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Standardising green city performance: multiple framings and overflows

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Abstract

Purpose – This study aims to address the roles and consequences of multiple framings shaping the process of green city standardisation, specifically by focusing on national and local efforts to define and operationalise green city performance within Turkish municipalities.

Design/methodology/approach – This interventionist study is based on in-depth interviews, focus group workshops, participant observations, document analysis and case studies. Data were collected between June 2020 and March 2023 during three focus group interviews, over 12 hours of observations and 28 interviews with managers and professionals involved in green city projects across 6 municipalities and ministries in Turkey, as well as European municipalities involved as dialogue partners for developing the green city framework in Turkish municipalities.

Findings – Illustrated by a case study in Turkish municipalities, we found that green city standardisation entails at least three framings: (1) social and environmental framings, (2) economic framings and (3) governance framings. The interplay between these framings produces overflows that do not merely disrupt but also redirect and reinforce standardisation, demonstrating how coherence is continuously negotiated rather than given. These overflows reshape how sustainability is enacted across environmental, social and economic dimensions.

Originality/value – This study advances sustainability accounting research by showing how overflows function as constitutive mechanisms through which green city standardisation efforts are sustained and reshaped in practice, highlighting the dynamic and contested nature of sustainability governance and metrics.

Keywords Standardisation, Framing, Green cities, Interventionist research

Paper type Research article

1. Introduction

As the climate crisis intensifies and the window for meaningful action narrows, the call for systematic transformation grows increasingly urgent. In this context, accounting has emerged not merely as a technical tool but as a site of contestation and great potential, a discipline implicated in how societies understand, manage and respond to environmental challenges (Bebbington and Unerman, 2018; Chung and Cho, 2018; Guthrie and Dumay, 2021). From

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enabling carbon markets to shaping corporate disclosures, accounting practices have begun to influence the terms on which sustainability is pursued and evaluated (Busco *et al.*, 2013; Cederberg and Sjögren, 2025; Chua *et al.*, 2024).

Sustainability accounting is at the heart of this development: a set of evolving practices aimed at quantifying environmental impacts and integrating them into organisational and societal decision-making (Hopwood, 2009). Yet, as sustainability accounting has become entangled with expanding regulatory frameworks and standardising efforts, its role has grown more complex and, at times, more ambiguous (Busco *et al.*, 2020). While the rise of non-financial reporting and carbon accounting reflects a growing awareness of ecological limits, the dominance of economic framings risks narrowing the transformative potential of these tools, privileging calculability and market logic over ecological and social justice (Bui *et al.*, 2024; Cook, 2009; Hartmann *et al.*, 2013). There is thereby a growing concern that sustainability accounting is at risk of becoming a formalistic or procedural exercise that measures and reports but fails to engage with the deeper questions of sustainability and responsibility (Busco *et al.*, 2018). This article takes up that concern.

This study focuses on the standardisation of *green cities' performance*. Sustainability accounting in urban contexts plays an important role in tackling grand challenges such as climate change, social equity and economic resilience (Argento *et al.*, 2025). These are described as large-scale, complex societal problems requiring coordinated, multi-actor solutions over the long run (George *et al.*, 2016). Developed by the *European Bank for Reconstruction and Development (EBRD)*, the *green cities framework* aims to address cities' climate change challenges while tackling municipalities' budgetary constraints and limited capacity to structure and deliver "*bankable" projects*, thereby building the market case for private sector investment in sustainable urban infrastructure (EBRD, 2019). We approach the green city concept as an attempt to frame cities in (un)intended directions together with their overflows (Callon, 1998a). Earlier research on green cities has predominantly focused on technological aspects, highlighting innovations to address urban sustainability challenges (Mora *et al.*, 2017). Within the accounting literature, sustainable cities are often conceptualised as complex systems where urban nature is framed in controllable and optimisable processes designed to enhance efficiency (Argento *et al.*, 2020; Grossi *et al.*, 2020).

Central to this approach is the role of standards, which serve as critical tools for governing these systems and enabling the precise measurement and regulation of information flows (Brorström *et al.*, 2018). Standardisation is often celebrated as a solution to complexity, leading to uniformity across different times and places (Brunsson, 2000). By setting benchmarks, defining performance indicators and establishing common procedures, it promises unity, comparability and clarity in governing sustainability transitions. In the context of green cities, standardisation appears to offer precisely this: a way to align urban sustainability with global climate goals while ensuring that municipalities remain accountable through effective performance measurement. The problem is not only how green city standards are implemented but also how they are continually remade in the interplay between different framings and their overflows. Against this backdrop, our research asks: *How do cities standardise green city performance in the face of multiple and competing framings, and how do the overflows emerging from these framings challenge or redirect standardisation efforts?*

Illustrated by a case study in Turkish municipalities, we argue that green city standardisation includes (at least) three framings: (1) social and environmental framings, (2) economic framings and (3) governance framings. Firstly, the green city concept concerns the transformation of cities into environmentally and socially sustainable entities (Bourmistrov and Mouritsen, 2022). Secondly, by enabling markets and private actors, the green city concept aligns with neoliberal ideologies, pushing cities into marketisation and diverting focus from urgent urban problems (Bracking, 2019; Grossi and Pianezzi, 2017). Thirdly, since the concept involves multiple and contested objectives (Grossi and Trunova, 2021; Bekier and Parisi, 2023, 2025) and deals with multifaceted realities (Stafford *et al.*, 2020), it contains complex political processes with skewed or uneven power relations between

multiple actors (municipalities, central governments, creditors and other stakeholders). These (three) framings require different standards and governance practices and produce diverse accounting tools (Christensen and Skærbæk, 2007), leading to competing pressures on municipalities.

The appearance of a unified green city standard is, in fact, constructed out of a multitude of interacting framings – namely, environmental and social, economic and governance – that are dynamic, contradictory and frequently in tension with one another. What is expected to be a monolithic framework is instead the outcome of ongoing negotiations, adjustments and overflows. This tension between the unity of standardisation and the multiplicity of framings constitutes the central problem addressed in this paper. While prior research has often treated standardisation as a technical or neutral process, we show how standardisation in practice is a negotiated outcome of competing rationalities, each shaping what counts as "green", what is prioritised and how sustainability is accounted for.

In this paper, we make three contributions. First, we extend the concept of overflows (Callon, 1998a) by showing that, in contexts shaped by multiple framings, overflows do not simply disrupt standardisation but also redirect and reinforce it, continuously reshaping what counts as a green city. Where prior research has highlighted how sustainability standards shape actions (Bouten and Hoozée, 2013; Busco *et al.*, 2013; MacKenzie, 2009), we advance this understanding by demonstrating not only that different framings coexist (Mouritsen *et al.*, 2022) but also that they interact in ways that reshape the process of standardisation. Second, we contribute to the literature on sustainability accounting by illustrating how calculative practices such as metrics, benchmarks, credit ratings and reporting are embedded within and shaped by interdependent framings, in this case environmental, economic and governance, which generate recursive effects on measurement, funding and implementation. Third, we contribute to previous studies on standardisation by empirically demonstrating how standard-setting practices are enacted, negotiated and contested across different institutional arenas, revealing the political and situated nature of sustainability standards and their role in shaping urban futures. Across these contributions, the novelty of our study lies in showing that overflows do not merely destabilise standardisation but actively sustain and redirect it, positioning them as constitutive mechanisms through which green city standardisation efforts are continuously reshaped in practice.

The remainder of the paper is organised as follows. Section 2 outlines the theoretical framework based on theoretical concepts of standards and framing, informing the subsequent analysis. Section 3 illustrates the empirical context and research method. Section 4 presents the empirical findings for the Turkish cities. Section 5 analyses and discusses the findings from the empirical research and concludes the paper.

2. Framework

Although existing research on green cities and sustainability governance has developed important insights into performance measurement, digital innovation and infrastructural reform (cf. Mora *et al.*, 2017; Grossi *et al.*, 2020), there is a tendency to assume standardisation is a technical or managerial process. It is less clear how multiple and sometimes conflicting framings of what constitutes a "green city" shape and are shaped by attempts to standardise performance. Previous literature has paid limited attention to standardisation's unintended and recursive outcomes, particularly how calculative practices can create tension or prompt contextual adaptations. This constitutes a critical knowledge gap, especially in grand challenges, where governance systems must coordinate across several, often fragmented, jurisdictions.

2.1 Green city as a standardisation process

Standards are central in designing, financing and implementing urban projects (White, 2021). They shape the definitions of city data and the components included within these definitions

and influence the organisational strategies for implementing the green city concept (White, 2019). Standards serve as tools to govern and regulate processes by establishing formal definitions, frameworks and methodological boundaries through legislative processes. These tools empower administrators to acquire and apply definitional power (Bellantuono, 2014; Borraz, 2007; Mukhtar-Landgren and Paulsson, 2021), often involving standards struggles (Markard and Erlinghagen, 2017).

We approach standardisation as a dynamic process (Brunsson *et al.*, 2012) based on a socio-material contextualisation (Callon, 1998b), rather than a ready-made, stable product. This means standardisation represents a specific way to organise interactions between human and non-human actors (Higgins and Larner, 2010). Standardisation is constructing uniformity across time and space by generating agreed-upon rules (Gustafsson, 2020). While standards are often described as voluntary rules that apply broadly (Brunsson *et al.*, 2012), sometimes even *ruling the world* (Gustafsson, 2020), it is not possible to apply a universal set of standards across all cities (Esposito *et al.*, 2021). Each city possesses unique socio-economic and socio-technical contexts, leading to different challenges and solutions (Esposito *et al.*, 2021). In line with this, it is uncommon to find situations where only a few standards address the same issue (Timmermans and Epstein, 2010). Because they shape the organisation of activities (Brunsson, 1997), standards have a range of conflicting effects. They can provide a distinct way of performing calculations and rendering organisations measurable (Higgins and Larner, 2010; Miller *et al.*, 2010), transform organisations into quantifiable entities (Lampland and Star, 2009), promote commensuration (Espeland and Stevens, 1998) and affect the devices used for calculation (e.g. Polzer *et al.*, 2021). At the same time, standards can reduce the number of possibilities to consider, resulting in unwelcome and potentially harmful intrusions into the professional discretion of individuals and organisations (Brunsson, 2000).

Standardisation efforts for green cities are aligned with the development of city indicators (White, 2019, 2021) and metrics (Joss *et al.*, 2017). To make cities *green*, standards have evolved into entities that make the city calculable and reportable (Brorström, 2018; Brorström and Parment, 2016; Czarniawska, 2010; Lapsley *et al.*, 2010). Once an urban standard is stabilised, it can provide clarity by offering standardised metrics and benchmarks. Still, it may also introduce rigidity, potentially constraining the involvement of actors in urban projects in various ways (Baskerville and Grossi, 2019). This contradictory role of standards, intended to simplify processes and ensure quality, yet often contributing to ambiguity and complexity in the organisation of green cities, aligns with the contextualisation of cities as arenas for "measuring, quantifying, and visualizing urban dynamics" (Grossi *et al.*, 2020, p. 634). While standardisation aims to systematise calculation methods, it can also complicate the context, with an additional layer of complexity arising from the diversity of standards that are often created by external actors, such as consultants, professionals, government representatives and experts (Reinecke *et al.*, 2012). These standards often consider engagement and dialogue as mere democratic rhetoric without taking them seriously (Aleksandrov *et al.*, 2022).

We approach standards as calculative practices. By this, we mean that standards do not simply prescribe technical requirements but actively shape how organisations classify, compare and evaluate phenomena (Vosselman, 2022; Vosselman and De Loo, 2023; Fırtın, 2023, 2024). Standardisation is therefore a means or device for structuring how calculations are made (Miller and Power, 2013). Through this structuring role, standards transform organisational work into comparable numerical forms, enabling calculation across different sites and actors (Fırtın and Karlsson, 2020; Fırtın and Kastberg, 2020). Consequently, standards may be integrated into calculative practices, such as rankings (Aleksandrov *et al.*, 2022; Pollock *et al.*, 2018; Sauder and Espeland, 2009), performance indicators, benchmarks (Argento *et al.*, 2020; Brorström *et al.*, 2018) and metrics (Viengkham, 2017; White, 2021), as well as broader guidelines and procedures that shape organisational processes (Brunsson, 1997). In these contexts, standards provide the categories, thresholds and formulas that make calculation possible, giving rise to comparable scores, indicators and classifications. Standardisation influences organisational practices within this framework by directing them

in specific ways. Once calculations are standardised, they begin to structure priorities, resource allocations and accountability relations (MacKenzie *et al.*, 2007). Organisations act upon the numbers that standards help produce. However, multiple standards introduce different organisational pressures, sometimes leading to conflicts (Reinecke *et al.*, 2012). The conflicted nature of standards and related metrics is often treated as a contested concept shaped by multiple interests and ideologies.

2.2 Framing cities as green cities and overflows

Consistent with our perspective of standardisation as a dynamic process (Brunsson *et al.*, 2012) that is organised and sometimes sustained by socio-material networks (Latour, 1990), we consider the organising efforts in and around the green city concept as accounting (Miller *et al.*, 2010), since these projects aim at making cities measurable (Lapsley *et al.*, 2010) and reportable (Brorström *et al.*, 2018). The process involves constructing metrics and benchmarks that enable comparisons between cities to measure their level of being green (Karppi and Vakkuri, 2020). It also encompasses the development of (performance) indicators that set targets for achieving desired levels of being green and monitor progress in these efforts. Green city projects and projections involve moments of prioritisation, such as financing and implementing projects, which share similarities with standardisation objectives. This implies that many actors participate in standardising a city as a green city in various ways. These include, for example, international certifications, efforts to establish national standards, municipal units, professionals, national and local politicians, city citizens, databases, security cameras, sensors and spreadsheets. Indeed, the list can vary in length depending on the specific aspect of standardisation one chooses to focus on (Nicolini, 2009). Within this assemblage, neither actors nor their interactions remain stable; instead, they are highly contextual (Callon, 1998a; Latour, 1986). Thereby, we shift focus from viewing "green" as an assumed starting point (cf. Mora *et al.*, 2017) towards understanding its "framing" as an ongoing organising process (Kornberger and Carter, 2010).

Drawing on this, green city projects can be viewed as framing devices, given their ultimate objective of standardising the cities in certain ways "to define agents [a Green City] who are clearly distinct and dissociated from one another [a non-Green City]" (Callon, 1998b, p. 17). Standardisation for the green city thus anticipates and prescribes that performances should adhere to specific guidelines. Based on the frame analysis introduced by Goffman (1974), Callon (1998a) discusses the socio-technological construction of markets and provides the example of framing with the construction of *homo economicus*. This entity influences how expectations are structured in a contractual relationship, such as the pursuit of interest maximisation between vendors and purchasers. Framing is achieved through epistemic objects (Knorr-Cetina, 1997), in which the idea (microeconomic theory or International Organization for Standardization standards) sets the stage, shaping the expectations of the participating actors (Goffman, 1974).

Empirically, however, framing rarely works perfectly. There are often deviations, which Callon (1998a) refers to as "overflows", representing instabilities while enacting an epistemic object within human-non-human actors and challenging the framing programme. Overflows are "the rules and not the exception" of a framing (Callon, 1998b, p. 6). In the interest of maximisation, (environmental) externalities represent unforeseeable and incalculable overflows that disrupt contractual relationships (Chua *et al.*, 2024). While framing establishes actors regarding certain expectations, reality rarely unfolds precisely as envisioned. Therefore, Callon (1998a) considers overflows to be the norm. With standards, we anticipate overflows stemming from the "rules for the many" (Brunsson *et al.*, 2012, p. 616) because standards themselves are often far from being completely stable (Timmermans and Epstein, 2010).

Kastberg (2014) has shown that accounting is not merely a framing device but can also create overflows and destabilisation in the interplay between framing and overflowing.

Similarly, Christensen and Skærbæk (2007) have demonstrated that accountability innovations have failed to achieve their intention of enhancing transparency for the public. Instead, they have brought about unexpected consequences and overflows that have reshaped the accountability framework. Similar findings have emerged regarding the relationship between the setters and users of standards (Durocher and Georgiou, 2021). We, therefore, view standardising efforts for the green city as framings that guide green city initiatives while acknowledging their potential to introduce overflows that create unforeseen and unintended organisational challenges for cities.

Drawing on framing and overflows, efforts to standardise the green city influence actors to move partly in programmatic directions, aligned with the different definitions, constructions and arrangements of the green city ideal, while also generating unintended actions and outcomes resulting from overflows. This suggests that multiple framings and overflows will be at play, as the *standardised* green city ideal encompasses diverse descriptions and performances. In this regard, sustainability accounting has already been shown to be subject to multiple framings (Christensen and Skærbæk, 2007). Callon (2009) conceptualises carbon markets as framed within processes of economisation, politicisation and technocratisation, revisited as ecologisation in a recent work (Callon *et al.*, 2025), emphasising that the organisation of activities related to market design can never entirely pre-determine and fully predict the market function *in vitro* (laboratory) but can unfold *in vivo* (real life). "Carbon markets . . . produce issues, matters of concern that no one is sure whether they should be addressed politically, economically or techno-scientifically" (Callon, 2009, p. 542). Similarly, Chua *et al.* (2024) study the practice of the carbon market and show that designing and structuring the market function visualises the project as achieved and achievable in the future. In the case of green cities, standardisation can become a process of organising outside formal organisations and, therefore, should be perceived as a powerful mechanism where rules are voluntary and difficult to control. The green city is not a pre-existing entity but a projected design of cities, and achieving green city standards unfolds between situated negotiations, contestations, material interventions and organisational adjustments. *In vitro* descriptions of green cities emphasise their role in promoting environmental and social sustainability, positioning them as solutions to climate change and urban resilience. However, green city projects are simultaneously embedded within a banking dynamic, where sustainability initiatives attract financial investments, loans and speculative capital flows. This means that economisation becomes integral to how green cities are realised. Beyond their economic dimension, green city investments are also inherently political decisions shaped by governance structures, regulatory frameworks and ideological positions. This results in politicisation, with green city projects becoming contested terrains of power, claim-making, inclusion and exclusion. This perspective suggests that green city standardisation be analysed through its intended environmental and social goals and the overflows emerging from the entanglements of governance and economic framings. In practice, this means that the standardisation of the green city involves continuous adjustments, as unforeseen consequences challenge initial framings and necessitate new forms of adaptation.

In our approach, framings serve as the overarching theoretical lens that structures the analysis. We thereby consider standardisation a dynamic process involving human and non-human actors. Standardisation is examined as the empirical process under study, while accounting captures the calculative practices through which framings are operationalised. Governance, together with environmental and economic perspectives, is analysed as one of the interrelated framings. Taken together, this integration of concepts provides a coherent analytical frame for understanding how green city standardisation emerges and becomes contested. For instance, from an environmental and social framing, a standardised green city would reduce environmental impacts and increase biodiversity; meanwhile, from an economic framing, standardisation would emphasise efficiency, investment and performance metrics. From a governance framing, the green city would be framed around the inclusion of multiple ideologies and participatory governance based on a dialogic decision-making approach. We

expect all these framings to be in play, compete and have distinct overflows challenging the green city standardisation.

3. Methodology

3.1 The research context

As in many countries, the green city concept in Turkey remains an emergent and evolving policy domain. While the implementation of green urban initiatives is often still at an early stage, municipalities are increasingly engaging in strategic efforts to align with international sustainability agendas through climate action planning, energy transitions, infrastructure investments and institutional restructuring (Demirel and Mülazımoğlu, 2022). We interpret these developments as part of the "becoming" of green cities (Karppi and Vakkuri, 2020), a continuous process shaped by aspirations to render urban environments more measurable, standardised and governable (Lapsley *et al.*, 2010). This becoming is rarely linear or locally autonomous; rather, it is mediated by transnational financial institutions (FIs), consultancy-led planning processes and conditional funding mechanisms, such as those introduced through the EBRD's Green Cities Programme. While these mechanisms introduce technical expertise and planning frameworks, they also impose standardised methodologies that do not always align with local institutional capacity, data availability or jurisdictional authority. Municipalities often struggle with fragmented responsibilities, particularly in policy areas such as air quality, transport emissions or energy regulation, which are frequently managed by central governments or external actors. This creates administrative and political limitations for local governments, which are often expected to deliver measurable environmental outcomes without full control over the necessary levers of change. Moreover, the creation and use of performance indicators are constrained by gaps in environmental data, limited monitoring infrastructure and difficulties in attributing environmental change to specific interventions. These constraints mean that urban sustainability planning often functions more as a framework for prioritisation and visibility than as a fully implementable or enforceable policy instrument. As such, our methodological approach treats green city planning not as a stable or unified model but as a socially and politically embedded process that reflects uneven capacities, hybrid governance structures and contested success metrics.

3.2 Data collection

The empirical data were acquired using an interventionist case study approach (Langley and Klag, 2019; Lukka and Wouters, 2022), specifically through in-depth interviews, focus group workshops, participant observations and document analysis. Data were collected between June 2020 and March 2023 in collaboration with a project titled "Turkey & Europe | An Integrated Service-Device-Technology Roadmap for Smart and Green Cities Project". This project was initiated by the Turkish Industry and Business Association (TUSIAD) in partnership with the Turkish Enterprise and Business Confederation and Institut du Bosphore & Berlin Bosphorus Initiative. Özyeğin University-TUSIAD Sustainable Development Forum served as the knowledge partner.

3.3 Interventionist approach

Drawing on the interventionist approach (Lukka and Wouters, 2022), the researchers and stakeholders selected the themes for the meetings collaboratively, guided by preliminary interviews with project partners and prior desk research. The focus group sessions provided a platform for the participants to reflect on and discuss these themes. The document analysis was applied to various documents, including policy guidelines, strategy and action plans, and PowerPoint presentations from stakeholders participating in the roundtable meetings.

Active intervention had two focuses: navigating close to the empirical case to facilitate richer data collection while also avoiding the risk of going native for the sake of maintaining

reflexivity. On the one hand, researchers facilitated meetings, invited stakeholders and designed themes that provided a framework for roundtable meetings. This active engagement aimed to foster meaningful dialogue and collaboration among participants. On the other hand, researchers adopted a reflexive stance, to maintain *professional distance* and avoid contaminating or becoming contaminated by the empirical field (going native) (Langley and Klag, 2019) to maintain critical reflexivity (Alvesson and Sköldberg, 2017). Moreover, maintaining professional impartiality among the different actors also aimed to capture a variety of opinions and perspectives pluralistically. In this regard, the participant observation was conducted similarly to the focus group interviews.

3.4 Case study and document analysis

A case analysis was employed to analyse the EBRD's Green Cities Programme in Izmir, Turkey. The analysed documents included interim and progress reports and official documents published by the municipal governments. Other documents were also collected, including policy documents guiding the national smart cities strategy and action plans, a digital library known as the "smart city corpus" compiled and presented by the Ministry of Environment, Urbanism and Climate Change (Smart Cities Strategy and Action Plan, 2022), PowerPoint presentations and written comments provided by the participants during the roundtable discussions.

3.5 Interviews and focus groups

The empirical material consists of semi-structured interviews and focus groups conducted with managers and municipal professionals involved in green city projects. The interviews were carried out in two formats. Some were conducted face-to-face during site visits to municipalities, while others took place through digital meeting platforms. Interviews conducted in Turkey were carried out in Turkish, whereas interviews with municipalities in the European Union (EU) countries were conducted in English. Both Turkish-speaking authors of this manuscript participated actively in the data collection process, which included conducting interviews, facilitating conversations and clarifying technical or administrative terminology when needed. The interviews focused on themes related to smart and green city transitions, sustainability strategies, digitalisation processes, data integration practices and the governance challenges associated with implementing green city frameworks. In total, 28 in-depth interviews and three focus groups were conducted with relevant stakeholders (Table 1).

Municipal data were collected from six selected cities: Istanbul, Ankara, Izmir, Gaziantep, Konya and Bursa, of which four (Istanbul, Ankara, Izmir and Gaziantep) are part of the EBRD Green City programme, with Istanbul, Ankara and Izmir being Turkey's three most populous cities. Gaziantep, one of Turkey's fastest-growing cities due to the influx of Syrian migrants over the last decade, was included as a pioneer in urban project initiatives and for having received international funding. Bursa and Konya were included to assess political party presence and diversity in local governments.

The data included 3 focus group interviews, over 12 hours of observations and 28 interviews with managers and professionals involved in green city projects across 6 municipalities and ministries in Turkey, together with European municipalities involved as dialogue partners for developing the green city framework in Turkish municipalities. The European dialogue partners are the experts providing comparative insights into how similar green city frameworks have been implemented in different governance contexts. Their perspectives were particularly useful in understanding how green city standardisation processes are transferred, adapted and sometimes contested across different national settings (Esposito *et al.*, 2021). Table 1 documents the respondents. For the participant observations, one researcher actively participated as one of the partners, contributing to the design and facilitation of roundtable meetings. These meetings brought together representatives from Turkey's Ministry of Environment, Urbanism and Climate Change and managers and

Table 1. List of interviewees

Position	Institution
ICT Manager	Ankara Municipality
ICT Manager	Ankara Municipality
Head of the Smart Cities Unit	Berlin Partner
Senior Policy Advisor	British Consulate General
Director	Citylab Berlin
Senior Advisor for Innovation, Technology & Science	Netherlands Innovation Network / Consulate General of Netherlands
Smart Cities and Geographic Technologies Unit Head	Ministry of Environment, Urbanism and Climate Change
Smart Cities and Geographic Technologies Unit Expert	Ministry of Environment, Urbanism and Climate Change
Country Deputy Manager	EBRD
Associate Director at the Infrastructure Division	EBRD
Analyst	EBRD
Partner and Markets and Innovation Leader	EY
Smart City Data Coordination Centre Branch Manager	Gaziantep Municipality
Head of Istanbul Metropolitan Municipality Smart City Unit	Istanbul Municipality
Department Head	İzmir Municipality
Smart City Management Branch Manager	Konya Municipality
ICT Manager	Konya Municipality
Economist, Policy Analyst	OECD
Deputy Mayor	Paris Municipality
Director	Paris Municipality
Director of International Relations	Paris Municipality
Head of Innovation Office	Paris Municipality
Head of Global Business Relations	UK, Department of International Trade
Future Cities and Prosperity Specialist	UK, Department of International Trade
Project Leader	City of Utrecht
Business Development Manager	BSI Middle East, Turkey and Africa
Consultant	ARUP Project Company
Expert	UN Habitat

Source(s): Authors' own construction

professionals from various Turkish municipalities (Istanbul, Ankara, Izmir, Gaziantep, Konya and Bursa), European municipalities (London, Paris, Berlin and Utrecht) and their consular attachés in Turkey. Other representatives included TUSIAD and EBRD, university researchers, non-profit organisations and a range of private technology and consulting companies, from multinational corporations to local start-ups.

One of the researchers co-facilitated three online roundtable meetings, each lasting over 12 hours and typically including approximately 50 participants. Three main themes were selected collaboratively, based on preliminary interviews with the project partners and prior desk research: (1) data management in green and smart cities; (2) access to finance for green and smart cities and (3) disaster control and disaster risk management in green and smart cities. The meetings were designed to provide the participants with opportunities for reflection and discussion on these three thematic areas.

3.6 Data analysis

The collected data were qualitatively analysed to understand the standardisation of the green city. The data analysis was systematically conducted in NVivo12 by creating themes and sub-themes to construct the theoretically aggregated dimensions (Gioia *et al.*, 2013). Considering

standardisation as a dynamic process (Brunsson *et al.*, 2012), we focused on specific actor constellations, activities and ideas in framing the narrative (Callon, 1998a; Goffman, 1974). Like Martinez *et al.*'s (2022) exploration of market territorialisation, we sought to explain the role of accounting within the context of green project initiatives by focusing on specific moments within the process. In this respect, we inductively started constructing a first-order coding of the collected material, closely aligning these initial codes with descriptions in the empirical data. We then grouped these first-level codes into second-order themes, such as *sustainability integration, frameworks and strategies, stakeholder engagement, regulatory alignment, financial strategies and funding and governance*. Building on this, we linked these second-order themes to broader framing categories, namely, environmental, social, economic and governance, to explore how different framings shape the standardisation process. Particular attention was paid to identifying challenges and points of contention – hot situations (Callon, 1998a) – where the overflows associated with these framings became more apparent, revealing how they destabilise networks. Table 2 shows examples of the coding scheme and data structure used to analyse the collected data.

4. Empirical analysis

In this section, we present our findings on green city standardisation through three distinct but interconnected framings: environmental and social, economic and governance. These framings shape how green city initiatives are conceptualised, implemented and evaluated, influencing governance structures and financial mechanisms. First, we explore the environmental and social framing, which emphasises environmental targets, climate resilience and the role of standardised metrics in guiding urban development. Second, we examine the economic framing, where green city initiatives are positioned as financial investments shaped by funding structures, borrowing capacities and branding strategies. Third, we analyse the governance framing, highlighting the role of governance actors, legislative processes and municipal-state relations in the making of green cities.

4.1 Environmental and social framing

The first framing of the green city standardisation process centres on environmental and social dimensions, examining how it is articulated in practice and where it encounters challenges. Rather than following a single trajectory, this framing unfolds through multiple domains of urban sustainability, each associated with specific performance expectations and data practices. While these efforts aim to align local initiatives with broader sustainability goals, they often generate tensions and overflows when standardised indicators encounter contextual limitations.

The concept of the green city has evolved from earlier smart city initiatives, where the focus initially revolved around digitalisation and technological efficiency. Over time, the descriptions have shifted, emphasising environmental and social values, yet the overarching goals remain to create resilient and resource-efficient urban environments. Having signed the Paris Agreement in November 2021, Turkey is revising its national targets, making local and national governments responsible for implementing the green transformation. This shift is driven by the Paris Agreement, which has necessitated a comprehensive study on green transformation. Such a transition is a multi-level process. Rather than relying on generic rules, it is dynamic and encompasses various actors' heterogeneous needs and priorities. The Ministry of Environment, Urbanism and Climate Change published its Smart Cities Strategy and Action Plan (Strategic Plan, 2020), a comprehensive document of over 650 pages. It emphasised that there is no standard definition of a smart city, as the concept is moulded by aligning solutions with specific local needs. While the national-level definition was broad and rooted in strategic policy, at a local level, it evolved into a dynamic process, known as "becoming greener" (i.e. C40 leadership standards). At the national level, the ministry defined a smart city as follows:

Table 2. Data structure

Aggregate dimension		Second order themes	First order concepts
Environmental and Social	Framing	Environmental Sustainability Integration and Urban Development	Integrating sustainability goals into urban development
			Adoption of green technologies
			Managing transition towards agile green operations
			Addressing pollution and energy efficiency
		Frameworks and Strategies for Green City Development	Public-private partnerships for green financing
			Aligning municipal strategies with international standards
			Long-term project sustainability planning
		Stakeholder Engagement and Collaboration	Engaging citizens and stakeholders in Green City planning
			Enhancing collaboration between public/private/NGO sectors
			Standard-setting involvement
	Overflows		Conflicts due to rigid metrics
			Exclusion of marginalised communities
			Economic vs environmental conflicts
Economic	Framing	Standardisation and Regulatory Alignment	Development of standardised Green City metrics
			Ensuring regulatory alignment
			Balancing strict adherence with adaptability
		Financial Strategies and Funding	Exploring financial models for green investments
			Addressing legal barriers to financial access
			Ensuring sustainable investment continuity
	Overflows		Financialisation over prioritisation of social needs
			Standardisation limiting local adaptability
			Digital divides affecting data-driven sustainability
Governance	Framing	Coordination and Control over Green Agendas	Adjusting legal frameworks to support Green City needs
			Overcoming resistance to technological adoption
			Bureaucratic streamlining for green projects
		Human Resources and Capacity Building	Developing human resource capabilities for sustainability
			Inter-municipal collaboration and technical support
	Overflows		Power struggles between central and local governments
			Green city initiatives as political branding
			Bureaucratic inefficiencies delaying implementation

Source(s): Authors' own construction

> More liveable and sustainable cities that are implemented through collaboration among stakeholders, utilizing new technologies and innovative approaches, grounded in data and expertise, and offering solutions that enhance quality of life by anticipating future challenges and requirements. (Strategic Plan, 2020, p. 20)

Within this perspective, smart cities use technologies and their organisational frameworks, focusing on environmental and social values. This broadens the scope of the smart city concept to include both public service improvements and economic development by justifying their actions to become green. The term "smart" encompasses "everything" about environmental issues and climate change mitigation:

> There should be some technology, but everything that is currently being done is labelled as a smart city. (Respondent from Konya Municipality)

> We have a broader perspective on a smart city . . . It not only enhances the quality of life for its citizens and public institutions but also enhances the city's capacity to operate, govern, and develop; we are working on developing this capacity. (Respondent from Ministry of Environment, Urbanism, and Climate Change)

These accounts indicate that interviewees understand the smart city as both a developmental aspiration and a governance tool. Interviewees frame the concept as expansive and flexible, allowing various ongoing activities to be justified as smart cities. We interpret this flexibility as enabling two parallel meanings. One meaning concerns development, where smart cities symbolise technological and economic progress. The other concerns governance, where the smart city becomes a device for coordination and control in the inter-institutional relationship between the ministry and municipalities. In Gaziantep, regarding being smart, the priority was monitoring the city and aggregating data for crisis management (Gaziantep Municipality). The capital city, Ankara, established an open data office to achieve a "smart and social municipality" to maintain control and controllability by processing and interpreting the correct data accurately, focusing on providing social assistance to disadvantaged individuals.

> Smart means . . . I examine how my technological data communication has evolved into something useful; a smart city means raising citizens' awareness and delivering services effectively. It encompasses not just sensors or cameras but also encourages all city stakeholders to act intelligently, from road maintenance to waste management. (Respondent from Ankara Municipality)

This account illustrates how the respondent understands smartness as encompassing both technological and human tools. The interviewee describes smartness as involving effective data use, citizen awareness and coordinated action across urban services. Sustainability extends beyond environmental concerns to encompass social dimensions, including equity, inclusivity and the well-being of urban populations, balancing ecological with broader societal goals. Interviewees describe sustainability as a broad principle that integrates environmental, social and economic considerations, reflecting shifting expectations about what sustainable urban development should involve. We interpret these descriptions as evidence that the sustainability framing is expanding. It is no longer limited to ecological concerns but increasingly includes social equity and public well-being. Through this expansion, sustainability becomes a flexible policy device that aligns with evolving governmental priorities and societal expectations. In Konya, the municipality applies the concept separately to each policy area within the smart city concept, such as water management, drought prevention and climate change adaptation. That is, being smart is related to sustainability (Konya Municipality). The EBRD is the foremost multinational actor in Turkey concerning green financing. The EBRD Green City Programme is designed to promote the development of the concept of a green city that municipalities in Turkey will embrace in the future.

> We do not differentiate between the concepts of smart or green; being smart is a necessity when going green. When sub-sovereign municipalities express their interest in the EBRD Green City programme and suggest integrating smart initiatives, we do not view the smartness of any project as a distinct

> category. For instance, the metro line project inherently incorporates smart components for enhancing energy efficiency. (EBRD, Deputy Head)

The quotation shows that the EBRD representative understands smart and green initiatives as intertwined. Smartness is described as a practical requirement for achieving green objectives, and technological developments are framed as inherent components of environmentally oriented projects. The EBRD does not treat green or smart as distinct framings but frames cities primarily through the lens of sustainability, where technological advancements (i.e. smart components) are valued for their contribution to both environmental and economic sustainability, such as improved energy efficiency. Interviewees depict sustainability as the primary framing through which the EBRD evaluates urban projects, and smart elements are considered valuable only when they support this broader sustainability orientation. According to Callon (1998b), framing involves delineating what is included and excluded from a network or re-presentation. In this case, the EBRD's framing absorbs *smartness* into the broader sustainability frame, meaning that it does not treat smart as a separate problematisation. Instead, only aspects of smart initiatives that support environmental and economic sustainability (e.g. energy efficiency) are included, selectively framing the city through sustainability.

The EBRD Green City Programme aims to expedite investments in the green transformation. It offers guidelines for municipalities to identify areas requiring attention, prioritise their investments and ensure a structured approach to the process. Successful programme implementation also involves the EBRD's technical support when necessary. For instance, if there are legislative gaps, the EBRD collaborates with the relevant authorities to rectify these shortcomings. Furthermore, the programme seeks to establish a platform for city networks and facilitate information exchange among cities. An initial project and action plan are initiated under the *Memorandum of Understanding* (MoU) framework prepared with technical experts. Subsequently, after a mutual letter of intent is signed with the municipalities, a consultant is engaged. The consultant helps the municipality set specific targets for transforming the city into green, such as carbon reduction. The municipality prioritises its projects to achieve these objectives, resulting in the creation of a green city action plan and the organisation of projects. While the EBRD frames sustainability broadly, operationalising that framing involves the selective inclusion of specific dimensions. The EBRD's Green City projects have 10 monitored performance requirements. Table 3 outlines these performance requirements for projects under the EBRD Green Cities framework, detailing the percentage of projects adhering to each requirement.

Key areas such as environmental and social risk management, labour conditions, health and safety and pollution control are universally applied across all projects. However, land acquisition and biodiversity conservation are incorporated into only 35–36% of projects, while cultural heritage considerations apply to 24%. Notably, Indigenous Peoples' concerns are absent, reflecting the contextual applicability of certain requirements. This selective application demonstrates how framing functions through boundary-drawing, determining what counts as relevant and governable sustainability content.

Additionally, financial intermediaries are monitored separately through the EBRD *Financial Intermediary Sustainability Index* (SI), which is designed to help EBRD's partner FIs assess their responses to sustainability challenges and evaluate the extent to which they have implemented a systematic approach to managing sustainability issues. This differentiation highlights how financial aspects of green city projects are evaluated through a distinct sustainability assessment framework rather than the general performance requirements applied to municipal-level projects. The separate monitoring of financial intermediaries through a tailored SI further shows how multiple framings are applied in parallel, illustrating how sustainability is operationalised differently across different actors and roles.

Table 3. Performance requirements of EBRD projects

Performance requirement	% of all EBRD green city projects
PR1: Assessment and Management of Environmental and Social Risks and Impacts	100
PR2: Labour and Working Conditions	100
PR3: Resource Efficiency and Pollution Prevention Control	97
PR4: Health, Safety and Security	100
PR5: Land Acquisition, Involuntary Resettlement and Economic Displacement	35
PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	36
PR7: Indigenous Peoples	0
PR8: Cultural Heritage	24
PR9: Financial Intermediaries	Monitored separately via the FI Sustainability Index
PR10: Information Disclosure and Stakeholder Engagement	97

Source(s): Authors' own construction based on the data gathered from EBRD Sustainability Report (2021)

The EBRD spreadsheet template for data collection is designed to capture the complete list of Green Cities Action Plan (GCAP) actions for each city. Cities indicate the status of each action (no action/in preparation/under implementation/completed) and provide a brief description of its implementation. This approach allows for assessing the extent to which actions are implemented or completed. However, this simplified template does not maintain the link between GCAP actions and the medium-term targets they are intended to contribute to, nor does it connect actions to contextual environmental indicators:

> While the monitoring of actions maintains their grouping under strategic objectives, and sometimes (not systematically) mentions the actual medium-term targets for the actions, these are not monitored or updated. (EBRD Green Cities Interim Report, 2023, p. 92)

The main goal of the EBRD methodology in the Transition Impact Monitoring System is to monitor the green cities programme's impact closely. The benchmarks are designed to ensure that a specific cause-and-effect sequence of results is accurately reported. However, the latest EBRD reporting on the impact expectations of the GCAP was inadequate regarding the vital impact expectations of the green cities programme:

> 8 cities (out of the 13 that have provided data) are showing improvement in environmental indicators either towards the higher benchmark or within the same benchmark. (EBRD Green Cities Interim Report, 2023, p. 97)

The benchmarks, however, do not simply measure whether the city's random environmental indicators have improved but aim to establish a credible connection between actions, their results and the overall impact. This issue represents an overflow in the sustainability framing of green city standardisation, as the simplified monitoring approach leads to gaps in measuring long-term progress and contextual environmental impact. While the EBRD spreadsheet template and impact monitoring system help track the status of GCAP actions, they fail to maintain clear links to medium-term targets or relevant environmental indicators. This disconnect creates challenges in evaluating the effectiveness of green city initiatives, as actions may be marked as completed without a clear understanding of their long-term contributions. Consequently, the monitoring process risks prioritising procedural completion over substantive environmental outcomes, highlighting a tension between standardised reporting and meaningful sustainability assessment.

The EBRD plays a role in financing these listed projects while also seeking to attract other funding sources. For the municipality, at least during the initial five years, the programme's objectives and priorities are clearly defined, enabling progress within this established framework (EBRD, Deputy Head). The investment programmes and green strategic frameworks designed for a specific city trigger ongoing national and regional commitments and priorities, which provide a "*platform for coordination*" (EBRD Green Cities Programme Interim Report, 2023).

Under the EBRD GCAP, 20 cities included the local governance structure, financial context and fiscal capabilities, legal and regulatory framework and existing policies and strategies. Thus, GCAPs act as "*the nexus of national and regional strategic plans for the environment and climate change*" (EBRD Green Cities Programme Interim Report, 2023, p. 12). Green city standardisation aims to drive the green transformation of cities, focusing on urban aspects such as carbon reduction, waste management and addressing societal needs to create more sustainable urban environments. However, these efforts generate overflows, as implementing standardised sustainability measures can lead to unintended consequences, such as financial constraints, governance challenges and socio-political tensions in urban planning. One example is the capacity problem, primarily a lack of qualified personnel. With no established standard for "smart" or "green" cities, coordination among experts is challenging. Additionally, limited resources force municipalities to prioritise areas with the most urgent needs:

> For a major city like Istanbul, managing projects such as energy generation from electricity is highly complex. We are uncertain about how to handle these challenges. Technologies for generating energy require significant expertise for a giant city like Istanbul. We are still exploring the options. (EBRD, Deputy Head)

This account illustrates how interviewees understand large-scale sustainability projects as demanding significant technical expertise and posing coordination challenges. The respondent highlights uncertainty, limited expertise and the difficulty of managing complex technologies within a large metropolitan context. This statement reveals how large-scale sustainability projects produce practical overflows, as existing framings and technical capacities are insufficient to fully anticipate or manage the complexity involved in implementation on the scale of a city like Istanbul. We interpret these findings as suggesting that current sustainability frameworks do not fully contain or predict the practical demands that emerge during project implementation. The sustainability framing of green city standardisation necessitates monitoring and tracing urban data to accurately measure and evaluate environmental impacts. However, differing maturity levels among organisations contribute to significant capacity limitations, creating overflows in implementing standardised sustainability measures. Some municipalities still store data on personal computers rather than transitioning to structured digital databases, making systematic monitoring and evaluation difficult. Technical standardisation is essential for digitalising data, developing applications and eventually creating integrated data warehouses that support sustainability tracking. Yet, many municipalities are only beginning this process, facing challenges in deciding whether to continue using existing applications or transition to new ones. These discrepancies in digital capacity reveal critical overflows in the ability to monitor, trace and standardise environmental data, ultimately affecting the effectiveness of sustainability initiatives (Interview with Konya Municipality).

Another concrete example of this framing and its operational challenges is air quality monitoring. Despite national alignment with EU standards, gaps in real-time data collection, as illustrated in Kemalpaşa (see Table 5), reveal a significant overflow between standardised expectations and local technical capacity. The Regulation on Assessment and Management of Air Quality was enacted in 2008 (Official Gazette No. 26898, 2022) to mitigate the environmental and health impacts of air pollution. It establishes methods for evaluating air quality, maintaining favourable conditions and ensuring public awareness through cautionary

thresholds. Turkey has harmonised its air quality standards with the EU's directives (2008/50/EC and 2004/107/EC), aiming to fully adopt EU regulations for all pollutants by 2024. The National Air Quality Index calculates five key pollutants: PM10, CO, SO2, NO2 and O3, as shown in Table 4. However, as seen in Izmir's Kemalpaşa district (Table 5), air quality sensors do not consistently collect or calculate real-time data, resulting in gaps that render certain index values invalid.

Table 4. Turkey and EU air quality limit values

Parameter	SO_2 ($\mu g/m^3$) 1 hour average	NO_2 ($\mu g/m^3$) 1 hour average	CO ($\mu g/m^3$) 8 hours average	O_3 ($\mu g/m^3$) 24 hours average	PM10 ($\mu g/m^3$) 24 hours average
National Limit Value	380	260	10,000	120	60
EU Limit Value	350	200	10,000	120	50

Source(s): Authors' own constructed based on the data gathered from Turkish Regulation on Air Quality Assessment and Management no. 26898 (2008) and European Union (EU) Directive 2008/50/EC

Table 5. Air quality index missing data example from Izmir, Kemalpaşa

Date	PM10 ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NOX ($\mu g/m^3$)	NO ($\mu g/m^3$)	O_3 ($\mu g/m^3$)
04.11.2023	30.80	–	6.94	–	–	–	–	53.19
05.11.2023	38.24	–	–	–	–	–	–	43.81
06.11.2023	50.45	–	2.72	–	–	–	–	39.14
07.11.2023	64.87	–	2.85	–	–	–	–	18.14
08.11.2023	67.75	–	5.45	–	–	–	–	21.80
09.11.2023	64.60	–	5.64	–	–	–	–	25.31
10.11.2023	41.84	–	6.21	–	–	–	–	21.76
11.11.2023	28.78	–	5.63	–	–	–	–	45.20
12.11.2023	37.38	–	3.61	–	–	–	–	35.97
13.11.2023	37.69	–	3.75	–	–	–	–	20.87
14.11.2023	30.46	–	7.11	–	–	–	–	36.14
15.11.2023	59.07	–	12.60	–	–	–	–	16.27
16.11.2023	43.30	–	8.65	–	–	–	–	32.16
17.11.2023	39.15	–	13.23	–	–	–	–	24.25
18.11.2023	33.50	–	12.31	–	–	–	–	43.74
19.11.2023	14.68	–	9.92	–	–	–	–	23.81
20.11.2023	75.61	–	33.13	–	–	–	–	14.73
21.11.2023	–	–	–	–	–	–	–	–
22.11.2023	–	–	–	–	–	–	–	–
23.11.2023	70.76	–	26.77	–	–	–	–	15.95
24.11.2023	77.96	–	18.99	–	–	–	–	15.80
25.11.2023	32.23	–	8.41	–	–	–	–	48.76
26.11.2023	10.91	–	3.48	–	–	–	–	52.56
27.11.2023	44.48	–	27.70	–	–	–	–	22.14
28.11.2023	45.34	–	13.80	–	–	–	–	29.62
29.11.2023	22.66	–	6.49	–	–	–	–	56.23
30.11.2023	55.47	–	18.38	–	–	–	–	30.64
01.12.2023	37.23	–	13.51	–	–	–	–	35.02
02.12.2023	31.76	–	16.15	–	–	–	–	33.34
03.12.2023	25.60	–	19.50	–	–	–	–	47.77

Source(s): Authors' own construction based on data gathered from Continuous Monitoring Centre, Ministry of Environment, Urbanisation and Climate Change (2024)

Table 5 illustrates the gaps in real-time air quality data that undermine standardised environmental measurement frameworks. These gaps limit the reliability of indicators and highlight infrastructural mismatches that generate overflows in sustainability implementation. This demonstrates the sustainability framing of green city standardisation, where air quality monitoring is essential for assessing environmental impacts and guiding policy decisions. However, Kemalpaşa's case shows an overflow, as inconsistent real-time data collection from air quality sensors undermines the effectiveness of standardised measurement. Despite efforts to align with EU regulations and establish national benchmarks, gaps in monitoring and data integration reveal technical and infrastructural challenges, limiting the ability to fully implement sustainability-driven urban governance.

In short, the sustainability framing of green city standardisation highlights the growing emphasis on environmental and social dimensions in urban development. While green city initiatives increasingly integrate sustainability goals, their implementation remains complex, with technical, financial and governance challenges creating overflows. The lack of standard definitions, capacity constraints and fragmented data infrastructures demonstrates the ongoing need for local adaptation and resource coordination to effectively realise green city ambitions.

4.2 Economic framing

Green city projects are primarily funded through a diverse range of financial instruments, including non-governmental organisations, green bonds, international financial institutions (IFIs), İlbank (state-owned development and investment bank subordinated to the Ministry of Environment and Urban Planning), private banks, public–private partnerships, municipal budgets and state funding. The EBRD Green Cities Programme entails accelerating green infrastructure investments and institutionalising processes to transform cities. It provides structured guidelines for municipalities to identify priorities, organise their investments and adopt a systematic approach to sustainability. By rectifying legislative and technical gaps, the EBRD performs a facilitative role, collaborating with authorities to remove regulatory barriers and aligning actions with measurable outcomes.

Under the EBRD Green Cities Programme, cities such as Izmir, Ankara, Istanbul, Gaziantep and Bursa have developed GCAPs to address key environmental challenges, including water management, biodiversity, air quality and climate change adaptation. The GCAP facilitates sustainable urban transformation across Turkey, with investments in public transportation infrastructure, including metro extensions and bus system upgrades, aimed at reducing emissions and improving urban mobility. Funding for these projects ranges from €37m to €125m, reflecting the varying needs of each city, while some also incorporate syndicated financing, securing up to €25 million in private sector contributions, demonstrating a hybrid public-private funding model. Since joining the programme in 2019, Izmir has prioritised metro investments to enhance its sustainable transport infrastructure, while Ankara, included in 2020, has focused on expanding bus and metro networks to reduce emissions and improve mobility. Istanbul, Turkey's largest economic hub, joined in 2021 and aims to integrate environmental policies into urban renewal efforts. That same year, Gaziantep initiated solar energy investments to meet local energy needs while strengthening the resilience of waste management, water systems and public transport against climate change. The most recent participant, Bursa, joined in 2023 and is focusing on water security projects to protect the city's drinking water supply and reduce vulnerability to drought. Together, these projects contribute to Turkey's green transition, equipping cities with sustainable infrastructure, climate resilience strategies and integrated urban solutions for a more environmentally responsible future.

The programme also fosters inter-city platforms, creating a space for knowledge exchange that shapes municipal practices and benchmarks performance. Its step-by-step process, beginning with an MoU, followed by a mutual letter of intent and consultant engagement, *materialises* sustainability goals into actionable strategies. The consultants help municipalities

define *the sustainability targets* such as carbon reduction, prioritise projects and operationalise their Green City Action Plans. These plans not only organise projects but also position municipalities to deliver on targets, illustrating how structured financing and strategic planning shape local actions towards sustainable urban transformation.

Green city initiatives function much like a business plan, where external actors, such as consultants, financial advisors and project firms, play a central role in shaping the standardisation process. However, current efforts lack integration, with limited data exchange and insufficient measurement and evaluation mechanisms, particularly in governance-related areas requiring improvement. A key challenge is supporting municipalities with technical expertise and capacity, as project-specific consultants are often hired, but their solutions tend to be short-term. The standardisation process is further complicated by the need to clarify the roles of different stakeholders, establish effective information flows and address gaps in complementary roles. As one consultant explained:

> If stakeholders are not adequately assigned for each project, a public sector stakeholder might have a different role in various initiatives . . . Project instruments function independently, with most of the data they generate lacking thorough analysis, making meaningful interpretation challenging. (Consultant, Ernst & Young)

The quotation shows how the consultant understands coordination problems across multiple projects. The respondent describes fragmented roles, independent project instruments and data that are collected but not systematically analysed, which makes interpretation difficult. This highlights the economic framing, where green city projects are structured around fragmented financial and technical instruments rather than a cohesive, long-term strategy. Interviewees portray this fragmentation as a barrier to effective project management, since resources and responsibilities become dispersed across separate initiatives. To address inefficiencies and investment duplication, municipalities have made efforts to develop a unified data platform, integrating diverse projects into a more structured system. However, this integration is not just a technical process. It involves customisation and market adaptation, ensuring that general standards are tailored to the specific needs of individuals and households (ARUP Project Company). The standardisation process is a financial and strategic instrument, where flexibility is key to market viability. As an expert from ARUP explained:

> Good standards, for us, include providing data down to the granular level, but this alone is not sufficient. What's crucial is understanding the elements that constitute the data. To standardise this with a one-size-fits-all approach is incorrect, as it attempts to make a city a standard product. The appropriateness and necessity of standards depend significantly on the unique needs and goals of each city. Therefore, imposing a single standard is not the right approach, as it varies based on the context and circumstances of each city. (ARUP Interview, 2021)

This account illustrates how the expert understands that standards need to adapt to the specific context of each city. The respondent emphasises the importance of detailed data but also argues that meaningful standardisation requires attention to local goals and circumstances rather than standardised prescriptions. This perspective reflects how green city standardisation is framed economically, where cities are treated as unique investment portfolios requiring customised financial and governance models. Interviewees define standardisation as a process shaped by consulting expertise and financial rationalities, where flexibility is necessary to maintain the market relevance of sustainability interventions. Rather than a purely environmental initiative, the standardisation of green cities aligns with economic rationalities, consultation-driven expertise and financial instruments that shape urban development through market-based principles. In this line, the EBRD representative underscores that municipalities must *perform* like "small banks" to navigate standardisation challenges and secure foreign financing effectively. Interviewees describe this shift as central to participating in green city programmes, since financial competence becomes a prerequisite for accessing international resources.

> With the growing pressures of climate change and escalating infrastructure investment needs, obtaining and maintaining a strong credit rating becomes essential for our city. It not only enhances municipalities' credibility with financiers but also enables them to access diverse funding sources, prioritise projects efficiently, and demonstrate their capacity to meet sustainability targets. (Interview with Istanbul Metropolitan Municipality official)

This indicates that the official understands creditworthiness as a foundation for both financial access and sustainability performance. The respondent describes a strong credit rating as strengthening credibility with financiers, expanding funding options and supporting strategic project prioritisation. This account highlights how green city standardisation is framed through an economic lens, emphasising creditworthiness and financial performance. We interpret these descriptions as indicating that sustainability targets become intertwined with financial metrics, where achieving environmental goals depends on demonstrating fiscal stability and investment capacity. Achieving sustainability targets is closely tied to obtaining and maintaining a strong credit rating, and this economic frame reinforces the idea that municipalities must operate as organisations that stand ready to fully invest in green city initiatives. Economic framing of the green city thereby positions sustainability not just as an environmental goal but as a financial strategy in which standardisation for green city becomes a means of attracting investment and demonstrating economic stability. This emphasis highlights how credit ratings function as both a measure and a mechanism that reinforces municipalities' financial resilience and green transformation.

> The first question taxpayers ask is whether the municipality has a credit rating when presenting any type of project. Having a credit rating allows municipalities to advance to the initial evaluation stages. Green City projects should be classified and prioritised based on cost-effectiveness, starting with low-cost and efficient projects. (EBRD, Deputy Head)

This account illustrates how the respondent understands credit ratings as a basic condition for project evaluation and public accountability. The interviewee describes creditworthiness as necessary for initiating project reviews and emphasises that green city initiatives should be prioritised according to cost-effectiveness, beginning with projects that deliver efficiency at lower expense. The quotation emphasises credit ratings as a prerequisite for municipal project approval and financial credibility. Additionally, green city projects are expected to be classified and prioritised based on cost-effectiveness, favouring low-cost and high-efficiency initiatives. We interpret this perspective as aligning sustainability work closely with financial performance, where investment choices are guided by financial sustainability rather than exclusively environmental or social goals. Through this framing, sustainability becomes embedded in financial metrics that privilege cost efficiency.

> There will come a point where significant infrastructure investments, substantial costs, and large project budgets are required. Unfortunately, relying solely on existing resources may not be sufficient. In such cases, economic analyses and methods like credit ratings, especially in outsourcing, become essential. Every municipality should establish a well-equipped financial department to manage innovative instruments effectively in the long term. While the first ten municipalities in Turkey may have their resources, diversifying funding sources and securing higher credit should be considered. Legislation may not always be necessary for this. (Ankara Municipality Representative)

This account illustrates how the respondent understands large infrastructure investments as requiring financial strategies that extend beyond existing municipal resources. The interviewee emphasises the importance of credit ratings, outsourcing and specialised financial departments and suggests that accessing diversified funding may not always depend on formal legislative change. Once more, the need for credit ratings and outsourcing to finance large infrastructure projects shows how the green city is framed by an economic outlook. We interpret these descriptions as indicating that the pursuit of sustainability goals becomes tightly connected to financial tools and investment practices. It also reveals an overflow into political processes, as financial strategies may sideline formal legislation. According to this

interpretation, economic pragmatism extends beyond administrative boundaries and reshapes how political oversight is enacted, since funding mechanisms can operate independently of legislative updates. Concerning EBRD financing, the municipality manages the bank's loan and is responsible for its distribution. The EBRD's Green City Programme encompasses Ankara, Istanbul, Izmir and Gaziantep. In line with the EBRD's mission, each project must contribute to the green transformation and is evaluated based on predefined calculative practices. For instance, financing is allocated according to its targets, such as the energy efficiency green gap ratio:

> For every lira we provide, 50% is allocated to green climate change mitigation . . . In Istanbul, we have 100 projects, and while we will prioritise them, the municipality handles stakeholder management, and consultants are compensated after submitting their reports to the municipality . . . We aim to incorporate these metrics into investment packages, as cities are projected to be the largest contributors to carbon emissions by 2023, relying on urban solutions to combat climate change. Branding is a significant concern for financiers; all types of branding are evaluated. Municipal adoption is also considered a form of branding, and municipalities may choose not to adopt them. We monitor the planned priorities and check if they align with policies, but we provide the loan. Hence, committed municipalities are crucial. (EBRD, Deputy Head)

This indicates that the official understands green city financing as being structured around investment targets and performance metrics. The interviewee emphasises allocation rules, stakeholder roles, consultant compensation procedures and the importance of branding and municipal commitment. Branding is described as influencing financiers' assessments, and municipal adoption of initiatives is framed as contributing to the perceived value of investment packages. This quotation highlights how green city projects are structured around financial priorities, investment metrics and brand management. Funding allocation, stakeholder coordination and consultant compensation are embedded within a financing framework in which municipalities are implementers and brand representatives. We interpret the emphasis on branding as indicating that sustainability initiatives function not only as environmental interventions but also as reputational assets that enhance investment appeal. The reference to branding as a concern for financiers suggests that municipal adoption of green initiatives is not only about sustainability but also about enhancing investment appeal and credibility. In this framing, committed municipalities are crucial, as their participation strengthens green city projects' financial and reputational value, turning sustainability into both an environmental and economic asset. Through this economic framing, sustainability becomes intertwined with market-oriented evaluations that position smart cities as investment platforms.

The economic framing of green city standardisation thereby reveals how sustainability initiatives are intertwined with financial mechanisms, investment strategies and credit ratings. Rather than purely environmental initiatives, green city projects function as structured financial assets, where municipalities must navigate funding constraints, branding concerns and investment priorities to secure resources. This framing underscores how financial instruments shape urban sustainability efforts while generating overflows into political processes, particularly as municipalities seek alternative funding sources and navigate tensions between economic pragmatism and regulatory oversight.

4.3 Governance framing

The actualisation of green city projects (including prioritisation, financing and implementation) is influenced by governance factors and legislation regarding the financial status of municipalities. Municipalities cannot rely solely on master plans prepared by FIs and internally, because Turkey's agenda constantly evolves, influenced by new regulations and legislative changes. Regarding green investments, each city's capacity is significantly impacted by fiscal decentralisation. For instance, cities in Turkey benefit from the borrowing limit, which is set at 150% of the previous year's revenue. This limit defines the financial manoeuvrability of municipalities, shaping their ability to invest in large-scale green projects.

> The PPP model is an excellent option for securing additional funding; we, among many stakeholders, are eagerly awaiting the passage of the PPP law. The EBRD Green City programme includes PPP, which enhances the borrowing capacity of municipalities. However, it is important to note that not every project is feasible within green cities. Turkey is a country that can benefit very little from concessional financing; our donor side is very limited. (EBRD, Deputy Head)

While green city initiatives are framed as economic investments, driven by financial instruments, credit ratings and strategic borrowing, political framing is also in play. The lack of a clear legislative framework for standardising green investments and sustainability reporting underscores the role of political processes in determining how cities access and manage funds. Municipalities must navigate financial constraints independently without national legislation to govern these investments, often relying on central government approval or international funding sources.

> Inquiries from international financial institutions to the Ministry regarding slow approval processes and cumbersome bureaucratic procedures highlight the urgency of addressing these challenges, despite the existence of legislation and municipal plans. (Respondent from Konya Municipality)

> If municipalities are already making their own plans, why should I go through the feasibility study and approval process again to include this project in the financing programme? There's urgency around the project, and it needs to start as soon as possible. For that, financing is required, and we are wasting time in the approval process. (EBRD, Deputy Head)

Municipalities often face delays in getting central authority approval for their financing projects. The political–economic relationship between a city and its central government can influence partnerships with global financiers like the EBRD. Izmir's local leadership, for example, is currently opposed to the central government, which affects the city's access to national funds. Hence, it seeks alternative funding from international partners like IFIs (EBRD Green Cities Programme Interim Report, 2023).

During our data collection, the political landscape was significantly influenced by the upcoming local elections, with major cities like Istanbul and Ankara being pivotal battlegrounds for both the ruling and opposition parties. In Istanbul, the Minister of Environment, Urbanisation and Climate Change, Murat Kurum, emerged as the candidate for the ruling Justice and Development Party (AK Party), challenging the incumbent mayor, Ekrem İmamoğlu, from the Republican People's Party (CHP). Concurrently, the Esenler district in Istanbul became a focal point for the Ministry's initiatives, notably through the *NAR Innovation District* project. This project aimed to transform Esenler into a human-centric, walkable city, addressing high population density and earthquake risks by replacing vulnerable building stock with sustainable urban designs. The project's emphasis on sustainability and innovation aligned with the broader political narrative of urban transformation. Integrating green city initiatives into political campaigns underscored their significance as instruments for garnering public support. The AK Party and CHP leveraged urban planning and sustainability projects to redefine citizenship and present their visions for Turkey's future, making green city projects central to their electoral strategies. Consequently, these initiatives became intertwined with political agendas, reflecting the critical role of urban development in Turkey's contemporary political discourse.

While the green city has been a part of political discourse, we have also found that governance framing has broader implications in practice. For example, municipalities often prioritise their political interests, resulting in selective programme revisions, which can cause delays and resource wastage. The municipalities' five-year programmes, renewed after each election, may not align with the financing project programme strategy or the municipality's regular planning strategies. Additionally, projects created in previous years may not fit into the current strategic framework, limiting municipalities' ability to implement short-term projects (1–2 years). For example, the Istanbul Metropolitan Municipality Smart City Department completed its plans in 2023, leaving only one year to implement the proposed projects:

> After conducting a one-year literature study from 2016 to 2019, we developed a five-year action plan, encompassing short, medium, and long-term goals. (Head of Istanbul Metropolitan Municipality Smart City Unit)

Furthermore, organisations' political will, particularly leadership commitment, is crucial in investing in internal capacity to advance the project process. "*When mayors prioritise and value a programme, the implementation process becomes more streamlined*" (EBRD, Deputy Head).

> Even if there is a service technology infrastructure in place, it becomes meaningless without a vision. The mayor's vision and, by extension, the human factor significantly influence the outcome. (Head of Istanbul Metropolitan Municipality Smart City Unit)

Their relationships with the central government can also influence municipalities' response strategies. Conversely, problems may arise if ministries and municipalities have strained relations, leading to a misalignment of goals and priorities. Interests may vary from project to project, and even municipalities from the same political party may have different relationships with the central government. For example, the Konya Municipality representative explained:

> Local governments are institutions that plan their decision mechanisms and budgets independently. They have an inherent decentralisation process, and we maintain strong communication with the Ministry of Environment and Urbanisation and the Ministry of Transport, resulting in mutual information exchange.

This indicates that the official understands local governments as formally autonomous while also engaged in continuous coordination with central ministries. The interviewee stresses independent planning and budgeting but simultaneously highlights ongoing communication with national authorities. This quotation highlights how political alignment between local and central governments facilitates collaboration. We interpret these descriptions as indicating that municipal autonomy is practised within a political environment in which cooperation with central ministries is influenced by alignment and mutual dependence. In this interpretation, decentralisation coexists with negotiated relationships that shape how authority and decision-making are exercised in practice. The Konya Municipality representative emphasises decentralisation, yet the strong ties with the Ministry of Environment and Urbanisation and the Ministry of Transport suggest that political affiliations shape municipal autonomy. Since the ruling party governs Konya, this alignment likely enables smoother cooperation, resource allocation and policy implementation, contrasting with municipalities led by opposition parties, which may face more bureaucratic hurdles or political resistance. For instance, unlike Konya, Ankara Municipality's relationship with the central government is complex and sometimes adversarial, while governmental directives hamper its activities. The municipality faces challenges in obtaining training, equipment and consultancy services due to austerity measures imposed at the presidential level (Ankara Municipality). The problems of governance and coordination regarding standardisation are also related to stakeholders' multiple interests and needs. The value of a project or initiative is not perceived or adopted in the same way by all stakeholders, as seen in several smart city projects (e.g. Argento *et al.*, 2020):

> We face significant governance issues and challenges in reaching out to our stakeholders and managing our operations collaboratively. Initially, we considered creating a city inventory data centre as a starting point. However, even if our ministry is working on something similar, I believe there's no need for redundancy and duplication. There are numerous coordination issues on the ground. For instance, during a crisis, questions like who is on-site, how many people are present, whose vehicles are in use, and what resources are needed should have only one answer. However, institutions often receive conflicting information. It is crucial that the local data created in each city is usable. While it may be excellent data, its effectiveness in reaching other cities during a crisis, such as during a major earthquake in Istanbul, should be considered. How well can institutions and NGOs integrate with this database? How dynamic and up to date can this data be? For example, how quickly can we redirect

> transportation routes or repair damaged highways during a crisis? How rapidly can we disseminate information? (Respondent from Ankara Municipality)

Another challenge is the perception and expectation of rapid progress among different actors with diverging interests. Both municipalities and financing actors often operate with short-term expectations, focusing on immediate results within six months. This can pose difficulties when dealing with long-term initiatives, such as climate finance accommodations, requiring a more extended outlook. Regulatory and legislative factors may also reduce municipalities' agility. According to the Ministry of Environment, Urbanism and Climate Change's representative, however, processes will gradually become more streamlined and standardisation more manageable:

> We also faced challenges within the Ministry. How should this work be standardised? We initially aimed to align with Europe, but it was suggested that we should establish national standardisation. Now, we are working together with other countries globally. Standards are challenging to implement, particularly when dealing with local governments that may be resistant to change. Transforming unstructured data into a cohesive system that communicates effectively is a complex task. We are working on comprehensive models and architectures to achieve this goal. It's an area where we believe we can make significant progress. (Respondent from Ministry of Environment, Urbanism and Climate Change)

As in other policy areas (Tekin Bilbil *et al.*, 2024), the quotation highlights the tensions between central and local governments in standardisation efforts, particularly regarding resistance to change and the difficulties local actors face in operationalising centrally formulated solutions within complex urban contexts. While the ministry initially sought alignment with European standards, the shift towards national standardisation suggests an effort to centralise control over sustainability policies. The mention of local governments being resistant to change reflects a broader political challenge: ensuring compliance and coordination across different municipalities, especially those not aligned with the ruling party. This dynamic underscores how standardisation becomes a tool of governance, where the central government shapes local practices, potentially reinforcing power hierarchies in environmental and urban policy implementation.

> We have conducted pioneering studies, but we struggle to find corresponding applications. For example, we completed a project with Japan, but we faced challenges explaining the structure of the municipal police [Zabıta] in Turkey to them, as our public structure is very diverse. (Respondent from Gaziantep Municipality)

This indicates that the official understands cross-national collaboration as complicated by local administrative structures. The interviewee describes difficulties in translating Turkish municipal arrangements to foreign partners, highlighting the uniqueness and specificity of local practices. This quotation highlights how political structures shape the implementation of green city initiatives, particularly in international collaborations. This suggests that, while cooperation with international development and finance agencies presents an opportunity to enhance data integration and standardisation, political and bureaucratic structures can create barriers to implementation. We interpret these descriptions as indicating that administrative diversity produces challenges for aligning local practices with international standards. In this interpretation, political and bureaucratic configurations act as constraints that limit the transferability of standardised models, revealing tensions between global project frameworks and local institutional realities. In short, the political framing of green city standardisation reveals a complex interplay between fiscal constraints, regulatory uncertainties and institutional politics that shape municipal decision-making and project implementation. The empirical evidence shows that political alignments and capacity challenges significantly influence municipalities' abilities to secure funding, coordinate with central authorities and achieve integrated sustainability outcomes.

5. Discussion and conclusions

This study sets out to examine the standardisation of green city performance, a process typically presented as a unifying framework for urban sustainability. Our findings, however, reveal that this unity is less a stable outcome and more a paradoxical effect: the apparent coherence of green city standards is constructed through the interplay of multiple framings, namely, environmental and social, economic and governance, that are dynamic, contested and often contradictory. Each framing imposes distinct calculative expectations, yet does not operate in isolation and constructs the city as governable, financeable and measurable, producing distinct interpretations of what it means to be a green city. These framings guide sustainability governance and generate tensions, mismatches and unintended consequences. We found, for example, that the lack of coherence between economic and environmental framings prompted municipalities to redefine project priorities: not by conflating these framings into a single standard, but by staging them sequentially or selectively. For instance, funding constraints pushed cities to pursue low-cost, high-impact sustainability initiatives (e.g. solar investments, transit electrification), which were both financially viable and environmentally beneficial. In this way, the overflow created by conflicting priorities acted as a generative constraint, producing sustainability gains through adaptive pragmatism. Rather than resolving complexity and generating uniformity, standardisation in practice depends on it. The very overflows that arise, such as technical gaps in data, financial constraints and political tensions, do not simply disrupt the process but also redirect and reinforce it, shaping new trends of standardisation. In this way, the monolithic image of a green city standard is not imposed from above but continuously produced from the bottom up, through negotiations, adaptations and recalibrations across diverse actors and institutions.

Findings presented in this paper thus support three theoretical contributions. First, this study extends the concept of overflows (Callon, 1998a) by demonstrating that overflows do not simply disrupt standardised processes in contexts shaped by multiple and interdependent framings. Instead, they can reinforce or redirect alternative rationalities, thereby reshaping the trajectory of sustainability initiatives. These framings interact, at times reinforcing each other and at other times competing, leading to continuous adaptation and revision in the green city standardisation process. The theoretical lens of framing enables us to theorise standardisation not as the technical adoption of pre-given rules but as an emergent process shaped by competing definitions of what counts as "green". Each framing creates distinct calculative expectations, i.e. credit ratings for economic performance indicators for environmental and formal procedures for governance. Overflows occur when these expectations collide, making visible the recursive negotiations through which standardisation emerges. In this way, framings not only capture organisational complexity but also explain how temporary coherence is achieved during competing rationalities, making visible the processes through which standardisation gains stability despite continual contestation. Second, this study advances the literature on sustainability accounting by demonstrating how calculative practices are embedded within and shaped by the different framings. These framings influence what is being measured and how measurement practices are prioritised, contested and adapted over time. Third, this study contributes to the scholarly interest in standardisation by empirically illustrating how standard-setting is enacted across multi-level governance systems. This highlights the inherently political and situated nature of sustainability standards and the recursive effects they produce in practice.

The environmental and social framing positions green cities as urban environments that align with global environmental commitments, such as the Paris Agreement, and integrate sustainability goals into municipal planning (Bebbington and Unerman, 2018; Hopwood, 2009). This framing constructs sustainability as quantifiable objectives, such as carbon reduction, waste management and air quality improvements. Standardisation efforts seek to translate these objectives into measurable performance indicators (Argento *et al.*, 2025; Brorström *et al.*, 2018). However, as shown in the case of air quality measurement in Izmir, overflows emerge due to technological limitations and governance fragmentation. While

regulatory frameworks mandate compliance with EU air quality standards, inconsistencies in real-time data collection and integration challenge the credibility of environmental monitoring. The difficulties in data standardisation reflect broader tensions in sustainability accounting, where the technical feasibility of achieving standardised environmental metrics is often constrained by local administrative and infrastructural realities (Cederberg and Sjögren, 2025). Current benchmarks fail to capture key measurements, obscuring potential correlations between actions taken, their outcomes and the programme's overall impact. The data monitored by the EBRD Green City team lacks a holistic view, missing connections between GCAP actions, their intended medium-term targets and contextual environmental indicators. This prevents the active monitoring and updating of these targets, which hinders effective alignment with strategic environmental sustainability objectives. Our findings also demonstrate the challenges in measuring environmental performance indicators (Busco *et al.*, 2018; Vollmer, 2021). These challenges draw attention to structural and organisational dynamics encompassing adaptability, reliability, subjectivity, data aggregation and the unpredictable nature of environmental events. These complexities paint a comprehensive picture of the overflows that emerge when attempting to monitor, interpret and report environmental measures.

The economic framing of green cities presents sustainability as an investment strategy, structuring municipal efforts around financial instruments, credit ratings and funding mechanisms (Grossi and Pianezzi, 2017). Green city projects are embedded within market-based governance structures, where IFIs, such as the EBRD, dictate the financial viability of sustainability initiatives through standardised investment models (Bracking, 2019). This framing establishes calculative structures, such as municipal credit ratings, that determine which sustainability projects can be prioritised and financed. As seen in the case of Turkey's green cities, the need for financial credibility pushes municipalities to frame sustainability initiatives in terms of cost-effectiveness rather than environmental urgency. The emphasis on aligning sustainability investments with financing criteria leads to overflows, as municipalities must prioritise projects that satisfy funding requirements over those that may have the most pressing ecological and social impacts (Chua *et al.*, 2024). The process of framing sustainability in economic terms thus introduces tensions between standardisation and local adaptation, as funding mechanisms impose constraints that shape how environmental objectives are enacted in practice.

Furthermore, the economic framing itself generates overflows that reinforce political contestations. The prioritisation of credit ratings and financial viability, which essentially positions municipalities as investment portfolios, limits the scope of sustainability projects to those that align with lender requirements. This leads to delays or reconfigurations of environmental projects, which become political bargaining tools. As municipalities attempt to reconcile financial constraints with environmental sustainability goals, the framing of the green city shifts from an environmental need to a politically contested space, where central governments, opposition parties and FIs negotiate authority over urban sustainability governance (Argento *et al.*, 2020; Bracking, 2019).

The governance framing of green city standardisation highlights the governance structures, power relations and institutional constraints that shape sustainability initiatives (Christensen and Skærbæk, 2007). Green city investments are not merely technical projects but are embedded within municipal-state relations, where sustainability policies are shaped by electoral cycles and political negotiations (Grossi and Trunova, 2021). The empirical findings illustrate how municipalities must navigate central government approval processes, which often delay the implementation of green city projects. This delay serves as an overflow, as it disrupts environmental, social and economic framings by slowing the execution of environmental investments and financial planning. However, these delays reinforce political control, positioning national governance structures as central actors in sustainability decision-making. Integrating green city initiatives into electoral strategies further reflects the politicised nature of sustainability governance, where sustainability

investments become instruments of political branding rather than purely environmental interventions (Brorström, 2018).

The interactions between these three framings illustrate how green city standardisation is a negotiated and dynamic process rather than a linear implementation of environmental policy. Overflows play a crucial role in this process by exposing the limits of each framing and prompting adjustments. For example, financial constraints in green city investments can transform sustainability framings, leading municipalities to redefine projects that align with creditworthiness criteria. Similarly, governance contestations can shift economic framings, as financial instruments are used strategically to navigate governance challenges. Rather than a stable or uniform standard, green city initiatives emerge through the continuous interplay between these framings, each shaping and reshaping how sustainability is implemented in urban governance.

In green city standardisation, overflows within environmental and social framing, such as inconsistencies in environmental monitoring or data fragmentation, challenge the environmental rationale and (re)activate economic and governance framings. For example, when real-time air quality measurement fails due to technological and infrastructural constraints, this is not merely a technical breakdown; it shifts the discourse towards economic justifications for further financial investment in monitoring infrastructure, reinforcing the economic framing of sustainability (Cederberg and Sjögren, 2025; Grossi and Pianezzi, 2017). Similarly, when municipalities struggle to meet international sustainability reporting requirements due to capacity limitations, this overflow strengthens the political framing, as regulatory delays and bureaucratic inefficiencies become points of contention between local and central authorities (Christensen and Skærbæk, 2007; Grossi and Trunova, 2021).

This leads us to our key theoretical contribution: overflow does not merely disrupt a given framing but also (re)enforces alternative framings, shaping the trajectory of green city standardisation in complex and often contradictory ways. Prior research conceptualises overflows as unintended consequences when agencements fail to sustain or fully control a process (Callon, 2007; Fırtın and Karlsson, 2020; Fırtın and Kastberg, 2020). Overflows expose the instability of calculative practices, revealing gaps between intended standardisation and practical implementation (Kastberg, 2014). However, our study extends this perspective by demonstrating that, in contexts where multiple framings coexist, overflow within one framing does not simply destabilise it but simultaneously reinforces or transforms the others. We show that overflows not only disrupt but also sustain and redirect standardisation, acting as mechanisms through which standards are continually reproduced and reconfigured in practice. This shifts the understanding of standardisation from a fragile process, vulnerable to breakdown, to one that depends on the continual presence of overflows in order to be maintained.

The interdependence of these framings suggests that green city governance is not a linear or predictable process but, rather, an ongoing negotiation between competing rationalities. Overflows do not simply challenge standardisation efforts; they redirect, reinforce and reframe how sustainability is enacted across environmental, social and economic dimensions. This has broader implications for sustainability accounting, where performance measurement and reporting must be understood not as static compliance mechanisms but as dynamic and contested processes that evolve in response to interwoven institutional pressures (Ascui and Lovell, 2011; Busco *et al.*, 2018; Vollmer, 2021).

This study contributes to the literature on sustainability accounting by showing how cities are framed through environmental, social, economic and governance dimensions and how these interacting framings generate overflows that continuously reshape the standardisation process. Prior research has examined the transformative role of sustainability standards (MacKenzie, 2009; Vollmer, 2021) and their consequences in structuring environmental accounting practices (Busco *et al.*, 2018; Cho and Patten, 2013; Chung and Cho, 2018; Hopwood, 2009). Our findings extend this by demonstrating that sustainability accounting is not a neutral or purely technical instrument but is embedded within economic and political

structures, where financial and governance constraints shape how environmental metrics are defined and operationalised (Argento *et al.*, 2020; Bui *et al.*, 2024). Overflows reveal the limits of standardised sustainability metrics, highlighting the need for more adaptable frameworks that account for financial and governance contingencies. This contributes to the broader debate on the role of accounting in environmental governance, emphasising that sustainability accounting is not just about measuring ecological impact but also about navigating financial structures and political institutions (Ascui and Lovell, 2011; Bourmistrov and Mouritsen, 2022). Overall, we position overflows as central to producing governable, financeable and accountable urban futures, showing that standardisation is sustained through ongoing negotiation rather than achieved through fixed templates.

For practitioners, this means shifting focus away from treating standards as fixed templates to be complied with. The study suggests that more meaningful outcomes for sustainable urban development may emerge when organisations respond according to their capacities, rather than being constrained by the rigidity of standards. Recognising the productive role of overflows may help practitioners design more flexible and context-sensitive approaches to green city transitions.

This study has several limitations that open avenues for future research. First, our empirical material focuses on municipalities involved in green city programmes, which means that the findings reflect contexts characterised by active engagement and ongoing efforts around sustainability frameworks. Further research across cities that have not adopted such programmes could reveal different forms of framings and overflows. Second, while our interviews capture the perspectives of municipal managers and consultants, future studies could include additional actors, such as citizens, private contractors or national agencies, to examine how overflows are experienced across broader networks. Third, our analysis is based on a snapshot of ongoing initiatives; longitudinal research could trace how framings and overflows evolve as green city standards develop over time. Future studies may also explore how calculative practices interact with political dynamics in other national settings, offering nuanced understandings of how sustainability standards travel and transform across governance environments.

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