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DOI

[10.1016/j.cities.2024.105423](https://doi.org/10.1016/j.cities.2024.105423)

Publication date

2024

Document Version

Final published version

Published in

Cities

Citation (APA)

Bucci Ancapi, F., Van den Berghe, K., & van Bueren, E. (2024). Circular city policy coherence in Greater London. *Cities*, 155, Article 105423. <https://doi.org/10.1016/j.cities.2024.105423>

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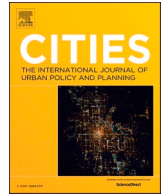
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Circular city policy coherence in Greater London

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ARTICLE INFO

Keywords:

Circular cities
Circular economy
Built environment
Policy coherence
Policy instruments

ABSTRACT

As circular economy policies are adopted to tackle unsustainable built environment patterns related to carbon emissions and inefficient use of resources, scholars warn about the inadequacy of such policies to support sustainable urban development. Siloed circular economy policies in the built environment have focused on applying circular strategies to construction practices. However, cities as complex adaptive systems require systemic interventions including ecologically regenerative and adaptation actions to bring about a more circular built environment and, ultimately, a circular city. This article analyses policy coherence –or the (mis)alignment and possible synergies– of circular built environment in Greater London. Resorting to a circular city policy coherence framework, through document analysis of planning and circular economy policies and semi-structured interviews, both the state of circular built environment policy is assessed and policy recommendations are provided. Circular built environment policies in Greater London have increased in their overall coherence by means of the application of circular economy principles in construction practices, but less so in bringing about a circular city. The findings contained herein may inform policy making in Greater London and other cities of the world to help improve their circular city policy responses to the complex societal challenges imposed by the ongoing socio-ecological crisis.

1. Introduction

Circular economy policies have been adopted in various cities in Europe as a response to the ever-increasing pressure on natural resources needed for infrastructure and housing (OECD, 2020). The increasing pressure on natural resources comes firstly from the quantitative growth of the built environment and thus the increasing demand for natural resources (e.g. urbanisation), and secondly from the take-make-waste treatment of these resources. This ‘linear economy’ of resource use undermines the availability of resources needed to sustain urban activities (Paiho et al., 2020; Williams, 2019, 2021). A circular economy has been proposed to reduce the use of unsustainably sourced primary resources through the use of secondary resources, thereby reducing negative environmental impacts (i.e. waste and emissions) (Korhonen et al., 2018).

Current circular economy policies in the built environment have been both praised and criticised. On the one hand, the inclusion of circular economy principles in construction has led to the inclusion of new dimensions of green, energy-efficient, and zero-emission construction, with a particular focus on the environmental and technological dimensions of construction. While ‘sustainable building’ already included

economic and societal dimensions, ‘circular building’ adds the importance of governmental and behavioural dimensions of building (Pomponi & Moncaster, 2017). On the other hand, the main critique about current circular economy policies in the built environment concerns the lack of clear definition for a circular built environment –or circular cities (Bucci Ancapi, Van Bueren, et al., 2022; Williams, 2019).

A circular city and a circular economy differ in that the former is a locally governed system that is spatially bounded and focuses on enabling systems of provision (e.g., infrastructure and services), while the latter aims to increase the efficiency of production systems and reduce environmental impacts (Van den Berghe & Verhagen, 2021; Van den Berghe & Vos, 2019). In many cases, the (implicit) main goal of a circular economy is the sustainable accumulation of capital and wealth (Savini, 2023; Williams, 2020, 2021). In practice, the lack of a circular city definition hinders the implementation of policies that contribute to a circular city. For example, research in Melbourne (Australia) and Malmö (Sweden) warns that the potential misinterpretation of the circular economy can offset the impact of circular actions in urban strategic planning (cf. Bolger & Doyon, 2019). Research in the Netherlands has shown that circular built environment policies seem well-aligned in fostering a circular economy but less so to create a more circular city, as

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<https://doi.org/10.1016/j.cities.2024.105423>

Received 2 January 2024; Received in revised form 16 July 2024; Accepted 9 September 2024

Available online 17 September 2024

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circular action focus mainly on resource looping (e.g. reuse and recycling) with limited attention to ecological regeneration and adaptation of physical and social fabrics (Bucci Ancapi, 2023), which are also essential parts of circular cities (Williams, 2021). In synthesis, the way policy issues are defined determines the subsequent choice for and coherence of instruments and implementation actions to address the issue at hand (Howlett et al., 2020).

In this article we therefore focus on the (mis)alignment and possible synergies between policy objectives, instruments, and implementation, or, in other words, the policy coherence (May et al., 2006; Nilsson et al., 2012). It is worth noting that the study of coherence does not come without limitations and criticisms. Theoretically, the most fundamental limitation in the study of policy coherence is the definition of system boundaries in relation to the policies that should cohere (cf. May et al., 2006). Empirically, research has shown that more coherent policy-making does not always help to improve the overall policy outcomes, such as reducing inequality (cf. Browne et al., 2023). Yet, these constraints do not diminish the usefulness of policy coherence analysis in informing policy- and decision-making processes (Bucci Ancapi, 2023; Nilsson et al., 2012).

As a metropolitan area, Greater London faces common governance issues related to its scale. As pointed out by da Cruz et al. (2020), the metropolitan scale typically lacks information on its governance and the disconnect between social and political institutions and the socio-technical systems in most metropolitan areas poses a challenge to the effective management of these areas. The study of circular economy governance in metropolitan areas has only recently gained attention as a research topic. The Greater London Authority (GLA) presents an interesting case to examining policy coherence of circular built environment policies due to its authority, governance structure, scale, and the notable gap in governance research that has not been fully explored (Bucci Ancapi, Van den Berghe, et al., 2022; Heurkens & Dabrowski, 2021; Munaro et al., 2020; Pomponi & Moncaster, 2017).

The Greater London Authority (GLA) has recently set out its own circular economy policy trajectory. A circular built environment is one of the focus areas for the circular economy in Greater London. The circular built environment policy introduces circular methods of construction (e.g. modularity and design for disassembly) and building use (e.g. space sharing and building reuse) (London Waste and Recycling Board, 2015). More recently, the GLA has also included circular economy objectives in the London Plan (2021), the spatial development strategy for Greater London. Policy SI 7, a sub-chapter dedicated to sustainable infrastructure of the London Plan, created the Circular Economy Statement Guidance (2022a), a tool for applying and reporting of circular economy principles in the design, construction, and end-of-life phases of major construction developments in London. By treating building materials as future secondary resources, reducing emissions from the extraction and production of primary resources, London also expects to address the climate emergency.

The GLA has statutory responsibilities for planning, economic development, and the environment in Greater London. It is also an autonomous but still intermediary government layer of government between local and the national government, which allows for analysis of the complexity and layering of policies that impact on Greater London. Moreover, Greater London has been implementing circular economy policy for over a decade. While aspects of the circular economy in Greater London have been studied in terms of local planning practices (Turcu & Gillie, 2020), urban regeneration (Domenech & Borrión, 2022), and circular urban development (Williams, 2020), the issue of policy coherence has not. Therefore, the outcome of circular economy policies in relation to urban development in London remains unassessed. This context leads to the research question: How coherent are circular built environment policies in Greater London?

The main objective of this article is to explore policy coherence analysis in the formulation of circular city policies by looking at specific mechanisms at work. Looking at London's built environment allows for

an initial exploration of the overall (mis)alignment and synergies of circular economy policies. Considering environmental and planning plans as policy domains, this article uses the circular city policy coherence framework by Bucci Ancapi (2023) to identify *ex ante* possible (mis)alignments and to enable synergies in the implementation of circular built environment policies in London.

The paper is structured as follows. Section 2 introduces the circular city policy coherence framework, conceptually and how it can be used analytically. Section 3 then explains the methodology and presents the case study. The results are presented in Section 4, followed by a discussion of policy (mis)alignment and possible synergies, as well as the validity and reliability of this study in Section 5. Finally, Section 6 presents conclusions and policy recommendations for circular built environment policy coherence in cities.

2. Background

Globally, the construction industry is the largest consumer of resources and raw materials across of all sectors. It consumes 40 % of materials and is responsible for 33 % of emissions and 40 % of waste worldwide. A staggering 42.4 billion tonnes are used to build and maintain houses, offices, roads, and other essential infrastructure (Ness, 2019). These figures are expected to increase given the ongoing shift towards urban living, with 60 % of the world's population expected to live in cities by 2030. Although cities occupy less than 3 % of the world's land surface, they concentrate 78 % of carbon emissions and 60 % of residual waste (Grimm et al., 2008). The sustainability of the urban built environment has become a policy concern for governments at various levels, from the international to the local level (United Nations Environmental Programme, 2022). Cities have adopted circular economy policies over the last decade to address, among other things, the unsustainable production and operation of their built environment. In Europe alone, at least dozens of cities have adopted circular built environment policies over this time (European Union, 2023). The construction industry is of particular interest for circularity, as the built environment is strikingly intertwined with the spatial concerns of sustainable urbanisation; arguably, the output of the construction sector is where it would be most desirable for circular economy and circular city ideas to be in sync.

The circular economy is a sustainable development initiative encompassing a shift from a linear production-consumption system to one that applies material cycles and cascading energy flows (Korhonen et al., 2018). While commonly discussed among experts and professionals, the idea of a circular economy is still under debate. As noted by Kirchherr et al. (2023), this debate persists for several reasons, including different interpretations of the concept as it evolves, the greater emphasis on conceptual framing in scientific circles compared to practical implementation, and questions about how (or whether) circularity can effectively balance environmental goals with economic growth. In absence of a "final definition" as Kirchherr et al. (2023) mention, a circular built environment might be better characterised through the practical interventions it involves. These include substituting primary resources with secondary ones (such as sustainably sourced or recycled materials) within supply chains during construction and renovation processes, standardisation in the design, construction, and deconstruction of buildings and infrastructure (for example, designing for disassembly and reuse), the creation of markets for secondary resources (achieved through the development of norms and standards for secondary use); and the gathering and sharing of the necessary knowledge to ensure the successful integration of a circular economy within construction value chains (Bucci Ancapi, 2023).

2.1. Circular built environment policy in Greater London

The GLA was established by the Greater London Authority Act of 1999 to act as the elected government for the 32 boroughs of Greater

London. Its main aim is to promote the social, economic, and environmental development of the metropolitan area. The GLA is made up of the Mayor of London and the London Assembly and has limited powers over transport, housing, planning, the environment, policing, economic development, and fire and rescue. The GLA differs from a local authority in several legal ways. For example, local authority mayors must form a cabinet from the council and have their budget approved by the council, with decisions subject to scrutiny by the council. These requirements do not apply to the GLA. What's more, unlike upper tier local authorities such as county councils, the GLA has no responsibility for service delivery. Instead, this role falls to the London boroughs, which are unitary local authorities. (Sandford, 2022). The Greater London Authority Act of, 2007 gave the elected government new powers and responsibilities, including a provision to ensure that GLA decisions do not contribute to climate change or its consequences in the city.

The circular economy in Greater London has been proposed as a solution to longstanding problems of waste generation and a housing crisis that requires a million new homes by 2041. When the GLA decided to develop a circular economy policy in 2017, the total amount of waste collected was 3.7 Mton. In that year 12.5 % of waste was landfilled, 52.9 % was incinerated with energy recovery, 0.7 % was incinerated without energy recovery, and 30.1 % of household waste was recycled (Greater London Authority, 2022c). Given the projected population growth in Greater London, local authorities would need to collect an additional 1 Mton of waste each year (Williams, 2021) and build approximately 43,000 new homes per year by 2041 (Greater London Authority, 2023).

In 2016, the Mayor of London commissioned ReLondon (formerly the London Waste & Recycling Board –LWARB) to produce a circular economy route map to 2036 (ReLondon, 2023). The Board of ReLondon is made up of: the Mayor or his deputy, who chairs the Board; an additional member appointed by the Mayor; four members elected by London's boroughs; and two independent members appointed by London Councils (ReLondon, 2024). The process was preceded by LWARB's 2015 report Towards a Circular Economy (London Waste and Recycling Board, 2015) (Fig. 1). The report was aimed to inform, raise awareness, and engage public and private stakeholders in the circular economy. It included the built environment, as one of its focus areas, and listed possible interventions in modular construction, more effective use of buildings, design for building disassembly, and material management and reuse (London Waste and Recycling Board, 2015).

The 2017 Circular Economy Route Map states that a circular economy approach to the built environment could help deliver more efficient and sustainable homes, business premises and infrastructure (London Waste and Recycling Board, 2017). The chapter on the built environment was influenced by the work of Cheshire (2016), *Building Revolutions: Applying the Circular Economy to the Built Environment*. The Route Map included a series of actions to accelerate the transition to a circular built environment, namely: (1) design for circularity, (2) management of building materials, and (3) circular operation of buildings. Each one of

these actions was accompanied by a list of resources required and expected outputs, outcomes, and impacts.

In 2020, the Route Map was accompanied by the 2020–2025 Business Plan. LWARB is legally required to produce an annual budget for its operations. The Business Plan aimed to support the implementation of London's consumption-based emissions reductions. For the built environment it was estimated that 12 Mton of materials were used between 2001 and 2016, generating 9 Mton of waste: 77 % of all waste generated in Greater London. The Business Plan included a financial plan of £6.3 m in 2020, which would gradually decrease to £2.7 m as upfront investment expenditure would decrease from £2.4 m in 2020 to £200,000 in 2025. These resources should be deployed across two programmes: Resource London and Circular London. The former aimed to reduce the amount of waste generated in Greater London and the latter to incentivise businesses to adopt circular economy principles. Both programmes included activities and projects in the areas of advice, support, research and innovation, behaviour change, and capacity building and skill development (London Waste and Recycling Board, 2020). Up to 2024, ReLondon has supported more than 40 pilots and collaborative projects with local authorities, architects, universities and businesses, more than a hundred businesses have received support from the programmes to adopt and scale circular business models and more than 200 local jobs have been created in the circular economy (ReLondon, 2024).

The 2021 London Plan, the spatial development strategy for Greater London, marked the introduction of the circular economy into urban development. The integration of the circular economy into London's built environment was commissioned to the Good Growth by Design programme for a better city through a high quality and inclusive built environment (Greater London Authority, 2022b). Its core concepts are outlined in the Design for a Circular Economy Primer (Greater London Authority, 2019). The circular economy is embedded in five out of twelve chapters, namely: (1) good growth, (3) design, (6) economy, (9) sustainable infrastructure, and (11) funding. Most of measures relating to a circular built environment are included in Chapter 9 under Policy SI 7 - Reducing waste and supporting the circular economy. Policy S7 has three objectives: (1) to promote resource conservation, waste reduction, material reuse and recycling; (2) to implement a Circular Economy Statement to demonstrate the circular economy principles throughout the lifecycle of project development, and (3) to apply the circular economy principles in development plans (Greater London Authority, 2021).

The 2022 Circular Economy Statement was the most recent policy development on a circular built environment in London during the period examined for this article. It is a policy instrument that sets out how a development will integrate circular economy measures into its design, construction, and operation process, including public spaces and supporting infrastructure. The Statement is mandatory for all developments overseen by the Greater London Authority (e.g., those with 150 or more residential units, or over 100,000m² in the city, 20,000m²

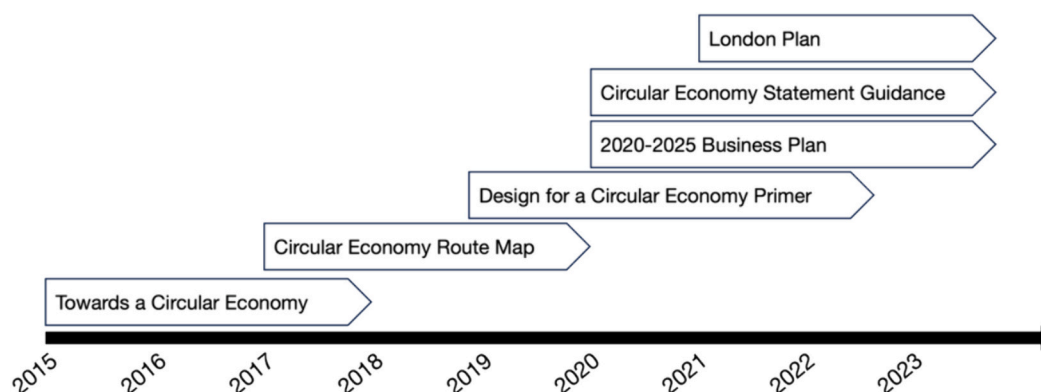


Fig. 1. Circular economy policy development in London. Source: the authors.

in central areas or 15,000m² in outer London). In order to comply with this instrument, the Greater London Authority has published a guidance document (Greater London Authority, 2022a). The London Plan and the Circular Economy Statement it contains are the only policy documents subject to public consultation, which took place in 2018.

Williams (2021) points out that circular economy policies are not explicitly included in any policy at the national level in the UK, but are present to some extent in the 2017 National Industrial Strategy in relation to resource efficiency along supply chains, waste management, and economic savings. A prevailing laissez-faire approach has resulted in a fragmented picture for the implementation of a circular economy. The focus of the circular economy in the UK is essentially sectoral, with no consideration of spatial development. Williams (2021) concludes by claiming that the role of cities in the transition to a circular economy is not clear, which may be related to the lack of government agencies responsible for urban development. Greater London is the only urban agglomeration in England to produce a spatial strategy outside of statutory responsibilities, the London Plan (Turcu & Gillie, 2020), which from 2021 includes circular economy provisions mainly related to looping and adaption measures (Williams, 2021). At the local government level, only eight out of 32 boroughs have included circular economy in their policies within the period studied, and only two (Islington and Merton) have included measures in the built environment (Turcu & Gillie, 2020).

3. Materials and methods

To analyse policy coherence in circular built environment policy in Greater London this article draws on the circular city policy coherence framework of Bucci Ancapi (2023) (Fig. 2). This framework enables ex-ante analysis that combines Williams (2021) three circular city development actions by Williams (2021) (i.e., looping, ecological regeneration, and adaptation) with Nilsson et al. (2012) three levels of policy analysis (i.e. objectives, instruments, and implementation). The need for ex-ante analysis arises due to the limited duration of circular economy policies (Bassens et al., 2020), which makes ex-post analysis impractical. However, ex-ante analysis can be achieved by examining policy coherence, assessing the alignment and synergies between policy objectives, instruments, and implementation practices. This approach holds promise as an early policy analysis tool, helping to identify integrative opportunities, such as the combination of looping, ecologically regenerative, and adapting actions, to promote circular built environments (Bucci Ancapi, 2023). Looping actions include recovery, recycle, reuse, and other circular strategies associated with the so-called 'R-Ladder' (cf. Potting et al., 2017). Ecologically regenerative actions promote the regeneration and support of ecosystem (services) degraded

by historical processes of unsustainable urbanisation. Adapting actions in turn seek to enhance and support capacity building and adapt both the urban and social fabric to change. The combination of these three actions, as explained in Section 1, can contribute to shifting from a predominant circular economy to a circular city approach that prioritises functioning of systems of urban provision over economic growth and production efficiency. This combination allows the analysis of policy coherence both in terms of content (circular city development) and process (policy making) within one or more policy domains. The framework also allows for the coverage of different policy domains within the city scope, such as food, transport, construction, and planning. For this article, two domains are included to assess policy coherence in circular city development: circular economy (i.e. 5 circular economy policy documents), as an emergent policy domain, and spatial development (i.e. the London Plan).

3.1. Evidence

Six policy documents specifically related to a circular built environment were used to analyse the coherence between circular economy and spatial development policies in Greater London. The documents were collected through exploratory interviews with researchers at the Bartlett School of Planning, University College London. The different policy objectives and instruments contained in the selected policy documents are listed in Appendix 1. All documents were produced by the Greater London Authority between 2015 and 2021. The analysis is based only on documents that explicitly consider circular built environment objectives. This decision to set the system boundaries around policy documents with a clear circular economy orientation avoided the inclusion of documents developing waste management frameworks (Bucci Ancapi, 2021). All documents are publicly available.

Six semi-structured interviews were conducted between March and April 2023 with representatives from ReLondon, the UCL Bartlett School of Environment, Energy & Resources, the London Energy Transformation Initiative (LETI), the UK Green Building Council, the Building Research Establishment, the Mayor's Design Advisory Group, and a bio-based design and construction company. These interviews aimed to further identify policy objectives, instruments, and implementation practices. The interviews followed the analytical steps and template of Nilsson et al. (2012), namely: the inventory of policy objectives, a review of interactions, and a more detailed mapping of key interactions. For further coherence analysis on implementation practices, the interviews also integrated the factors for policy coherence analysis of Ranabhat et al. (2018), which distinguishes five factors, namely: motivation, measures, implementation plans, resources, and monitoring and evaluation aspects of policies and policy instruments.

3.2. Qualitative analysis

Computer-assisted qualitative data analysis (QAQDA) using Atlas.ti 23.3 software was used to analyse the documents. As the interviews were structured according to the template and factors included in Section 3.1, the responses were consolidated in MS Excel for text analysis. The coding process consisted of three rounds. The first round was open coding, which aimed at identifying information of interest. The second and third rounds were theoretical coding, aimed at identifying references to policy levels, circular actions, and factors of policy coherence. 11 codes were generated and used in the analysis. The interviews were conducted and recorded in English with prior informed consent. The identification of circular actions in the selected policy documents distinguished between actions that were explicitly and implicitly mentioned. Explicit references included concrete applications of circular actions (e.g., modular construction, the reuse of specific building components, recycling of construction and demolition waste) while implicit references included general ambitions to apply circular actions (e.g., resource efficiency or waste reduction). Once all documents were

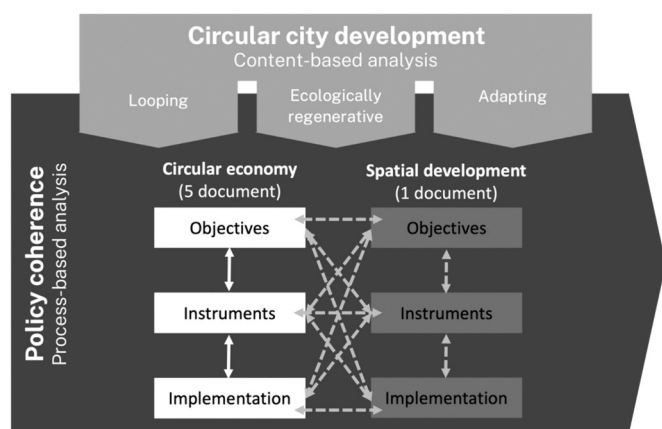


Fig. 2. Circular city policy coherence framework. Adapted from Bucci Ancapi (2023).

analysed, cross-checks were carried out by the authors to ensure a correct extraction and interpretation of the data. The datasets are publicly available in the <https://data.4tu.nl> online and open access database repository, DOI: <https://doi.org/10.4121/1eeaab32-302c-4ab6-926f-7ecf1b73d8b9.v1>.

4. Results

4.1. Assessing circular actions

Circular actions in the policy domains of circular economy and planning were assessed. In terms of circular economy policies, most actions correspond to looping, followed by adapting ones. Looping is included through actions to reduce the use of primary resources, substitute unsustainably sourced resources with sustainably produced ones, develop new design and production processes and promote new ways of consuming, reuse secondary resources, reduce waste, develop markets for secondary resources, include looping actions in policies and regulations, and create and gather knowledge on economic opportunities, circular innovation, resource cadastres, and scoping for circular economy implementation. All these measures were explicitly mentioned in the selected policy documents. In terms of adaptation, actions aim to produce durable infrastructure that can adapt over time while meeting current needs; to use buildings more effectively through better urban planning, office sharing, and the reuse and multiple use of buildings; to change the behaviour of residents through recycling programmes; and, to build capacity and skills within public authorities through workshops, webinars, events, toolkits, and guidelines. These references include both explicit and implicit references in selected documents. No reference to ecological regeneration was identified in circular economy policy documents.

The spatial development policy (i.e. the London Plan) included all three circular actions. However, adapting ones were only implicitly mentioned. Looping actions include promoting the circular economy to improve resource efficiency and innovation to keep products and materials at their highest use value; preventing and reducing waste through resource reuse; achieving or exceeding 95 % reuse/recycling/recovery in the medium term; incorporating circular economy strategies in the design, planning, construction and deconstruction of new buildings; and, achieving zero carbon in major developments by means of reducing greenhouse gas emissions from operations and minimising annual and peak energy demand of buildings. All of these actions are explicitly mentioned in the selected documents. Ecological regeneration actions include the identification, protection from harmful development and expansion of Sites for Nature Conservation (SINCs), urban forests, woodlands, green and open spaces through (cross)borough collaboration (e.g. London's Green Belt and Metropolitan Open Areas); the integration of ecosystem services into major development through high-

quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage; to ensure biodiversity benefits in new developments; and the protection of existing allotments for urban agriculture and their possible expansion through new development and vacant or under-utilised sites in London. All these actions are explicitly mentioned in the documents. The London Plan also includes the Urban Greening Factor, a scoreboard for integrating greening in new developments. It facilitates and frames greening in major developments overseen by the Greater London Authority. Interviewees expected that urban greening is to be extended to smaller projects managed by the boroughs to ensure sufficient greening in new developments. Finally, adaptation actions refer to collaborative efforts to develop green infrastructure strategies to optimise green infrastructure across boroughs. Figs. 3 and 4 are visualisations of the code co-occurrence between the focus of circular actions (loop, adapt or regenerate) and the policy levels (objective, instrumentation, or implementation) in the analysed circular economy and planning policy documents, respectively. Table 1 summarises the references to circular actions in the policy documents.

4.2. Analysing policy coherence

4.2.1. Overall policy assessment

London's circular built environment policy shows increasing coherence across both circular economy and planning policy domains. Sparked by an initial mayoral request in 2015, circular economy policies have evolved from a document designed to raise awareness among businesses and waste management organisations to a more elaborate set of objectives and instruments. This has also driven vertical (or top-down) policy alignment in Greater London. However, as circular economy policies have only been in place for a short time, their impact in Greater London has been limited, as most objectives have not been operationalised within the period studied. In terms of planning policy, the inclusion of circular economy principles in spatial development creates a binding obligation for new developments in Greater London, which can lead to changes in construction and development towards more circular practices.

4.2.2. Key synergies and conflicts

At the level of objectives, no conflicts were identified to become a more resilient, resource efficient and competitive circular city in the future, which is the vision for London contained in the 2017 Circular Economy Route Map. A set of twelve overarching objectives were identified among policy documents (Appendix 1). These objectives cover waste reduction; primary and secondary resource management; developing new ways of designing, producing, and consuming; developing markets for circular products and resources; evaluation and monitoring processes; policy, legislation, and regulation; knowledge, innovation and awareness; capacity building; adaptation; accelerating

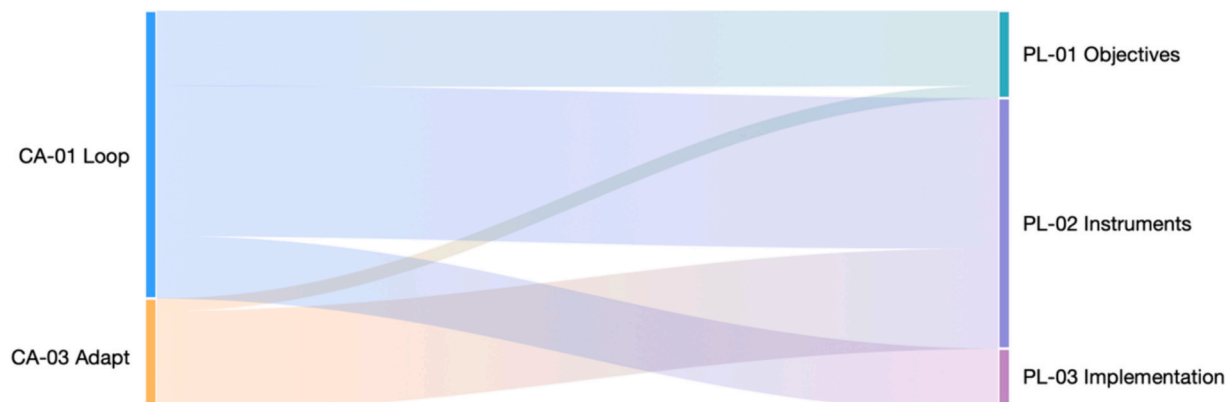


Fig. 3. Circular actions (CA) regarding policy levels (PL) for circular economy. Atlas.ti code co-occurrence analysis by the authors.

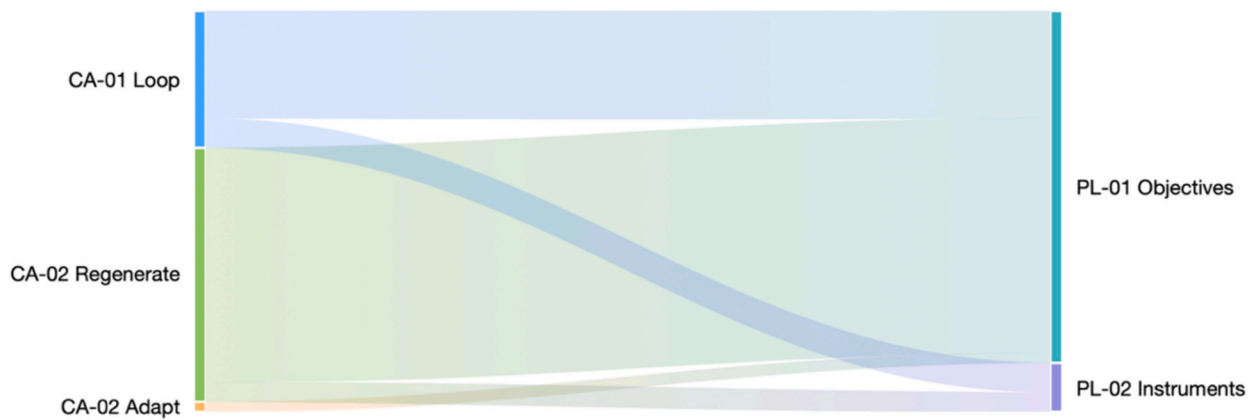


Fig. 4. Circular actions (CA) regarding policy levels (PL) for planning policy. Atlas.ti code co-occurrence analysis by the authors.

Table 1

Circular actions covered in selected policy documents. Note: e = explicit reference; i = implicit reference.

Policy domain	Documents	Circular actions		
		Loop	Regenerate	Adapt
Circular economy	Towards a circular economy (2015)	e		i
	Circular Economy Route Map (2017)	e		e
	Design for a Circular Economy Primer (2019)	e		
	2020–2025 Business Plan (2020)	e		e
	Circular Economy Statement Guidance (2020)	e		e
Planning	London Plan (2021)	e	e	i

the circular economy; and, ecosystem conservation and urban greening.

Synergies and conflicts can be found at the level of instruments. The eight years of circular economy policy development in Greater London has allowed the inclusion of instruments specifically designed to operationalise some of its objectives in the construction sector. Fifty-five instruments were identified in relation to the twelve objectives (see Appendix 1). Although the London Plan comes into force in 2021, the Circular Economy Statement was created in 2020 and included in policy SI7 of the London Plan. This is arguably London’s most advanced instrument for the circular economy as it establishes a compliance obligation for new developments at the Greater London level, and its future inclusion in development plans at the borough level. It is worth noting that the completion of the Circular Economy Statement relies mainly on future assumptions and the description of actions, which are not supported by indicators that could enable their evaluation. The co-existence of the Circular Economy Statement and the Urban Greening Factor in the London Plan, has also the potential to align ecosystem services provision in the built environment with circular economy principles. During the interviews, the Royal Institution of Chartered Surveyors’ (RICS) Whole Life Carbon Assessment tool for the built environment was identified as another policy instrument that can be combined with the Circular Economy Statement to deliver more circular construction. However, this instrument is neither mandatory nor of public origin, and was therefore not identified in the selected documents or included in the analysis. An apparent conflict or obstacle to achieving a more circular city lies in the limited circular city actions related to existing buildings and their refurbishment. While retrofitting is considered in circular city policies, ecological regeneration is only applied to new buildings, so the provision of ecosystem services may have an impact on the homes built to accommodate the additional one million residents expected in Greater London by 2040, but not on the existing eight million. One potential issue is the value added tax (VAT) levied on retrofitting, whereas new

build is VAT exempt.

In terms of implementation, little or no information was found on the finalisation of the circular economy policies, their implementation plans, the resources needed per objective and the monitoring and evaluation processes. The 2020–2025 Business Plan is the only policy document that provides a somewhat detailed implementation plan in terms of budget execution. Five budget lines are included for the period: Resource London Programme, Circular Economy Programme, Revenue Programme, Net Programme Expenditure and Net Investment Expenditure.

5. Greater coherence for Greater London

5.1. Circular city policy coherence and the built environment

Both expected and unexpected findings emerged from the study of circular city policy coherence in Greater London. Given the history of looping and adaptation of circular actions for the built environment in Greater London (Williams, 2021), it was expected that a more developed set of objectives and instruments would be found in circular economy policies and as a result of its recent inclusion in planning policy. This was evident for the case of the Circular Economy Statement, which sets out circular economy strategies for buildings regarding its design, planning, construction, and their function adaptability. The observation of only limited monitoring and evaluation of existing policies was also to be expected, as recently noted by Turcu and Gillie (2020) across boroughs in Greater London, and in another case study in the Netherlands by Bucci Ancapi (2023). The continued underdevelopment of meaningful indicators for the circular economy seems to be related to its novelty and the ever-increasing demands for its operationalisation. Compared to the energy transition in the built environment, which is mostly developing around concrete and measurable indicators of CO2 equivalent emissions and energy use efficiency (i.e. wattage), the circular economy faces a difficult multi-level process of policy formulation, with local and supra-local authorities such as the GLA waiting for national frameworks to follow. However, in the UK, austerity policies are limiting the powers and capacity of local government to act (Turcu & Gillie, 2020).

The unexpected includes both positive and negative outcomes in promoting a more circular built environment and ultimately a circular city. The inclusion of both circular economy and greening policies in the London Plan is a step forward in aligning policies for a circular, resilient and environmentally regenerative built environment in Greater London. From 2021, major development projects will be required to provide a Circular Economy Statement and an estimate of their Urban Greening Factor, which together with the energy efficiency measures included in the London Plan, will bring a more integrated approach to construction in line with the vision of London as a circular, resilient and energy efficient city of the future and the circular city development policies.

While this policy integration effort helps to create a more circular built environment, it may also represent the further optimisation of circularity in cities as a business-driven concept. After all, the Circular Economy Statement and the Urban Greening Factor are tools for developers, in developments that may or may not involve Londoners. The dominant driver of economic gain, wealth and growth in circular economy policies (Ness, 2022; Williams, 2021), also known as eco-accumulation (cf. Savini, 2019), has not been accompanied with policies to support residents and communities to enable circular systems of provision and new ways of inhabiting and making the city. This is the missing pillar of circular actions in Greater London, as there are measures to adapt the urban fabric but not the social fabric.

5.2. Not seeing the city for the buildings

The advantage of analysing policy coherence in the context of circular city development is that it allows the analysis of both process (policy making) and content (circular city development framework). While considering coherence solely in terms of circular economy objectives, instruments, and implementation practices could lead to a diagnosis of consistent coherence, it is only when matched to the circular actions of Williams (2021) (i.e. looping, ecologically regenerative, adapting) that synergies and misalignments can be more easily identified, mitigated or improved (Bucci Ancapi, 2023). The dominant technocratic perspective on urban metabolism, a concept that analyses cities as if they were living biological systems that process resource inputs, throughputs, and outputs, has historically been the epistemological lens for the study of circular economy in cities (cf. Wachsmuth, 2012). Urban metabolism has been concretised through widely used analytical approaches such as material flow analysis (MFA), life cycle assessment (LCA), and environmentally extended input-output analysis (EEIO) (Ness & Xing, 2017). As such, urban metabolism has overlooked the issue of (political) power in both the making of the city and the ownership of resources within urban areas (cf. Wachsmuth, 2012). As Savini (2019) concludes, political processes pursuing eco-accumulation through the circular economy have not consistently promoted waste reduction through anti-consumerism practices. Ness (2022) echoes this and brings this claim to circular built environment policies mentioning that so far these policies have not pushed societies to build less by means of adapting existing buildings stock and having a serious discussion about what, where and whether new buildings are needed.

Speculatively for the case of Greater London, although supported by historical evidence of urban governance, neoliberal policies have reduced the powers and capacities of local government and urban politics in general (Pill, 2021). In the case of Greater London, this could be exemplified by austerity policies, as a combination of government budget cuts, privatisation of public services, wage cuts, and the dismantling of the welfare state, which works downwards by allocating risks, responsibilities, and deficits to local government (Schipper & Schönig, 2016). This context conflicts with and hinders the vision of Greater London as a circular city in the future (London Waste and Recycling Board, 2017).

The direction and content of policies and the instruments that deliver them depend on how ideas are framed (Bemelmans-Videc et al., 2003; Howlett et al., 2020). As noted above, top-down policies in the UK have been usually based on centralised decision-making, emphasise technocracy and promote market mechanisms. In itself, this downward flow of policy formulation is not a problem, as multi-level government bodies are mandated to set policy. The problem arises when this downward flow is not paired with transformative bottom-up ventures led, for example, by communities and businesses with secured self-organising capacities (Colander & Kupers, 2014; Kupers, 2020) to foster the more radical societal changes needed to address the ongoing socio-environmental crisis. Currently, urban planning Moreover, in addition to encouraging bottom-up action, there is a need to improve the readiness of central authorities to identify emerging policy conflicts and

obstacles and to adapt policy packages to address them (Bucci Ancapi, 2023; Song & Müller, 2022). Arguably, the current governance of the circular economy in Greater London has not synergistically contributed to more radical changes in the way Londoners inhabit and make the city and its built environment, and thus the concretisation of a circular city remains out of reach (Ness, 2022; Savini, 2019). This study cannot argue that circular economy policies may have deepened the neoliberal turn in Greater London in recent decades, but it can argue that circular economy policies do not contribute to the balance of power between the usual incumbents (i.e. governments, corporations) and Londoners. Herein lies an indication to why policy coherence may fail. According to Browne et al. (2023), there are two main reasons why improved coherence may still not lead to better policy outcomes. The first is a lack of ambition in setting policy objectives, and the second is institutional failure. The GLA arguably suffers from the latter and less from the former. From its inception, circular built environment policy in Greater London has evolved from a supply chain-based approach to one that includes its spatial components in the London Plan, demonstrating a growing ambition to integrate circularity into the way the built environment is constructed and operated. However, institutional failures can occur in relation to circular built environment policies, as most of what has been identified in policy documents relates to objectives and instruments. Implementation aspects such as resources, implementation plans and monitoring evaluation (cf. Ranabhat et al., 2018) are not sufficiently covered. For example, the overall evaluation of the Circular Economy Statement in terms of how effective it is in driving the inclusion of circular economy principles in project development is not mentioned and remains an open question in terms of when, how and what will be evaluated to determine its impact.

5.3. Validity and reliability

This study had several limitations. Firstly, it only used explicit circularity policy documents for the built environment, without considering broader policy frameworks for waste management. However, this was done to highlight the current state of circularity-specific policy development (Bucci Ancapi, 2023; Bucci Ancapi, Van den Berghe, et al., 2022). Second, while vertical and horizontal policy interactions across Greater London policies were considered, but more insightful analytical results could be obtained by linking (future) plans developed by boroughs in Greater London. However, a recent study on the status of circular economy in local planning processes in Greater London identified only two general inclusions of a circular built environment (Turcu & Gillie, 2020). Thirdly, as the UK left the European Union in December of 2020, this study did not consider European level policies. Finally, as this study uses an ex-ante analytical framework, it is not possible to determine whether existing policies are effective in changing construction and planning practices nor the extent of their effectiveness in implementation practices.

This study has both theoretical and practical implications. Theoretically, this study provides further validation of the circular city policy coherence of Bucci Ancapi (2023), as this study includes two policy domains and focuses the analysis on vertical and horizontal interactions between domains rather than only vertical ones. This study also updates and extends the findings of Williams (2021) in relation to Greater London and its circular built environment policy, which focuses mainly on looping and adapting actions. In practical terms, this study can inform the Greater London Authority, local authorities, and all stakeholder interested in the development of circular built environment and urban policies in the city. In London, as it points out areas such as adaptation and greening that could be strengthened through synergic policy instruments, for instance, by aligning the Circular Economy Statement and Urban Greening Factor in project evaluation. In other cities around the world, it may help those seeking a better understanding of their current circular economy policy and more effective circular city policy formulation. However, the analytical limitations of this study must be

considered and may be overcome by (1) including policy documents from local and (supra)national governments to improve the analysis of vertical and horizontal coherence and (2) gathering data to provide at least a brief analysis of implementation practices in relation to circular economy and circular city ideas. Furthermore, the policy analysis in this study has begun to bridge theoretical and practical aspects of the ongoing critique of the circular economy (cf. [Kebłowski et al., 2020](#); [Kirchherr et al., 2023](#); [Savini, 2023](#); [Williams, 2019](#)) by providing evidence based on policy as a crystallisation of political power upon which not only a theoretical but also a practical critique can be sustained. Policy analysis can thus be instrumental in enabling what [Bassens et al. \(2020\)](#) identify as the potential of an urban circular economy to move beyond neoliberal urbanism and create spaces for much-needed socio-ecological transformations that sustain humanity in the long term.

6. Conclusion

How coherent are circular built environment policies in Greater London? The answer to this question is that circular built environment policies in Greater London have increased their overall coherence through business-driven optimisations in construction practices, but less so in achieving a circular city as conceptualised by the Circular City Policy Coherence Framework. As a major driver of the ongoing socio-environmental crisis, urbanisation and the construction and operation of the built environment require drastic, radical changes to enable more resource-efficient and resilient development in the future. The circular built environment policies implemented in Greater London effectively draw attention to issues of resource depletion, waste generation and potential strategies to address these unsustainable trends. However, deeper and more systemic discussions about the need for new buildings, the maintenance of the existing building stock, and the involvement and adaptation of residents and communities in circular urban development remain largely unconsidered in current policies. Future research could benefit from addressing these issues by constructing and evaluating possible future scenarios in relation to different policy directions. An ex-post evaluation of Greater London’s circular built environment could shed light on whether policy implementation is able to overcome the limitations of circular policies in urban development. It could also benefit from analysing the coherence between the built environment and other aspects of circular city development, such as urban food production, which is included in the London Plan but whose spatial implications have not yet been analysed. Future research should also

explore the equity implications of neglecting political power in discussions of urban metabolism, echoing to some extent debates by [Heynen et al. \(2006\)](#); [Molotch \(1976\)](#), [Wachsmuth \(2012\)](#) and [Savini \(2019\)](#); [Savini \(2023\)](#). Examining political power dynamics in the design and implementation of circular built environment policies could pave the way for rethinking urban circularity, prioritising holistic, socially embedded sustainability frameworks over isolated metrics. This article concludes by arguing that current policy efforts are insufficient to concretise a more circular city, but this is not to say that what has been done is worthless, as each city must find its own ways to develop more sustainable habits through experimentation and learning ([Van den Berghe et al., 2020](#); [Van den Berghe & Vos, 2019](#); [Williams, 2019](#)).

Funding

This research was funded through a scholarship granted by ANID, the National Agency for Research and Development of Chile (resolution number 6528/2019).

CRediT authorship contribution statement

Felipe Bucci Ancapi: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Karel Van den Berghe:** Writing – original draft, Supervision, Data curation. **Ellen van Bueren:** Writing – original draft, Supervision, Data curation.

Declaration of competing interest

The authors have no competing interests to declare.

Data availability

<https://data.4tu.nl/datasets/1eeaab32-302c-4ab6-926f-7ecf1b73d8b9/1>

Acknowledgement

The authors would like to thank Jo Williams of Bartlett’s School of Planning, University College London, for her help in making this study a reality.

Appendix 1. Inventory of circular built environment policies

Objectives	Instruments	References
1. To reduce the intake of primary resources	1.1. Sample public and private buildings in London to estimate levels of underutilisation.	Circular Economy Route Map
	1.2. An adequate supply of aggregates to support construction in London will be achieved by encouraging reuse and recycling of C&DW, extracting land-won aggregates within London, and importing aggregates by sustainable transport modes.	The London Plan
2. To substitute unsustainably-sourced resources by sustainably produced ones.	1.3. Reduce environmental impact of aggregate sites and facilities development proposals.	The London Plan
	1.4. Identify mineral safeguarding areas to protect sand and gravel resources from exhaustion.	The London Plan
3. To develop new design and production processes to promote new ways of consumption.	1.5. Incorporate circular economy principles into public new build, refit and infrastructure.	Circular Economy Route Map
	1.6. Funding for circular built environment demonstration project.	Circular Economy Route Map
	1.7. Design guidelines to eliminate waste and for ease of building maintenance through long-life and loose fit and design for disassembly.	Design for a Circular Economy Primer
4. To reuse secondary resources (waste flows)	1.8. Research current and former mechanisms for reuse of surplus and reclaimed construction materials.	Circular Economy Route Map
	1.9. Research the implications of a reuse target for built environment projects in London.	Circular Economy Route Map
	1.10. Resource conservation, waste reduction, increased material reuse and recycling, and reduction of waste will be achieved by the Mayor, waste authorities and industry.	The London Plan

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Objectives	Instruments	References
5. Waste reduction	1.11. Conserve resources, increase efficiency and source building material ethically to minimise material, energy, water and land use.	Design for a Circular Economy Primer The London Plan
	1.12. Waste is sustainably managed entirely in London, waste management sites are safeguarded, treatment capacity optimised, and environmental, social, and economic benefits of waste and secondary materials are created.	
6. Evaluation and Monitoring	1.13. Manage waste sustainably and at the highest value through deconstruction, demolition and excavation operations.	Design for a Circular Economy Primer Circular Economy Route Map
	1.14. Promote circular economy technologies (e.g. BIM).	
7. Market development for secondary resources	1.15. Incorporate learning from ongoing projects.	Circular Economy Route Map
	1.16. Business support for built environment projects.	Circular Economy Route Map
	1.17. Investigate opportunities for an accelerator/incubator programme.	Circular Economy Route Map
	1.18. Seek opportunities to invest in circular building opportunities.	Circular Economy Route Map
	1.19. Working group to make recommendations on developing secondary resource markets.	Circular Economy Route Map
	1.20. Innovate and pilot circular business models.	Circular Economy Route Map
	1.21. Develop a directory of circular economy products and services in London.	LWARB Business Plan
8. Policy, legislation, and regulation	1.22. Budget for corporate engagement in the circular economy transition.	LWARB Business Plan
	1.23. Incorporate circular economy principles into the London Plan and guidance documents.	Circular Economy Route Map
	1.24. Lobby for reduction of VAT for refit to be in line with zero VAT for new build.	Circular Economy Route Map
	1.25. Business Plan to set a more commercial approach to paid-for and fee services.	LWARB Business Plan
	1.26. Green infrastructure strategies should be created by Boroughs.	The London Plan
	1.27. Development Plans should use green infrastructure strategies to identify assets and opportunities to address environmental and social challenges through greening.	The London Plan
	1.28. Development Plans should assess all open space to inform policy and the creation of new areas.	The London Plan
	1.29. Boroughs should develop an Urban Greening Factor to identify the appropriate amount of greening in new developments. They should be based on GLA factors and scores.	The London Plan
	1.30. In Development Plans, boroughs should protect existing allotments and encourage space for urban agriculture.	The London Plan
	1.31. Referable applications should promote circular economy outcomes and aim to be net zero-waste in new developments. A Circular Economy Statement should be submitted.	The London Plan
9. Knowledge, innovation and awareness	1.32. Development Plans should identify waste needs, how it will be reduced, and allocate sufficient sites for this purpose.	The London Plan
	1.33. Development proposal for material and waste management sites are encouraged.	The London Plan
	1.34. Development Plans should make provisions to maintain landbanks, ensure sufficient capacity of aggregates depots, support the production of recycled/secondary aggregates.	The London Plan
	1.35. Introduce circular economy thinking in higher education.	Circular Economy Route Map
	1.36. Conduct scoping study on the potential to implement circular economy in London.	Circular Economy Route Map
	1.37. Conduct a material resource requirements study of major infrastructure.	Circular Economy Route Map
	1.38. Work together with construction and demolition companies to identify circular economy opportunities.	Circular Economy Route Map
	1.39. Research and demonstrate circular economy opportunities in 'meanwhile' spaces in the city.	Circular Economy Route Map
	1.40. Research, innovation and demonstration of circular economy solutions.	LWARB Business Plan
	1.41. Annual Circular Economy Week event.	LWARB Business Plan
10. Ecosystem preservation and urban greening	1.42. Support SMEs wishing to transition to a circular economy through Advance London.	LWARB Business Plan
	1.43. Protection of green and open space and green features in the built environment.	The London Plan
	1.44. London's Green Belt should be protected from inappropriate development.	The London Plan
	1.45. Metropolitan Open Land has same status as Green Belt and should be extended when possible.	The London Plan
	1.46. Developments should not result in loss of protected open space.	The London Plan
	1.47. Major development proposals should contribute to the greening of London, including high-quality landscaping (including trees), green roofs, green walls, and nature-based sustainable drainage.	The London Plan
	1.48. London's urban forests and woodlands should be protected, maintained and increased.	The London Plan
11. Adaptation	1.49. Funding for behaviour change through the London Recycles programme.	LWARB Business Plan
	1.50. Workshops for public and private actors to embed circular economy in refit and new build and infrastructure.	Circular Economy Route Map
12. Capacity building	1.51. For a network of facilities and office managers to implement circular economy principles in running their buildings.	Circular Economy Route Map
	1.52. Advice and support for local authorities in delivering services.	LWARB Business Plan
	1.53. Capacity building and upskilling through the sharing on Resource London research, innovation, and demonstration outputs to public authorities.	LWARB Business Plan
	1.54. Capacity building through low cost, professional training to local authorities' employees.	LWARB Business Plan
	1.55. Research (CIRCUIT, Horizon 2020) for piloting smart, eco-friendly, regenerative, and circular practices in the built environment.	LWARB Business Plan
13. Acceleration of circular economy		

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