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Monica Bernardi, Alberica Aquili[1]

Beyond "Climate-Neutral and Smart Cities": Reflections on Strategies and Governance Models[2]

Introduction: "Code Red for Humanity"

In August 2021, the Intergovernmental Panel on Climate Change (IPCC, 2021) published a study concluding that humans' damage to the planet is a "statement of fact" and the Paris Agreement goals are "beyond reach". António Guterres, UN Secretary-General, has talked of "code red for humanity", stressing the irrefutable evidence of human influence and drawing attention to the seriousness of the situation. Other recent UN Climate Change reports, presented during the Sharm El-Sheikh Climate Change Conference in November 2022[3], and the 2022 IPCC report (IPCC, 2022) have confirmed the inadequacy of current climate plans that are unable of avoiding the rise of global temperature to 1.5 degrees Celsius by the end of the century (UNFCCC, 2022). Despite efforts in many countries to reduce greenhouse gas emissions, more ambitious actions are needed (United Nation, 2011).

The impacts of this scenario are most concentrated in cities (climate-induced mass migrations, overpopulation, pandemics and conflicts over resources, the source of 72% of greenhouse gas emissions) (IPCC, 2022) but they can also play a fundamental role in the decarbonisation mission (Bulkeley, 2013; van der Heijden *et al.*, 2019). The vision that each city is working towards in tackling urban challenges, in particular within the framework of climate change, is particularly significant.

This article proposes a range of city models (section 1) suggested by the literature on the approaches to the challenges facing cities (the smart and sharing city model, the "15-minute city", the self-sufficient city, the circular city, the co-city) in order to frame the approach to responding to urban issues. Specifically, the main questions are: how to answer the increasing demand for food, energy, housing, water, transportation, and healthcare that can only be made even more significant by climate change? And how to provide all these services in a fair and just way while respecting people and without impacting the environment?

In this direction, Europe and the European Commission are promoting actions in order to meet the 2030 climate neutrality goals and bring concrete solutions to the main challenges. Five EU Missions have been launched for the period 2021-2027. Among these is the Horizon Europe Mission on "Climate-Neutral and Smart Cities", which aims to identify and deliver 100 climate-neutral and smart cities by 2030 in order to inspire other cities to follow their example by 2050. Nine out of the 100 cities selected are Italian: Bergamo, Bologna, Florence, Milan, Padua, Parma, Prato, Rome and Turin (MUR, 2022; European Commission *et al.*, 2020).

The EU mission and its limits are described in detail (section 2) before investigating the general scenario of those Italian cities that are active in the field of climate change, within the framework of or simply inspired by the EU Mission (section 3).

This is the basis for some preliminary reflections on the actions and governance models of cities (section 4), advancing the hypothesis that a Co-City model based on a penta-helix approach, like that proposed by Foster and Iaione (2016, 2019, 2022), could be a better answer to our questions and more effectively embody the EU requirements, helping cities to meet the EU goals by 2030.

1. Fragile cities and urban models

In all cities and urban areas, the likelihood of disasters associated with climate change is increasing (IPCC, 2022), with all the attendant risks for people and assets. There is a direct link between environmental issues and phenomena such as urbanization, overpopulation and overconsumption, creating a kind of vicious circle of resource scarcity, pollution and ageing infrastructure. In addition, urban vulnerability is rising most rapidly in cities and settlements with low capacity for adaptation and the effects concern not only current urban populations (Martinotti & Forbici, 2012) but also future generations and people living outside cities, throwing into doubt issues such as access to services access and security in cities (food, water, energy and mobility etc.). Global population growth only worsens the situation. Currently, there are 8 billion people on Earth but that figure is forecast to reach 9.9 billion by 2050 (PRB, 2021). Around 55% (4.2 billion) of the global population already live in urban areas and this is expected to increase to 6 billion by 2050. That means that 7 out of 10 people around the world will live in cities by that date.

Under this scenario, cities will experience conditions of fragility and face a whole range of challenges – environmental, economic and social – as well as an increase in conflicts, rising inequality and the lack of equal access to opportunities and resources (IPCC, 2021, 2022).

Nevertheless, cities are considered pivotal in the literature in addressing fragilities and making progress towards climate neutrality (Bulkeley, 2013; van der Heijden *et al.,* 2019). By acknowledging that the future of civilization is dependent on urban centres, the need to prioritise urban management through comprehensive approaches that encompass issue resolution becomes apparent. In the field of urban studies, the fundamental question revolves around how cities can adequately prepare and adapt, both physically and conceptually, to deal with the complex challenges presented by climate change (IPCC, 2022).

Various ideas have emerged over time in an attempt to address the main urban challenges. In the last decade, in particular, some city models have been reimagined and improved in order to more effectively tackle climate change and overcome the city's structural fragilities.

One of these models is the idea of the *smart city*, with the aim of managing cities in an integrated manner, providing the tangible and social infrastructures (March & Ribera-Fumaz, 2016; Batty *et al.* 2012, Caragliu *et al.* 2009). Caragliu *et al.* (2009) stated that a city would become smart "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance" (p. 50). This definition stresses the development of the economy, the sensible use of natural resources, and the engagement of citizens in a participatory governance model. Technology enables citizens to access urban resources and deal in an efficient and cost-effective way with the main urban issues, such as mobility, energy, pollution, water etc. The shift from the idea of an *intelligent/cyber/digital* city to that of a *smart city* reflected the desire for a more inclusive and sustainable environment (March & Ribera-Fumaz, 2016). However, this has often been decried as too uncritical an approach, mainly conducted at a discursive level through policy documents, guidelines, and blueprints (Deakin & Al Waer, 2012; Hollands, 2008; Vanolo, 2014), leading to the fragmentation of the proposals into a series of pilot programmes and the unequal distribution of benefits to citizens (Gibbs *et al.*, 2013).

The idea of a *sharing city* is basically a smart city that relies on smart technologies to improve the quality of life of citizens (Arcidiacono, 2017). The technological dimension is expressed through digital platforms (Kenney & Zysman, 2016) which amplify community exchanges based on reciprocity, collaboration and sharing (Pais & Provasi, 2015), thereby boosting the human factor and the idea of community. In environmental terms, the 'recirculation of idling capacities' (Rinne, 2017), the promotion of sustainability and lifestyles that reflect greater environmental awareness become core values. The proposed new social paradigm (Van Dijk & de Wall, 2018) also promotes inclusiveness and accessibility. In this case too, however, there are some problematic

issues. Economically, big platforms benefit most from an exploitative and 'netarchical' approach (Kostakis & Bauwens, 2014). Socially, the sharing economy appears to mainly benefit some specific groups, that is, the well-educated, employed, upper middle-class, with no housing problems and a sizeable income, millennials concentrated in densely populated urban areas, (Arcidiacono, 2017). What's more, the relational dimension is more discussed than it is implemented (Dubois *et al.*, 2014) and certain kinds of discrimination are reinforced rather than reduced (Eldman *et al.*, 2017; Pais, Del Maral, 2018). Environmentally, it is unclear whether the sharing economy has any positive effect (Codagnone *et al.*, 2016), what the real extent of the orientation of the platforms to sustainability is (i.e. Geissinger *et al.*, 2019) and whether platform users really are interested in sustainable lifestyles (Parguel *et al.*, 2016).

Another city approach with less impact on the environment is the so-called *self-sufficient city*, conceived by Guallart in 2012 (and adopted by Barcelona) as a "system of systems" in which technologies, ICT and self-sufficiency solutions are the "obligatory rite of passage" in order to "cure urban pathologies" (Söderström *et al.*, 2014 p. 308). Guallart (2012) says that "the Internet has changed our lives, but it hasn't changed our cities yet [...]. We are waiting to see the technologies that will transform our cities". In his vision, cities are the result of the interaction between nodes (homes, blocks, districts, neighbourhoods, cities, metropolises) and the connected flows (information, environment, people, transport, objects etc.). The city of the future is therefore a metropolis of self-sufficient neighbourhoods, capable of almost everything required at times of crisis in health, energy or food; it is a multi-scalable, globally connected city. The *smart city* attracts its fair share of criticism over the discursive level at which the self-sufficient city still remains, the difficulty in scaling up from experimental areas to the entire city, the risk of deploying the environment as the "legitimisation" of urban renovation and the promise to promote inclusiveness and citizen empowerment without clarifying how the citizen's interests can be reconciled with the interests of private capital and how the urban political elites can be engaged in a city's governance (March & Ribera-Fumaz, 2016).

The idea of small units within a broader smart city enshrined in the *self-sufficient city* is also found in the *15-minute city* proposed by Moreno (2020) and adopted by Paris, inspiring many other cities to replicate this approach. According to Moreno, the daily urban necessities of citizens (work, home, shops, entertainment, education and healthcare) should be within a 15-minute walking or biking distance (Allam *et al.*, 2022; Whittle, 2020). A new city rhythm is required, with fewer cars and more multipurpose services. In the opinion of Allam *et al.* (2022), the "15-minute city" can be an effective solution for restructuring cities and increasing sustainability, inclusivity, and economic equity. Moreno is inspired by the concept of the *living smart city*, based on proximity, diversity, density and ubiquity, in which every area within the city should provide six social functions: living, working, supplying, caring, learning, and enjoying (Moreno *et al.* 2021). Spatial, temporal and/or geographical proximity guarantees a marked decentralization of services at the local level and better service provision, thereby reducing disparities between urban districts (Pozoukidou & Chatziyiannaki, 2021). Density promotes the idea of a compact city where residents are at an optimum number to use sufficient resource capacity (Manifesty *et al.*, 2022). Diversity concerns mixed and multicultural neighbourhoods, which promote inclusiveness, foster sustainable practices and a sense of connection (Mocák *et al.*, 2022) as well as encouraging bottom-up dynamics (Allam *et al.* 2022). Ubiquity/digitalization are essential to achieve the other three aspects, speed up the processes and enable easy access to services. This city concept has been criticised for being physically deterministic and taking a one-size-fits-all approach (Khavarian-Garmsir *et al.*, 2022); moreover, the function of "working" is difficult to achieve since homes and workplaces have been kept apart for years, increasing the dependency on cars (Mocák *et al.*, 2022).

A final type (of the various models in the literature) is the *circular city*. Here, a circular approach is applied to the management of city resources (water, food, materials, energy, land) in order to reduce the consumption of limited resources (Williams, 2019). The concept of the circular econ-

omy has been systematized by the Ellen MacArthur Foundation (EMF) through the RESOLVE framework, which proposes six actions to favour circularity: regenerate, share, optimise, loop, virtualise, and exchange. Prendeville *et al.* (2018) define a circular city as "one that practices the principles of the circular economy to close resource loops, in partnership with the city's stakeholders (citizens, community, business and knowledge stakeholders), to realize its vision of a future-proof city". If cities are able to close resource loops and reduce waste, their ecological footprint diminishes and they become regenerative and adaptive urban ecosystems (Williams, 2021). According to Fratini *et al.* (2019), the concept of the circular economy is criticised for lacking a strong scientific basis, being "created mainly by practitioners, the business community and policy-makers" (Korhonen *et al.*, 2018 p. 45), and for being "over-hyped, scarcely investigated and therefore as yet ill-defined" (Prendeville *et al.*, 2018, p 172). This is also true of the circular city, mainly defined (and not always clearly) by policymakers with companies and practitioners that prefer to use affordable experimentation and business incentives, such as collaboration platforms, funding mechanisms, and knowledge-building approaches. Moreover, while the roles of citizens and communities are respected, there seems to be a mismatch in how these stakeholders are included in building a circular vision for the city. Instead, the focus from the outset is on the key city stakeholders, data-driven digital approaches and policy development (*ibidem*).

2. Climate neutrality for european smart cities

2.1 What is climate neutrality

Currently, under the scenario described above, all the city models tend towards so-called climate neutrality and thereby become *climate-neutral cities*. Climate neutrality means achieving net zero greenhouse gas emissions (GHG) by cutting emissions, investing in green technologies, and protecting the natural environment (Höhne *et al.*, 2015). According to the European Commission (2020), a strategy for climate neutrality suggests that:
- "Cities aim to move towards net zero by reducing GHG emissions as much as possible and by developing trade-off mechanisms in order to offset the remaining unavoidable emissions; and,
- cities aim to become climate-proof, or resilient to the negative impacts of the changing climate, by improving their adaptive capacities".
 Mitigation (reducing the reliance of cities on carbon /net zero carbon emissions) and adaptation (adapting cities to climate risks / future-proofing, resilient cities) are two aspects of an integrated urban response; in combination, they lead to a climate-neutral city based on sustainable development with multiple benefits for the economy, society and the environment (United Nation 2011).

2.2 "100 climate-neutral and smart cities"

The European Commission has adopted a mission-driven approach to guide the Horizon Europe Research and Innovation Framework Programme (European Commission, 2020). The goal is to advance the Green Deal and the European Sustainable Development Goals. Among the five main missions, one is dedicated to creating 100 climate-neutral and smart cities[4] that will serve as the model for all European cities. The EU Commission selected the 100 cities through a Call for Expression of Interest, choosing from 377 proposals and 12 associated countries[5].

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4   The other missions concern adaptation to climate change, cleaning the oceans, fighting cancer, and soil health and food security (https://tinyurl.com/t5wr4em7).
5   The Commission has put in place support for cities that were not selected, including through the Mission Platform and funding opportunities under the Cities Mission Work Programme of Horizon Europe.

These cities are receiving support from the international NetZeroCities consortium in their efforts to achieve climate neutrality by 2030. NetZeroCities brings together citizens, academia and businesses to implement innovative actions and transformative processes. It offers a comprehensive platform for cities, providing access to online resources, tools, peer-to-peer learning, and collaboration spaces.

The role of citizens in the city's governance is regarded as crucial for the success of the mission since they are in a position to transform and innovate. According to the EU commission, three governance principles should be followed: a holistic and integrated approach to foster innovation and development; multi-level governance involving all the actors in the processes; extensive and continuous collaboration between all stakeholders in the processes of inclusivity and co-creation (*ibidem*). Together with all the local stakeholders, the citizens, academia and businesses, each city is also called upon to jointly draw up a Climate City Contract (CCCs), a dynamic, strategic and evolving document aimed at setting up five driving forces for transformation: new forms of participatory and innovative governance; a new economic and funding model; integrated urban planning; digital technologies; innovation management (European Commission, 2020). The CCC is regarded as a Memorandum of Understanding signed by the Mayor that expresses the clear political commitment of the city to its citizens, the Commission and the national and regional authorities.

The benefits of being part of the mission include: tailor-made advice and assistance; access to additional funding and financing opportunities; extra research and innovation funding opportunities and the chance to join pilot projects and demonstrations; support from a national coordination network; new networking, learning and exchange opportunities among cities; support in the process of involving citizens in decision-making; high visibility.

The Mission lays down the six main principles/building blocks of an integrated approach: strategic dimension; territorial focus; good governance; cross-sectoral approach; a multiplicity of funding sources; effective monitoring.

To ensure a just transition, the Mission stresses the importance of mapping social vulnerability, connecting to existing tools and initiatives, widening society's participation in the decision-making process, integrating fairness in policy and the assessment and monitoring programmes, and enshrining equity in energy governance.

Despite the creation of an "Info Kit for Cities", some areas of ambiguity and a lack of guidance have been identified by Shabb *et al.* (2022). The distinction between climate neutrality and carbon neutrality is sometimes unclear, with the risk that the mission's objective may be misinterpreted. The governance principles suggest a holistic approach and a multi-level framework but there is no practical guidance on implementation. The emissions monitoring methodology provided by the Global Covenant of Mayors for Climate and Energy is useful for detecting direct sources of emissions but does not address indirect emissions from construction and consumption in the city. There is also no clear explanation of how to deal with offsetting. There is some ambiguity around the nature of the CCC, whether or not it is legally or politically binding and to what extent. According to Shabb et al. (2020): "It is critical that the CCCs are an instrument that can define the objectives, how success toward targets can be tracked, and provide a mechanism to ensure the necessary political and financial support", otherwise the credibility of the process is harmed. Lastly, regarding the engagement of citizens and the inclusive participation approach, which is fundamental for the success of the mission, the report is vague on how to carry out the mission in an inclusive way yet inclusivity should be to the fore, from the design phase to the implementation of CCCs and the transformative actions of municipalities.

3. Different types of answers within and beyond the eu mission

3.1 The nine italian selected cities

Bergamo, Bologna, Florence, Milan, Padua, Parma, Prato, Rome and Turin are the nine Italian cities selected by the Mission to become pioneers of the Green Transition (MUR, 2022) through processes that will involve citizens, private entities (profit and non-profit), and public entities (such as European and national institutions, as well as regional and local authorities)[6].

In Italy, the first step to strengthen the commitment of the national authority and cities to achieving the Mission's goals was a *Memorandum of Understanding* between the Ministry of Infrastructure and Sustainable Mobility (MIMS) and the nine Italian cities[7]. The document proposes solutions, including regulatory measures, to design or implementation issues that may hinder the Mission's success. It also fosters collaboration for innovative projects, attracts funds, and creates a knowledge base for other entities to achieve the Mission more efficiently. Parties receive support from a Coordinating Committee and a Technical Round Table of experts.

The strategic commitments of the nine Italian cities, selected to embark on the path of decarbonization, are briefly analysed in the light of the documents of the official cities, local newsletters and reports by specialized agencies.

Bergamo. In recent years the city has been working on environmental policies to address climate change. As reported in the main local newsletters, its proposal sets several goals[8]:

a) waste: making the city a virtuous example of waste management, using the residual, undifferentiated portion to power district heating, thereby avoiding the use of fossil fuels, and integration with other sources of thermal recovery (e.g. sewage sludge) and/or solar thermal energy;

b) circular economy: implementing all forms of the circular economy, starting with a radical reduction of food waste;

c) energy: reducing emissions generated by electricity consumption in the civil and tertiary sectors through investments in photovoltaic systems, promoting the establishment of energy communities;

d) land: limiting land consumption by updating the Territorial Government Plan;

e) sustainable mobility: creation of a second tramway line (Bergamo-Villa d'Almè) and the expansion of the railway infrastructure for access to the city (connection with Orio al Serio airport, doubling of the line that passes through Ponte S. Pietro-Montello, expansion of rail services to/from Milan) in order to reduce road traffic;

f) sharing: the city also plans to promote electric and shared mobility (bike and car sharing) and new cycle lanes, also through the adoption of the Urban Plan for Sustainable Mobility (PUMS).

Bologna. The city of Bologna has always demonstrated a propensity to use renewable energy sources (Fabbricatti, 2016) and has been acting to reduce greenhouse gas emissions since 2005. According to some authors, its local, cooperation-based social structures could be an interesting starting point for a more egalitarian organization of the economy and society, but always needs to be updated (Caperna *et al.*, 2017).

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6   The selected Italian cities have strong ties to the Recovery and Resilience Plan (PNRR), particularly in areas such as digitalization, innovation, and security in public administration (Mission M1C1); circular economy and sustainable agriculture (Mission M2C1); renewable energy, hydrogen, network, and sustainable mobility (Mission M2C2); energy efficiency and building redevelopment (Mission M2C3); and protection of the territory and water resources (Mission M2C4).

7   Read the Memorandum here: https://tinyurl.com/2c6p5nbb (accessed February 2023).

8   Read the complete description here: https://tinyurl.com/vpnk5es5 (accessed February 2023).

The city was selected for the mission based on two types of implemented measures. First, the adoption of plans such as the Sustainable Urban Mobility Plan (PUMS), the Sustainable Energy Action Plan (PAESC), the General Urban Plan (PUG) with the Green Plan. Second, regulations on existing and new buildings and districts, zero land consumption requirements and stricter energy upgrading standards in the PUG. In addition, new constructions or reconstructions must adhere to the ZEB (Zero Energy Building) classification. Other actions involve the electrification of local public transport, promoting sustainable mobility, transitioning to LED public lighting, and enhancing green areas by planting 2,000 new trees annually. Bologna's proposal for the Mission encompasses six main areas[9]:

a) Mobility and Transport: decarbonization of Local Public Transport, completion of Biciplan and incentives for active mobility, the creation of a Green Area;
b) Energy efficiency: energy upgrading of public housing, realization of positive energy districts, energy upgrading of university buildings;
c) Public lighting: completion of LED lighting conversion, zero emission energy supply for public lighting, smart city-adaptive lighting;
d) Waste: construction of the "Power to Gas" plant at the Hera purification plant in Bologna, interconnection of two energy systems to power the Fair and the University, installation of an electrolyser for the production of green hydrogen;
e) Renewable energy production: supplies from renewable sources, promotion of energy communities, energy communities in public housing (ERP);
f) Across-the-board "flagship" projects: Green Footprint, Digital Twin, City of Knowledge (Bologna Municipality, 2022).

In December 2020, as reported on the city's website and by local urban agencies such as the Fondazione Innovazione Urbana, Bologna organized a launch event to embark on the path to drafting the Climate City Contract. Along with the European Commission, its partners will be public institutions, businesses, local authorities and consortia including the University of Bologna, Hera, Guglielmo Marconi Airport, Tper and Acer, CAAB, LegaCoop, health companies, the Canal Consortium and the energy sector company Illumia. Bologna has stressed the importance of engaging citizens in the process of adopting a new participatory tool recently introduced in the City Statute: the Citizens Assembly for the climate. The Assembly will be made up of a group of citizens representing all local society, selected at random, who will work with the support of experts and facilitators in defining proposals for the City Council to examine and vote on.

Florence. The city has always been firmly committed to social, economic and environmental sustainability (Rimoldi & D'Orsi, 2022). This is borne out by its participation in important international networks, such as the Covenant of Mayors (since 2010), and by several European awards, including the European Energy Silver (2016) and 2021 Gold (2021) Awards for climate management in the municipal area (Florence was the only large Italian city to obtain this award out of 1700 virtuous European municipalities taking part in the programme)[10]. Renowned for its cultural, artistic and landscape heritage, as well as a thriving tourist industry, it is implementing a package of integrated plans for the ecological transition and actions to change the city's emission profile. Some examples: the Sustainable Energy Action Plan (PAESC) in the sustainability and energy sector; the Green Plan and the Structural Plan with Zero Volumes among the urban development plans, and a 2022 Municipal Operational Plan (Florence Municipality, 2023) – adopted for the first time along with the Structural Plan – which provided several new urban planning tools, with the aim of building no new hotels and offering services for all within a 15-minute walking distance, and 50 choices for a fair and forthcoming Florence through public and private innovation. There is a specific Smart City Plan (2015) with its own Digital Manifesto,

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9   The areas of focus are described in the official documents of the Municipality and of the Metropolitan City: https://tinylink.net/FxkPr (accessed February 2023)
10   For more info: www.european-energy-award.org.

the PON Metro on smart cities and a Roll out Plan (Replicate-REnaissance of PLaces with Innovative Citizenship and Technology)[11] which aims to create smart city services through innovative technology, sustainable mobility, infrastructural innovations and energy efficiency. With regard to mobility, there is a specific Sustainable Urban Mobility Plan (UMSP), and the city is also working on circularity through the Actions for a Circular Florence, the Water Safety Plan, and the Local Plan for obtaining National Recovery and Resilience Plan (NRP) funds. Given this context, as reported on the city official website (Florence Municipality, 2022), the city's proposal included a five-pronged plan:

a) Energy efficiency and energy poverty (promoting renewable energy, optimizing and renovating public buildings, schools, sports centres, markets and social housing, as well as adopting energy monitoring schemes);
b) Services (Smart-street lighting with SILFI; smart water management with Publiacqua; Smart Waste and Florence Circular with Alia to reduce quantities, promote recycling, reduce the impact of waste collection);
c) a Smart Grid to improve the electricity grid in collaboration with grid operator E-distribuzione;
d) Sustainable mobility through the optimization of public transport through apps for purchasing e-tickets, advanced intermodality, a traffic supervisor, increased electric mobility and an electric sharing service, and through the adoption of a *smart city control room*;
e) Social innovation aimed at engaging citizens in greater social inclusivity through the Smart City platform and interaction with different "habitat teams", thematic groups formed by specific stakeholders and citizens). In 2020, they city launched the programme "Firenze Prossima", based on participatory paths, through which it has collected 2,000 proposals and signed eight research agreements with Florence University.

Milan. This is an Italian multimodal smart city, long committed to the ecological transition and the renowned capital of shared mobility. It considers the idea of a smart city not as technology-driven but centred on its citizens (Borrelli *et al.* 2015). The city has adopted specific guidelines for creating the smart city, considering Milan as a laboratory in seven areas: 1. boosting national and European networks; 2. sustainable urban mobility; 3. environmental and energy policies; 4. social inclusion and diversity; 5. Wellness; 6. simplification of the public administration; 7. business creation. The guidelines emerged from the work of multiple stakeholders (Galliano 2016).
Since 2012, the city has developed and adopted a range of plans in the following policy areas: sustainable mobility, energy efficiency, urban development, the sharing economy and smart cities.
The PAC-Air and Climate Plan aims for full carbon neutrality and a bicycle-pedestrian city by 2050. It envisages the gradual implementation of a bicycle-pedestrian city, a 30-km-per-hour area to significantly reduce car traffic, the energy upgrading of public heritage buildings, greening actions to reduce urban heat islands through pavement removal and increasing urban green spaces and forestation. The implementation of the PAC is being achieved through a participatory process involving citizens, associations, businesses and other city stakeholders. Thanks to these ongoing efforts, Milan was selected by the European Commission to join its Mission (EIT, 2022). Through its participation, Milan plans to implement a number of projects in the green sector, including:

- the Rotaie Verdi to create a large naturalistic oasis designed to connect the disused railway yards of San Cristoforo, Porta Genova and Porta Romana;
- the Nido Verticale, the new sustainable tower to be built in Porta Nuova;
- the Nuova Bovisa project, which will become the first truly international hub dedicated to research and innovation on energy and sustainable mobility issues.
   Milan is also embracing the circular economy and intends to build three photovoltaic-pow-

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ered recycling areas, which will become reuse centres; it also plans an intervention on the Lambro River for the enhancement and return to the city of green areas, with the creation of a bike path and protection measures against flooding, increasingly frequent due to climate change (Facchini, 2022). In addition, the city has been working for many years on social innovation and, more recently, on city proximity initiatives (Tajani, 2021).

Padua. The city's participation in the EU Mission is grounded in the actions already implemented for environmental sustainability through the adoption of several plans (Ecopolis, 2022), such as:
- the PAESC (the Padua Sustainable Energy and Climate Action Plan), approved in June 2021 and required by the Covenant of Mayors
- the Green Plan for the implementation of new green areas
- a project for the promotion of bicycle mobility
- the Zero Land Use Interventions Plan for the reduction of land consumption
- the Sustainable Urban Mobility Plan (PUMS) for the enhancement of public transport through new tram lines based on a smart system

Furthermore, the project "Padua SoftCity" aims to make Padua a more innovative and ecological smart city, boosting community, sharing and collaboration[12].

As with other cities, the Climate City Contract must be drafted by the municipality together with additional urban stakeholders, both public and private, and will focus on the implementation of climate neutrality projects affecting strategic sectors such as: renewable energy, green infrastructure, construction, waste, transportation, circular economy, urban planning, drawing up specific investment plans.

Parma. As reported on the city's website (Parma Municipality, 2022a), Parma has produced a Municipal Structural Plan - PSC 2030 aimed at accelerating the process of transition to a greener, more sustainable, more modern and more inclusive city model. In 2020, it enjoyed a position of cultural leadership as the holder of the Italian Cultural Capital award. To apply for the Mission, it drew up a city vision, a roadmap and a plan of initiatives and funds. Specific smart city governance has been organised to work as a point of connection and an enabler for local stakeholders; by networking with other European cities[13], it has developed skills and project ideas. The city has outlined four key strategies:
a) Community bond for the involvement of different urban actors: citizens, Universities, Businesses;
b) Sustainable mobility, through a green area to limit vehicular access to the urban area, promoting cycling and sharing mobility, adopting the local public transport fleet renewal plan;
c) Eco-city: focus on urban regeneration to avoid land consumption and to "build on what has already been built";
d) Infrastructure: improving public lighting with LED and smart lighting, promoting energy and the seismic efficiency of public and private buildings, adopting a circular economy for the waste differentiation system, developing a real-time city management platform, reducing-water leakage and promoting urban forestation[14].

The first step towards these goals was the signing in December 2020 of the *Carbon Neutrality Parma Territorial Alliance* by the representatives of the 10 public bodies and private entities participating in the agreement: the Emilia Romagna Region, the Province of Parma, the Municipality of Parma, the Management Body for Parks and Biodiversity of Western Emilia, the University of Parma, ARPAE Emilia Romagna, the National Research Council, the Unione Parmense degli Industriali, Parma, *io ci sto!,* and the Kilometroverde Parma Forestry Consortium (Parma Municipality, 2020). This Alliance paved the way in December 2022 for the signing of the Climate City

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12 The project can be examined in-depth here: https://padovasoftcity.it/#obbiettivi (accessed February 1, 2023).
13 Information taken from https://tinyurl.com/5n6tarw9 (accessed February 1, 2023).
14 More info here: https://tinyurl.com/bdzdjxk7 (accessed February 1, 2023).

Contract, in which actions and resources will be identified for attaining the goal of a Climate Neutral Parma in 2030. An Action Plan was agreed and backed up with an investment plan. Moreover, an internal working group was appointed in the City Council to meet the various stakeholders in the area (economic, production, commercial, associations, the cultural, social, health institutions) and arrange the signing of the Climate City Contract by mid-2023 (Parma Municipality, 2022b).

Prato. Prato's carbon neutrality policy is anchored in plans and actions adopted over the years by the city, such as the Sustainable Urban Mobility Plan (PUMS), the Sustainable Energy and Climate Action Plan (PAESC), the Urban Forestry Plan, the Prato Urban Jungle, the Next Generation Prato, actions for the energy efficiency of public and private buildings, and the Smart City plan (Prato Municipality).

For the purpose of signing the Climate City Contract, the City of Prato has launched a dedicated website to schedule joint design meetings in the form of focus groups and workshops mainly within the City's CTE-House of Emerging Technologies – in which the administration, citizens and relevant stakeholders in the area can participate. The goal is to use these meetings to define the city's 2030 Climate Neutrality Action Plan, focusing on key areas:

a. Energy Efficiency for sustainable and smart public lighting, efficiency upgrading of existing buildings, the promotion of renewable energy sources and coordination over the implementation of renewable energy communities;
b. Sustainable Mobility to create a network of cycle lanes, promoting electric mobility, sharing mobility; Sustainable Mobility Governance (through connections such as Home-School, Home-Work, a Timetable Plan, green zones and a Plan of Why), a new local public transport plan based on intermodality and smart logistics (based on drones, E-bike logistics, Smart City Services);
c. A Circular Economy through the financing of the textile district and a textile recycling hub, waste management, the adoption of a circular building regulations, the reuse of civil and industrial wastewater;
d. Agriculture, with the promotion of sustainable urban agriculture based on the construction of short supply chains, land use (e.g., by initiating the implementation of Nature-Based Solutions in private construction);
e. Urban forestry through interventions to build large parks and green infrastructure for climate change mitigation[15]. The Action Plan is important because it will serve as the basis for signing the Climate City Contract with the European Commission and other city stakeholders.

Rome. The proposal for which the city was selected aims to make Rome a major inclusive laboratory of the ecological transition. It is based on the PAESC, the Action Plan for Energy and Climate, through which it respects the commitments undertaken in 2017 with the signing of the 'Covenant of Mayors' and aims to reduce climate-changing emissions by more than 51% by 2030, well beyond the 40% set by that agreement (Rome Municipality, 2021). The pillars of action are:

- sustainable mobility, by enhancing the cycle network and revitalizing public transport and the transport network with interconnected services;
- realising the vision of the "15 minute-city" based on proximity services;
- the reduction of waste by closing the waste cycle, in which waste collection and disposal are supported by advanced technological tools, such as "smart bins" with increased recycling and energy recovery facilities;
- sustainable urban forestation (20,000 trees to be replaced, 1 million new trees by 2030, 2 million new trees by 2050);

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15   For more information see the website of the Municipality of Prato: https://tinyurl.com/3rnsxemh (accessed February 3, 2023).

- the energy efficiency of the building stock, through photovoltaic systems and solar-powered houses;
- an increase in smart working in the public administration (to reduce the CO_2 in the atmosphere).

Turin. In the last 25 years, Torino has worked to become a more sustainable and resilient city, leveraging both its technological, engineering, academic, design and manufacturing flair and its artistic and cultural heritage. In recent years, it has focused mainly on sustainable development policies, working on the urban environment, green infrastructure and sustainable urban mobility. Its Action Plan, *Turin 2030, Sustainable and Resilient,* is the city's response to the UN 2030 Agenda and the 17 Sustainable Development Goals[16]. Its proposal for the EU Mission is based on a series of innovative and sustainable projects. In particular, the focus is on energy, waste, transportation, green urban planning and the smart city (Turin Municipality, 2023). The collaboration with local stakeholders is extensive, for example, with Turin Polytechnic's Energy Centre, the University of Turin, the ESCP Business School and the many actors in the local ecosystem participating on the two platforms of Turin City Lab and Turin Social Impact[17].

Its candidacy was also bolstered by the adoption of the Sustainable Energy and Climate Action Plan (PAESC) in January 2023, which rolls out a series of different actions in several areas: from the residential and tertiary sectors to the public sector, transportation and urban mobility, district heating and local power generation, from renewable sources to urban forestation interventions (Turin Municipality, 2023).

It should be noted that all the mission cities are working to develop the CCC, which includes a Climate Neutrality Action Plan and a Climate Neutrality Investment Plan, in order to assess the cities' financial needs and ways to address them.

3.2 EU mission-inspired cities: the case of Reggio Emilia

Within the group of pioneering cities in Italy aiming for climate neutrality are cities inspired by the Mission. Not all can be covered here, but it is worth mentioning Reggio Emilia as the first Italian city to have "institutionalized" and regulated a Climate City Contract within its Regulations on Democracy, Urban and Climate Justice. This shows what a significant step forward Reggio Emilia has taken compared to other selected cities.

Reggio Emilia has a rich history of sustainable and eco-friendly urban projects, emphasizing deliberative democracy and civic participation. Since 2015, the Quartiere Bene Comune programme has been laying the groundwork for a collaborative city. In 2016, the *Reggio Collaboratory* was launched in partnership with the University of Modena and Reggio Emilia, supported by LagGov ETS NGO and Kilowatt. This initiative acts as a hub where social and technological innovations can be incubated and accelerated. The city has also organized various open labs with citizens and drew up a Smart City Memorandum of Understanding in 2017 to guide digital and innovative development in the region. In 2018, the city adopted the *Regulation of Citizenship Laboratories and Citizenship Agreements*. Noteworthy initiatives include the *Coviolo Wi-Fi Community*, which aims to bridge the digital divide at the neighbourhood level, and the *City Science Initiative*, the *City Science Office*, and the Horizon 2020 European project EUARENAS (Cities as arenas for deliberative democracy), in which Reggio Emilia serves as a pilot city.

With the approval of the *Regulation on Democracy and Urban and Climate Justice* in September 2022, Reggio Emilia intends to establish a new governance structure for the Municipality based on participation, collaborative bodies, and protocols. The goal is to achieve participatory administrative planning that addresses genuine territorial needs and implements a sustainable,

16   Information from https://tinyurl.com/2jnm3v2v (accessed February 5, 2023).
17   See: https://tinyurl.com/2p922t5t (accessed February 5, 2023).

equitable, and inclusive model of urban development. Through this Regulation, Reggio Emilia became the first Italian city to have already defined, institutionalized, and regulated the Climate City Contract, drawing inspiration from what the EU Mission-cities are expected to develop in collaboration with local stakeholders.

The Regulation changes the institutional legal framework in Reggio Emilia. The city is divided into nine Areas, each represented by an Area Council. These Councils collect feedback on needs and problem areas before discussing and directly collaborating with the Municipality in order to develop public policies based on these needs and issues, as expressed locally. The dialogue between the Councils and the Municipal Services results in an Area Pact, which is a multi-actor Programme Agreement that defines the guidelines of the intervention to be shared among the area actors, which then becomes part of the Single Programming Document. The Area Pact guides interventions and is approved by elected bodies. Its implementation involves a joint design programme called the 'Community Laboratory' where the local community, stakeholders and the City Administration collaborate on innovative solutions for neighbourhoods. The projects are executed through the Partnership for Sustainable Development and Innovation, involving in the Laboratory different actors in line with the quintuple helix paradigm (public actors, research and knowledge institutions, for-profit entities, associations and Third-Party entities and even individual citizens).

In addition, the city is working within the circular economy framework, with a plant to convert organic residues into biomethane (Iren's FORSU). It has approved a Sustainable Urban Mobility Plan (PUMS) laying out significant and sustainable transformations in transportation and mobility habits. It is also active in urban forestation through the Natural Urban project for improving the microclimate and promoting adaptation to climate change.

4. Analysis and preliminary reflections

The information provided for each city is not comprehensive, since the cities undertake numerous initiatives, including minor ones. However, it offers an initial overview of the approaches adopted by cities to address the EU mission objectives. The table below highlights the key areas of cities' engagement: energy efficiency, circular economy and waste management, sustainable and shared mobility, urban greening, citizen engagement and social inclusion. As the table shows, cities are adopting a holistic approach towards sustainability, resource efficiency, and community involvement by integrating advanced technologies, circular economy principles, shared mobility solutions, urban greening initiatives, and citizen engagement strategies.

Fig. 1 - Summarizing table on cities' actions divided into key areas of cities' engagement
(Authors: Monica Bernardi & Alberica Aquili)

City	Energy Efficiency	Circular Economy and Waste Management	Sustainable Mobility	Urban Greening	Citizen Engagement and Social Inclusion	Other Initiatives
Bergamo	Waste management for district heating using residual undifferentiated fraction and other sources	Implementation of circular economy practices with a focus on reducing food waste	Expansion of railway infrastructure, creation of tramway line, promotion of sustainable, electric and sharing mobility, adoption of Urban Plan for Sustainable Mobility (PUMS),	Limiting land consumption through updated Territorial Government Plan	*Will be implemented in the CCC*	*Will be implemented in the CCC*

Bologna	Energy upgrading of public buildings and university buildings	Construction of "Power to Gas" plant, interconnection of energy systems, promotion of energy communities	Decarbonization of local public transport, completion of Biciplan, incentives for active mobility	LED lighting conversion, zero emission energy supply for public lighting	Engagement of citizens through Citizen Assembly for the climate, participatory decision-making process	Green Footprint, Digital Twin, City of Knowledge
Florence	Renewable energy promotion, energy upgrading of public buildings, energy grid improvement in collaboration with E-distribuzione, energy communities in public housing	Smart-street lighting, smart water management, smart waste management, circularity actions	Optimization of public transport, traffic supervision, increased electric mobility, adoption of smart city control room	Green urban areas projects incorporating Sustainable Land Use, Urban Forest	Engagement of citizens through Smart City platform and thematic groups, Participative paths for citizen proposals	Firenze Prossima program
Milan	Carbon neutrality plan, energy upgrading of public buildings	Creation of naturalistic oasis, sustainable tower, international hub for energy and sustainable mobility	Implementation of PAC to become a bicycle-pedestrian city, energy upgrading of public heritage buildings	Greening actions to reduce urban heat islands, urban green spaces, forestation	Participatory process involving citizens, associations, and businesses	Rotaie Verdi, Nido Verticale, Nuova Bovisa
Padua	Padua Sustainable Energy and Climate Action Plan	*Will be implemented in the CCC*	Sustainable Urban Mobility Plans (PUMS), Enhancement of public transport through smart system, new tram lines, promotion of cycle mobility	Green Plan, Implementation of green areas, Zero land use	Project "Padova SoftCity" for community strengthening and ecological smart city	Investment plans for strategic sectors
Parma	Carbon Neutrality Parma Territorial Alliance	Circular economy for waste sorting system	Green area to limit vehicle access, promoting cycling and sharing mobility, sustainable mobility	Improving public lighting with LED and smart lighting, Eco-City for urban regeneration at zero land consumption	Cultural leadership of Italian Cultural Capital award, Community bond for involvement of different urban actors	Real-time city management platform
Prato	PAESC-Sustainable Energy and Climate Action Plan, Next generation Prato, Actions for energy efficiency of public and private buildings	Textile recycling hub	Network of cycle lanes, Sustainable Urban Mobility Plan (PUMS), sustainable mobility governance	Urban Forestry Plan, Prato Urban Jungle, Sustainable urban agriculture	*Will be implemented in the CCC*	Smart City plan

Rome	PAESC-Sustainable Energy and Climate Action Plan, energy efficiency of the building stock (photovoltaic and solar), reduction of climate-changing emissions	Advanced waste collection and disposal tools	Sustainable mobility (Enhanced cycle network and revitalized public transport system)	Sustainable urban forestation	Vision of the "15 minute-city" based on proximity services	Increased smart working in public administration
Turin	Sustainable Energy and Climate Action Plan (PAESC)	Sustainable development policies	Sustainable urban mobility	Green urban planning	Collaboration with local stakeholders and research institutions	Sustainable and Resilient Turin 2030 Action Plan
Reggio Emilia	Reggio Emilia Municipality Energy Plan Institutionalized and regulated Climate City Contract for the realization of energy communities	Iren's FORSU plant of Reggio Emilia for the circular economy in Reggio Emilia territory to convert organic residues into biomethane	Sustainable Urban Mobility Plan (PUMS) approved by the City Council for significant and sustainable transformation in transportation and mobility habits.	Natural Urban, a project to implement the 'network' of trees in the urban area suitable for improving the microclimate and promoting adaptation to climate change	Quartiere Bene Comune program Regulation of Citizenship Laboratories and Citizenship Agreements Regulation on Democracy and Urban and Climate Justice Sustainable city living with less impact and collaborative governance Deliberative democracy and civic participation	Reggio Collaboratory Coviolo Wi-Fi Community City Science Iniziative

Working on these key dimensions to achieve climate neutrality by 2030, the ten cities are integrating the principles of technology, circularity, self-sufficiency, sharing and proximity into the smart city model. Their efforts are in line with those of the EU Mission: waste, circular economy, energy production and distribution, land, sustainable mobility and transport, sharing, lighting, citizen engagement. In general, cities are demonstrating a strong territorial focus, the ability to merge national and regional programmes with local projects to create synergies, the ability to maintain a cross-sectoral approach while ensuring coherence in policymaking principles and objectives. They are making efforts to introduce good governance arrangements, inclusive and responsive processes, as well as effective decision-making processes. Their approaches are also in line with the building blocks proposed by the Mission in the search for multiple funding sources, although the monitoring to quantify progress has not yet been clearly enunciated. On the other hand, the significance of citizens' engagement is widely recognized by our cities as crucial to creating a sustainable, equitable and inclusive model of urban development while mitigating environmental impact. As the literature states (among others: Alusi *et al.*, 2011; Goh, 2015), it helps in defining priorities, allocating scarce resources (Voorberg *et al.*, 2015) and leads to more democratic processes while serving as an intelligence-gathering tool (Tomor *et al.*, 2019).

Cities are already pursuing a multi-level, multi-stakeholder and participatory approach to governance as crucial strategies in jointly developing the Climate City Contract. Currently, only Reggio

Emilia has enshrined it in the Regulation but all the other cities are working on it within this governance framework. Nevertheless, in our opinion, the governance approach that best helps to overcome the limitations highlighted for each city model in section 1, is the one that sees the city as a shared urban benefit (Foster & Iaione, 2016). This is called the Co-City model and envisages participants, guided by principles of distributive justice, sharing resources, engaging in collective decision-making and jointly producing shared urban resources and services, supported by open data and technology. This model has been developed from the theories of Elinor Ostrom[18] and adapted to the urban dimension by Foster and Iaione (2016, 2019, 2022), that is, neighbourhood and community spaces, green areas, natural resources, streets, and historic and cultural assets, and neighbourhood or community services that are functional to local well-being and the satisfaction of needs related to city life (De Nictolis & Iaione, 2019). The authors developed an index to gauge the capacity of urban areas in implementing "the right to the city", fostering collaboration and innovation in cities through five design principles: enabling state, social and economic pooling, urban "experimentalism", technological justice, and co-governance based on the quintuple helix.

1) The enabling state denotes the role of public authorities as facilitators of collaboration with other urban actors.
2) Social and pooling economies involve civic enterprises operating alongside comprehensive economic ecosystems managed or owned by the community. Investing in collaborative, creative, and innovative economic models involve organizing resources to generate new employment opportunities and community services in complex neighbourhoods.
3) Urban experimentalism encompasses an experimental approach to urban processes.
4) Technological justice ensures equitable access to technology and digital infrastructure, sometimes managed by the community itself to develop neighbourhood services.
5) The quintuple helix represents the co-governance ecosystem, where public-private-community partnerships involve five types of actors: civic, social, cognitive, public, and private actor. These design principles make clear the factors required to depict the city as a cooperative/collaborative space capable of resource sharing, collective decision-making, and sustainable co-production of shared resources, encompassing environmental, cultural, knowledge, and digital assets (Foster & Iaione, 2016).

From our perspective, in order to truly transform cities into influential hubs of sustainable innovation and ecological transition while advancing their existing efforts, it is crucial to consider the city as more than just a common good. This means viewing the city not merely as governable (or better, co-governable), but as a shared resource with all the actors of the quintuple helix. This is what the aforementioned cities are trying to do, involving the civic actor (innovative communities and active citizens), the social actor (third sector organizations), the cognitive actor (cultural institutions, schools and universities), the public actor (public institutions), and the private actor (responsible companies and industries that build on local vocations).

The adoption of the Co-City model can help cities during the difficult transition to climate neutrality, since it deploys collaborative and polycentric governance for the co-management and co-ownership of a variety of urban assets and infrastructures, thanks to contractual or institutionalized public-community or public-private-community partnerships (Foster & Iaione, 2022). This is the key element for development at scale, empowering communities, giving people the management/ownership of assets/infrastructures. In our view, it is a kind of sociotechnical approach, through which technical possibilities can be explored from the perspective of social justice, and new ways of working with government and local communities to achieve sustainable communities.

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18 Ostrom in her study of "collectively governed resources", proposed to abandon the 'state-market' dichotomy and move toward solutions based on institutions for collective action, featuring cooperation among users. Such cooperation has the peculiarity of following the principles of "institutional design" that allow the users of a shared resource to design, implement and monitor the rules for its governance (Ostrom, Hess, 2010).

Final Remarks

In the light of what has been described, it is clear that the approach of the EU Mission for climate-neutral and smart cities by 2030, as expressed in the selected cities' proposals, as well as by outsider cities like Reggio Emilia, is based on a reformulation of the smart city model by integrating principles of technology, circularity, sharing, self-sufficiency and proximity. The city models described embody different approaches through which cities try to respond to climate challenges in an urban context, gradually focusing attention on different aspects (technology, spatial proximity, self-production and self-reply to the needs of citizens, circularity, sharing and collaborative practices). All these dimensions are aimed at finding solutions to the increasing demand for food, water, energy, healthcare, housing, and transportation, exacerbated by climate change. The sectors in which cities are concentrating their efforts are in line with those indicated by the Mission: waste, circular economy, energy production and distribution, land, sustainable mobility and transport, sharing, lighting, citizen engagement. In particular, considering the cities' initiatives, we can see that *environmental sustainability* appears to be a primary focus, as cities implement waste management, renewable energy, sustainable and shared mobility, and green infrastructure initiatives. *Climate change resilience* is also crucial, encompassing resilient urban planning, disaster preparedness, infrastructure resilience, resource management. *Innovation and technology* play a significant role as cities embrace smart city initiatives, make use of open data and implement sustainable development practices. Finally, cities are also prioritising *social justice and equity* by addressing social inequalities, ensuring equal access to essential services, focusing on poverty reduction, education and healthcare improvement, affordable housing provision, social inclusion, and community engagement, along with the general adoption of multi-stakeholder and participatory governance approaches.

In terms of governance, cities are already implementing multi-stakeholder, multi-level participatory measures. The traditional top-down approach to governance is increasingly being complemented by participatory and collaborative models that involve multiple stakeholders, including citizens, businesses, academia, and civil society organizations. Nevertheless, no city has yet drawn up the CCC and the path is still long in order to meet the EU goals by 2030. In our opinion, the Co-City model could represent a valid approach to guiding cities in this mission by overcoming the difficulties highlighted in the various city models presented since it includes co-creation, shared decision-making, and collective responsibility, allowing for more inclusive and context-specific solutions. The five design principles (the enabling state, pooling, experimentalism, tech justice and co-governance) could help to boost the cities' commitment (and their results) in environmental sustainability, climate change resilience, equity and social inclusion, and innovation and technology.

Note that the contribution of this study to the discussion is mainly conceptual; from this first theoretical analysis, we conclude that the Co-City model developed by Foster and Iaione encapsulates the EU requirements by helping the cities achieve the European goals by 2030 in a fair and just way (De Nictolis & Iaione, 2019).

However, further insights are required. In particular, the analysis could benefit from a more in-depth examination of the specific measures and actions implemented by each city to achieve climate neutrality and from an assessment of the impact and effectiveness of these initiatives in terms of the reduction of greenhouse gas emissions, resource efficiency, and social inclusion that also relies on quantitative data analysis. Further research might include interviews with city officials in order to gain a deeper understanding of the state of the art, strategies and governance of the cities. In addition, future studies might also delve deeper into the implementation of the Co-City model in practice, with a comparative analysis of case studies and evaluating the scalability and replicability of the Co-City model in different contexts.

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