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The '15-Minute City' concept can shape a net-zero urban future

Zaheer Allam^{1,2,3✉}, Simon Elias Bibri^{4,5}, Didier Chabaud¹ & Carlos Moreno¹

Numerous urban models are emerging in response to climate urgencies, as pointed out in COP26, resulting in a call for urgent and deep decarbonization policies. One emerging model, responsive to the need for more sustainable urban outcomes, is that of the '15-Minute City'. The quest for more sustainable and smarter cities is urgent, as cities contribute more than 60% of greenhouse gas (GHG) emissions, and thus demands a redefinition of some contemporary urban policies, especially around mobility. The '15-Minute City' is an emerging concept, currently in application in major European Cities, such as Paris and Barcelona, and quickly gaining popularity as a potent solution for encouraging urban sustainability transitions. As the model approaches urban planning via humane socio-economic dimensions, it can be further developed to benefit urban communities, globally in an equitable fashion. In doing so, the model can be crafted to respond to the challenges of the other geographies, including those of the Global South, specifically relating to urban infrastructural financing. This approach recognizes the need for models that can contribute to deep decarbonization agendas, while being contextually responsive with sound financial mechanisms—including both Public and Private parties. In this paper, we argue that the '15-Minute City' concept can be poised as a potent solution to restructure cities for increased sustainability, inclusivity, and economic equity, through locally implemented fiscal mechanisms.

¹Chaire Entrepreneuriat Territoire Innovation (ETI), IAE Paris—Sorbonne Business School, Université Paris 1 Panthéon-Sorbonne, 75013 Paris, France. ²Live +Smart Research Lab, School of Architecture and Built Environment, Deakin University, Geelong, VIC 3220, Australia. ³Institute for Sustainable Futures, University of Technology Sydney, Sydney 2007, Australia. ⁴Department of Computer Science, Norwegian University of Science and Technology, Sem Saelands veie 9, NO-7491 Trondheim, Norway. ⁵Department of Architecture and Planning, Norwegian University of Science and Technology, Alfred Getz vei 3, Sentralbygg 1, 5th Floor, NO-7491 Trondheim, Norway. ✉email: zaheerallam@gmail.com

A new urban paradigm is needed

Recent reports by the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC) warn that the world is set to exceed the Paris Agreement targeted temperatures of below 2 °C (preferably 1.5 °C), and reach a high of 2.7 °C pre-industrial levels by end of this century (IPCC, 2021; UNFCCC, 2021b), as countries are far below their emissions targets. This underlines a new urgency to avert the already increasing climate change events, evident with increasing frequency and intensity of events such as storm surges, unpredictable and erratic weather conditions that have prompted flooding, increased desertification, prolonged and harsh drought, and sea level rise to name a few. Those events have increased pressures on communities, prompting new challenges, such as climate induced migrations, with over 30 million people reported to have migrated between 2018 and 2020 alone (Bollettino et al., 2020).

The anticipated temperature rise would be expected to impact and disrupt the quality of lives of urban communities, especially for those who reside in coastal regions and low-lying lands. This is critical as it is evident that already, over 55% of the global population are based in urban areas and it is expected that by 2050 the global urban population will reach a high of over 68% (United Nations Human Settlements Programme (UN-Habitat), 2020). Further, urban areas have been reported to be the main engine of different economies (contributing over 70% of the global GDP) across the globe, and any disruption would have a cascading effect on almost all major sectors in global economies. However, it is also noteworthy to understand that urban areas across the globe are responsible for approximately more than 60% of global greenhouse gases (GHG), following trends such as increased consumption of resources such as energy, where 78% of world energy is consumed in sectors such as transport, construction and manufacturing industries based in cities (United Nations, 2020). Also, due to changing global consumption trends, where most of the global population are seen to have high affinity for manufactured goods, urban areas have become a major source of pollution, affecting different parts of the environments (C40 Cities, 2021). Urban players will then be made to play an important role in deep decarbonisation agendas, being a key subject at the recent COP26, which called for net-zero commitments by 2050 (UNFCCC, 2021a).

Adding to decarbonisation agendas, urban players will further need to urgently consider the targets established in the Sustainable Development Goal 11, emphasising the need for inclusivity and equitability in urban areas (UN Environment Programme, 2015). While urban transitions will require climate financing, it is noted that the \$100 billion pledged in the Paris Agreement by developed economies will only unfortunately actualise by 2023 (OECD, 2021), prompting the need for alternative urban climate financing strategies. In this case, models highlighting private sector participation, rendering high societal outcomes, can be favoured. One viable model include a by-product of the Smart City model: the '15-Minute City', initially proposed in 2016 (Moreno, 2019), but gained popularity during global lockdowns prompted by the COVID-19 pandemic (Moreno et al., 2021). The concept not only proposes a reduction in resource use, but also reduces travel needs in urban areas, calling for higher density and urban activities. This renders an urban milieu, calling for a paradigm shift, where different urban nodes could be accessed within 15-minute walks or via cycling. To support this model, it will be key that public services (post offices, banks, etc.) and amenities such as parks and recreation centres be fairly distributed across the city and restructured such that they allow for healthy human interactions, essential to foster social cohesiveness, which in

turn would allow for urban communities to gain in higher quality of life.

The 15-Minute City is responsive to contemporary urban challenges

The '15-Minute City' concept is a new urban planning model conceived in 2016 by Franco-Colombian scientist Carlos Moreno, a specialist in intelligent control of complex systems, who envisioned the need for urban environments to be people centered (Moreno, 2020; Moreno, 2016). Moreno acknowledges that he drew inspiration from Jane Jacobs' writings (Jacobs, 1961). His model gained prominence with its electoral advancement by Paris Mayor Anne Hidalgo within her "living smart city" initiative called the "Ville du quart d'heure"—the 15-minute city (Willsher). The concept advocates for human centered urbanism, where aspects such as socialization, self-actualisation, cultural demand and health among others, are accessible in short commutes; i.e. that the time required for people to access different nodes within urban spaces is given precedence and priority during city planning. This policy empowers that the placement of essential urban amenities, infrastructures and opportunities is deliberately actioned to facilitate enhanced accessibility. With policy implementation, it becomes possible for residents within given urban areas to comfortably walk or cycle to any given node within a city in a timeframe not exceeding 15 min (White, 2020). Thus, the demand for the use of automobiles to travel within the city is reduced providing room for opportunities to create walkways and bicycle lanes that would have been otherwise suppressed in conventional urban planning models that prioritise vehicular flows efficiencies; thus, leading to more sustainability (Allam et al., 2022). The 15-minute city concept therefore seeks to bring a paradigm shift in the way urban planning has been previously practiced, shifting it from one focused upon vehicular flows, resulting in gridlocked cities, being a deterrent to the human societal endeavours and city liveability. This aligns with previous urban models such as the Green City, the Slow Movement, the Walkable City, and others, but as opposed to previous models, the '15-Minute City' gained prominence due to its strong political branding, and implementation pragmatism both from a political standpoint, and from an emissions reduction perspective, aligning with the objectives and principles established by the SDGs, and the IPCC, through its landmark report—Working Group 3—Mitigation of Climate Change (IPCC, 2014), with the Assessment 6 report expected to be published in mid-2022. Regarding emissions reduction, the proximity-based urban concept directly reduces travel needs and thus urban emissions generally; as it has been noted that vehicular transportation is a major source of the 78% of emissions attributed to urban areas. Globally, it is noted that 14% of annual emissions are attributable to transport sector, of which 72% is linked to road vehicles (Wiggins, 2020). Another aspect of the '15-minute city' concept, is the creation of decentralised production and consumption hubs within the city, where significant amounts of GHG emissions could be further eliminated. Already, it is noted that even in cities that have not adopted this planning model, the idea of 'producing and shopping locally' has gained popularity, as people gained more trust with local supplies during the height of COVID-19 lockdowns (International Trade Centre, 2020). For instance, it is noted that most supermarket chains in Swedish cities are favouring locally produced products (Askew, 2020). In other regions, such as American cities, most e-commerce deliveries are observed to be sourced from small local hubs rather than the traditionally centralized locations, as such are often located at a far distance requiring car transportation. In the pursuit of sustainability, the idea of sourcing, producing and consuming local

products can thus help to build resilience, as well as reduce emissions. Research local food innovations during the pandemic further showcases that over 29% of locals, in different countries, favoured locally produced products, and this figure can climb higher in some instances, where in France 51% were in support of locally sourced food and were willing to continue supporting innovations promoting decentralisations Askew (2020).

Besides the proximity dimension, the 15-minute city concept is also anchored on other three dimensions (Density, Diversity and Digitalization) that can be calibrated to respond to the net-zero agenda in an inclusive and equitable fashion. For instance, in respect to density, the concept promotes the idea of a compact city where people could be comfortably sustained by the availability of resources; thus, differing from the conventional urban planning concept where density is solely viewed in terms of built environment quotas. Diversity is conceptualized in two distinct ways: (i) mixed use of built environment, such that there is healthy mix of both residential, entertainment and commercial elements, thus maximizing available spaces as well as foster the proximity between services and, (ii) Diversity is also viewed in terms of multi-culturality. On this, with mixed use neighborhoods, it is possible to welcome different cultures transacting for both social and economic gains, and such will lead to increased social coherence (Allam and Jones, 2019a; Allam, 2020; Bibri and Krogstie, 2017). The digitalisation in its various form makes it possible for the other three dimensions to be achieved, especially via the automation of different processes and operations (see Bibri and Krogstie, 2020 for a relevant model based on empirical research in the form of multiple case studies based on a comparative analysis). For instance, with digital solutions such as use of smart cameras and sensors, it would be possible to monitor the usability of different public spaces such as parks, bicycle lanes and others; hence, adopt the most optimal strategies to maximize user experience (Bibri, 2021a, b). Data gathered can be utilised to increase performance and efficiency at both city, community and individual level, and such would allow such cities to adopt sustainable practices like adoption of energy efficient buildings, incorporate renewable energies and automate waste management among other services (Bibri, 2018; Zaheer, 2020). Additionally, through using the smart technologies it will be possible to customise the '15-Minute City' model to match the needs of varying geographies to fully address place-relevant human dimensions. Such technologies will thus help in fast-tracking those customisations needs and implementation challenges, as is already being done in cities like Paris, where the agenda is to reduce private cars—with a target of 50%, while ensuring cycling friendly environments through creation of more bicycle lanes in the city. Another city implementing this concept is Bellevue through its *Environmental Stewardship Plan 2021–2025*. This thus unveils opportunities for decentralised solutions, with the possibility to be developed locally; hence, empowering local communities in the process, and aligning with the narrative that climate solutions must be contextualised, and solutions made to emerge locally where possible.

Humane and pragmatic solutions are required

The application of the '15-minute city' concept should not however to be taken literally, such that urban infrastructures and elements are strictly constrained within a 15-minute radius. The urban restructuring needs to take into account different dynamics and unique urban morphologies, which already exists in different cities. On this, urban planners can borrow from the extensive work of urban thinkers such as Jane Jacobs, Christopher Alexander, Nikos Salingaros, Leon Krier and others who advocate for human scale urban areas. This means that the different

components, such as residential areas, walkways and bicycle lanes, markets, schools, recreation centres and others, should not operate as single entities, but rather be put together to collectively enhance human interactions and social life. On this, Jacobs (1961) noted that in the course of urban planning, it could be possible to alienate people, especially by not having them participate in creating the city. That is, planning and implementing projects without the participation of residents who are the main consumers. With such, urban areas, though presented as a 15-minute city would fall short of what Leon Krier expressly describe in his book 'The City Within the City' (Krier, 1984), where he advocates for urban neighbourhoods (quarters) to be designed in such a manner that residents can comfortably achieve all their daily functions. Further, the 15-minute concept also needs to be guided by the prescripts of Alexander (2002), who advocated for cities to be built in such a way that they evoke the aspect of 'wholeness'; where small 'blocks' are craftily ordered in a way that at the end, a 'complete' whole is achieved. On this vein, it will be key that future research dwelling into the implementation of the 15-Minute City, and its relevant to international accords and objectives, which may guide regional and local development priorities. Building more resilient, sustainable, humane, safer, inclusive, and just cities can be unpacked quicker if made to align with international documents such as the SDGs, the Sendai Framework, and others. On this front, a new report by UNEP offers interesting perspectives on the urban interactions between international agreements and key dimensions of urban transformation (Delgado and Wolch, 2021). Interestingly, those approaches can feed in urban densification strategies, being key in the arguments of the 15-Minute City and be implemented in large metropolitan areas and emerging megacities. Densification, in this case, can be coined as being both population and service provision. On his vein, densification has often been used as an inherent argument to the building of skyscrapers, but urban thinkers such as Salingaros (2013) underlines that such are destructive to the human scale of cities, and further underlines problems in terms of the efficient use of resources. Interestingly, it is also noted that contemporary planning principles are leading to speculation associated with ultra-high towers, with an example being the 'Billionaire's Row' in New York, presented as a display of wealth by the ultra-rich (SETHI, 2021); many of whom do not live there full-time, leading to low occupancy rates (Forrest et al., 2017). Additionally, skyscrapers do not contribute to the mixed-use components that healthy cities require and can ultimately lead to profound socio-economic disparities on the larger urban fabric. Swilling et al. (2018) further underline the importance of urban densification in optimally managing resources, key in pursuing urban transitions agendas, aligning with the principle of the 15-Minute City.

Considering key planning principles to achieve 'complexity' in the process of implementing the 15-minute city concept would be important, and it needs to be acknowledged that this would be an expensive undertaking. The financial aspect would be particularly elusive, especially in post-pandemic contexts in the certain geographies, like in the Global South, following the widespread economic disruptions that the pandemic prompted, where even developed economies are redirecting funds from infrastructural development to healthcare (World Bank, 2021). Adding to the challenge that climate financing pledged in the Paris Agreement would likely not materialise in the immediate term, financing should be sourced either internally or via loans—which however pose the risk of increasing unhealthy debt ceilings. Spurring local economies to invest within their city is possible, where urban policy makers need to carefully engage with the private sector, by offering fiscal incentives and mechanisms to achieve common objectives via partnership developmental models. Allam and

Jones (2019b) provide a pathway on how to potentially achieve this, by viewing the city as a Special Economic Zone (SEZs), hence incentivising investment in the public domain while bridging overarching aims. There are numerous wins in this approach, where for the public sector, the city is regenerated; for the private sector, profits are generated via tax credits; and for the urban residents, an increased quality of life is gained, more so from the increased job opportunities and availability of quality infrastructures. With case studies having succeeded in SEZs, and via Urban Regeneration schemes in Mauritius (Allam, 2019; Allam and Newman, 2018)—being part of the Global South, similar approaches can be designed for implementation of the 15-Minute City for varied geographies to address contextual challenges. To ensure a favourable outcome on this proposal, local community participation would be critical, as their acceptability of the project would hasten its success, and ultimately help in revamping neighbourhoods, where collective actions can aid in reducing urban emissions.

With the subject of climate financing positing itself on the frontline of urban regenerative narratives, it will be key to ensure that chosen models can respond not only to financing needs, but also in a way that can ensure economic equity, to benefit local communities while achieving net-zero emissions targets. This will unveil opportunities to ensure that just transition models are pursued while increasing the quality-of-life urban residents. This is extremely important as what purpose will it serve to have a climate resilient city, where no one wants to live? As such, models favouring higher liveability, complexity and human interactions must be favoured, and the 15-minute city is a potent solution which can be moulded into a net-zero urban model, equipped with the appropriate fiscal mechanisms for implementation.

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Competing interests

The authors declare no competing interests.

Ethical approval

Not Applicable.

Informed consent

Not Applicable.

Additional information

Correspondence and requests for materials should be addressed to Zaheer Allam.

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