Energy Research & Social Science 131 (2026) 104468

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

Optimism and pragmatism in mission cities: Exploring narratives for climate neutrality in Stockholm and Amsterdam

Jasmine Chakravarty [a], Björn Wickenberg [a,*], Kes McCormick [b]

[a] International Institute for Industrial Environmental Economics (IIIEE), Lund University, Skåne, Sweden
[b] Department of People and Society, Swedish University of Agricultural Sciences, Uppsala, Sweden

ARTICLE INFO

Keywords:
Climate neutrality
Cities Mission
Missions
Socio-technical imaginaries
Narratives

ABSTRACT

Climate neutrality of cities has emerged as a critical goal for sustainable urban development. This is typified by the mission in the European Union (EU) to achieve 100 climate neutral and smart cities by 2030. The idea of carbon or climate neutrality holds diverse interpretations. This paper investigates the dominant socio-technical imaginary for urban climate neutrality within the context of the EU Cities Mission, focusing on the cities of Stockholm and Amsterdam. Through narrative analysis of interviews and documents six key narratives are identified: 1) sustainable mobility and transport, 2) community engagement and just transition, 3) frontrunners in urban climate action, 4) the city as an experiment, 5) green economy and business innovation, and 6) the city as a complex system. This paper sheds light on the overlaps and contradictions between the narratives, suggesting opportunities for integrated policies centred on justice, leadership and experimentation. The analysis also reveals contrasting perspectives on the 2030 goal – namely an optimistic approach in the case of Stockholm and a pragmatic approach in the case of Amsterdam.

1. Introduction

In the face of escalating climate challenges, the imperative to foster sustainable urban development has propelled cities worldwide into ambitious initiatives aimed at achieving carbon and climate neutrality [1]. One such effort is the mission for 100 climate neutral and smart cities by 2030 ('the EU Cities Mission'), which is a collective endeavour, launched in 2021 by the European Commission (EC), which seeks to transform 112 cities into resilient and low-carbon entities by 2030 [2]. At the heart of this initiative lies not just a technical transition but a profound socio-technical transformation that is driven by the narratives and socio-technical imaginaries held by urban stakeholders [3].

Socio-technical imaginaries, as coined by Jasanoff and Kim [4], can be understood as visions of desirable futures that are collectively embraced, institutionally stabilised, and publicly enacted, particularly at the intersection of science and technology. These socio-technical imaginaries are powerful and can have a substantial impact on policy development and decision-making [5,6]. However, the specific contours of resilient and low-carbon urban futures remain uncertain, ill-defined, and subject to disagreement [3,6,7]. This heterogeneity in the definition of climate neutrality can lead to divergent ambitions, policy inefficiencies, and inconsistent development [8]. Therefore, it is important to understand what cities seeking climate neutrality are aiming to achieve, both in terms of emission targets, but also more holistically, with regards to envisioned futures.

Understanding the role of socio-technical imaginaries in energy transitions has been identified as an important issue in both research and practice [6,9,10]. For instance, von Wirth et al. [9] identify imaginaries as a key research theme in the 100 Social Sciences and Humanities priority research questions for renewable energy in Horizon Europe. Furthermore, Rudek [6] and Diezmartínez et al. [10] underscore the importance of understanding the role of imaginaries and narratives for achieving just and effective energy transitions. Meanwhile, in the frame of the EU Cities Mission, the importance of a shared vision for the effective implementation of urban climate initiatives is emphasised; there is a need to "collectively envision desired futures as guideposts and orientation for mission implementation" [11]. Similarly, the mission needs to be translated into tangible narratives in order to engage stakeholders and enable the effective and just realisation of the mission objectives [12]. These insights highlight the significance of socio-technical imaginaries and tangible narratives for achieving energy transitions and urban climate neutrality.

* Corresponding author at: International Institute for Industrial Environmental Economics (IIIEE), Lund University, Box 196, SE-221 00, Lund, Sweden.
E-mail address: bjorn.wickenberg@iiiee.lu.se (B. Wickenberg).

https://doi.org/10.1016/j.erss.2025.104468
Received 16 April 2025; Received in revised form 12 November 2025; Accepted 19 November 2025
Available online 2 December 2025

Overall, the pivotal role of narratives and imaginaries in describing and shaping energy transitions and urban sustainability initiatives makes them key objects of interest in the context of the EU Cities Mission. By unravelling the dominant socio-technical imaginary for urban climate neutrality in the EU Cities Mission, this paper seeks to contribute to the effective implementation of urban initiatives for climate neutrality. Specifically, it seeks to identify the narratives contained within the dominant socio-technical imaginary for urban climate neutrality, with a focus on the two cities of Stockholm and Amsterdam. In this paper, the dominant socio-technical imaginary for urban climate neutrality is understood to be composed of various narratives that collectively outline the desired future state and the pathways to achieve it.

Notably, while the narratives contained within the socio-technical imaginary for urban climate neutrality have not been explicitly explored in previous research, Tidwell and Tidwell [13] and Rudek [6] advocate for the exploration of narrative patterns for understanding socio-technical imaginaries in energy research, while Tozer and Klenk [14] have investigated the underlying storylines of the imaginary for urban climate neutrality within the Carbon Neutral Cities Alliance. Their work provides a foundation for understanding how narratives and stories can be examined to gain insights into a broader imaginary.

This paper focuses on the cities of Stockholm and Amsterdam, which are part of the EU Cities Mission. It also examines the Dutch and Swedish national levels of governance, in relation to the EU Cities Mission, and places this in the context of EU policies and initiatives to gain an understanding of the narratives for urban climate neutrality across different levels of governance from local to national to European. The following research question guides this investigation: *What are the key narratives contained in the dominant socio-technical imaginary for urban climate neutrality in the EU Cities Mission, with a specific focus on the two mission cities of Stockholm and Amsterdam?*

This is an in-depth case study with limited generalizability for other than the two studied mission cities, however provides relevant insights regarding the narratives and the challenges of realising them within the EU Cities Mission in a multi-stakeholder and multi-level policy and governance context. In other words, findings are primarily relevant for the studied cases, but may also provide interesting points of reflection for other European mission cities given the common policy framework, intentions, directions and guidelines provided by the European Commission and the Mission Board.

1.1. The EU Cities Mission and critiques

In 2017, the EU adopted an approach known as the mission approach, to tackle pressing societal challenges faced by European societies [12]. Embedded within the Horizon Europe research and innovation framework programme, the EU flagship funding initiative aimed at driving scientific excellence and innovation across Europe from 2021 to 2027, the EC adopted five key missions [15] (Table 1), one of which is the EU Cities Mission to achieve 100 climate neutral and smart cities by 2030. The connections to the mission on adaptation to climate change are increasingly recognised.

Table 1
The EU missions.

#	Mission topics	Mission goals
1	Adaptation	Adaptation to Climate Change: support at least 150 European regions and communities to become climate resilient by 2030
2	Cancer	Working with Europe's Beating Cancer Plan to improve the lives of more than 3 million people by 2030 through prevention, cure and solutions to live longer and better
3	Oceans	Restore our Ocean and Waters by 2030
4	Cities	100 Climate Neutral and Smart Cities by 2030
5	Soil	A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

The EU Cities Mission has two broad objectives, as outlined in the EC implementation plan [2], namely "to deliver at least 100 European climate-neutral and smart cities by 2030" and "to ensure that these cities also act as experimentation and innovation hubs for others to follow, to enable all European cities to become climate-neutral by 2050".

Climate City Contracts (CCCs) are a key element in operationalising and governing the mission across European cities. The CCCs, though non-binding, serve as pivotal documents wherein each local municipality delineates its objectives, targets, and strategic action plans aimed at achieving climate neutrality by 2030 [16]. CCCs are to be developed through a collaborative co-creation process engaging the respective local municipality, national and regional authorities, local citizens, and relevant stakeholders. Upon the signing of the CCCs by the local municipalities themselves, the city is poised to commence the implementation phase, executing the provisions outlined in their CCCs.

The timeline for the mission objectives, detailed in the implementation plan, spans from 2021 to 2050, encompassing several stages [12]. The main implementation phase unfolds from 2021 to 2030, starting with the creation and endorsement of the CCCs. This phase focuses on the reduction of Scope One and Scope Two emissions, i.e., those that are directly emitted by the cities and those indirectly associated with the consumption of purchased electricity, heat, and cooling [2]. Ultimately, the expectation is that this pioneering group of 112 cities will serve as 'trailblazers', inspiring and guiding European cities towards achieving climate neutrality by 2050 [2].

The EC launching a mission on climate neutral cities, a policy initiative which is to trickle down and transform into climate action at the local level, may represent a promising "new turn in innovation policy" [17], however, also leaves room for critical reflections around the transferability and mainstreaming of a climate neutrality imaginary and its realisation, especially with regards to the local context-sensitivity of policy and governance processes and the narratives that underpin them.

The literature reveals some critiques of the EC's mission approach. For example, Wanzenböck et al. [18] argue that the understanding of missions is too undifferentiated and reflects a technocratic view of mission-oriented policies. Furthermore, it is based on a too narrow view on the number of actors needed in governance arrangements and program structures around missions to adequately address the uncertainty and wickedness of the problems we are facing. The authors highlight the importance of strengthening policy coordination and alignment to meet the ambitions of the mission-oriented program in achieving impact and governing transformative change. Considering the broad and multi-level policy and governance character of the EU Cities Mission, Hekkert et al. [17] point to another problem, namely that of specifying the system boundaries to effectively attain the innovation dynamics related to a societal mission, including its ability to engage diverse stakeholders and institutions in defining, pursuing and completing it. The latter furthermore requires involving multiple competing solutions and applying bottom-up experimentation [18].

Considering these critical points and what seems to be required for realising the EU Cities Mission, including the short timeline for it, it is relevant to gain knowledge on how key actors define, envision and pursue it. This inevitably involves the imaginary of climate neutral cities and the narratives contained therein.

1.2. Introducing the two Mission Cities Stockholm and Amsterdam

Stockholm, the capital city of Sweden, stands as the country's largest municipality and serves as its political and economic centre. Stockholm's sustainability efforts can be traced back to 1976 when the city adopted its first comprehensive environment program [19]. Since then, the city has participated in various sustainability initiatives, for instance, becoming a member of the C40 Cities network and joining the Swedish strategic innovation programme, Viable Cities [20]. Notably,

Stockholm signed a CCC with the Swedish state under the supervision of the Viable Cities program in 2020, a contract which has been updated every year since [20]. Subsequently, the city signed a CCC with the EU in 2023, as part of the EU Cities Mission.

Under its Environment Programme, Stockholm initially sought to achieve a fossil-free status by 2040, as outlined in its Climate Action Plan for 2020–2023 [21]. However, in light of its participation in the EU Cities Mission and the pressing need for accelerated climate action, the city is in the process of updating the Environmental Programme and associated Climate Action Plan, setting the more ambitious target of achieving climate positivity by 2030 [20], which goes beyond the targets of the EU Cities Mission. This revised goal marks a shift from the original 2040 timeline and is enabled through Stockholm's work in bioenergy with carbon capture and storage. This target would require an 80 % decrease in emissions compared to 1990 levels [19].

In 2022, Stockholm was selected to be part of the EU Cities Mission. Since then, Stockholm was chosen as one of 26 cities to participate in the Pilot Cities Cohort 2 to receive additional expert support and funding under the EU's Horizon Europe program [21], and in October 2023, along with nine other cities, was awarded the EU Mission Label for its robust plans to achieve climate neutrality by 2030 [22]. This label acknowledges the city's work on their Climate City Contract, which outlines comprehensive visions for attaining climate neutrality, complete with action plans and investment strategies.

Amsterdam, the capital of the Netherlands, is located in the North Holland province, approximately 25 km from the North Sea. It is the largest city in the country, spanning an area of 165.9 km^2 [23]. With a population of 882,633, it is also the most densely populated city in the Netherlands [24]. Amsterdam was selected in 2022 as one of the 112 cities in the EU Cities Mission. The city has not yet published a CCC.

According to a representative from Amsterdam municipality, the city's most recent targets include achieving a 60 % reduction in Scope 1 and Scope 2 emissions by 2030 compared to 1990 levels, with the goal of achieving full climate neutrality by 2050. By 2030, the city also seeks to achieve a 50 % reduction in primary raw material usage compared to 1990 levels and a climate-neutral municipal organisation.

Notably, these targets are more ambitious than those expressed in the city's roadmap, the Roadmap Amsterdam Climate Neutral 2050 [25], published in March of 2020 and included in the document analysis of this paper. Nonetheless, these targets do not adhere to the EU Cities Mission goal of achieving climate neutrality in Scope 1 and 2 by 2030 [2].

1.3. What are socio-technical imaginaries?

There are many different ways to think about the future. In the domains of urban development and energy transition research, which inherently imply a forward-looking perspective [6], a range of methodologies have been employed to predict, envision, and influence future landscapes, social dynamics, and technological advancements [3]. These include approaches such as scenario planning and Hajer's concept of discourse coalitions which emphasises how groups of actors coalesce around shared storylines to influence policy and institutional practices [26]. Notably, within this methodological spectrum, the concept of socio-technical imaginaries emerges as a useful construct for conceptualising collective visions or shared understandings of desirable futures that can guide technological development, policy-making, and social practices within society [4]. The concept of sociotechnical imaginaries is particularly well suited to this study as it goes beyond discourse to capture not only the discursive alignment but also the normative and future oriented visions that shape transitions [4].

Initially developed to analyse nuclear power regulations in Korea and the USA, socio-technical imaginaries were first defined as "collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects" [27]. Since this initial conceptualisation was limited to analysis at the national and cross-national level, it later broadened to "collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" [4], thus acknowledging the role of local, regional, and global actors in articulating socio-technical imaginaries.

A distinction is presented in the literature between dominant and alternative socio-technical imaginaries. Dominant socio-technical imaginaries are understood as the imaginaries that have the greatest public and institutional investment and support [28], they are institutionalised, and they are promoted by influential actors within a society or specific field [6]. These imaginaries gain traction through acts of power and coalition building and they are characterised by their significant influence over policymaking, governance, and public discourse [5].

In contrast, alternative socio-technical imaginaries encompass those which challenge or diverge from the dominant socio-technical imaginary, articulating visions for different socio-technical arrangements that reflect different values and ideas of progress [29]. These imaginaries are often promoted by marginalised groups, grassroots movements, or non-governmental organisations (NGOs) [5]. Alternative imaginaries can coexist alongside dominant imaginaries and compete for materiality [5]. However, for a socio-technical imaginary to become widely recognised and influential, it must often possess performative power and be continually re-enacted through policies, strategies, technology, and societal practices [6,30,31].

1.3.1. Applications

Socio-technical imaginaries are increasingly employed in energy research, in particular as an analytical tool for examining sustainable technologies [30,32–36] and energy transitions, more broadly [27,37,38]. Looking specifically at the transition to carbon neutrality, Carvalho et al. [39] investigated socio-technical imaginaries for the energy transition in the context of the Portuguese roadmap for carbon neutrality by 2050, highlighting the emergence of multiple socio-technical imaginaries pertaining to the energy transition, each advocated by distinct social actor groups. Meanwhile, a few studies have explored socio-technical imaginaries for the transition to carbon neutrality at the municipal level. Tozer and Klenk [3] analysed discourses in the carbon governance texts of the founding members of the Carbon Neutral Cities Alliance, a transnational climate governance network, to identify the storylines underlying cities' socio-technical imaginaries of urban carbon neutrality. They identified diverse interpretations of the socio-technical pathways for achieving carbon neutrality.

Overall, as articulated by Rudek [6] in a review of socio-technical imaginaries in energy research, the literature reveals them to be powerful tools for understanding, governing, and performing energy transitions. Existing research has explored and applied the analytical concept to various contexts, including at local, national, and international levels. However, Rudek [6] notes that there is a lack of research that investigates these imaginaries across various governance levels. Moreover, the literature on socio-technical imaginaries indicates varying conceptualisations, where understandings of socio-technical imaginaries, storylines, and configurations appear to overlap. In the frame of this paper, these conceptualisations are broadly understood to be narratives.

1.3.2. Impacts

The significance of socio-technical imaginaries lies in their dual role: not only do they describe desirable futures, but, due to their performative nature [40,41], they also actively influence and dictate said futures through their repeated performance [14,27]. As such, while not strictly deterministic, socio-technical imaginaries can play a role in shaping the trajectory of development by influencing policy and governance

decisions, research trajectories and fund allocations, as well as societal actions and responses to innovation [14,42]. This can be linked to the *materiality* of socio-technical imaginaries, i.e., the reciprocal relation between material realities (e.g., technology, the urban landscape) and certain imaginaries, which, in tandem, can hamper or enhance certain behaviours [43].

As stated by Jasanoff and Kim [42], imaginaries can guide the formulation and implementation of policies which shape regulatory frameworks and institutional practices for managing technological change. Thus, by informing policy and governance decisions, socio-technical imaginaries can shape the socio-technical landscape and governance structures within which technological innovations unfold [44]. They can also impact research trajectories and innovation pathways and influence the allocation of funding for technological development and innovation [28,37]. Notably, fund allocations and investments for research projects and innovation initiatives are often aligned with the priorities and visions articulated within dominant socio-technical imaginaries [6,37].

Critically, socio-technical imaginaries can justify the inclusion or exclusion of particular groups, such as citizens, from the decision-making process and the benefits of technological innovation [27,37]. As Beck et al. [45] report, the discourse surrounding imaginaries is intricately tied to questions of power and agency, specifically questions such as "who gets to imagine the future," and crucially, "whose visions and actions count?". These sentiments are echoed by Ballo [32], who emphasises that it is often a limited number of actors that wield the capacity to materialise such imaginations, making the discourses surrounding them pivotal. Thus, the literature highlights the power dynamics inherent in socio-technical imaginaries and envisioning the future.

2. Methods

A qualitative research approach was adopted for this study, employing an in-depth case study methodology to explore the narratives surrounding urban climate neutrality across multiple governance levels. Specifically, this study focuses on the municipal level through the mission cities of Amsterdam and Stockholm in the context of the European and national governance levels of the EU Cities Mission. The two cities were selected since this allowed for a comparison of two leading cities on climate action that were selected as mission cities at an early stage of the EU Cities Mission work plan.

Data collection included 11 semi-structured interviews with board members, platform and network officials, urban planners and city officials from the different levels of governance involved in the EU Cities Mission, including the EU Cities Mission Board, the NetZeroCities project, Viable Cities, the Netherlands Enterprise Agency and the municipalities of Stockholm and Amsterdam (Table 2). The in-depth, hour-long interviews with key officials in the two selected frontrunner cities in climate action, including their national-level mission support, were deemed relevant for gaining insights into climate neutrality narratives in the context of governing the EU Cities Mission. In contrast to Sweden, by the time of collecting data the national level mission support in The Netherlands had just recently been established, which resulted in only one national level interview. However, it revealed all the details deemed necessary for this type of case study. Since this study is not including other stakeholder groups, such as community groups, citizens or private sector stakeholders, the generalisability of the findings is thus limited.

All interview participants were informed about the nature and purpose of the research and gave written and verbal informed consent. Participation was voluntary, and confidentiality was ensured through anonymisation of data.

A document analysis of municipal climate governance documents from Stockholm and Amsterdam, outlining their climate goals, strategies, and implementation approaches, was conducted to complement the interviews. For Stockholm, this document analysis included the city's Climate City Contract (CCC), which details its commitments and action plans for achieving the goals of the Cities Mission. As the CCC was not publicly available during the research period, it was obtained through direct correspondence with municipal representatives. The CCC is made up of several documents, including a 2030 Climate Neutrality Action Plan, Climate Neutrality Commitments, and a 2030 Climate Neutrality Investment Plan, as outlined in Table 2. Since Amsterdam has not yet finalised or released a CCC, the most recent and comprehensive available strategy, the Amsterdam Climate Neutral Roadmap 2050 [25], was selected for review. While this roadmap outlines key targets and sectoral measures, its publication in February 2020 means it may not fully reflect current developments. This limitation is addressed through the inclusion of interview data, which offers more up-to-date insights into Amsterdam's evolving climate strategy.

Table 2
Overview of data collected at the different governance levels of the EU Cities Mission.

Governance level	Data collection	
EU level	EU Cities Mission Board • 2 interviews NetZeroCities • 1 interview	
National level	Netherlands Enterprise Agency • 1 interview	Viable Cities • 3 interviews
Municipal level	Amsterdam • 2 interviews • *New Amsterdam Climate, Amsterdam Climate Neutral Roadmap 2050 [Public Version]* (2020)	Stockholm • 2 interviews • Climate City Contract, EU Cities Mission (2023) o *2030 Climate Neutrality Action Plan of the City of Stockholm* o *Climate Neutrality Commitments of the City of Stockholm* o *2030 Climate Neutrality Investment Plan of the City of Stockholm*

A narrative analysis of the interview and documentary data was conducted, allowing for the identification of the key narratives. Since socio-technical imaginaries are understood as collectively held visions of desirable future states [4], which inherently involve a mental image, or a 'story' that individuals have about the future, narrative analysis was considered suitable for identifying these narratives and how they are articulated. Adopting the Figgou and Pavlopoulos [46] typology of narrative analysis, this paper followed a narrative analytical approach which focuses on the narrative content presented in the data, as opposed to the narrative structure. The document analysis was conducted using an inductive thematic coding approach. This involved a detailed and systematic review of the content of the municipal climate governance documents, whereby codes were generated directly from the text. These initial codes were then grouped into broader themes that reflected the key narratives. NVivo 14, a computer-assisted qualitative data analysis software, was used to facilitate the coding process.

Through further qualitative interpretation and thematic analysis of the content of the six key narratives, and by using existing literature in the field, we were able to identify three cross-cutting themes that require further attention in policy and governance to advance climate neutrality in the two cases studied.

3. Analysis

The following section presents the key narratives (Table 3) contained in the dominant socio-technical imaginary for urban climate neutrality

Table 3
Key narratives in the dominant socio-technical imaginary for urban climate neutrality across governance levels, their main focus and type of narrative.

Key narratives	Main focus	Type
Sustainable mobility and transportation	Electrification of transports; increased active mobility (walking and biking); improved public transports; a boost in shared mobility; decreased car traffic; creation of zero-emission zones	Technological
Community engagement and a just transition	Active citizens; community-driven action; co-creation; creating spaces for participation; involving young and vulnerable people; including marginalised communities; citizen panels; municipal support structures; fair and inclusive transitions; social equity; climate justice; people-centred approaches; need for positive future visions	Social
Frontrunners in urban climate action	Cities as role models; leading by example; driving global climate transition; ambitious goal-setting; progressive leadership; inclusion of consumption-based emissions; affluence means responsibility; need for actionable policies and organisational changes	Political
The city as an experiment	Cities as innovation hubs and testbeds; provide space for exploring new ideas; innovative action; experimentation; iterative learning processes; acceptance of failures; knowledge exchange and peer-to-peer learning; international collaboration and networks	Innovation
Green economy and business innovation	Cities as hubs for climate-neutral businesses; public-private partnerships; new economic opportunities and job creation; business driving innovation; accelerating energy-efficient business markets	Economic
The city as a complex system	Need for a holistic and systemic approach; coordinated efforts across sectors and levels of governance; multi-level governance; bridging traditional silos	System

in the cities of Stockholm and Amsterdam. These narratives emerge from the analysis of strategic documents and the semi-structured interviews with key stakeholders at different governance levels of the EU Cities Mission. Six key narratives were identified: sustainable mobility and transport; community engagement and just transition; frontrunners in urban climate action; the city as an experiment; green economy and business innovation; and the city as a complex system. These are presented in no particular order, and are not mutually exclusive, meaning that several narratives can exist simultaneously and can be mobilised by the same actor or actor group in the context of the dominant socio-technical imaginary.

3.1. Sustainable mobility and transportation

Sustainable mobility and transportation emerges as a key narrative within the socio-technical imaginary for urban climate neutrality. Particularly at the municipal level, there is an emphasis on the importance of transitioning towards sustainable transportation systems, electrified transport, and a focus on more active forms of mobility in order to achieve climate goals. In their respective strategy documents, both Stockholm and Amsterdam outline targets and measures for achieving more sustainable transport, identifying this sector as a key component in their transition.

The Stockholm CCC of 2023 sets targets for reducing emissions from the transport sector by 80 % by 2030 compared to 2010 levels, and a target to decrease total car traffic volumes by 30 % from 2017 levels. It also outlines measures to promote non-car transport [19]. These targets are echoed in the sentiments of the city representatives. As one Stockholm city representative states, "*I think it will be quite the same Stockholm [in 2030], but with some more electrified transport and more bikes and active forms of transport and walking. And not so much parking, within the city area at least*".

Drawing inspiration from cities like Paris, the representative notes a focus on creating more liveable streets and shifting towards more active and sustainable forms of mobility. Zero-emission zones are seen as a key part of this transition, with one representative noting that in addition to one emission-free zone which is currently under development, they envision the establishment of multiple emission-free zones by 2030, further restricting the entry of fossil fuel cars and prioritising active and electrified forms of transportation.

Electrification is identified as a key element in Stockholm's narrative for future sustainable mobility. The CCC places emphasis on the promotion of electric vehicle uptake and usage through various measures, such as increasing charging infrastructure, implementing zero-emission zones, and providing citizens with information [19]. It also outlines how electrification efforts are to be supported by the "Electrification Pact," a coalition of 63 organisations working together to accelerate electric transport. Moreover, both city representatives envisage an increase in electrified transport, envisioning a future where electric vehicles, combined with active transportation modes like biking and walking, dominate the urban mobility landscape.

Amsterdam's roadmap document sets out the aim of having emission-free traffic in the city by 2030 and seeks to boost more sustainable forms of transport, such as cycling, car-sharing, and public transport [25]. As in Stockholm, emission-free zones are also viewed as central in Amsterdam's future transportation system. As expressed in the roadmap, which asks: "*Can you picture it? By 2030, Amsterdam's streets will be free of exhaust-emitting cars*", the city seeks to introduce new low- and zero-emission zones, as well as tighten up existing ones, ultimately leading to a complete removal of fossil-fuel transport in the city, by 2030 [25]. Closely linked, a future in which the car is less prominent as a form of transport was described by both representatives from Amsterdam.

One representative noted that while they envision that cars will still play a role in future transport, they imagine that cities can be designed so that cars are no longer a necessity, meaning that "*the car will become much less prominent, we'll have a huge cycle infrastructure and good public transport*". They noted that they "*expect the car to go away, and that provides a lot of space to do other things, like to add more green*", a view mirrored by the other city representative, who highlighted the potential increase in public and green space as a result of the transition away from the car. Overall, the narrative of sustainable mobility and transportation reflects a vision of cities where car use is minimised, and alternative and greener modes of transport are prioritised.

3.2. Community engagement and a just transition

The engagement of local citizens and communities, particularly in the context of achieving a socially just transition, emerged as a prominent narrative across all governance levels. This narrative emphasises the role of citizens as active and vital participants in the transition process, highlighting the importance of community engagement and co-creation. Furthermore, it underscores the principle of climate justice, ensuring that vulnerable groups are not left behind, and envisions a future city that is equitable and inclusive.

3.2.1. Community engagement

Members of the Cities Mission Board emphasised the value of community engagement and active citizen participation for driving urban climate neutrality. For instance, one of the Board members highlighted the significance of genuine citizen involvement, stating, "*I'm a big believer in citizen involvement and not just for the sake of informing, or just participation, but in terms of city-making.*". This sentiment was echoed by

another member of the Mission Board, who stressed the necessity of citizen activation and community-driven action, noting that public and private sectors alone cannot achieve climate goals without active citizen participation. This representative also proposed the provision of spaces and frameworks where local communities can meet and create calls for action as practical ways to foster engagement.

At the city level, the role of citizens in making the climate transition relevant and effective is emphasised. In the case of Stockholm, the CCC [19] states that "*involvement of citizens is a priority area*", noting an emphasis on including young people and vulnerable groups. The document points to existing initiatives for engaging citizens, such as a digital citizen panel, which is used to gather public perspectives and ideas for the transition, and advocates for the development of further digital solutions to increase collaboration. Furthermore, it indicates a commitment to working with a range of perspectives and being open to new ways of thinking and working.

In Amsterdam, community engagement is similarly prioritised. For example, the roadmap document describes how thousands of citizens are already involved in initiatives across the city to save or generate clean energy and to share resources [25]. Emphasising the importance of individual actions and behaviour change, the roadmap also directly addresses the citizens, noting: "*The next step is for climate-neutral to become the new normal. And that can't happen without you*", and "*We are asking every citizen of Amsterdam to play their part*" [25]. Thus, the citizens of Amsterdam are encouraged to play an active role in the energy transition. Furthermore, the municipality will offer support for citizen initiatives, including technical, organisational, and financial assistance, particularly through a flagship online platform, the *New Amsterdam Climate* platform. This underscores the emphasis placed on co-creation, particularly with citizens and local communities, as a central element of the city's transition to climate neutrality.

3.2.2. Just transition

Closely intertwined with the concepts of community engagement and co-creation, the narrative of a just transition focuses on a shift towards climate neutrality that is fair and inclusive, addressing social equity alongside environmental goals. Social justice was identified by representatives across municipal, national, and EU levels, as well as in the strategy documents of both cities, as a vital component of the energy transition and of climate-neutral futures.

At the international level, representatives from the Cities Mission Board highlight the holistic nature of climate neutrality, framing it as a transformation that supports both urban innovation and social inclusivity. For instance, articulating their desired vision for a climate-neutral city, a Mission Board member noted that their vision of climate neutrality goes beyond a reduction of emissions. Instead, "*it is about providing life quality, improving the conditions in the city. It means that it's about cities as places for life; it's about urban innovation; it's about cities as living labs; and it's about the just transition. That means leaving no one behind, so doing it in a way that everybody can still afford to have a good life*".

At the national level, representatives from both Viable Cities and the Netherlands Enterprise Agency (RVO) promote a people-centred approach to the energy transition. A representative from Viable Cities stated that "*it's not about technology and digitalisation, it's about people*". Similarly, a representative from the RVO highlighted that "*in the end, it's more of a social transition. We need to have an idea of what are we doing it for, other than to stop climate change, of course. You need a transition path where you have a perspective for people—what the future would look like—and that is also a just transition*". This sentiment reflects the need to go beyond technical solutions and emission targets, underscoring a just transition as a vision that provides a tangible, positive outlook for society.

Amsterdam adopts climate justice as a guiding principle for the energy transition, as reflected in the following excerpt of the roadmap: "*In our vision, the city will only become climate-neutral if we conceive of the energy transition as a social transformation, if climate justice is adopted as a guiding principle, we work together, the municipality takes the lead in the process, and we take responsibility as a capital city*" [25]. This reflects an emphasis on climate justice and the inclusion of marginalised communities.

In Stockholm, the principle of a just transition is also emphasised as crucial for the city's transition. For instance, the CCC details initiatives aimed at promoting environmentally friendly behaviours, such as using public transport, while also working to reduce barriers for vulnerable groups [19]. This approach ensures that sustainable options are not only viable but also the most accessible choice for all residents.

In summary, the narratives of community engagement, co-creation, and just transition are integral components of the urban climate neutrality agenda, resonating across governance levels and exemplified in the strategies of the Stockholm and Amsterdam municipalities. At the heart of these narratives is the recognition of citizens as active agents in driving the transition process, with initiatives aimed at fostering their participation and ensuring inclusivity.

3.3. Frontrunners in urban climate action

Stockholm and Amsterdam are both keen to position themselves as frontrunners in urban climate action, striving to lead by example and inspire other cities around the world. This narrative underscores their commitment to ambitious climate goals and strategies aimed at significantly reducing emissions and driving the global transition to urban sustainability.

Stockholm distinguishes itself through its ambition to achieve climate positivity by 2030, an objective that exceeds the EU Cities Mission target of climate neutrality by the same year. This heightened ambition is articulated by city representatives and formalised in the CCC, underscoring Stockholm's intent to position itself as a global leader in the climate transition. Moreover, the CCC further outlines the city's aspiration to serve as a global example, stating that, "*Cities have an important role in the transition, and Stockholm aims to be a world leader in this process by reducing emissions and being a role model for others*". This aspiration is further reinforced by the city's political goals, which include being a model for decreasing emissions and leading in the global efforts to implement the Paris Agreement [19]. Additionally, Stockholm supports Sweden's national goal to become the world's first fossil-free nation, actively participating in initiatives like Fossil Free Sweden to accelerate the climate transition [19].

Representatives from Stockholm echoed this ambition. For instance, one representative highlighted the city's reputation for being a progressive leader in climate emissions, noting that "*we are one of the most progressive cities in the world when it comes to climate emissions*". Another city representative pointed to the ambitious targets set out in Stockholm's CCC [19], such as achieving climate positivity by 2030, contending that these targets, which go beyond those set by the EU Cities Mission, aligned with the city's frontrunner status. They also suggested that expanding the scope to include consumption-based emissions could further advance Stockholm's global leadership position.

Similarly, Amsterdam positions itself as a frontrunner in urban climate action, leveraging its status as a wealthy and influential city to drive sustainable change. The city's roadmap articulates the city's responsibility to contribute significantly to the global transition to sustainability, asserting, "*We are responsible - as one of the most affluent cities in the world and the Dutch capital, Amsterdam is responsible for making a real contribution to the transition to a sustainable world*" [25]. Additionally, it highlights Amsterdam's success in facilitating electric transport through a broad range of measures, which it argues sets an example for other cities to follow.

Despite its achievements, Amsterdam city representatives provided a more nuanced perspective on the city's leadership status. Reflecting on the city's target of achieving climate neutrality by 2050, as opposed to the 2030 goal promoted by the EU Cities Mission [2], one representative

stated that "*we think it would be a fiction to pretend that we could achieve climate neutrality by 2030. We'd rather tell the honest story that we can't achieve that even if we would like to achieve it*". Furthermore, a representative commented on the city's global reputation, noting that while Amsterdam is recognised internationally for its innovative ideas and international collaborations for climate action, there is a need to translate these ideas into actionable policies and internal organisational changes to make significant changes in climate action and solidify its frontrunner status.

3.4. The city as an experiment

Cities are increasingly seen as experimental hubs for innovative climate action, learning, and co-learning. This narrative emphasises cities as living laboratories where new ideas can be tested, refined, and scaled, offering valuable lessons for broader application. This narrative was expressed across local, national, and EU governance levels.

Representatives from the Cities Mission Board underscored the importance of experimentation and shared learning. One representative highlighted the role of 'Lighthouse Cities' as hubs of innovation, whose insights and successful experiments can be adapted and replicated across Europe. Furthermore, they emphasised that cities are no longer seen merely as collections of problems but as arenas for pioneering solutions: "*We've seen many cities experimenting in a really good way. In the last, I would say 30 years…if you were to combine all the pilots, all the experiments that have been set up, if you put them together in a city, you're almost there*". Thus, the representative indicated that, in a sense, "*the ideal city already exists*" through a combination of different cities' initiatives.

Another representative from the Mission Board pointed out that learning is most effective when cities with similar challenges collaborate and exchange knowledge. They elaborated that this peer-to-peer learning enriches both the advisors and those seeking guidance, facilitating mutual growth and adaptation. Thus, they highlighted the importance of meta-level discussions with cities to extract common challenges and solutions applicable to diverse contexts.

Stockholm exemplifies this experimental ethos by positioning itself as a test bed for innovative solutions. A representative from Stockholm described their approach: "*We try to understand and co-create experiments of how we can change the system to make it more in line with the mission. And also the idea of scaling those things that actually work*". This iterative process involves starting with small-scale pilots, learning from them, and scaling successful initiatives. The Stockholm CCC also emphasises the city's active participation in international collaborations and networks, underscoring the value placed on sharing insights and learning from global peers [19]. For example, the CCC notes collaborations with academic partners, including the Royal Institute of Technology (KTH), Stockholm University, and Massachusetts Institute of Technology, on projects which employ the city as a living lab to test digital and environmental innovations.

Amsterdam's approach to experimentation is similarly robust, with a strong emphasis on innovation and collaboration. The roadmap document highlights the necessity of exploring new and previously unexplored paths, advocating for an environment that encourages trying out new ideas. Emphasising Amsterdam's focus on international collaboration, it states "*Together we are learning about what does and does not work, and thereby accelerating the transition in our own city and beyond*" [25]. This is further evidenced by the city's involvement in pilot projects such as the EU ATELIER project. A representative illustrated the unpredictable nature of this innovation process, noting how some solutions, like the rapid adoption of solar panels, can advance unexpectedly fast, while others, such as infrastructure changes for heating, reveal unforeseen challenges only upon implementation. Nonetheless, they underscored that this iterative learning process is crucial for advancing the energy transition.

A key element of the experimental narrative is the acceptance of failure as part of the learning process. For instance, a representative from the Mission Board asserted that space for failure is essential in a mission-driven approach, allowing cities to innovate and learn without the fear of setbacks. According to this representative, this perspective is crucial for fostering a culture of resilience and continuous improvement. This perspective was shared by another representative from the Board, who acknowledged the ambitious nature of achieving climate neutrality by 2030 and emphasised that the broader goal is to demonstrate that such a transition is feasible within a decade, even if individual experiments do not always succeed. Amsterdam's roadmap similarly emphasises the need for space to explore new ideas and paths, noting that both successes and failures are integral to the learning process; "*Space is needed to try out new ideas and find out what does and does not work. In essence, this means giving each other space and security to do things differently, in the shared knowledge that regardless of whether an experiment succeeds or fails, we will keep learning until we have found a way that works*" [25].

Overall, by embracing experimentation, collaboration, and a willingness to learn from both successes and failures, the narrative of the city as an experiment was made evident in Stockholm and Amsterdam, as well as across governance levels of the EU Cities Mission. This narrative highlights the dynamic, evolving nature of urban climate action, where continuous learning and adaptation are key to achieving long-term sustainability goals.

3.5. Green economy and business innovation

Another prominent narrative within the dominant socio-technical imaginary for urban climate neutrality revolves around the concept of the green economy and business innovation. This narrative highlights the importance of public-private partnerships, as well as the economic opportunities created by the transition.

Public and private partnerships and collaboration were identified as central to achieving climate neutrality by several stakeholders. For example, a representative from the EU Cities Mission Board highlighted the importance of public-private dialogues, arguing that these facilitate systemic change. They noted that such collaboration can extend beyond national borders, fostering a just and affordable transition. Furthermore, a representative from Viable Cities emphasised the growing interaction between cities and private companies. According to this representative, businesses increasingly see value in aligning with cities aiming for climate neutrality, which has benefits for both parties, since businesses can enhance their brand and employee satisfaction, while cities can gain momentum in their climate goals. As a result, they predicted that cities will increasingly become hubs for climate-neutral and sustainable businesses.

At the municipal level, the economic and business opportunities created by the transition, as well as the role of local businesses and industries in driving innovation were further emphasised. For instance, Stockholm's CCC outlines the city's goal of building a strong industrial sector and creating job opportunities through fossil-free practices, stating that "*Apart from achieving climate neutrality, this climate city contract also leads to several co-benefits. New job opportunities are already emerging in the energy, mobility and circularity sectors*" [19]. To help realise this ambition, the CCC highlights initiatives such as the Climate Pact and Electrification Pact, which involve more than 400 companies and businesses, particularly from the logistics and construction sectors, that seek to reduce emissions and support electrification. Additionally, a representative from Stockholm highlighted the city's considerable existing collaborations with business actors, noting that future collaboration can build on these partnerships.

Meanwhile, Amsterdam's roadmap highlights the city's ambitions to accelerate the energy-efficient business market to foster innovation and efficiency within the business community and align economic activities with the city's sustainability goals [25]. This includes measures such as sector specific consultations for businesses and targeted subsidies, with the ambition of all companies in the municipality to eventually become

climate neutral and natural gas-free. This emphasis underscores the city's commitment to leveraging economic activities for advancing climate goals.

Overall, the narrative of business innovation and a green economy as central to climate-neutral cities reflects a vision of cities where economic prosperity is linked to urban sustainability. This vision was shared across different levels of governance, showing a unified commitment to integrating business innovation with environmental goals.

3.6. The city as a complex system

Another prominent narrative which emerged within the socio-technical imaginary for urban climate neutrality is the city as a complex system. This narrative emphasises the need for a holistic and systemic approach to achieving climate goals, recognising that cities are intricate networks of interconnected elements that require coordinated efforts across various sectors and levels of governance.

At the heart of this narrative is the recognition that achieving net-zero emissions requires collaboration and coordination across traditional silos (see also Buylova et al. [47]), a perspective which is central to the EU Cities Mission [30]. A representative from NetZeroCities emphasised the importance of systemic thinking and coordination in implementing solutions at scale. They argued that traditional incremental methods have historically proven insufficient and highlighted the need for societal, governance, and mind-set changes to complement technological solutions. Furthermore, they recognised the EU Cities Mission as a useful platform for this kind of systemic approach. Similarly, a representative from the EU Cities Mission Board advocated for systemic change through public-private dialogues and cross-border collaborations, rather than focusing solely on achieving net-zero emissions by 2030, arguing that such changes are a better indicator of the Mission's success than specific targets.

In Stockholm, the CCC acknowledges the inherently systemic nature of the transition to climate neutrality, noting that "*this insight will permeate the work process towards climate neutrality*" [19]. A representative from Stockholm elaborated that while technological solutions have contributed significantly to emission reductions, the city is "*now at a stage where [they] need to do system changes*", something that is only possible through a multitude of coordinated actions. This approach is reflected in the city's Integrated Management Budget System (ILS), as outlined in the CCC, which embeds climate goals across all municipal departments and ensures that actions are aligned across government functions.

In Amsterdam, the importance of a systems perspective is illustrated by the holistic approach to climate neutrality and the EU Cities Mission. Representatives emphasised that the city is taking a broader approach to the mission, as one representative noted, "*We have a holistic vision of sustainability so it's not just neutrality*". Alongside a goal to achieve carbon neutrality, the city reportedly integrates additional principles into its transition approach, such as nature inclusivity and circular economy principles. The roadmap also outlines an adaptive planning approach supported by a Climate Budgeting system, which is updated annually to track emissions reduction efforts and ensure progress across sectors [25].

Overall, the narrative of the city as a complex system highlights the interconnectedness of cities and the need for comprehensive, coordinated efforts to achieve urban climate neutrality. This perspective encourages innovative approaches that go beyond technology to include changes in governance, societal behaviour, and cross-sector collaboration.

4. Discussion

This paper identifies several key narratives underlying the socio-technical imaginary of urban climate neutrality: Sustainable Mobility and Transport, Community Engagement and Just Transition, Frontrunners in Urban Climate Action, The City as an Experiment, Green Economy and Business Innovation, and The City as a Complex System. These narratives offer a comprehensive view of how key documents and representatives at each studied level of governance participating in the EU Cities Mission envision and pursue climate neutrality.

This section explores the divergent approaches of Amsterdam and Stockholm towards the EU Cities Mission, as well as the varying prominence of these narratives across different governance levels. It also compares these narratives with existing research in the field, under the broader themes of 'justice and engagement', 'leadership and status', 'experimentation and innovation'. These cross-cutting themes were identified through further interpretation of the key narratives and represent important challenges and prerequisites for everyday urban policy and planning practices in the two cities in order to advance climate neutrality. These themes are indeed, to various degrees, present in the policy framework for the EU Cities Mission [2,16], and therefore relevant to highlight. However, the extent to which the EU Cities Mission framework provides actual implementation guidance and supporting structures for cities to advance the integration of justice, leadership and innovation in climate action is not included within the scope of this study and could thus be investigated by future research.

4.1. Contrasting approaches to the EU Cities Mission

The analysis reveals contrasting perspectives on the 2030 goal in Stockholm and Amsterdam, namely an optimistic approach in the case of the former and a pragmatic approach in the case of the latter. In Amsterdam, representatives described the 2030 climate goals as ambitious yet largely aspirational. One city representative acknowledged that the city's official target of a 60 % CO_2 reduction by 2030, which surpasses the national legal obligation of 55 % under the Paris Agreement, is unachievable in reality. They cautioned that, despite the city's commitment, achieving these targets was "an illusion".

Amsterdam's internal projections, as laid out in the roadmap [25], estimate a maximum feasible reduction of around 48 %, even with strong political support and resources. This sentiment was echoed by another representative, who emphasised the importance of a "realistic" approach, describing full climate neutrality by 2030 as a "fiction," given current progress and infrastructural limitations. Both representatives noted that, while the EU Cities Mission provides valuable collaboration opportunities, it does not necessarily address the foundational barriers that Amsterdam faces in meeting these targets.

In contrast, Stockholm has approached the 2030 goal with greater optimism, aiming to become climate positive by 2030 [19]. City representatives expressed confidence in Stockholm's ability to mobilise the necessary resources and technological solutions, such as bioenergy with carbon capture and storage. This difference in outlook between the two cities illustrates the varied approaches and strategies within the EU Cities Mission, demonstrating how cities interpret the shared objective of climate neutrality in ways that are shaped by their unique contexts.

4.2. Differences in adopting narratives across governance levels for the EU Cities Mission

The narratives identified in this study varied in prominence across governance levels (Table 4), reflecting the differing roles, responsibilities, and scopes of influence of actors at the EU, national, and city levels. While some narratives were shared across all levels, others were not, likely due to the unique priorities and challenges faced by governance tiers.

At the municipal level, the narrative of 'Sustainable Mobility and Transportation' was particularly prominent. Representatives from both Stockholm and Amsterdam emphasised sustainable urban transport as a key element of their transition. This focus aligns with findings from Christidis et al. [7], who highlight urban transport as a primary focus in most climate neutrality strategies in the EU Cities Mission. This is

Table 4
Comparison of key narratives across governance levels.

Narrative	City level	National level	EU level
Sustainable mobility	Emission-free zones; electrification; active mobility	*Not explicit*	*Not explicit*
Community engagement & justice	Inclusive co-creation; vulnerable groups prioritised; digital and grassroots engagement	People-centred social transition	Holistic, just transition focus
Frontrunners in urban action	Stockholm: climate positivity (2030); Amsterdam: neutrality (2050)	*Not explicit*	*Not explicit*
City as experiment	Living Labs; scaling pilot projects; learning from failure	*Not explicit*	'Lighthouse cities'; peer-to-peer learning
Green economy & innovation	Public-private partnerships; local green jobs; business collaboration	City-business collaboration	Public-private partnerships and collaboration
City as complex system	Holistic, systemic coordination beyond technology; multi-sector collaboration	*Not explicit*	Systemic change; governance shifts

connected to the transport sector's significant contribution to greenhouse gas emissions, and the ability of city authorities to address some transport-related challenges effectively at the urban level.

Additionally, the 'Frontrunners in Urban Climate Action' narrative was unique to the municipal level, as the two cities present themselves as leaders in advancing climate neutrality, highlighting their pioneering efforts in implementing innovative policies and technologies, aiming to set an example for other cities. This reflects a strategic approach, where local achievements can serve to inspire and inform other municipalities, while also leveraging their achievements to inspire broader action and attract investment.

At the EU level, 'The City as an Experiment' narrative was especially prominent. In particular, the EU Cities Mission Board emphasised the value of Lighthouse Cities as hubs of innovation, where successful initiatives can be refined and scaled, and peer-to-peer learning and knowledge exchange between cities. This focus on experimentation and learning reflects the role of the EU Cities Mission Board in fostering this kind of cross-city collaboration and knowledge-sharing, as well as its EU level focus for achieving change across multiple cities.

Certain narratives were consistently present across all levels of governance, reflecting shared priorities. Both 'Community Engagement and Just Transition' as well as 'Green Economy and Business Innovation' were strong across all governance levels. The former narrative focused on involving citizens in decision-making processes and ensuring that the transition is socially just. Meanwhile, the latter narrative centred on maximising public and private partnerships and the creation of business opportunities as a result of the transition.

This widespread presence suggests that while different actors prioritise distinct aspects of the transition, there is a shared understanding across governance levels of the EU Cities Mission that climate action must integrate social equity and economic transformation to be effective and scalable. At the same time, it is noticeable, in the context of this study, that some of the narratives are less explicit at the national level. This may suggest that climate neutral cities need further attention at national policy and governance levels to effectively leverage climate action. Overall, understanding these differences in prominence can help align strategies across governance levels, ensuring that policies and initiatives reinforce rather than conflict with one another.

4.3. Prominent themes shaping narratives for the EU Cities Mission

In exploring the dominant socio-technical imaginary for urban climate neutrality, it becomes evident that the various narratives contained within it exhibit both synergies and tensions that reflect the complexities of implementing climate strategies in urban contexts. There are three crosscutting themes that were identified in the narratives documented in this paper that closely connect with existing literature. This includes the broader themes of 'justice and engagement', 'leadership and status', 'experimentation and innovation' (Fig. 1).

4.3.1. Justice and engagement

This paper identified 'Community Engagement and Just Transition' as a key narrative for urban climate neutrality in the Cities Mission. This narrative aligns closely with socio-technical imaginaries identified by Carvalho et al. [39] in the Portuguese roadmap for carbon neutrality 2050, namely 'Energy Citizenship' and 'Just Transition'. The authors [39] described 'Energy Citizenship' as an imaginary where citizens are viewed as active agents of change in the energy transition, while the 'Just Transition' imaginary was understood as "highlighting the need for an inclusive and fair reconfiguration of socio-technical and socioeconomic systems". In the same vein, Tozer and Klenk [3] identified "reframing what it means to be a 'good' urban citizen" as a storyline which underlies socio-technical imaginaries of urban carbon neutrality.

Similarly to the imaginaries described by Carvalho et al. [39], this storyline emphasises the role of citizens as potential agents of change in the energy transition, through behaviour changes and sustainable decision-making. Thus, the identified 'Community Engagement and Just Transition' narrative, which emphasises the active involvement of citizens in the energy transition through collaboration and co-creation, in particular, to ensure the inclusion of vulnerable groups, has significant parallels with the two socio-technical imaginaries outlined by Carvalho et al. [38] and the storyline described by Tozer and Klenk [3]. These parallels suggest that citizen involvement and socially just transitions are considered central to energy transitions and governing climate action across different contexts.

4.3.2. Leadership and status

Next, the narrative of 'Frontrunners in Urban Climate Action', as identified in this paper, also aligns with certain socio-technical imaginaries and storylines identified in existing research. Firstly, the concept of being a world leader in climate action aligns closely with the socio-technical imaginary of "Modernization and Techno-Economic Development" as outlined by Carvalho et al. [38]. Within this imaginary, the energy transition is positioned as a means to attain economic and geopolitical leadership.

This perspective resonates with the narrative of being a frontrunner in urban climate action, where cities strive to lead by example and drive progress towards urban climate neutrality through their climate initiatives. Moreover, Tozer and Klenk [3] outlined the storyline of 'Technological Fixes and the Modern City,' which underscores the notion that cities must embrace sustainable technological innovation to remain competitive and maintain their stature on the global stage. Here, the emphasis on cities positioning themselves as international leaders through climate action aligns with the frontrunner narrative described in this paper.

4.3.3. Experimentation and innovation

The narrative of 'The City as an Experiment' resonates closely with the storyline of 'The City as a Laboratory' introduced by Tozer and Klenk [3], which characterises urban areas as hubs of innovation and experimentation for climate solutions. Cities are portrayed as dynamic spaces where public and private actors collaborate to experiment with different approaches to address climate challenges [3]. This is closely in line with the narrative expressed in this paper, which views cities as vital experimental hubs for innovative climate action and, crucially, as places of learning. Learning plays a particularly prominent role in the narrative discussed here, as cities are not only seen as spaces for testing new ideas but also for adapting and refining climate strategies, and ultimately

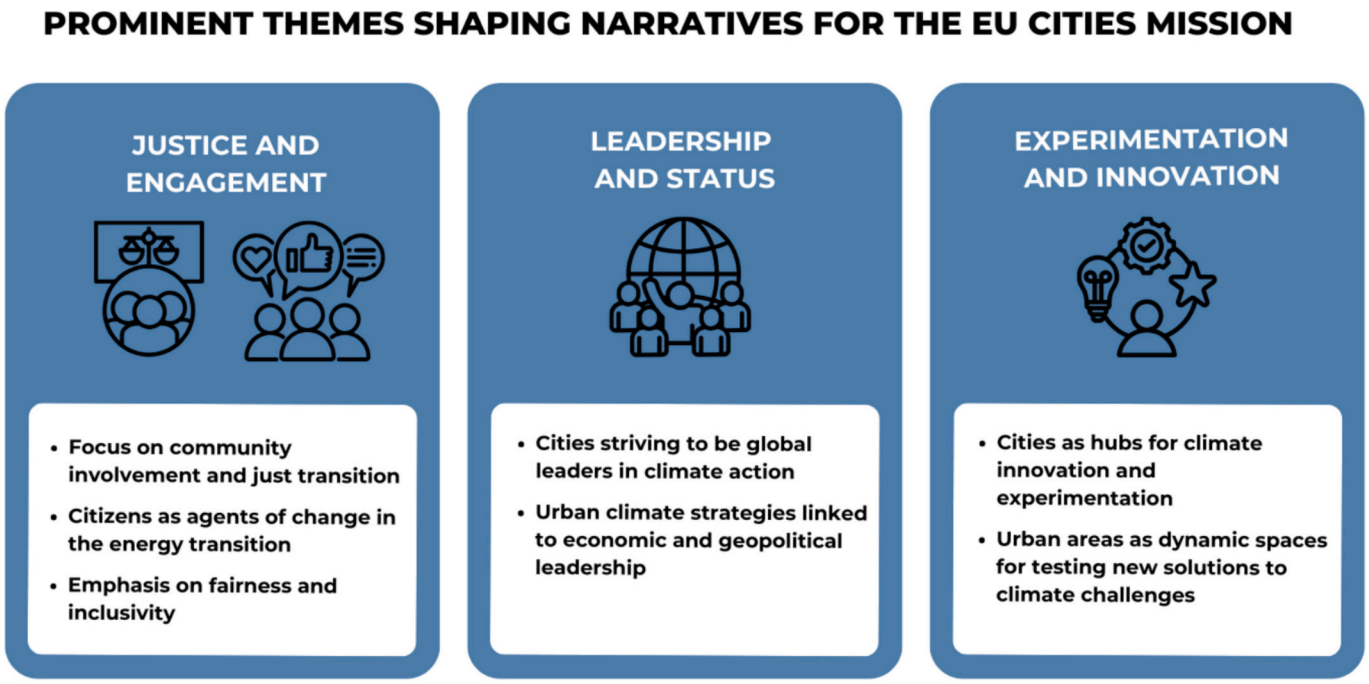

Fig. 1. Crosscutting themes related to the narratives for urban climate neutrality.

transforming complex urban systems, based on continuous learning. This emphasis on "reflective future-making" [44] and learning for transformation (see e.g. [48,49]) may be an emerging focus in the field, reflecting broader trends towards adaptive management and transformative capacity through iterative learning processes in urban climate action.

The narrative of 'Green Economy and Business Innovation' identified in this paper is strongly aligned with the socio-technical imaginary of the 'Green Economy' described by Carvalho et al. [38] and the storyline of the 'New Economy of Carbon Control' outlined by Tozer and Klenk [3]. Carvalho et al. [38] described the 'green economy' socio-technical imaginary as a paradigm where economic growth is closely coupled with sustainability and climate change mitigation, which highlights the decarbonisation process as beneficial to the economy through the creation of new markets, business opportunities, and jobs within a carbon-neutral framework. The narrative identified in this paper reflects these tenets by focusing on the economic opportunities created by the transition to a climate-neutral city, and the role of public-private partnerships in fostering sustainable business practices.

5. Conclusions

As stated at the outset of this paper, the idea of carbon or climate neutrality holds diverse interpretations among stakeholders, but it is generally understood in this context as creating resilient and low-carbon cities. This paper investigated the narratives underlying the dominant socio-technical imaginary for urban climate neutrality in the EU Cities Mission with a focus on the cities of Stockholm and Amsterdam. These narratives provide insights into how stakeholders in the two cities, and at different governance levels of the EU Cities Mission, conceptualise the transition to urban climate neutrality, and how they envision the future.

Overall, the six identified narratives offer a framework for understanding the dominant imaginary shaping urban climate action under the EU Cities Mission. The study reveals that certain narratives are more prominent in the two cities, namely, sustainable mobility, cities as frontrunners in climate action, and, partly, the recognition of the complexity of coordinating and governing the energy transition in cities. This reflects the differing priorities and responsibilities at the various levels of governance. Meanwhile, an emphasis on a just transition and green business opportunities is prevalent across all levels, reflecting a shared recognition of the social and economic dimensions of the transition. The study also highlights both synergies and tensions between narratives, which create opportunities for more integrated policy interventions and reveal areas where trade-offs must be carefully managed. These findings shed light on the complexity of transitions, demonstrating that while climate neutrality is often a unifying goal, the pathways to achieving it vary across governance levels and contexts.

Moreover, the findings suggest that these narratives broadly align with three overarching themes: justice and engagement, leadership and status, and experimentation and innovation. These themes frame how cities aim to achieve climate neutrality and what they prioritise in their vision of a sustainable future. Understanding these narratives and themes is valuable because they can influence real-world strategies and outcomes, including practices, policies, fund allocation, and research trajectories, as outlined in the literature [3,4,6,37]. Recognising these themes can foster more coherent and effective collaboration among stakeholders by providing a structured framework to align objectives across governance levels, identify priorities, and tailor interventions to specific local contexts where climate action is to take place. The latter is highlighted in the EU Cities Mission specific objectives, i.e., the provision of EU wide skills and expertise and tailored support within the EU mission platform but seem to require increased attention to better support the cities in their challenging transition processes and thus minimise the gap between policy and practice.

The partial divergence in the climate neutrality rhetoric may indicate that the EU missions approach is still a predominantly "top-down" approach, "pushing" an overarching socio-technical imaginary of climate neutral cities by 2030, yet lacking the methods and supporting structures to address truly innovative governance and how to actually change planning and implementation processes that can lead to desired shifts at the local level, e.g., the support needed to break, or bridge, different silos that hamper more transformative action [48].

The findings of this study underscore the importance of recognising and addressing the overlaps and contradictions in the key narratives underlying the dominant socio-technical imaginary for urban climate neutrality. These narratives, centred around justice and engagement,

leadership and status, and experimentation and innovation, offer valuable insights for policymakers and practitioners seeking to design and implement effective strategies for urban climate neutrality.

5.1. Recommendations for policy and practice

To better support the implementation of climate neutrality at the city level, policymakers should consider differentiated support structures aligned with the crosscutting themes identified in this study. First, under the theme of justice and engagement, national and EU institutions should prioritise funding mechanisms that support community-led initiatives and co-creation processes, particularly those targeting marginalised groups. This includes developing tools to assess the social equity impacts of climate policies and ensuring active citizen involvement in decision-making processes. Second, related to leadership and status, cities positioning themselves as frontrunners need recognition and tailored structural support, including greater vertical coordination across governance levels and long-term financing tools to scale up effective local measures. Third, in line with experimentation and innovation, regulatory frameworks should enable cities to pilot new ideas with reduced risk, embed learning mechanisms to assess both successes and failures, and facilitate peer learning across municipalities. Strengthening these three areas can enhance the capacity of cities to operationalise climate neutrality strategies in ways that are context-sensitive and systemically supported across governance levels.

Despite the current narrative around cities as forerunners, they still need enhanced supportive mission "functions", especially at the national level, to effectively address financial and regulatory barriers and to go from "fiction" to reality. For this, the unlocking of narratives can be useful to better understand the needs and worries at the local level, and to provide input for more tailor-made support, which is the actual role of the mission support functions at national and EU levels. The goal of achieving climate-neutral cities is truly a multi-level governance challenge, which requires innovation at all levels of governance. For national and EU policy levels, achieving the EU Cities Mission requires increased priority to and focus on local implementation, which in turn seems to require a higher level of cross-boundary collaboration, building knowledge and capacity for local energy transitions, and providing supporting regulatory and financial structures for it.

In light of the parallels between narratives, it is recommended that policymakers, at all levels of governance, design integrated policies that leverage synergies between different narratives. This holistic approach can ensure that policy objectives are aligned and mutually reinforcing. For instance, the overlap between narratives advocating sustainable mobility and those focusing on community engagement highlights opportunities to enhance liveability through accessible public transport, shared mobility and active mobility.

Addressing contradictions within and between narratives is equally critical. For example, acknowledging tensions, such as the promotion of electric vehicles alongside calls to reduce car traffic, allows policymakers and practitioners to develop more coherent and realistic strategies and interventions that balance competing goals, especially at the local level. By openly addressing these contradictions, policymakers and practitioners can build trust with stakeholders and foster collaboration, which is needed to enhance low-carbon behaviours and lifestyles in cities.

Lastly, recognising and addressing contradictions, as well as strengthening synergies, can create a foundation for more effective stakeholder engagement and policy implementation. By more systematically considering the broader themes of justice, leadership, and experimentation, policymakers and practitioners can better navigate the complexities of urban climate neutrality and develop strategies that are both realistic and responsive to local and broader societal needs.

CRediT authorship contribution statement

Jasmine Chakravarty: Writing – original draft, Investigation, Conceptualization. **Björn Wickenberg:** Writing – review & editing, Supervision. **Kes McCormick:** Writing – review & editing.

Funding sources

This work was supported by the Swedish Energy Agency (Energimyndigheten) grant number P2022-01086 (Breaking Up Silos Project) and grant number 50337-1 (Massive Urban Missions Project).

Declaration of competing interest

There are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

The authors would like to thank all the people interviewed for sharing their experiences and insights, and the participants of the Breaking Up Silos (BUS) project as well as the Massive Urban Missions (MUM) project, and the reviewers for constructive comments on earlier versions of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.erss.2025.104468.

References

[1] K. Shabb, K. McCormick, S. Mujkic, S. Anderberg, J. Palm, A. Carlsson, Launching the mission for 100 climate neutral cities in Europe: characteristics, critiques, and challenges, Front. Sustain. Cities 3 (2022) 817804, https://doi.org/10.3389/frsc.2021.817804.

[2] European Commission, 100 climate-neutral and smart cities by 2030 implementation plan, European Commission DG Research & Innovation, 2023. https://research-and-innovation.ec.europa.eu/system/files/2021-09/cities_mission_implementation_plan.pdf. (Accessed 12 October 2023).

[3] L. Tozer, N. Klenk, Discourses of carbon neutrality and imaginaries of urban futures, Energy Res. Soc. Sci. 35 (2018) 174–181, https://doi.org/10.1016/j.erss.2017.10.017.

[4] S. Jasanoff, S.-H. Kim, Dreamscapes of Modernity: Socio-technical Imaginaries and the Fabrication of Power, University of Chicago Press, 2015.

[5] L.L. Delina, Committing to coal? Scripts, socio-technical imaginaries, and the resurgence of a coal regime in the Philippines, Energy Res. Soc. Sci. 81 (2021) 102258, https://doi.org/10.1016/j.erss.2021.102258.

[6] T.J. Rudek, Capturing the invisible. Socio-technical imaginaries of energy. The critical overview, Sci. Public Policy 49 (2) (2022) 219–245, https://doi.org/10.1093/scipol/scab076.

[7] P. Christidis, G. Ulpiani, M. Stepniak, N. Vetters, Research and innovation paving the way for climate neutrality in urban transport: analysis of 362 cities on their journey to zero emissions, Transp. Policy 148 (2024) 107–123, https://doi.org/10.1016/j.tranpol.2024.01.008.

[8] A. Huovila, H. Siikavirta, C. Antuña Rozado, J. Rökman, P. Tuominen, S. Paiho, Å. Hedman, P. Ylén, Carbon-neutral cities: critical review of theory and practice, J. Clean. Prod. 341 (2022) 130912, https://doi.org/10.1016/j.jclepro.2022.130912.

[9] T. von Wirth, D. Loorbach, A. Wagner, O. Koretskaya, R. Wade, S. Krupnik, T. Rudek, C. Foulds, C. Adem, S. Akerboom, S. Batel, F. Caspar Rabitz, C. Certoma, A. Cherp, J. Chodkowska-Miszczuk, M. Denac, D. Dokupilová, M. Dotterud Leiren, M. Frolova Ignatieva, D. Gabaldón-Estevan, A. Horta, P. Karnøe, J. Lilliestam, J. Markard, M. Mišik, S. Mühlemeier, S. Nemoz, M. Nilsson, J. Osička, L. Papamikrouli, L. Pellizioni, S. Sareen, M. Sarrica, G. Seyfang, K. Smith Stegen, B. Sovacool, A. Telesiene, V. Zapletalova, 100 Social Sciences and Humanities priority research questions for renewable energy in Horizon Europe, Cambridge : Energy-SHIFTS 28, 2020. https://publications.rifs-potsdam.de/pubman/item/item_6000592.

[10] C.V. Diezmartínez, B.K. Sovacool, A.G.S. Gianotti, Conflicted climate futures: climate justice imaginaries as tools for policy evaluation in cities, Energy Res. Soc. Sci. 120 (2025) 103886, https://doi.org/10.1016/j.erss.2024.103886.
[11] TRAMI, Report on 2nd European Mission Forum EMiF, 07 March 2024, Transnational Cooperation on the Missions Approach (TRAMI), 2024, p. 23.
[12] P. Kaufmann, H. Wieser, J. Kofler, R. Harding, Study Supporting the Assessment of EU Missions and the Review of Mission Areas: Mission Climate Neutral and Smart Cities Assessment Report, European Commission. Directorate General for Research and Innovation, 2023, p. 78, https://doi.org/10.2777/35567.
[13] J.H. Tidwell, A.S. Tidwell, Energy ideals, visions, narratives, and rhetoric: examining sociotechnical imaginaries theory and methodology in energy research, Energy Res. Soc. Sci. 39 (2018) 103–107, https://doi.org/10.1016/j.erss.2017.11.005.
[14] L. Tozer, N. Klenk, Urban configurations of carbon neutrality: insights from the Carbon Neutral Cities Alliance, Environ. Plan. C Polit. Space 37 (3) (2019) 539–557, https://doi.org/10.1177/2399654418784949.
[15] European Commission, EU missions in Horizon Europe—European Commission. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en, 2024. (Accessed 30 January 2024).
[16] European Commission: Directorate-General for Research and Innovation, H. Gronkiewicz-Waltz, A. Larsson, A. Boni, K. Krogh Andersen, et al., 100 Climate-neutral Cities by 2030 - By and for the Citizens – Report of the Mission Board for Climate-neutral and Smart Cities, Publications Office, 2020, https://doi.org/10.2777/46063.
[17] M.P. Hekkert, M.J. Janssen, J.H. Wesseling, S.O. Negro, Mission-oriented innovation systems, Environ. Innov. Soc. Trans. 34 (2020) 76–79, https://doi.org/10.1016/j.eist.2019.11.011.
[18] I. Wanzenböck, J.H. Wesseling, K. Frenken, M.P. Hekkert, K.M. Weber, A framework for mission-oriented innovation policy: alternative pathways through the problem–solution space, Sci. Public Policy 47 (4) (2020) 474–489, https://doi.org/10.1093/scipol/scaa027.
[19] Stockholms Stad, 2030 Climate Neutrality Action Plan of the City of Stockholm, Net Zero Cities and Stockholms Stad, 2023.
[20] Stockholms Stad, Så arbetar staden med klimat och miljö—Stockholms stad, Stockholms Stad - Klimat Och Miljö, 2024. https://start.stockholm/om-stockholms-stad/sa-arbetar-staden/klimat-och-miljo/. (Accessed 2 February 2024).
[21] E. Morgan, 26 cities to receive additional EU support on climate-neutral journey, NetZeroCities, 2024. https://netzerocities.eu/2024/01/23/26-cities-to-receive-additional-eu-support-on-climate-neutral-journey/. (Accessed 23 January 2024) (Press Release).
[22] European Commission, Climate-neutrality by 2030: ten cities awarded label, European Commission, 2023. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4879. (Accessed 12 October 2023) (Press Release).
[23] University College London, Amsterdam. The INEQ-CITIES Project. https://www.ucl.ac.uk/ineq-cities/atlas/cities/amsterdam, 2019. (Accessed 24 January 2024).
[24] Statistics Netherlands, Population dynamics; birth, death and migration per region [Webpagina], Statistics Netherlands, 2023. https://www.cbs.nl/en-gb/figures/detail/37259ENG. (Accessed 4 August 2023).
[25] Gemeente Amsterdam, Amsterdam Climate Neutral 2050: roadmap 2020, City of Amsterdam, 2020. https://assets.amsterdam.nl/publish/pages/943415/roadmap_amsterdam_climate_neutral_2050_2.pdf (Public Version).
[26] M.A. Hajer, Discourse coalitions and the institutionalization of practice: the case of acid rain in Great Britain, in: F. Fischer, J. Forester (Eds.), The Argumentative Turn in Policy Analysis and Planning, Duke University Press, 1993, pp. 43–76.
[27] S. Jasanoff, S.-H. Kim, Containing the atom: socio-technical imaginaries and nuclear power in the United States and South Korea, Minerva 47 (2) (2009) 119–146, https://doi.org/10.1007/s11024-009-9124-4.
[28] T.R. Miller, Imaginaries of sustainability: the techno-politics of smart cities, Sci. Cult. 29 (3) (2020) 365–387, https://doi.org/10.1080/09505431.2019.1705273.
[29] K. Hudlet-Vazquez, M. Bollman, J. Craigg, J. McCarthy, Utopias and dystopias of renewable energy imaginaries, in: Energy Democracies for Sustainable Futures, Elsevier, 2023, pp. 31–40, https://doi.org/10.1016/B978-0-12-822796-1.00004-8.
[30] A.M. Levenda, J. Richter, T. Miller, E. Fisher, Regional socio-technical imaginaries and the governance of energy innovations, Futures 109 (2019) 181–191, https://doi.org/10.1016/j.futures.2018.03.001.
[31] A. Wentland, Imagining and enacting the future of the German energy transition: electric vehicles as grid infrastructure, Innov. Eur. J. Soc. Sci. Res. 29 (3) (2016) 285–302, https://doi.org/10.1080/13511610.2016.1159946.
[32] I.F. Ballo, Imagining energy futures: socio-technical imaginaries of the future Smart Grid in Norway, Energy Res. Soc. Sci. 9 (2015) 9–20, https://doi.org/10.1016/j.erss.2015.08.015.
[33] F. Engels, A.V. Münch, The micro smart grid as a materialised imaginary within the German energy transition, Energy Res. Soc. Sci. 9 (2015) 35–42, https://doi.org/10.1016/j.erss.2015.08.024.
[34] A. Mutter, Embedding imaginaries- electric vehicles in Sweden's fossil fuel free future, Futures 129 (2021) 102742, https://doi.org/10.1016/j.futures.2021.102742.
[35] L. Quitzow, F. Rohde, Imagining the smart city through smart grids? Urban energy futures between technological experimentation and the imagined low-carbon city, Urban Stud. 59 (2) (2022) 341–359, https://doi.org/10.1177/00420980211005946.
[36] L. Vesnic-Alujevic, M. Breitegger, Â.G. Pereira, What smart grids tell about innovation narratives in the European Union: hopes, imaginaries and policy, Energy Res. Soc. Sci. 12 (2016) 16–26, https://doi.org/10.1016/j.erss.2015.11.011.
[37] L.L. Delina, Whose and what futures? Navigating the contested coproduction of Thailand's energy socio-technical imaginaries, Energy Res. Soc. Sci. 35 (2018) 48–56, https://doi.org/10.1016/j.erss.2017.10.045.
[38] K. Rabiej-Sienicka, T.J. Rudek, A. Wagner, Let it Flow, Our Energy or Bright Future: socio-technical imaginaries of energy transition in Poland, Energy Res. Soc. Sci. 89 (2022) 102568, https://doi.org/10.1016/j.erss.2022.102568.
[39] A. Carvalho, M. Riquito, V. Ferreira, Socio-technical imaginaries of energy transition: the case of the Portuguese roadmap for carbon neutrality 2050, Energy Rep. 8 (2022) 2413–2423, https://doi.org/10.1016/j.egyr.2022.01.138.
[40] M. Kuchler, G.M. Stigson, Unravelling the 'collective' in socio-technical imaginaries: a literature review, Energy Res. Soc. Sci. 110 (2024) 103422, https://doi.org/10.1016/j.erss.2024.103422.
[41] E. Smith, Imaginaries of development: the Rockefeller Foundation and Rice Research, Sci. Cult. 18 (4) (2009) 461–482, https://doi.org/10.1080/09505430903186070.
[42] S. Jasanoff, S.-H. Kim, Socio-technical imaginaries and national energy policies, Sci. Cult. 22 (2) (2013) 189–196, https://doi.org/10.1080/09505431.2013.786990.
[43] B.K. Sovacool, Visions of Energy Futures: Imagining and Innovating Low-carbon Transitions, Routledge, 2019, https://doi.org/10.4324/9780367135171.
[44] K. Konrad, K. Böhle, Socio-technical futures and the governance of innovation processes—an introduction to the special issue, Futures 109 (2019) 101–107, https://doi.org/10.1016/j.futures.2019.03.003.
[45] S. Beck, S. Jasanoff, A. Stirling, C. Polzin, The governance of socio-technical transformations to sustainability, Curr. Opin. Environ. Sustain. 49 (2021) 143–152, https://doi.org/10.1016/j.cosust.2021.04.010.
[46] L. Figgou, V. Pavlopoulos, Social psychology: research methods, in: International Encyclopedia of the Social & Behavioral Sciences, Elsevier, 2015, pp. 544–552, https://doi.org/10.1016/B978-0-08-097086-8.24028-2.
[47] A. Buylova, N. Nasiritousi, J. Bergman, L. Sanderink, B. Wickenberg, C. Casiano Flores, K. McCormick, Bridging silos through governance innovations: the role of the EU cities mission, Front. Sustain. Cities 6 (2025) 1463870, https://doi.org/10.3389/frsc.2024.1463870.
[48] M. Boström, E. Andersson, M. Berg, K. Gustafsson, E. Gustavsson, E. Hysing, R. Lidskog, E. Löfmarck, M. Ojala, J. Olsson, et al., Conditions for Transformative Learning for Sustainable Development: A Theoretical Review and Approach, Sustainability 10 (12) (2018) 4479, https://doi.org/10.3390/su10124479.
[49] M. Wolfram, S. Borgström, M. Farrelly, Urban transformative capacity: from concept to practice, Ambio 48 (2019) 437–448, https://doi.org/10.1007/s13280-019-01169-y.