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Doomed to grow? German municipalities in the stranglehold of a growth logic—a policy analysis of barriers to a circular urban transformation

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This paper explores the relationship between municipal finance, urban development, and environmental sustainability in Germany, with a specific focus on the potential for a circular economy to address persistent issues of land consumption. As centres of concentrated economic activity, urban areas are central to the achievement of sustainability goals, yet the German construction and housing sector operates largely within a linear system. Despite ambitious national targets, such as a goal to reduce land development to a net-zero increase by 2050, political objectives have not been met, and land consumption remains too high. The paper investigates whether institutional and structural barriers prevent municipalities from implementing effective sustainability measures. Using a two-part methodology, the research combines a narrative literature review on urban transformation, (post-)growth, and the circular economy with a quantitative data analysis. The data analysis utilises the INKAR database to examine land consumption, population density, tax revenues, and debt in German municipalities with the highest land consumption in 2022. The literature review suggests that the current political and financial systems in Germany create a systemic bias towards growth, as municipalities are incentivised to expand to generate income and compete for businesses and residents. While the data analysis finds that the correlation between financial pressure and land consumption is not statistically significant, indicating other factors may be at play, the findings of the literature analysis emphasise a conflict between municipal economic growth and environmental goals. The short-term financial gains of expansive development often come at the expense of long-term social and environmental costs. The paper reveals a research gap and addresses the lack of a clear explanation for why German municipalities, despite national policy, continue to consume land at an unsustainable rate, and provides new, counter-intuitive data on the role of municipal finance in this dynamic.

KEYWORDS

urban planning, municipalities, circular economy, resource efficiency, post-growth

1 Introduction—urban development, construction, and land consumption

Over 75% of the German population live in urban areas (the global figure is 50%) (Die Bundesregierung, 2025) and around 70% of the sustainability goals and indicators are directly related to the context of urban areas and urban living (Die Bundesregierung, 2025). To address this, the country has implemented numerous strategies for sustainable development, focusing on minimising environmental harm through measures related to emissions, resource efficiency, and nature conservation. The German Sustainable Development Strategy (Deutsche Nachhaltigkeitsstrategie, DNS), for example, uses an indicator called “increase in settlement and transport area” (Destatis, 2025b). It sets a goal to stabilise the new development of land to 30 hectares per day by 2030 (Destatis, 2025b), with a long-term goal of achieving a net-zero increase by 2050. The initial target for 2020 was not met. The total settlement and transport area in Germany has grown significantly, increasing from 40,305 square kilometres in 1992 to 52,074 square kilometres in 2023 (Umweltbundesamt, 2025). While the average rate of land consumption has decreased in recent years—from 129 hectares per day between 1997 and 2000 to 51 hectares per day between 2020 and 2023 (Umweltbundesamt, 2025). Thus, the political goals have not been achieved and land consumption remains too high.

New land development has significant ecological impacts, largely converting natural and agricultural spaces into urban and transport areas. Between 2015 and 2020, a majority of the newly utilised land was previously agricultural land (71%) or forest and woodland (20%); other purposes (9%) (IÖR, 2021) in Germany (see Figure 1). The new development primarily serves residential (42%), non-residential (28%), and transport purposes (16%), with a smaller portion designated as open space (13%). The process of sealing these surfaces can lead to severe environmental consequences. It can cause the destruction of natural habitats and biodiversity loss, while also impairing the water balance. Furthermore, sealed surfaces increase the likelihood of urban heat islands in town and cities by reducing vegetation and precipitation, leading to a loss of the soil’s natural

functions (European Environmental Agency, 2024). The negative ecological effects of growing settlement and traffic areas strongly suggest that new land should only be developed when absolutely necessary.

In addition to the aspects of land consumption sketched above, it is also important to consider the resource-intensive construction sector, which is characterised by a largely linear system. In Germany, it accounts for around 63% of the raw material extraction of non-metallic minerals for the construction and maintenance of buildings and infrastructure (Lutter et al., 2022) and over 55% of gross waste generation (Umweltbundesamt, 2020), i.e., it is of great importance in terms of materials and waste at the beginning and the end of the value chain as well as for the potential of energy efficiency in the production and utilisation phase.

The construction and housing sector is a very complex multi-level policy field. It has a strong macro-economic significance and in order to operate, it usually requires land to build on. Land consumption and sealing through building development and associated traffic as settlement and transport areas are thus an important field of action. Despite the ambitious political goals to reduce land consumption, land is frequently made available by municipalities against the background of their municipal financial structure. The circular economy could provide a way by moving from a linear to a circular construction, built environment and land use. The newly released German National Circular Economy Strategy refers to the construction and building sector, but does not yet paint a clear picture of circular urban development (BMUV, 2024).

Municipal practices for a circular economy with a focus on land use concentrate on creating regenerative urban environments by emphasising the reuse and regeneration of existing urban spaces and infrastructure, such as the redevelopment of brownfield sites and the repurposing of old buildings. Through strategic urban planning and land use planning, local authorities can promote dense, mixed-use development and designate areas for circular economy businesses. Another important measure is the creation of a circular built environment by promoting “urban mining” to recover materials from demolition work and encouraging the use of recycled or bio-based

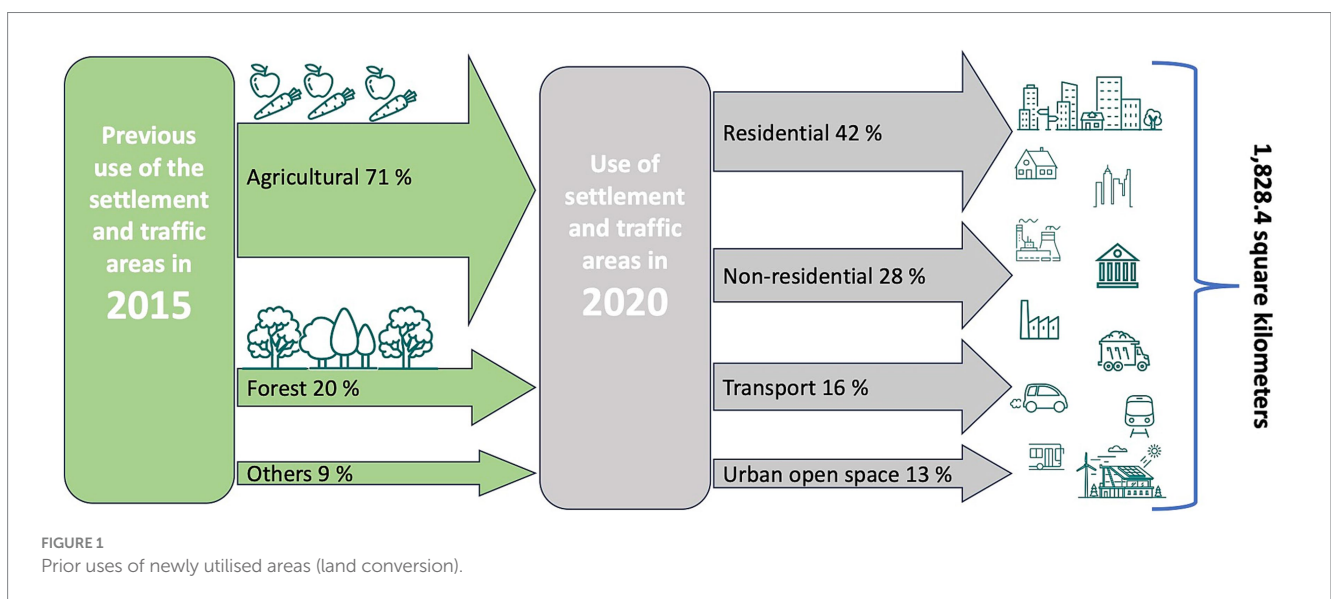


FIGURE 1
Prior uses of newly utilised areas (land conversion).

materials in new construction (Feleki et al., 2025; Williams, 2023). However, according to a recent OECD report (OECD, 2025), there is currently no city in the OECD area whose policy regulations have been implemented to such an extent that they could be called a full urban circular economy. Nevertheless, numerous cities have set out on this path in the meantime. There are concrete examples of cities that have integrated circular economy measures into their urban planning specifically in order to reduce land consumption or optimise land use. Examples are Amsterdam, NL (revitalisation of brownfields and densification of already built-up areas), Houston (USA) (re-use warehouse for building materials), Copenhagen (DK) (green and blue infrastructure), Vienna (AU) (dismantling of industrial sites), Seoul (sharing city to reduce traffic and traffic areas), Zurich (CH) (urban mining) (Feleki et al., 2025; Cities and Climate-KIC, 2018; WEF and PwC, 2018). The connection is often indirect, but clear: promoting ‘inward development’ and a more efficient use of existing resources reduces the need to develop new land. Directly measuring ‘reductions in land consumption’ solely through circular economy measures is however complex, as many factors can play a role.

One of those factors highlighted in the OECD study is the municipal budget (OECD, 2025). German municipalities are facing an alarming financial crisis. The latest Municipal Finance Report by the Bertelsmann Stiftung (Freier et al., 2025) highlights the situation. In 2024, German municipalities noted a record deficit of nearly 25 billion euros, marking the most significant financial collapse since the foundation of the German Federal Republic in 1949. The primary causes for this dire situation are a combination of stagnant tax revenues, partly due to a weak economy, and a sharp increase in social and personnel expenditures (Freier et al., 2025). The report concludes that the financial capacity of municipalities is severely endangered, posing a significant threat to their operational ability and future stability. Several key factors contribute to this situation but a primary cause is the stagnation of tax revenues.

Current environmental issues such as space-saving land use, land recycling, resource-efficient construction and housing and a climate-friendly urban development have to be addressed at municipal level first and foremost. Better management of urban resources is crucial to achieving national sustainability goals, increasing resource security, and strengthening urban resilience (Williams, 2023). But can these important concerns even be adequately addressed within the existing framework conditions for cities and municipalities in Germany (Lamker and Terfrüchte, 2024)? This paper explores the institutional and structural barriers that prevent municipalities from effectively implementing key sustainability measures. One question we want to examine in particular is: Are ‘poorer’ municipalities (meaning the bottom fifth of municipalities in terms of per capita tax revenue) are more inclined to convert green spaces into development areas than ‘richer’ municipalities and therefore subject to growth pressure?

Following this introduction to initial insights into urban development, construction, and land use (section 1) the methodological approach is presented (section 2). Based on a literature and data analysis, key drivers and obstacles are identified (section 3), including subsections on societal trends, political and legal framework conditions, economic incentives and the municipal financial system, commercial space, the investment backlog, and municipal income, debt and competition. The discussion (section 4) will consider how financial sustainability can be ensured and whether a circular urban transformation offers a

viable new direction. Finally, conclusions are drawn on the structural growth pressure, challenges and potentials of the circular economy approaches and further research needs are sketched (section 5).

2 Materials and methods

This article will conduct a narrative review, a type of literature reviews that summarises individual studies on specific topic. This approach differs from more structured methods in that it does not follow a predefined, systematic selection process, which can lead to a degree of subjectivity. However, the flexibility makes it an excellent tool for providing an introduction and overview of a subject of new research. Unlike a systematic review or meta-analysis, the primary goal of a narrative review is therefore not to aggregate all existing findings. Instead, it offers a broad presentation and reflection of theoretical, methodological, and empirical dimension of a (new) research field (Döring and Bortz, 2016).

For our review, we started by examining a wide range of academic literature related to “(post-)growth, urban transformation, and the circular economy.” We then curated the selected literature based on the following criteria:

- i *Content relevance*: The sources must be directly related to the topic of urban development.
- ii *Source authority*: Sources from experienced authors or research institutions who have published multiple academic articles or research reports on the subject were prioritised.
- iii *Scientific rigour*: A focus was laid on peer-reviewed sources and scientific publications that demonstrate high methodological quality and reliability.
- iv *Timeliness*: Particular emphasis was placed on sources with empirical or quantitative data that were published within the last 5 years.

In total, we included 30 sources for the core analysis. While this is a substantial number for a narrative review, it is justified by the need to give equal consideration to the three core pillars of (post-)growth, urban transformation, and circular economy.

For the data analysis, the INKAR database (Integriertes Klimainformations- und Auswertungssystem = Integrated Climate Information and Evaluation System) of the Federal Institute for Research on Building, Urban Affairs and Spatial Development was additionally used. This database allows to combine numerous data sets to determine land use. While this database is not primarily designed to provide comprehensive, high-resolution land use data, it is used indirectly through the combination of various indicators, using, e.g., the following indicators:

- *Settlement and transport area*: INKAR contains time series on indicators such as settlement and transport area at various administrative levels (municipalities, districts). These data, based on the land use survey by type of actual use conducted by the Federal and State Statistical Offices, form the basis for quantifying land use for construction and infrastructure purposes. From this, we were able to identify trends in land use over time and analyse regional differences.

- *Population development and settlement density*: By combining data from settlement and transport areas with population data from INKAR, the development of settlement density can be calculated. Increasing land use with a stagnating or declining population indicates a lower settlement density and thus inefficient or unsustainable land use.
- *Economic structures*: INKAR also provides information on economic structures. These can be used to examine the relationship between economic development, the creation of new commercial space, and the associated land use.
- *Comparative analyses and modelling*: Through the time series and the ability to query data at different spatial levels, INKAR enabled us to conduct a comparative analysis.

A key limitation is that INKAR can only primarily use aggregated statistical data. For detailed analyses of land use at a very small-scale level (e.g., individual parcels of land, brownfield potential), additional data sources such as geospatial data, aerial photographs, or special cadastres (e.g., vacant lot cadastres) would be required. However, INKAR provides an excellent foundation for the analyses in this paper, used to carry out the spatial and temporal analyses presented here. For the questions addressed here, the INKAR database, with its extensive regional statistical data on settlement and transport areas, demographics, economy, and infrastructure, provided a solid basis for scientifically analysing land use and substantiating the trends presented.

In combination with the narrative literature review, it is possible to explore the relationships between spatially relevant factors (land use), resource-intensive activities (construction of houses and roads), and existing instruments for financing municipal budgets. By using data from the INKAR database, an analysis was conducted of 50 German municipalities with the highest land consumption in 2022. The analysis examined their population densities, tax revenues and municipal debt per capita and whether any anomalies could be identified. The quantitative analysis also aimed to answer the question of how much land is developed for new housing estates in Germany (annually), how much of this is commercial space and how much is residential development, and what function these areas previously had. The excel data for the IKAR database evaluation are available for download.

3 Results of the literature and data analysis on drivers and barriers

Municipal growth is a complex interplay of a thrive for economic growth and municipal financial stability, social preferences for individualised, land-intensive lifestyles, migration movements from rural areas to cities and vice versa and existing political and regional planning structures that are designed for or encourage growth (Ehrhardt et al., 2022; Knak, 2021). The following sections present what literature identifies as various growth drivers in the area of settlement and land development in cities and municipalities.

3.1 Societal developments

With increasing prosperity in a growth-oriented economic and social order, cultural models and personal lifestyles have developed

that are also associated with continuously growing and individualised demands on living space and mobility (Böcker et al., 2020; Schmelzer and Vetter, 2020). The average living area per capita in Germany stands at 49.2 square meters in 2024, representing a substantial increase from the 35 square meters recorded in 1991 (Destatis, 2025a). In large cities and Metropolitan areas in particular, the pressure on the housing markets and the lack of housing in the lower and middle price segments, inter alia due to rural–urban migration, is leading to demands for rapid and affordable construction and new infrastructures (ARL, 2024; SRU, 2018). At the same time, building land is also being designated in stagnating or shrinking regions in order to prevent emigration or attract new residents (Böcker et al., 2020; SRU, 2018). A deeply rooted paradigm of the detached single-family home (as a positive vision) and a lack of acceptance for higher building densities make inner-city development currently difficult and promote an expansive settlement policy (Bizer et al., 2018). Municipalities set the framework and make decisions on land designation, acting in a self-serving and calculated manner to increase budgets and votes, while not giving sufficient weight to overarching social goals such as the goals from the German sustainability strategy when making decisions (Bizer et al., 2018) and also failing to take into account current guiding principles and objectives from spatial planning such as the guiding principle of compact urban development (Adrian et al., 2018, p. 40).

3.2 Political and legal framework conditions

Urban planning is often characterised by the idea that cities can be further developed and problems be solved through continued planning, efficient building and growth. Growth is pursued as a central goal of urban policy (Brokow-Loga and Eckardt, 2020). Deregulation through legislative amendments, such as the “Entfesselungspaket” (unleashing package) in North-Rhine Westphalia or the (recently cancelled) § 13b BauGB (German Building Code), aim(ed) to facilitate the designation of new areas and foster construction (Lamker and Dieckhoff, 2020). So does the currently deliberated “Bauturbo” (construction turbo) in the German Parliament, which is a special regulation in section 246e of the German Building Code allowing to dispense a development plan. It also makes it easier to extend and add storeys to residential buildings and to convert buildings into living space, for example commercial premises and buildings (Bundesregierung, 2025). This indicates that political goals and the legislative framework often hamper a congruent strategy. The typification of building areas and the principle of separating urban planning functions in building planning law make it difficult to achieve a functional mix and thus compact inner-city development (Böcker et al., 2020) while individual policy areas often operate side by side, leading to conflicts of targets, e.g., when building land is designated for housing while at the same time neighbourhoods are to be made greener (Eckardt and Brokow-Loga, 2020). Sufficiency, which is considered a key strategy for sustainability (Schmitt et al., 2015), has so far found little application at city level, as its implementation is seen as delicate and conflict-laden (Lage et al., 2023; SRU, 2024). Finally, municipalities frequently do not have the financial and human resources to sufficiently mobilise inner-city development potential and make it ready for alternative construction (SRU, 2018). Furthermore, they lack the capacity to develop innovative concepts that create

incentives to tap the potential of sufficient building and land use. Only a few cities, such as Hamburg, follow this path so far (Bierwirth and Buschka, 2025).

3.3 Economic and fiscal incentives and the municipal financial system

A further central driver is the municipal revenue system in Germany. Business taxes, income taxes and property taxes on land and building ownership (alongside allocations (financial equalization), fees and contributions and income from assets and companies) are the main sources of income for municipalities in Germany (Freier et al., 2023; Kühl and Hollbach-Grömig, 2025).

According to the Federal Statistical Office, Germany's total tax revenues in 2023 were €915.9 billion. Besides the federal level and states, municipalities received the smaller portion of this, at €143.7 billion. Their tax revenue, inter alia, comes from community taxes, i.e., proportional shares of sales and income taxes. The federal government determines the amount of income or sales taxes to be distributed. The municipal share of income taxes is currently 15% (fix) and of the sales taxes about 2.5–2.8% (fluctuating). Cities and municipalities therefore primarily benefit from business tax revenues, amounting to €75.1 billion (Statistisches Bundesamt, 2024). In Germany, this tax implies a structural distribution problem: As cities and municipalities have limited influence over a large portion of the tax rates, the business tax assessment rate is the key leverage for municipalities. The federal government sets the tax base (currently 3.5% of trade income) and municipalities have the authority to set their own assessment rate, which is then multiplied by this base. Consequently, the differences between municipal assessment rates are substantial. In Germany, the range is between 200 and 650%. Therefore, depending on the municipality in which the business is located, the 3.5% trade tax can effectively double to six and a half times its base value (Fischedick et al., 2024).

Municipalities under fiscal pressure compete for residents and businesses to secure and increase their revenues (Lage et al., 2023; Böcker et al., 2020; SRU, 2018; Adrian et al., 2018). The provision of areas for new settlements is used as a means of creating an attractive and innovative city (Lamker and Dieckhoff, 2020), so that inter-municipal competition is led by the designation of attractive residential and commercial sites (such as malls) as well as a well-developed transport infrastructure (Böcker et al., 2020). From a business point of view, the development of land outside the city (on greenfield sites) is often more favourable for investors than inner-city development, as the costs of external development can be more easily passed on to the general public as externalities (e.g., loss of natural areas, infrastructure costs) (ARL, 2024). In addition, the German property tax favours the commercial marketing and structural use of undeveloped land while subsidies such as the owner-occupier allowance or the building subsidy for children promote land-intensive forms of housing such as detached and semi-detached houses by making construction activities artificially cheaper. This also shows that political goals and the regulatory framework prevent a congruent strategy. Municipal financial equalisation and commuter allowance can create further incentives for expansion on greenfield sites by providing benefits per kilometre of road (Böcker et al., 2020). In the past, local authorities have often been forced to privatise housing stock, land and

infrastructure in order to plug short-term budget gaps, but in doing so they have given up room for political leeway (Lage et al., 2023).

Land designation can thus be a strategy to generate further income (Siedentop, 2018). Municipalities aim to generate more income when there is a good supply of spaces available that meet the needs of companies or households that could potentially settle there. Some municipalities also expect to increase the utilisation of municipal infrastructure with a higher number of households as for example municipal swimming pools, kindergartens and schools, so they can better finance their maintenance (Bizer et al., 2018). Local decision-makers often have to act under pressure and may oversee the long-term environmental and social costs and impacts of land development and conversion. Knowledge gaps often contribute to the conclusion that re-developing building sites is too expensive and strategies do not always work out as expected, resulting in negative financial, social or environmental impacts (Bizer et al., 2018).

3.4 Commercial spaces

Commercial and retail spaces play a central role in the context of municipalities, encompassing both economic necessities and considerable challenges as well as potential for a sustainable urban development. Commercial and industrial areas are centres in which various economic activities such as production, trade and services are concentrated. They are typically associated with high resource and energy consumption. In recent decades, little attention has been paid to the further development of existing business parks in planning and economic development leading to “forgotten,” unorganised and isolated urban spaces (Angstmann et al., 2023) with a simultaneously increasing amount of inner-city wasteland and obsolete areas and buildings (vacancies) (Robert Bosch Stiftung, 2023).

The designation of attractive commercial sites and a well-developed transport infrastructure are still popular tools in the inter-municipal competition for new companies. Cities advertise with a “home advantage” through the rapid provision of land for new companies in order to be recognised as an attractive and innovative location. The economic attractiveness of a city, including its commercial and street spaces, is also an important location factor in the international competition for skilled labour, especially in post-industrial countries where the service sector dominates (Urbanista, 2024). Commercial space competes with other demands for use in scarce urban space, such as housing, transport, green and open spaces, and the development on greenfield sites often leads to a zero-sum game between municipalities, with additional land consumption and traffic, inducing vacancies and underutilised infrastructure in other municipalities. At the same time, the “sponge city” principle calls for an urban transformation of neighbourhoods and cities to address water management and climate adaptation challenges and pursue a strategy that can reduce the frequency and intensity of extreme precipitation events and urban heat islands, for example (Stevanovic and Eggimann, 2024).

“As a result, expansive residential development - particularly in conjunction with space-consuming building such as detached houses or spacious, single-storey business parks - significantly increases infrastructure costs per inhabitant. This not only applies to technical infrastructure such as supply lines, sewerage systems and transport routes, but also to local public transport and social infrastructure

such as educational and healthcare facilities” (Adrian et al., 2018, p. 39, translation by the authors.)

3.5 The investment backlog

It is crucial for municipalities to invest in technical, social, and cultural infrastructure in order to preserve and maintain it for the future. However, many German cities currently lack the financial resources to make these vital investments. The revenue situation and growing social expenditure have led to a considerable investment backlog in German municipalities, which is estimated at a total of €216 billion (Freier et al., 2025; Raffer et al., 2025). This shortfall makes it increasingly difficult to provide adequate essential public services and infrastructure for the citizens. Temporary project-based subsidies do not offer a long-term solution for financially struggling municipalities. These subsidies often require municipal contributions, and, for securing them, demand further financial and human resources for the application process. While initial funding might be available, the ongoing financial commitment is only addressed temporarily this way and often cannot be maintained.

Initially, it might seem appealing for municipalities to leverage the business tax rate as a tool for their own benefit. A municipality could raise its tax rate if it urgently requires revenue to renovate schools, roads, and bridges, those areas which are mainly affected by the investment backlog. To attract businesses, municipalities often entice them with low business tax rates, which can induce the creation of “municipal tax havens.” This, in turn, generates an uncooperative advantage over other municipalities. A prime example is the small municipality of Monheim am Rhein, with a population of 43,000. Following a significant reduction in trade tax, approximately 500 companies, including major corporations like UPS, DHL, Deutsche Post, Bayer, BASF, and Henkel, relocated there. However, only a mailbox was installed, value creation was not relocated. This shows how structurally underfunded municipalities find themselves competing with each other, unable to address their substantial transformation challenges and structural problems due to insufficient revenue.

To finance and offer public services, municipalities need, on the one hand, a strong economic presence of companies and, on the other hand, a large number of high-income residents who are less dependent on municipal services at the same time. Besides industrial and commercial areas, municipalities are often pursuing this by designating new residential areas for higher earners. On average, between 2019 and 2022, approximately 52 hectares (equivalent to 72 football fields) were newly designated as residential and transport areas daily (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz, 2024). These extensively sealed areas are consequently unavailable for agriculture, recreational activities, or water absorption during heavy rainfall events. The repercussions of land sales, conducted to temporarily offset structural financial deficits, are clearly apparent today, manifesting as increased flood damage and a loss of biodiversity (Fischedick et al., 2024).

3.6 Municipal income, debt and competition

The analysis of data concerning land consumption in Germany with the help of the INKAR database shows that the largest areas

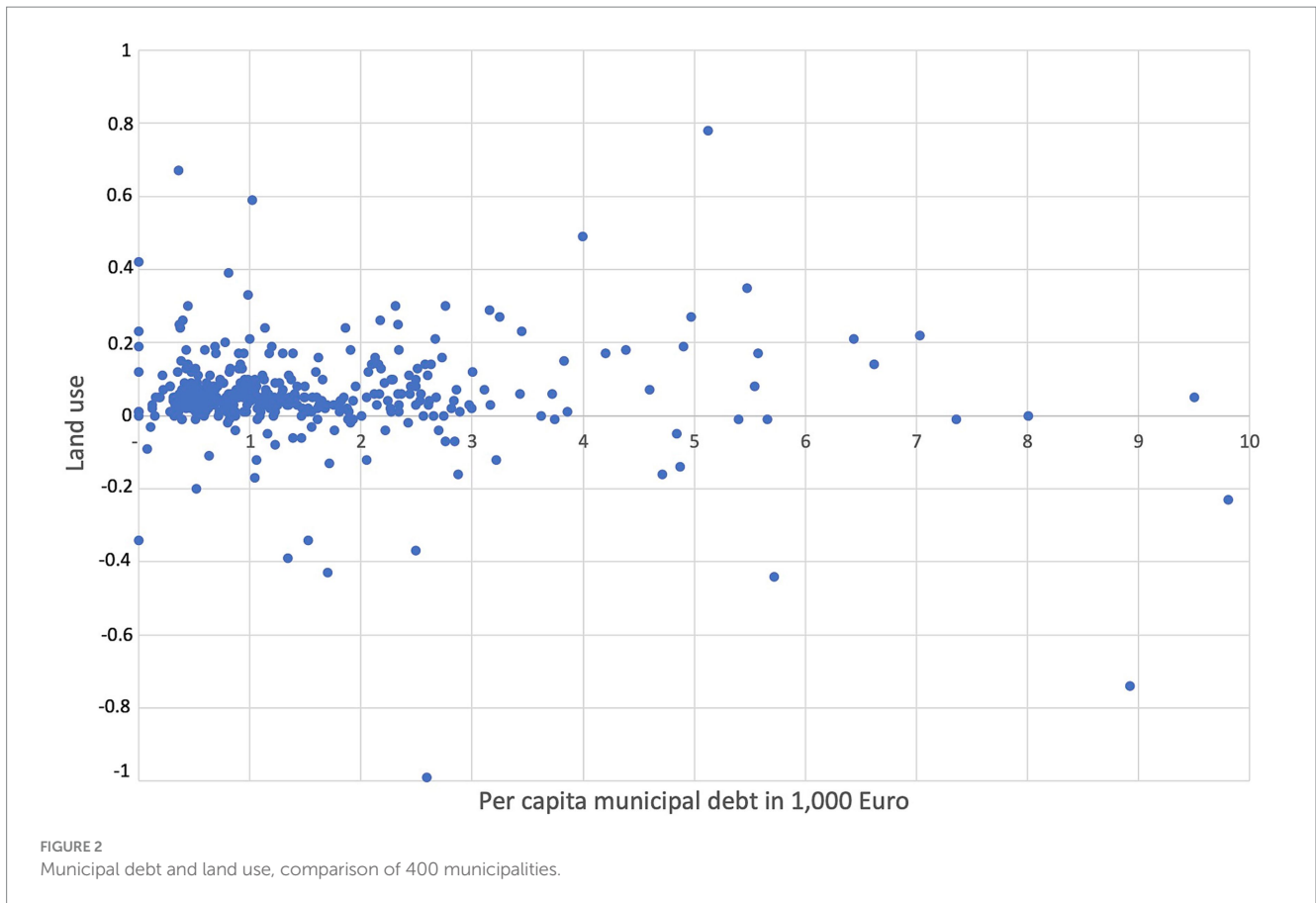
newly designated in 2022 were predominantly found in rural districts with low tax revenues and population densities. 60% of the 50 largest land designations were in districts with low population densities and 62% of 50 were among the lowest-income municipalities. Only a few urban or high-income municipalities took up a particularly large amount of land (own analysis based on INKAR-data). Also Adrian et al. (2018, p. 38) present data showing that municipalities in need of additional income and municipalities with lower settlement density tend to promote land consumption in order to generate more income. Richer municipalities are less dependent on land-intensive development due to lower financial pressure. Therefore, it can be noted that it is not primarily cities that are expanding.

When it comes to generating income and closing fiscal gaps, there is regional competition between neighbouring municipalities. Municipalities try to offer better incentives than their neighbours in order to attract businesses or households so that they can benefit from the taxes paid by successful companies or wealthy households (Siedentop, 2018). At the same time, there are high government subsidies for climate-damaging mobility behaviour, for example through tax incentives for long commutes and tax breaks for company cars, which means that the distance between the workplace and home plays a lesser economic role (Gerold et al., 2024). These subsidies further encourage private individuals and companies to relocate to neighbouring cities. Overall, this creates a competitive environment in and between regions. The aim is to see who can offer the most attractive commercial and residential locations while sustainability goals are increasingly losing importance.

Coming back to our initial question whether “poorer” municipalities are more inclined to convert green spaces into development areas than “richer” municipalities it has to be stated that, based on the data analysis, the connection is not unambiguous. Our correlation calculations using the INKAR values do not provide a clear answer. The statistical t-test is approximately 0.23, which does not indicate a statistically significant relationship between municipal per capita debt and land use. This can be seen in the following graph showing 400 cities with their relative land use and their relative debt.

Figure 2 illustrates the relationship between municipal debt per capita (in Euros) and green space land use. Negative values for green space land use indicate that the area of previously sealed surfaces that has been greened exceeds the area of new surfaces sealed for infrastructure and building development. Each data point on the graph represents a distinct city from the INKAR database.

The combined analysis of literature and data suggests that the current political and financial systems in Germany create a structural bias toward growth and against sustainable urban development. This is particularly evident in the way tax revenues are distributed, which disproportionately affects financially struggling municipalities, leading to a systemic disadvantage. While the data analysis alone suggests a rather loose and not statistically significant or clear-cut correlation between financial pressure on municipalities and land consumption, indicating that other factors may play a more important role, the literature analysis identifies a tendency. Specifically, the literature suggests that low-income municipalities generally have a stronger incentive to promote land consumption if it is necessary to generate revenue, highlighting fiscal pressure as a driver for this behaviour. There is a clear conflict between economic growth—which is sometimes tied to land expansion, even in shrinking communities—and environmental



sustainability goals, such as green space preservation and compact urban development. This conflict is exacerbated by the competition between municipalities to attract businesses and residents, representing a challenge of competing goals. The analysed documents further suggest that the short-term financial benefits of expansive development often come at the expense of long-term social and environmental costs. These long-term costs and externalities, such as increased infrastructure costs per inhabitant and negative environmental impacts like flood damage and biodiversity loss, are often not adequately considered by decision-makers.

The findings are summarised in a table as drivers of urban growth and obstacles to sustainable urban development according to the categories identified in the literature (see Table 1).

4 Discussion

Based on our analyses, we propose two key questions for discussion. The first concerns the financial situation of cities and municipalities, and the second relates to the legal framework required for achieving a circular urban transformation. Our findings suggest that these two aspects are interconnected. The precarious financial situation of cities creates pressure for more intensive land use, while simultaneously hindering municipal administrations from developing the necessary expertise to consistently pursue circular urban planning strategies. Accordingly, we will explore both questions and discuss potential solutions. Finally, we summarise the two discussion points.

4.1 How to deal with the sustainability and financial challenges?

Given the substantial financial hurdles in developing sustainable infrastructure and safeguarding the environment together with the current investment backlog, many municipalities confront what appears to be an insurmountable challenge. Fostering sustainable living environments may require profound local changes within municipalities and necessitate significant shifts in people’s lifestyles. To achieve this, a diverse array of steering instruments must be employed. It is critical to develop a cohesive and strategically sound combination of these instruments, one that also enjoys widespread acceptance. For example, the potential sustainability benefits of bus lanes and bicycle paths are undermined if, concurrently, parking management is relaxed, new areas are paved for parking, and bus routes are discontinued.

As climate protection and sustainability are still no legally mandated municipal responsibilities, they are often perceived as burdensome additional tasks. Their priority on municipal agendas frequently fluctuates, depending on the financial health of various municipal budgets and the pressures of inter-municipal competition. This is particularly unfortunate, as the concrete implementation of sustainability measures often hinges on local action. Analyses indicate that nine of the seventeen Sustainable Development Goals (SDGs) would significantly benefit from decentralisation and a localised governance approach (Awortwi, 2016).

TABLE 1 Drivers of urban growth and barriers to sustainable urban development.

Category	Drivers of urban growth	Barriers to sustainable urban development
Societal developments	<ul style="list-style-type: none"> – Increasing prosperity and individual demand for larger living spaces and mobility – Rural-to-urban migration, especially to large cities and metropolitan areas, creating demand for new housing and infrastructure. – Efforts to prevent emigration and attract new residents in stagnating or shrinking regions by designating new building land. 	<ul style="list-style-type: none"> – Cultural preferences for detached single-family homes make inner-city development more challenging. – A lack of public acceptance for higher building densities. – Insufficient consideration of sustainability goals and principles like “compact urban development.”
Political and legal framework	<ul style="list-style-type: none"> – Urban policy often prioritises economic growth as a central goal. – Legislative changes, such as the “Bauturbo” simplify the designation of new areas and promote construction. 	<ul style="list-style-type: none"> – The separation of urban planning functions in building law complicates the creation of a functional mix and compact inner-city development. – Conflicting policy goals, such as designating land for housing while simultaneously aiming to make neighbourhoods greener. – Sufficiency is rarely implemented at the city level due to perceived conflicts and delicacy.
Economic and fiscal incentives	<ul style="list-style-type: none"> – Municipalities can use land consumption to generate income from business taxes, income taxes, and property taxes. – Competition among municipalities to attract residents and businesses and thus increase revenues. – Developing land on greenfield sites is often more financially favourable for investors than inner-city development, as costs can be externalized. – Subsidies for detached and semi-detached homes and tax incentives for long commutes encourage land-intensive development and relocation to neighbouring cities. 	<ul style="list-style-type: none"> – Municipalities often lack the financial and human resources to effectively mobilise inner-city development potential. – The municipal revenue system fosters competition instead of cooperation, as municipalities entice businesses with low tax rates. – Municipalities under fiscal pressure may sell off land to address short-term budget deficits, sacrificing future political flexibility. – Decision-makers may have limited knowledge of the long-term social and environmental costs of developing building sites.
Commercial spaces	<ul style="list-style-type: none"> – Commercial and industrial areas are crucial for concentrating economic activities. – Offering attractive commercial sites and a well-developed transport infrastructure are popular tools for attracting new companies. – The economic attractiveness of a city is a significant factor in international competition for skilled labour. 	<ul style="list-style-type: none"> – The focus on designating new commercial sites has led to a neglect of existing business parks, resulting in “forgotten” and isolated urban spaces. – There is an increasing amount of inner-city wasteland, obsolete buildings, and vacancies. – The development of greenfield sites for commercial use can be a zero-sum game, increasing land consumption and traffic in one municipality while creating vacancies in others.
Investment backlog and municipal debt	<p>The current multi-level system for distributing tax revenues structurally disadvantages municipalities with significant challenges, as those in a strong economic position receive the highest revenues.</p> <p>Municipalities have limited influence over a large portion of their tax rates, with the exception of the business tax rate.</p>	<ul style="list-style-type: none"> – Many German municipalities lack the financial resources for crucial investments in infrastructure. – Temporary, project-based subsidies from the federal government do not offer a long-term solution and require significant resources from municipalities to secure and maintain.

Therefore, climate protection and sustainability should be understood as mandatory community—and consequently municipal—tasks across all sectors, and they should be assured with appropriate foundational funding from the federal government. The German Federal Constitutional Court issued a significant ruling on this matter in 2021. This ruling, which concerned the federal government’s national Climate Protection Act, implies that, in addition to the federal level within Germany’s multi-level system, the federal states and municipalities must also be provided with improved foundational conditions for their commitment to sustainability. The ruling states:

“Article 20a of the German Constitution includes the necessity to treat the natural foundations of life with such care and to leave them to posterity in such a condition that future generations can continue to preserve them not only at the price of radical abstinence themselves.”

The discussion surrounding dilapidated municipal infrastructure and the substantial investment backlog in municipalities in Germany is not new. In this context, numerous methodologically diverse surveys estimate the extent of the investment need. The results of these studies offer an insight into the financial outlay required to eliminate the investment backlog and adapt infrastructure to new challenges, such as climate change adaptation, an ageing and inclusive society, and digitalisation. What all these analyses share, regardless of their methodological approach, is the conclusion that there is a significant, unmet investment need in municipalities. Furthermore, it is becoming increasingly clear that structural financing changes are necessary. A mix of instruments comprising three central elements is required for this (Hesse, 2024):

- i Strengthening of municipal tax revenues
- ii Reduction in municipal social spending and strengthening of federal government allocations

iii Stabilisation and simplification of funding programmes.

A second question, which can be derived from the city's financially challenging situation, examines the legal and organisational aspects of a circular urban transformation.

4.2 Circular urban transformation—a new direction?

The legal framework and the procedure for the design of new buildings is highly standardised in Germany. In contrast, circular approaches, such as the reuse of existing buildings, temporary use of buildings, urban densification and the revitalization of brownfield sites are complex to implement and not sufficiently standardised to date. They require adequate financing, specialised and enough personnel and expertise as well as the cooperation of urban planners, property owners and investors. This makes it more difficult to transform existing structures to meet existing demands than it is to plan new buildings on greenfield sites (Malburg-Graf, 2018). Furthermore, a demand for residential and commercial spaces can also be a reason for municipalities to operate land consumption. However, as mentioned above, municipalities also take land without demand to attract new households or companies (“Angebotsplanung” in German).

The enduring popularity of new developments is ensured not only by financial incentives but also by emotional and historical motives. Living in a newly built single-family home remains the goal of many people (Bizer et al., 2018). In many parts of Germany, detached houses dominate residential areas, providing a tangible representation of this aspiration. Even politicians use the vision of a detached house to generate votes as they promise new development areas and modern living. However, it has not been widely recognised in discussions on municipal level that this counteracts sustainability goals and has negative environmental impacts. Local authorities often make land use planning decisions in their own interests, aiming to improve their budgets and increase their electoral popularity, but also depending on trend-setting decisions in their federal state (Siedentop et al., 2009). In doing so they consider overarching sustainability policy goals as well as current spatial planning principles such as compact urban development not enough.

However, there are many buildings or building parts that could be (re)used instead of constructing new houses on green fields. Circular Cities or Circular Urban Planning are holistic economic and urban planning concepts for municipalities that aim to transform cities and their functions from a linear “produce, use, dispose” economy to a continuous cycle of value preservation and resource optimisation. It is a further development of the concept of the circular economy that takes particular account of the spatial dimension (Deutz et al., 2024) as well as social and political aspects in cities (WEF and PwC, 2018; Williams, 2023; Winslow and Coenen, 2023). However, concepts of the circular economy are diverse and sometimes even controversial. According to Winslow and Coenen (2023) two main strands can be distinguished:

- a) The *mechanistic or technocratic Circular City* view rather looks at cities or municipalities as a man-made system that can be efficiently organised through technical systems and routines.

The focus is on decoupling economic growth and resource consumption through engineering solutions and closed-loop systems for materials, water and waste (Christensen, 2021; Swilling et al., 2013). Quantitative measurements and standardised approaches that are easy to commercialise often dominate here. This strand comes from the far-advanced waste management sector and economic circular economy debate, introduced by the European Commission (Domenech and Bahn-Walkowiak, 2019).

- b) The *vitalistic or socio-ecological post-growth city* view rather sees cities as a living entity and emphasises the relational perspective of circularity, which considers it impossible to separate economy and ecology (Savini, 2024). The focus is on a transformation that better harmonises the economy with planetary systems, primarily through less materialistic lifestyles, equitable resource distribution and ecological regeneration (Lamker and Dieckhoff, 2020; Schmelzer and Vetter, 2020; UBA, 2020). The initiatives referred to are often small-scale, community-orientated and politically motivated (e.g., transition towns, urban gardening). However, they are often dependent on external funding and difficult to anchor in established institutional structures. This strand is rather inspired by social movements in urban centres and sometimes originating from student initiatives, such as “Utopia City” (Wanner et al., 2024). However, there are also numerous traditional associations that can be revitalized. For example, gentle and ecological tourism is part of the 130-year history of the Friends of Nature movement, whose founding fathers and mothers wanted to offer workers recreation and further education in nature. Thus, it is possible to draw on traditional experiences that could experience a renaissance. These include the so-called allotment garden associations, in which experiential knowledge, for example, about seasonal and regional fruit varieties, biodiversity, and subsistence farming, can be utilised. In the so-called settlers' associations, which emerged as organised group self-help, houses and entire settlements were built communally, with mutual aid being the primary focus.

Synthesising approaches attempt to use the contradictions between these approaches to promote learning processes and transformations instead of favouring only one side (Winslow and Coenen, 2023). More sophisticated differentiations may be found in Calisto Friant et al. (2023) and (2025).

The post-growth city debate and the circular city debate do not originate from the same background, but are nonetheless worth discussing together. They share certain objectives and the instruments are partly compatible and complementary. The promotion of local solutions and the involvement of communities and stakeholders is central to both concepts. The post-growth city emphasises fostering local communities and shifting production closer to consumption (Gärtner and Schepelmann, 2020). The Circular City emphasises the collaboration with citizens, businesses and the scientific community and the development of new local economies (Circular Economy Initiative Deutschland, 2021).

Closing resource cycles by keeping products, components and materials in the economic cycle for as long as possible in order to

reduce resource consumption and waste generation (including strategies such as reuse, recycling and recovery) can be regarded as the core principles and objectives of a circular economy (Neue Effizienz gGmbH, 2024; WEF and PwC, 2018; Williams, 2023). However, if the idea of sufficiency is to be included in the context of urban planning, then the aim is to reduce the absolute consumption of energy and materials and it has to be scrutinised how much mobility, living space or energy consumption is actually necessary within the community (Bierwirth and Buschka, 2025). Distribution and redistribution thus become key words. Sufficiency aims to redistribute existing resources (e.g., living and commercial space, transport space) instead of further growth (Böcker et al., 2020; Brokow-Loga and Eckardt, 2020; Graaf et al., 2024; Lage et al., 2023). The focus is on the densification of existing areas and the conversion of brownfield sites to prevent the loss of open landscapes, agricultural land and ecological habitats (ARL, 2021; UBA, 2023). Instead of monofunctional separation of living, working and leisure, new neighbourhoods should be functionally mixed and enable short distances in order to reduce traffic and space requirements (Altrock, 2022; Böcker et al., 2020). When land is newly utilised, an area of the same size for settlement or transport must be returned to nature elsewhere (“Zubau-Rückbau-Regel”) (ARL, 2024).

The handling of “urban obsolescence” (of often former commercial spaces) plays a key role in this context: the “obsolete city” (Robert Bosch Stiftung, 2023) views vacant buildings and spaces that are no longer used due to social changes (e.g., digitalisation, transport transition) as a crucial resource for inner-city development. By transforming these spaces and buildings, an orientation towards the common good, affordable housing, resilient neighbourhoods and new infrastructures for the energy and transport transition can be created. Informal and communicative planning instruments, such as real-world labs and exchange formats that are interlinked with formal planning, are crucial for this. The use of land policy instruments, such as redevelopment law, is recommended in order to steer these transformations.

4.3 Are there synthetic solutions to both of the aforementioned problem areas?

In line with a holistic approach, we combine both strands of discussion and propose a more integrated view of concepts for sustainable urban development in conjunction with sustainable financing of municipal budgets. New land developments and consumption are institutionalised practices that are supported by existing structures in Germany. In order to change this complex situation, several conditions must be altered. Some of these seem difficult to change as they concern individual, sometimes even emotional preferences. Based on our review of the existing literature and our data analysis, we propose the following theses for further discussion:

- Current framework conditions make circular and sustainable land use and building difficult, particularly due to municipal revenues and growth expectations.
- Municipal financing would need to change, and more support would be required, such as funding programmes, a stronger focus of building law on existing buildings, useful guidelines and trained personnel with the necessary expertise for implementation.

- Motives/narratives in the population ensure a demand for newly built (single-family) homes (and possibly for growth expectations), but do not address the social and ecological follow-up costs.
- Regulatory measures (building bans) and a national moratorium on the sealing of new areas could be helpful.
- A competitive component could also be conceivable in this context, e.g., certificates for the sealing of land could be developed, similar to CO₂ trading. Renaturation measures could then receive an economic incentive.

Climate protection and sustainability have to be understood as binding tasks of local authorities in all sectors and secured with corresponding basic funding from the federal government. The judgement of the Federal Constitutional Court in 2021 underlines the need to offer federal, state and local authorities improved framework conditions for their commitment to sustainability. This could be a permanent strengthening of municipal tax revenues and the stabilisation and simplification of funding programmes. Project-based subsidies are no long-term solution, as they often require municipal contributions and tie up resources for the application process, while the long-term financial commitment to sustainability is insufficiently addressed.

4.4 Limitations

This investigation is subject to several limitations. First, its exploratory nature must be acknowledged, largely due to the limited previous research available on the complex relationship between economic growth pressure, circular economy and land consumption. Second, our detailed data analysis provides only a cross-sectional assessment, offering a snapshot in time rather than depicting long-term temporal trends or developmental trajectories. Consequently, it may be affected by unforeseen, non-generalisable, idiosyncratic events that occurred within specific municipalities during the observation year.

Illustrative example: Idiosyncratic events.

For instance, the construction of the so-called Tesla Gigafactory Europe in the small municipality of Grünheide (population under 10,000) in the Oder-Spree district required the immediate consumption of 300 hectares of land (Piepkorn, 2023). Following this development, Tesla paid approximately 6 million Euros in business tax, compared to the municipality's total 2022 budget of around 20 million Euros a very high sum (Langenbacher, 2023; Richter and Kerry, 2023). However, this corporate settlement was less a result of municipal strategy and more driven by a national interest in attracting the investment. The geographical proximity of Grünheide to the federal capital (approx. 30 kilometres from Berlin-Brandenburg Airport) and the pre-existing availability of a large site that was previously prepared for another industrial settlement (which subsequently withdrew) (Petersdorff and Krauss, 2024).

Unaccounted inverse effects: The current analysis is also unable to capture inverse single-occurrence effects. For example, some municipalities may have lost substantial industrial areas due to ongoing transformation processes (such as in the coal region), with these sites subsequently being partially re-greened. In such cases, the proportion of green space may increase despite a financially stressed municipal budget, a counterintuitive outcome that is not reflected by a simple cross-sectional growth analysis.

5 Conclusion

The analysis of the current political and financial systems in Germany indicates a structural bias towards economic growth which conflicts with sustainable urban development goals. This is primarily a result of the tax revenue distribution system, which creates a systemic disadvantage for financially struggling municipalities. Although the quantitative data analysis suggests only a loose and statistically insignificant correlation between overall financial pressure and land consumption, the literature confirms that low-income municipalities face a stronger incentive to promote land consumption as a necessary means to generate revenue, thereby confirming fiscal pressure as a driver.

The federal government and the federal states emerge as the key actors responsible for addressing these systemic issues: they must harmonise conflicting political objectives and legal frameworks, and they must tackle the budgetary imbalances between local tax revenues and mounting expenditures for social and public services. Furthermore, they need to abolish environmentally harmful subsidies that continue to encourage land-intensive development and competition among municipalities instead of promoting sustainable practices and cooperation. Sustainability and climate protection need to be upgraded to mandatory tasks at the municipal level, thus leading to new priorities and a competition for sustainability ideas and quality of urban life (amenities, services, and environment).

The municipalities are called upon to take a pro-active role by shifting their focus from growth-oriented to circular urban strategies, considering both the technical solutions and the socio-ecological perspective. This shift also requires the active involvement of citizens and a targeted cooperation of urban planners, architects, housing companies, and construction industry to drive forward the improved use and conversion of buildings, spatial densification, better distribution of living space, and the functional mixing of neighbourhoods, to reduce resource and land requirements. However, without a stable financial architecture to be established by higher levels of government beyond project-based support programmes, the local implementation of sustainable, circular post-growth concepts remains hindered.

Based on the findings in this article, we see a clear need for research into how precarious municipal budgets and investment strategies can be successfully integrated with circular urban planning. Furthermore, there are no scientific studies on whether municipalities with financial difficulties face greater hurdles in imposing requirements on investors in the field of circular and resource-efficient construction and land use. Reliable findings are also needed to determine how investments in land recycling, the flexible use of residential and commercial space, and the reuse of existing buildings can be designed more effectively and economically amortised. Last but not least, research is needed to investigate which specific incentive systems are effective for private and public actors and how innovative financing instruments can be integrated into existing challenging budgetary and financing structures.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

Author contributions

BB-W: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. OW: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. CK: Data curation, Formal analysis, Investigation, Writing – original draft.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/frsus.2025.1664706/full#supplementary-material>

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