finding that the discursive depiction of the CE as a transformative social strategy is not mirrored in policy practices, which continue to prioritise end-of-pipe value retention strategies (e.g. recycling). The above research on Amsterdam strengthens our results, which also revealed that

**Table 8.** Summary of results in the 3 policy categories and 12 policy areas for the 3 case studies.

| Policy type | | Amsterdam | Glasgow | Copenhagen |
|---|---|---|---|---|
| Policy category | **Socio-Political Structure** | **51%** | **47%** | **20%** |
| Policy areas within Socio-political Structure | Economic & Industrial Policy | 36% | 24% | 16% |
| | Governance & Municipal Operations | 72% | 72% | 24% |
| | Education & Knowledge Development | 65% | 75% | 25% |
| | Social Justice & Livelihoods | 30% | 15% | 15% |
| Policy category | **Waste, Energy, & Material Resource Flows** | **44%** | **23%** | **16%** |
| Policy areas within Waste, Energy, & Material Resource Flows | Renewable Energy | 10% | 30% | 0% |
| | Waste Management | 50% | 27% | 27% |
| | Water Management | 20% | 0% | 0% |
| | Food & Organic Waste Streams | 70% | 30% | 20% |
| Policy category | **Built Environment & Spatial Planning** | **21%** | **32%** | **5%** |
| Policy areas within Built Environment & Spatial Planning | Transport & Mobility | 15% | 45% | 0% |
| | Green Buildings | 40% | 40% | 16% |
| | Urban Form & Territorial Planning | 10% | 10% | 0% |
| | Ecosystems & Nature-Based Solutions | 10% | 30% | 0% |

Amsterdam's discourse on CE is rather holistic on paper but lacks more transformative social actions that go beyond its focus on economic growth and competitiveness.

Compared to Amsterdam, there is still little scientific literature published on Glasgow's and Copenhagen's CE strategies. Prendeville, Cherim, and Bocken (2018) have analysed the previous 2016 "Circular Glasgow" strategy, finding that the city took a rather contradictory approach by being business-centric in its policies while simultaneously offering the possibilities of "being really radical" in its vision of social justice and ecological transformation (p.186). These results align with our analysis of the 2020 route map, which strongly criticised the impacts of neoliberal capitalism, yet sought market-based innovations and green growth as a solution to those problems.

Krähmer (2021) analysed Copenhagen's climate and sustainability plans and strategies published between 2012 and 2016. His analysis of those older sustainability policies evidenced that eco-economic decoupling played a central role, assuming that it would enhance growth while reducing carbon emissions (Krähmer 2021). This shows that Copenhagen has been following a technocentric "green growth" approach for some time now, which, as our research revealed, is reiterated in its latest CE policies.

### *5.2. Technological optimism and the limits to growth*

Our findings show that Amsterdam, Copenhagen, and Glasgow pursue economic growth as a positive societal goal and objective. All cities thereby assume that, with the transition to a CE, economic growth can be decoupled from environmental degradation. This is reflective of our case study's alignment to the "optimist" *Reformist Circular Society* and *Technocentric Circular Economy* discourse types. However, the assumption that eco-economic decoupling is possible is problematic as decades of research have evidenced that absolute decoupling is, in fact, impossible and incompatible with wider ecological and climate ambitions (Hickel and Kallis 2019; Jackson 2016; Parrique et al. 2019; Wiedenhofer et al. 2020; Haberl et al. 2017). Indeed, economic growth is intrinsically tied to energy and material consumption and recycling, and recovery technologies can only supply a fraction of necessary raw materials in a continuously growing economy (Marín-Beltrán et al. 2022; Giampietro 2019; Skene 2018). By leaving economic growth unquestioned, our case studies fail to address the origins of the socio-ecological issues they want to deal with (Giampietro and Funtowicz 2020; Hobson and Lynch 2016; Genovese and Pansera 2020).

Moreover, the economic growth and competitiveness approach chosen by our three case studies will likely lead to the development and consolidation of waste management start-ups and businesses. This can create infrastructural lock-ins and path dependencies whereby a city's industry and economy become dependent on the continuous outflow of waste (Savini 2019). In fact, the waste management industry operates on very low margins, so to be competitive, it requires substantial investments in infrastructure and an abundant and steady stream of waste to create economies of scale (Savini 2021a). The three case studies in this research could thereby end up depending on continuous resource consumption and extraction to fuel their new waste management and valorisation industries.

All in all, the growth optimist discourse and policies chosen by Amsterdam, Copenhagen, and Glasgow are deeply problematic from a sustainability point of view. The economic development of these cities will undoubtedly necessitate large amounts of raw materials and thereby exacerbate socio-ecological impacts throughout the globe (Marín-Beltrán et al. 2022; Martinez-Alier 2021a). To address these issues, public policies should focus on reducing consumption rather than simply recovering waste (Reike, Vermeulen, and Witjes 2018; Calisto Friant, Vermeulen, and Salomone 2021; Genovese and Pansera 2020). This can be done by fostering socio-cultural change to encourage a transition to more sustainable, slower, and more convivial ways of life.

International market competition, globalised capitalist culture, advertisements, and competitive education and employment systems create and reinforce materialist, individualist and consumerist lifestyles (Jackson 2021; Hickel 2021; Latouche 2009). Research has found that this

hypercompetitive and hyperconsumerist culture not only has adverse impacts on human health, happiness, and wellbeing but also on the planet as it fuels the incessant need for needless material consumption (Vita et al. 2020; Verma 2017; Fanning and O'Neill 2019; Büchs and Koch 2019; Jackson 2016). Cities should thus establish policies that encourage a transformation to healthier and more sustainable ways of life, such as bans and restrictions on advertisements, especially in public areas, establishing socio-ecological education programmes in schools, promoting community ethics through cultural programmes, and creating community-owned media sources (Zwiers, Jaeger-Erben, and Hofmann 2020; Haluza-DeLay and Berezan 2013; White 2008; Poland et al. 2019; Sitas 2020).

### 5.3. Social justice and transformation

Amsterdam and Glasgow have developed some social policies; however, they have mainly been carried out through a reformist and growth-dependent approach which limits their transformative potential. Societal concerns are not addressed through the redistribution of wealth, property, and resources but rather through specific social projects and investments, such as promoting sharing economies or building retrofits to reduce energy bills. By not distributing wealth, power, and property away from those that overshoot their fair share of planetary resources and towards those that undershoot their fair share, those cities do not fundamentally change unequal societal relations. Instead, they merely address some of the social externalities of a deeply unequal linear system. Moreover, by focusing on specific projects rather than deeper redistribution of wealth, these policies become dependent on future economic growth and development to obtain funding and resources (Savini 2021b). This ties social policies to the pursuit of economic growth, which has negative ecological implications, as we saw in the above section.

It is also interesting to note that, while Amsterdam and Glasgow acknowledge their dominant position as large centres of consumption and capital replication and accumulation in the Global North, their policies hardly do anything to reduce the impact this has on the Global South. The CE strategies of these cities thus don't live up to the socially progressive vision they set for themselves. Amsterdam is often presented as a pioneer, and an example of best practice in the urban CE transition; and Circular Glasgow was a finalist of the Circulars Award of the World Economic Forum (Maldini 2021; Cuomo et al. 2020; Williams 2021). Both cities have thus built up a strong reputation as CE innovators, which further enhances the competitiveness of their CE business sector while taking limited tangible actions to fundamentally transform their production and consumption systems.

Nonetheless, it is worth adding that the CE action plans of our case studies are in their early stages. Some concrete social policies are still being designed and developed through research activities, pilot projects, and collaborative experiments. In the future, these projects may lead to stronger actions. However, it is unlikely that they will take a radically different approach from what we have evidenced through this research.

To reinforce social justice policies related to CE, these cities could develop actions that circulate money, power, and wealth throughout the local economy in democratic and redistributive manners. This can be done by creating and fostering non-profit cooperative production, banking and housing systems (the so-called social and solidarity economy) and supporting them with sustainable municipal public procurement strategies (Crabtree 2006; White 2008; Korsunsky 2019; Latouche 2016; Escobar 2019; Delgado Ramos 2015; Savini 2021b). This approach has been implemented with positive social and environmental outcomes, notably in Preston (UK) and Cleveland (USA) (Roberts 2017; Song 2016; Sutton 2019; Manley and Aiken 2020; McInroy 2018).

Cooperatives are directly co-owned and co-managed by workers, communities and/or consumers themselves. They foster democratic citizen control over the economy and create more resilient, vibrant, and self-sufficient local economies (Felber 2015; Bookchin 1982; Alexander 2015). By supporting local cooperatives, municipalities can not only maintain wealth and resources

within the local economy but can also promote and finance ecologically sustainable initiatives such as repair cafés, tool libraries, community swap centres, community-owned renewable energy generation, and community-supported organic agriculture (Koretskaya and Feola 2020; Morrow and Davies 2021; Hobson 2019; Lekan, Jonas, and Deutz 2021; Hobson and Lynch 2016). Moreover, cooperatives can enable the redistribution of resources, land, wealth, and knowledge, from private corporations to local communities thanks to open-source platforms, community land trusts, local currencies, community banking and other key elements of cooperative and collective ownership structures (Gerber and Gerber 2017; Ferreira and von Schönfeld 2020; Bengtsson et al. 2018; D'Alisa and Kallis 2020; Foramitti, Varvarousis, and Kallis 2020).

### *5.4. Participatory democracy*

The policies of Glasgow, Amsterdam and Copenhagen lacked substantial participatory processes and commitments in their CE policies beyond public-private partnerships with industrial and economic actors. While Amsterdam is the only case study that had a number of participatory workshops in the development of its CE action plan, these were rather used as consultation processes since the final decisions regarding CE policies remained in the hands of the Municipal government. By excluding citizens from meaningfully participating in the creation of the respective CE strategies and failing to implement participatory governance mechanisms more broadly, different viewpoints and perspectives are missed, limiting the government's ability to identify and explore radically different futures. Through recognising and exploring the diversity in circularity thinking and visions, a greater range of policies and ideas can come to the forefront to address the plethora of socio-ecological challenges that cities face. This democratic diversity and pluralism can lead to more appropriate and effective solutions and policies for each city and improve citizens' commitments to the necessary transformations towards slower and more sustainable consumption practices.

More generally, there is a lack of discussion concerning who controls and governs the CE transition in Amsterdam, Glasgow and Copenhagen. For example, who owns the CE technologies, industries, and innovations? Who controls the resource and material flows in the city? What are the implications of these processes? If those questions are not addressed, a CE transition might end up reinforcing or exacerbating current power dynamics and inequalities; benefitting some and disadvantaging others (Wuyts and Marin 2022; Hobson and Lynch 2016; Moreau et al. 2017). For example, prosperous neighbourhoods are more likely to benefit from sustainable projects like green spaces and infrastructure, while poorer neighbourhoods are more likely to be affected by polluting activities like waste incineration plants (Williams 2021; Harvey 2012; Dushkova and Haase 2020). Moreover, projects branded as "circular" or "sustainable", such as urban "greening", "renewal", or "revitalization", can often lead to gentrification by increasing housing prices, disregarding local needs, customs and aspirations, and even physically displacing vulnerable people to create space for "green" projects (Kębłowski, Lambert, and Bassens 2020; Checker 2011, 2020).

Therefore, local governments must think more clearly about how the CE is governed and who would be advantaged or disadvantaged by implementing circular policies and actions. This can be achieved through a myriad of participatory mechanisms that give citizens not only a voice but actual power over policy decisions, such as participatory budgeting processes, citizen assemblies and deliberative councils (Bookchin 1982; Voytenko Palgan, Mont, and Sulkakoski 2021; Prendeville, Cherim, and Bocken 2018; Savini 2021b). Research on deliberative democracy shows that these democratic mechanisms not only improve the engagement and empowerment of citizens in the construction of their city but also lead to more sustainable and progressive policies than top-down forms of decision-making (Calisto Friant 2019; Fishkin 2018; Dryzek et al. 2019; Fung and Wright 2001).

### 5.5. Sustainable post-growth urban planning

One critical insight from this research is the apparent lack of attention to interventions and policies in urban form and territorial planning across all our case studies. This is a striking omission since urban planning policies have a considerable impact on a city's consumption of material resources by determining the use of land through zoning, and enabling the development of key infrastructure such as roads, highways, train stations, bridges, metro lines, parking spaces, parks, gardens and avenues (Xue 2014; Ness 2021; Elmqvist et al. 2021; Folke et al. 2021). As these investments will remain in the long term, these policies establish critical path dependencies and infrastructure lock-ins and will determine the historical shape and morphology of the city and its overall ecological footprint (Du Plessis 2012; Thomson and Newman 2020; Joensuu, Edelman, and Saari 2020).

Urban planning has historically operated as a significant engine of economic growth and development (Ferreira and von Schönfeld 2020). Within a capitalist context, where cities must compete for resources and investments, zoning laws have been used to attract private capital by maximising the profitability and economic value of land (Savini 2021b). In this quest for economic growth and competitiveness, cities have commodified and destroyed arable land and biodiverse ecosystems and have dispossessed and displaced poor communities and vulnerable populations to make space for infrastructure that benefits the interests of capital, such as upscale real estate, malls, shipping warehouses and airports (Ferreira and von Schönfeld 2020; Ruiz-Alejos and Prats 2021; Savini 2021b; Spanier and Feola 2022). Similarly, zoning and planning have been used to push unwanted developments in poor areas, thereby replicating territorial patterns of environmental injustice (Harvey 2012; Derickson 2014; Agyeman and Evans 2004; Shah et al. 2018; Martinez-Alier 2021b).

National austerity policies and globalised markets have further intensified this trend in planning practices as cities depend on limited tax revenues to invest in social and environmental goods and services like parks, public areas, schools and social housing (Savini 2021b; Ferreira and von Schönfeld 2020). There is thus currently a dichotomy in planning approaches between, on the one hand, the need to be competitive and open the door for capital to obtain resources necessary for social investments and, on the other hand, the environmental injustice, ecological destruction, and social segregation and gentrification that this causes. Capitalist, growth-based city planning is a constant process of senseless destruction whereby municipalities compete for resources to create social and environmental projects by undermining the very social and ecological fabric of their cities.

Nevertheless, there are other forms of planning that subordinate economic growth to social needs and ecological imperatives (Ruiz-Alejos and Prats 2021; Ferreira and von Schönfeld 2020; Savini 2021b; Delgado Ramos 2015; Escobar 2019; Spanier and Feola 2022). Despite some strong social and ecological narratives, no city from our case studies embraced these approaches to break free from the contradictions and injustices of growth-focused urban planning.

Post-growth and post-capitalist planning policies advocate for establishing consumption limits to ensure scarce planetary resources are equally distributed and accessible with a logic of equity and sufficiency, that is, "enough for everyone, forever" (Alexander 2015). This is particularly important in the case of housing due to its high ecological footprint and unequal distribution (Lehmann 2013; Joensuu, Edelman, and Saari 2020; Christis, Athanassiadis, and Vercalsteren 2019; Spiegelhalter and Arch 2010). Degrowth and post-growth policies in the housing sector thereby seek to redistribute unused and under-used buildings to housing cooperatives and prevent the accumulation of building stock through speculation and vacancy taxes, limits to housing ownership per capita, banning new single-family housing, limits to new housing size, rent controls, minimum occupancy rates etc. (Marín-Beltrán et al. 2022; Xue 2021; Krähmer 2022; Savini 2021b; Zárate 2011; Crabtree 2006; Lehtinen 2018; Alexander and Gleeson 2021; Cucca and Friesenecker 2022).

Consumption limits can also be established by protecting and restoring biodiversity through policies like setting limits to land artificialisation, prohibiting the destruction of arable land, establishing strict protection of green corridors and belts, creating conservation areas, banning extractive activities, and replacing grey infrastructure with green infrastructure (by transforming parking lots, roads,

**Table 9.** Summary of policy recommendations.

| Policy Recommendation | Section where it is discussed |
|---|---|
| Fostering a socio-cultural transformation away from capitalist hyperconsumerism and hypercompetitiveness and towards slower, healthier, and more convivial ways of life through community-owned media sources, restrictions on advertisements, environmental education and promotion of non-materialist values and community ethics. | 5.2 |
| Circulating money, wealth, knowledge, and power throughout the local economy in democratic and redistributive manners by creating and supporting non-profit cooperative production, banking, and housing systems (of the social and solidarity economy). | 5.3 |
| Establishing and facilitating participatory mechanisms for the development, governance, and implementation of CE policies (such as participatory budgeting processes, citizen assemblies and deliberative councils). | 5.4 |
| Implement post-growth urban planning approaches by creating compact multi-functional neighbourhoods (with easy and quick access to urban infrastructure and services), by redistributing and preventing the unfair and unsustainable accumulation of housing stock, and by conserving and restoring biodiversity. | 5.5 |

and highways into gardens and parks, greening public areas etc.) (Savini 2021b; Ruiz-Alejos and Prats 2021; Wang, Huang, and Yuan 2012; Haluza-DeLay and Berezan 2013; Hong et al. 2014; Dushkova and Haase 2020). These policies can not only improve urban biodiversity but also deliver many ecosystem services such as flood protection, heat attenuation, air purification, carbon sequestration, food production, improved mental and physical wellbeing, and connection with nature etc. (Spiegelhalter and Arch 2010; Deng, Cai, and Li 2012; Du Plessis 2012; Baffour Awuah and Booth 2014; Benyus 2015; Schneider, Meyer, and Plat 2019; Dushkova and Haase 2020).

Limits can also be set for transportation and the city's physical expansion. This can be done by banning, limiting, or restricting private vehicle access while reducing the need for transportation altogether by building compact multi-functional neighbourhoods as well as promoting a variety of alternative green transport options (cycling paths, bike-sharing and parking, quality public transport, attractive footpaths and sidewalks etc.) (Spiegelhalter and Arch 2010; Baffour Awuah and Booth 2014; Delgado Ramos 2015; Prendeville, Cherim, and Bocken 2018; Cattaneo et al. 2022). These multi-functional planning policies can not only reduce a city's occupation of land but also create convivial neighbourhoods where offices, housing, parks, markets, education, public transport, healthcare, and other key urban infrastructure and services are easily and quickly accessible for all people (including disabled, elderly, children, women and other vulnerable or marginalised groups) (Hirwani and Vaiya 2020; Xue 2014; Krähmer 2022; Crabtree 2006; Carrière et al. 2020; Thomson and Newman 2016; Spiegelhalter and Arch 2010; Kusumo 2012; Baffour Awuah and Booth 2014; Hong et al. 2014).

### *5.6. Policy recommendations*

The policy recommendations developed and presented in this article are summarised in Table 9. These recommendations are based on the most socially and ecologically impactful actions mentioned in the literature we reviewed, which were missing from our selected case studies despite their importance for sustainability and circularity. These recommendations are therefore developed as complements to the current CE policies and actions at the city level. Moreover, they should not be implemented by themselves but rather as a set of actions that must, first and foremost, be developed with the direct and active participation of local citizens through democratic and deliberative mechanisms.

## 6. Conclusions and reflections

In answering the research questions posed by this paper, we first developed a framework to critically analyse the CE policies of different cities. This framework proved to be a valuable tool for

systematically analysing each city's CE strategy. Indeed, the framework identified a wide range of possible circular city policies and our case study's commitments to those policies.

When applying this framework, we found that Amsterdam, Glasgow, and Copenhagen's CE policies are currently dominated by technological optimist discourses, which seek economic growth and reduced environmental impacts through eco-economic decoupling. We have evidenced the critical limits of this approach based on academic research on the topic and conclude that it could lead to many unintended socio-ecological impacts. While Amsterdam and Glasgow establish some social justice discourses, these visions do not lead to sufficiently transformative policies and actions. We propose four policy recommendations to overcome the limitations of the CE approach implemented by our case studies and foster a sustainable post-growth path towards a circular society (see Table 9).

In the future, the framework we developed in this article could be used by practitioners and academics seeking to assess a city's CE policies and develop further recommendations in the areas where CE actions are most lacking and needed. Indeed, by providing a plural and diverse list of possible circularity policies, the framework could be used as a reflection and planning tool for academics and practitioners seeking to understand the broad range of possible CE policies and to help them choose and adapt those that they find most relevant for their socio-ecological context. This could be particularly valuable for planning practitioners as research has found that policymakers sometimes struggle to envision practical CE actions and policies (Prendeville, Cherim, and Bocken 2018).

The framework can also be used as an education and facilitation tool for participatory planning and policy development workshops with citizens to help raise awareness and understanding regarding the diversity of CE policies and visions that are possible. Finally, it can be used for transdisciplinary research practices with societal stakeholders involved in urban CE development and planning. In any future use of the framework, we highly encourage its continuous improvement, adaptation, and expansion to reflect local contexts and new policies in the area. The framework is best used and understood as an open contribution to the academic debate and practice on circular cities, which should be continuously criticised, edited, debated and expanded.

Discussing the limitations of our research methods and results is also essential. First, we only looked at three economically powerful cities in Europe. While this choice emanated from our case study selection criteria, this has obvious limitations regarding the replicability of the framework and the recommendations we have provided. Further research in other cities with different social, economic, and cultural contexts would thus be necessary. It is particularly important for future research to focus on less-researched case studies in the Global South. After all, that is where most of the urbanisation is going to happen in the future, as it is estimated that urban population growth in the Global South will require the construction of built infrastructure to provide the basic needs of 1 million people every 5 days until 2050 (this is the equivalent of building ten cities the size of Hong Kong every year) (Thomson and Newman 2020). While the academic literature reviewed to develop the framework included publications and case studies from the Global South, the framework was not tested for validity in cities in that context. This is a promising avenue for future research to improve our understanding of CE implementation in the Global South and to adapt and improve the framework for those cities and regions.

Second, it is worth mentioning that the analysed cities might have some exemplary initiatives in the areas of social justice, energy, transportation, or urban planning within non-CE-related policies or plans, which we did not assess here as we looked only at the specific CE strategies of target cities. Since our focus was to analyse how our case studies understood and led the transition to a CE through their policies and their discourse, it was essential to look only at what our target cities decided to include in their explicit CE strategies. This allows us to reveal what vision of CE they hold and what kind of policies and actions that entails for them. This is why we examined only documents relating specifically to our case studies' CE strategies or plans rather than other policy documents aimed at related social or ecological goals. In future research, other policy plans and strategies not explicitly on CE could also be analysed. However, it should be kept in mind that such analysis

would not be capable of reflecting a city's discourse and vision of CE but rather its overall commitment to sustainability and circularity.

Third, there are some limitations related to using the broad typology of circularity discourses chosen in this research (Figure 1), as it can simplify a more complex reality or have a scope that does not align with the policies and discourses of the selected case studied. The fact that we could find aspects of 3 out of the 4 discourse types of the typology in the CE policies and discourses of our 3 case studies shows that the typology was indeed well suited to understanding the range of CE visions found in the selected cities. However, there might still be some nuances and details in the policies of our four case studies which could not be revealed due to the specific scope of the typology. Indeed, the typology focuses specifically on aspects related to social justice and growth/degrowth orientation. Thereby, other elements such as specific governance types, business models, technologies, and value retention options received comparatively less attention and could be the focus of future research to complement our results.

Fourth, one might question the feasibility of our recommendations as they might need a transformation of an entire national economy beyond the city scale. While cities offer unique opportunities for social transformation, they are also limited by the structural conditions of the capitalist system in which they are embedded. Post-growth and post-capitalist planning approaches might try to promote socio-cultural change. Yet, if systemic conditions push for increased consumption and production and unsustainable materialist lifestyles, then cities might have a limited scope of impact. Nonetheless, the fact that alternative policies might be hard to implement is only secondary to the fact that considering the current socio-ecological impacts of growth-based capitalist planning, an alternative is urgently needed and must be implemented as quickly as possible (IPCC 2022).

Moreover, research shows that alternative approaches have had positive impacts in some cities, such as Preston and Cleveland (Roberts 2017; Song 2016; Sutton 2019; Manley and Aiken 2020; McInroy 2018). Finally, the democratic development of these policies is what matters most. When brought to deliberate and decide on sustainability policies in a fair, informed, and democratic manner, research has shown that citizens tend to choose much more radical approaches then politicians and government officials (Calisto Friant 2019; Fishkin 2018; Dryzek et al. 2019; Fung and Wright 2001). There is, therefore, a realistic possibility that post-growth city planning policies could be brought about through democratic innovations like participatory budgeting and deliberative citizen assemblies.

All in all, it is rather positive to find that some cities like Amsterdam and Glasgow are embracing more holistic versions of circularity and are starting to question the impact of their economic models beyond their borders. On the other hand, it is somewhat disappointing to find that their implementation remains limited and leaves much to be desired. This dichotomy between discourses and policy actions could be explained by the complexities of creating political support for more transformative policies. Decision-makers might be forced to make political compromises that dilute radical and transformative policies to secure their political acceptance and prevent outright opposition by more conservative municipal stakeholders. As academics, we must point out these inconsistencies and propose alternative policies that address the limitations of current policy approaches. This is precisely what we have sought to do with the policy recommendations developed in the discussion section. However, more research is still needed to help cities transition to fair and sustainable circular societies.

Future research should examine the CE policies of other cities, especially in less researched case studies in the Global South. Future research should also further develop policy actions and recommendations to help city planners and practitioners create convivial post-growth cities that place social needs and ecological imperatives above economic growth. We hope the policy framework suggested in this paper could help academics seeking to analyse city-level CE policies and practitioners seeking to develop their CE policies and needing a diverse list of possible actions.

## Notes

1. Cities can be defined in various ways as they are inherently complex systems, ranging from small human settlments to large megacities. Their exact boundaries and limits are thus hard to establish as their economies, resources, infrastructures, and networks can cross multiple actors, geographical areas, and political scales. In this paper we will follow the OECD classification of cities, defining them as urban areas with at least 50.000 inhabitants (Dijkstra and Poelman 2012).
2. Urban metabolism can generally be defined as "the sum total of the technical and socio-economic processes that occur in cities, resulting in growth, production of energy, and elimination of waste" (Castán Broto, Allen, and Rapoport 2012). The concept of urban metabolism facilitated the analysis of how resources, materials, energy, power, wealth, labour, and knowledge flows within cities, as well as the socio-political structure that governs who controls these flows and how they are distributed.
3. Discourses condition how we define, interpret, and address environmental issues (Dryzek 2013) and can generally be defined as "an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices" (Hajer and Versteeg 2005, 175). They enable and constrain how political actors and society understand and act on particular physical or social phenomena discussed within environmental policymaking, shaping what can and cannot be thought and what range of policy options are possible (Leipold et al. 2019).
4. The number of concepts chosen for each circularity discourse type was proportional to their prevalence in the CE typology. For example, (Calisto Friant, Vermeulen, and Salomone 2020) found that the most widespread discourse within academic literature is Transformational Circular Society (42% of reviewed concepts); thus, more Transformational Circular Society concepts were reviewed in this research than Technocentric Circular Economy (26%), Reformist Circular Society (28%) and Fortress Circular Economy (4%) respectively.
5. List of examined circular city initiatives and networks: Circular City Declaration (https://circularcitiesdeclaration.eu/), the C40 Cities list of Circular cities (https://www.c40.org/researches/municipality-led-circular-economy), OECD circular city case-studies (https://www.oecd.org/cfe/regionaldevelopment/circular-economy-cities.htm), the Ellen McArthur Foundation circular city examples (https://ellenmacarthurfoundation.org/topics/cities/examples), the Climate-KIC circular cities project (https://nordic.climate-kic.org/success-stories/circular-cities-project/), EU circular urban agenda members (https://futurium.ec.europa.eu/en/urban-agenda/circular-economy/pages/members), ICLEI Circulars leading circular city list (https://circulars.iclei.org/), Circular City Governance case-studies (https://vlaanderen-circulair.be/circulargovernance/index.html), Circular City Funding Guide case studies (https://www.circularcityfundingguide.eu/case-studies/), EU SHARING project cities stakeholders (https://www.espon.eu/sharing), Circle Economy circular city projects (https://www.circle-economy.com/programmes/cities/services), Zero waste cities best practice list (https://zerowastecities.eu/bestpractice/the-story-of-roubaix/), Carbon Neutral Cities Alliance (https://carbonneutralcities.org/cities/).
6. The search for case studies took place from March to April 2021, any circular city policy published after those dates could thus not be considered for this study.
7. The use of percentages rather than absolute numbers was necessary to better grasp the overall picture regarding each city's commitment towards each policy area and discourse type because all different policy areas and discourse types have a different number of associated policy actions. Thereby a percentage gives a more complete and coherent understanding regarding what percentage of all the possible actions in each possible policy area and discourse type, each city ends up doing. Otherwise, we would just get a general number, that is hard to understand and compare without knowing exactly how many policies are placed under that respective policy area or discourse type.
8. The doughnut model proposes a social foundation and ecological ceiling for the planet. The inner ring of the doughnut sets the minimum we need to lead good life and to thrive and includes concerns such as health, housing, social equity, political voice, and income work (Raworth 2017). The outer ring represents the ecological ceiling and is comprised of nine planetary boundaries developed by Rockström et al. (2009) to define the "safe operating space for humanity" in relation to the environment. According to the municipality, the doughnut model's representation of the CE shows the interconnected nature of the city and offers a unique perspective of a society that can thrive in a sustainable, safe and equitable way (Municipality of Amsterdam 2020a).

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This work was supported by European Commission: [Grant Number 765198].

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