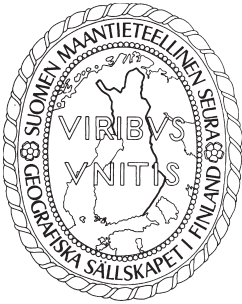


Reflections

Rethinking urban sustainability: consumption-based emissions through the lens of planetary urbanization

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Urban areas, which are responsible for the majority of global greenhouse gas emissions, play an important role in climate change mitigation. Although many cities are setting ambitious targets, these typically focus on production-based emissions within municipal boundaries, leaving consumption-based emissions — those embedded in goods and services often produced elsewhere — largely unaddressed. Meanwhile, the theoretical concept of planetary urbanization highlights how urban processes extend well beyond traditional city limits, shaping global resource flows, infrastructure networks, and ecosystems.

Cities are beginning to recognize the importance of tracking and managing consumption-based emissions, yet most use such metrics only as informational tools rather than formal targets. Various strategies — ranging from degrowth proposals that advocate reduced overall consumption to circular economy initiatives emphasizing reuse and recycling — offer pathways for lowering urban footprints. However, the efficacy and equity of these approaches require more research, and existing indicators often overlook complex transboundary impacts.

Despite these challenges, cities are uniquely positioned to lead the shift toward more sustainable lifestyles, given their density-driven advantages in infrastructure provision and innovation. By leveraging these strengths, experimenting with policy interventions, and rigorously measuring outcomes, urban areas have the potential to catalyze transformative change. Ultimately, a deeper acknowledgment of planetary interconnectedness, combined with expanded data collection and inclusive decision-making, is essential for cities to fulfill their potential as engines of global sustainability.

Keyword: urban sustainability; planetary urbanization; consumption-based emissions; carbon footprints

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Urban areas at the forefront of climate change mitigation

Urbanization is a global megatrend showing no signs of slowing down. Even in the face of major shocks, such as the COVID-19 pandemic, disruptions to urbanization patterns have been largely temporary. As cities continue to absorb growing populations, they have also emerged as key arenas for advancing economic, environmental, and social sustainability (Angelo & Wachsmuth 2020). Consequently, policy and governance efforts toward global sustainability are increasingly being rescaled to the city level (Andonova & Mitchell 2010). Against this backdrop, understanding how urban growth interacts with and reshapes several aspects of sustainability becomes increasingly important. For example, in the realm of environmental sustainability, research highlights the complex and context-dependent relationship between urbanization, the environment, and energy use. Factors such as developmental stage, income, and the magnitude of urban growth shape these dynamics (e.g. Poumanyong & Kaneko 2010; Kasman & Duman 2015).

Currently, urban areas account for roughly two-thirds of Global Greenhouse Gas (GHG) emissions (Messerli *et al.* 2019). Also building stock is pivotal in urban sustainability efforts, given its significant land use and substantial contributions to global greenhouse gas emissions and energy demand (Cabeza *et al.* 2023). Indeed, in response, cities worldwide, including Finnish cities, are setting ambitious carbon-neutrality goals and implementing emission monitoring systems. Traditionally, these city-level mitigation targets have focused on production-based territorial emissions, addressing primarily energy and transportation sectors (Huovila *et al.* 2022), that are directly within the city's control. Yet, examining urban lifestyles and consumption patterns reveals that affluent cities are hotspots of unsustainable practices, exerting environmental pressures well beyond their administrative boundaries.

To capture this broader impact, it is essential to consider the city's metabolism extending outside its borders. This can be done by tracking also consumption-based CO₂ emissions — those associated with goods and services consumed within a city but produced elsewhere, often outside national borders (Wiedmann *et al.* 2021). As my previous research has shown, carbon footprints — typical indicators of consumption-based emissions — are unsustainably high in affluent societies and are particularly pronounced in urban areas characterized by elevated consumption (Ala-Mantila *et al.* 2014, 2023). Similarly, the global biodiversity crisis is partly driven by unsustainable consumption habits of wealthy urban populations, whose lifestyle effects often materialize in distant locations (Koslowski *et al.* 2020). These findings underscore the urgent need to address the broader, consumption-driven consequences of urban life and to develop strategies that align urbanization with long-term sustainability goals.

Planetary urbanization

At a theoretical level, these observations resonate with Brenner and Schmid's (2012) concept of planetary urbanization, which frames urbanization as a global phenomenon extending beyond the traditional boundaries of cities. In this view, urbanization intensifies infrastructure networks and strengthens interaction flows across the planet, meaning that human activities increasingly influence systemic natural processes such as atmospheric and oceanic cycles. The spatial transformations driven by urbanization thus surpass city limits, necessitating a new epistemology of the urban — one that views the urban as an ongoing process rather than a fixed form. This perspective builds on Lefebvre's (1974/2003) idea that urbanization, as a driving force of the prevailing economic system, extends urban infrastructures and lifestyles across expansive regions and beyond administrative borders (for more discussion about this, see Ala-Mantila *et al.* 2022).

This line of thinking intersects with concerns about a growing environmental disconnect in urbanized societies (Kronenberg *et al.* 2024). This disconnect manifests spatially, economically, cognitively, and emotionally. Spatially, complex supply chains obscure the connections between urban centers and their ecological hinterlands — making environmental impacts appear distant — while economically, globalized urban economies exploit remote peripheries, sustaining unsustainable consumption patterns and concentrating power and resources in city cores (*ibid.*). Cognitively and emotionally, because urban settings offer fewer chances to engage with natural elements, it is thought that city residents face an increased risk of developing weak connections to nature, potentially leading to what has been described

as a 'nature disconnect' (Frumkin *et al.* 2017). Such disconnections perpetuate the illusion of self-sufficient cities and encourage consumption-driven emissions (Wiedmann *et al.* 2021).

Addressed from these planetary and environmental disconnect perspectives, urbanization is both a driver of global sustainability challenges and a potential site of solutions. Focusing on planetary urbanization draws attention to the global flows of energy, water, food, and raw materials moving through urban systems. It highlights the urgency of measuring, understanding, and ultimately reducing these flows. A central question emerges: how should, and could, the transboundary impacts of urban consumption be incorporated into city-level climate agendas?

Cities are taking steps towards consumption-based emissions

Currently, an increasing number of cities are beginning to incorporate emissions calculations that extend beyond their territorial emissions, thereby acknowledging the broader influence of local consumption — such as food and construction activities — on global climate impacts. This is despite cities having limited influence over hard-to-decarbonize sectors like steel and cement production, as well as emissions embedded in global supply chains (Lichtman 2024).

For example, the city of Portland's 2022-2025 Climate Emergency Workplan includes a significant focus on consumption-based emissions, acknowledging the environmental impact of the goods, food, and materials consumed by Portlanders (City of Portland Bureau of Planning and Sustainability, 2022). They identify embodied carbon in building materials, food, and consumer goods as critical sources of emissions. While there are clear actions and measurable progress points (e.g., participation rates, reductions in waste, adoption of low-carbon materials), the Workplan does not provide specific quantified emissions reduction targets directly linked to these actions.

Likewise, the city of Stockholm aims to reduce consumption-related climate impact, but the city does not have explicit, measurable consumption-based emissions targets. However, several ongoing and forward-looking efforts address consumption-based emissions, including, for example, monitoring greenhouse gas emissions from residents' air travel (Stockholm Miljöbarometern, 2024a), and the direct carbon dioxide emissions from business air travel undertaken by city staff (Stockholm Miljöbarometern, 2024b), and the climate impact of the food purchased, prepared, and served in municipal operations, primarily in preschools, schools, and elderly care facilities (Stockholm Miljöbarometern, 2024c).

In Amsterdam, The Circular Amsterdam 2020-2025 program addresses the reduction of scope three emissions, i.e. emissions outside of Amsterdam resulting from consumption within the city (City of Amsterdam, n.d.). However, this program is not part of the Climate Neutral Roadmap that focuses on achieving a 95% reduction in CO₂ emissions by 2050. In Circular program, the city aims to, e.g., reduce the use of new raw materials by 50% by 2030, achieve 100% circular procurement by 2030, and implement circular construction criteria for all new buildings and public spaces by 2023. Other actions include promoting urban agriculture, reducing food waste by 50% by 2030, and increasing the separate collection of kitchen and garden waste to 73% of households by 2030. These targets and actions primarily focus on reducing resource consumption and promoting circularity within specific sectors. However, it seems to lack comprehensive data on overall consumption-based emission reduction targets or a detailed breakdown of actions across various consumption categories.

To sum up, while cities increasingly recognize the significance of indirect, consumption-based emissions, they often still use carbon footprints primarily as informational tools rather than as official metrics. However, this still presents an important opportunity for them to move beyond sector-specific approaches and assume more comprehensive accountability, ultimately adopting a broader and more holistic framework for addressing their climate impacts.

How do we move forward?

In the broader theoretical context, the notion of planetary urbanization (Brenner & Schmid 2012) provides a useful lens for understanding the global implications of urban processes. Yet, while planetary urbanization highlights the worldwide scope and interconnectedness of urbanization, it offers limited guidance on the specific responsibilities of cities within this global framework.

Furthermore, critics argue that the planetary urbanization perspective may overlook the social and political dynamics of urbanization, the diversity of everyday experiences, and the transformative potential of local practices and struggles (Ruddick *et al.* 2018).

In my view, the first key step in addressing consumption-based emissions is ensuring reliable and consistent data for calculations. This enables cities to understand the true impact of their consumption patterns and to track progress toward emissions reduction targets.

In practice, mitigating carbon footprints can involve either reducing overall consumption, restructuring consumption patterns, or both. One approach to reducing consumption draws on the degrowth movement, which argues for curbing excessive resource use and has gained traction as a strategy for achieving sustainable urban environments (Kronenberg *et al.* 2024). For example, Krähmer (2021) proposes a suite of degrowth-oriented urban strategies — such as adopting consumption-based accounting of both environmental and social impacts, but also embracing sufficiency by reducing living space and car dependency, halting airport expansions, transforming commercial areas into social commons, and encouraging inclusive, bottom-up planning processes to allow for such changes.

A softer alternative that perhaps has had less resistance is to reshape consumption practices, supported by, e.g., circular economy initiatives that emphasize resource efficiency, waste reduction, and reuse (Calisto Friant *et al.* 2023). For instance, shifting from product-based to service-based consumption could lessen the environmental burden by extending product lifespans and reducing the need for continuous production of new goods. However, empirical evidence for these approaches remains limited, underscoring the need for further research and experimentation. Furthermore, current circular city strategies and supporting indicators often fail to account for upstream and offsite environmental impacts across entire value chains — focusing instead on production-based metrics and technological solutions — which obscures the true global environmental impact of urban consumption and overestimates the possibility of economic decoupling (*ibid.*; Kopp *et al.* 2024).

Practical policy options for cities that take into account a consumption-based viewpoint include implementing product and procurement standards, as well as introducing economic measures that incentivize product longevity and the sharing economy (Millward-Hopkins *et al.* 2017). My earlier research also suggests that some kind of sharing economy models may offset the higher per-capita environmental footprints typically associated with solo dwellers, who are common in urban contexts (Ala-Mantila *et al.* 2016). By guiding citizens toward more sustainable consumption, cities can assume a leadership role, using their influence and resources to set a positive example. Empowering citizens to participate in decision-making processes and hold policymakers accountable is also critical to ensuring that sustainable urban policies are both effective and equitable (Lichtman 2024).

Despite these debates and current limitations, cities remain well-placed to spearhead these changes and make meaningful actions toward more sustainable and just urban futures. Their inherent advantages — such as economies of scale in infrastructure provision, opportunities for recycling and resource recovery, and the density that facilitates social interaction and knowledge exchange — make them potential leaders in fostering sustainable lifestyles. Previous studies have shown that the uptake of innovative practices in one area can influence their adoption in adjacent areas through social interaction, visibility, and information sharing (Graziano *et al.* 2019). Cities should see how they could leverage these behavioral dynamics to promote more sustainable consumption patterns.

Conclusions

Urbanisation should not be associated only with the growth of cities — planetary urbanisation also involves processes within cities and sociospatial and political-ecological transformations outside of cities, spanning different territories and landscapes. In its essence, the planetary urbanization perspective highlights cities' interconnectedness and global impact, challenging the notion of isolated urban entities. By examining urbanization through a planetary lens, it becomes clear that improving urban sustainability and reducing environmental impacts, including consumption-based emissions, must involve not only addressing local production and waste management within city boundaries, but also acknowledging and alleviating the environmental and social costs borne by the territories and communities integrated — often unequally — into the global urban fabric.

Thus, I understand that planetary urbanization suggests a responsibility to urban decision-makers to leverage the urban advantages to create more sustainable futures locally and globally. However, this doesn't mean they are left alone in this endeavor: also the consumption-based method highlights the interdependence of cities and their supply chains, encouraging collaboration with regional and national governments and other cities to reduce emissions (Wiedmann *et al.* 2021). For cities, encouraging robust data collection, experimenting with policy interventions and rigorously measuring their effects, engaging residents, and developing and communicating a nuanced understanding of the complexities inherent in global urbanization patterns provide a good starting point. However, translating the insights of planetary urbanization into concrete responsibilities and new mandates for cities still requires further research and dialogue among scholars, policymakers, and residents.

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