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Tourism in net-zero cities

This is the final peer-reviewed author's accepted manuscript (postprint) of the following publication:

*Published Version:*

Zoltan, J. (2024). Tourism in net-zero cities. *CITIES*, 152, 1-4 [10.1016/j.cities.2024.105178].

*Availability:*

This version is available at: <https://hdl.handle.net/11585/971630> since: 2024-06-11

*Published:*

DOI: <http://doi.org/10.1016/j.cities.2024.105178>

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# TOURISM IN NET-ZERO CITIES

## ABSTRACT

This study aims to strengthen the nexus between urban tourism and net-zero city planning by focusing on tourists and tourism operators as stakeholders of cities' decarbonization agendas. The existence of seasonal tourism flows poses challenges to the targeted provisioning systems of local governments and in the same time climate policies will likely affect the tourism demand of destinations. Given the importance of tourism for local economies, a conceptual framework is proposed to support a research agenda towards the co-implementation of tourism and net-zero policies.

Key words: Net-zero cities, green transition, urban tourism

## INTRODUCTION

In order to avoid the adverse effects of climate change, countries committed to achieve net-zero emissions by 2050, by balancing the amount of GHG they emit to the atmosphere with the amount removed within a specific timeframe (Masson-Delmotte et al., 2018). Green transition to carbon-neutral destinations requires a shift away from fossil fuels to clean energy supply, improving energy efficiency and changing production and consumption patterns also in the slowly decarbonizing tourism industry (Sun et al., 2022). The current study focuses on strategies of urban destinations, given that more than 70% of CO<sub>2</sub> emissions are generated in cities, and climate actions in urban planning gained particular importance in the EU (Netzerocities).

New climate governance models require holistic and decentralized organization among the various departments of city's administration, and increased stakeholder engagement in governance structures (Shtjefni et al., 2024). Huovila et al. (2022) reviewed theory and practice of carbon neutral cities, without mentioning tourism. However, tourism has a role in supporting the development of sustainable cities (SDG 11 in UNWTO), and as a stakeholder will be impacted by climate agendas, hence, it should not be ignored. Indeed, knowledge gaps are identified on the implications of decarbonization pathways for tourism and on addressing carbon risk for visiting urban destinations (Scott & Gössling, 2022).

This work takes a multidisciplinary approach by identifying tourism issues in relation to cities' decarbonization plans, structured according to the seven provisioning systems targeted for emission reductions in line with Seto et al. (2021); energy supply, mobility, building construction, waste management, wastewater treatment, food systems, and the carbon sequestration benefits of vegetation.

### *1. Energy supply*

The source of energy supply is a crucial issue in green transition of cities, yet the increased application of renewable energies can affect the attractiveness of a destination. Visual pollution from the use of wind turbines alters the natural environment, and it is debated in literature whether that attracts or deters tourists visiting a destination (Smythe et al., 2020). In

this line, research on tourists' preferences and their willingness to accept the level of view alteration of renewable energy plants (e.g., extensive solar panels and on-, and off-shore wind energy parks), and their effects on tourism revenues should be further investigated.

## 2. *Mobility*

Tourism and transport issues need to be addressed between the origin and destination, and within destination(s). Most tourism emissions happen by reaching the destinations; airlines being responsible for at least 3.5% of global emissions (Lee et al., 2021). The implementation of sustainable alternative fuel is necessary to reach net-zero, albeit still under research. Decarbonizing strategies at national level can include imposed modal shifts, such as banning short, domestic flights, promote highspeed rail development, and redirecting marketing from long-haul markets. The effects of these strategies on arrivals and revenues for urban destinations are under-researched.

In the intra- and inter-destination mobility context, the main issue is the reduction of private car use of tourists through policies and incentives (Kim et al., 2023). Electrifying public transport and construction of bike trails for the use of micromobilities are included in most city plans. Walkability of cities triggers sustainable exploration, yet the adaptation of low-emission visitation by different tourist markets needs further investigation (Hall & Ram, 2019). Furthermore, the Fifteen-minutes city model has not been analyzed from the tourism perspective yet. This urban planning concept, contemplates that everything needed in each part of the city can be reached within a 15 min walk or bike ride from a resident's home (Moreno et al., 2021). While the idea is to reduce residents' commuting, the additional infrastructure planning will increase the livability of neighborhoods. Therefore, this concept can have interesting effects on tourist movements in previously less visited parts of cities, hence can help to decongest tourism flows from primary areas.

## 3. *Buildings*

In cities' decarbonization programs, energy use in buildings is addressed by regulations of new constructions and incentivized building upgrades. The hotel sector needs a 90% reduction of GHG emission from the 2010 baseline level by 2050 (ITP, 2017). With energy efficient infrastructure, use of renewable energy, and other mitigation techniques, emission-free hotels do exist (Vourdoubas, 2018). However, despite the availability of EU subsidies, and the profitability energy upgrades, hoteliers perceive several barriers regarding green investments (Crapolicchio et al. 2020). Therefore, further research should focus on the application and adoption of subsidies offered by municipalities and EU funds to accelerate decarbonization in the hotel sector.

## 4. *Waste*

The seasonality and quantity of tourism waste create additional challenges for municipal solid waste management. Caramiello et al. (2009) estimated 93% more waste between the months with lowest and with highest tourist arrivals in a summer destination area. Obersteiner et al. (2021) measured the effectiveness of different urban strategies in managing tourist waste and concluded that food waste prevention should be first priority. Indeed, food waste cause 9% of global emission, and 26% of it is originated by restaurants (UNEP, 2021). Nudges are proven powerful in reducing plate waste generated in breakfast buffets (Dolnicar, 2023), while food donation are the best practices for unsold food. Furthermore, tourists' recycling practices are challenged by hotel room designs and the variation of disposal systems across cities. Effective, large scale waste reduction policies and behavioral approaches needs further research in the industry.

## 5. *Wastewater*

Water management became critical in climate change mitigation and adaptation. Improving wastewater treatment and water efficiency are also crucial with seasonally intense tourism consumption. Water scarcity needs to be addressed by the hospitality industry, and besides

reducing consumption in different operations, recycling wastewater will be a solution. A challenge of water sensitive urban design is to fit treatment facilities into densely built areas of cities (Seto et al., 2021), and trading expensive real estate locations for this purpose. Therefore, besides policies and behavioral approaches to reduce water usage in the hospitality industry, the design and inclusion of wastewater treatment plants in touristic areas deserve the attention of researchers.

#### 6. Food

Food systems are responsible for approximately 35% of total GHG emissions, and only livestock generates at least 14% of total emissions (FAO, 2017). A difference could be already achieved if restaurants collectively reduce the beef offer on their menu, and provide carbon footprint signage of dishes (Brunner et al, 2018). Localization of food is crucial in green transition, by encouraging regional production of authentic food. Sampling local food is enriching the tourists' experience, yet tourists' intention-purchase gap of local food are under-researched topics. Given the amount of food consumed by tourists, the acceptability of sustainable food defaults and the efficacy of nudges aiming at responsible consumption, worth further investigation.

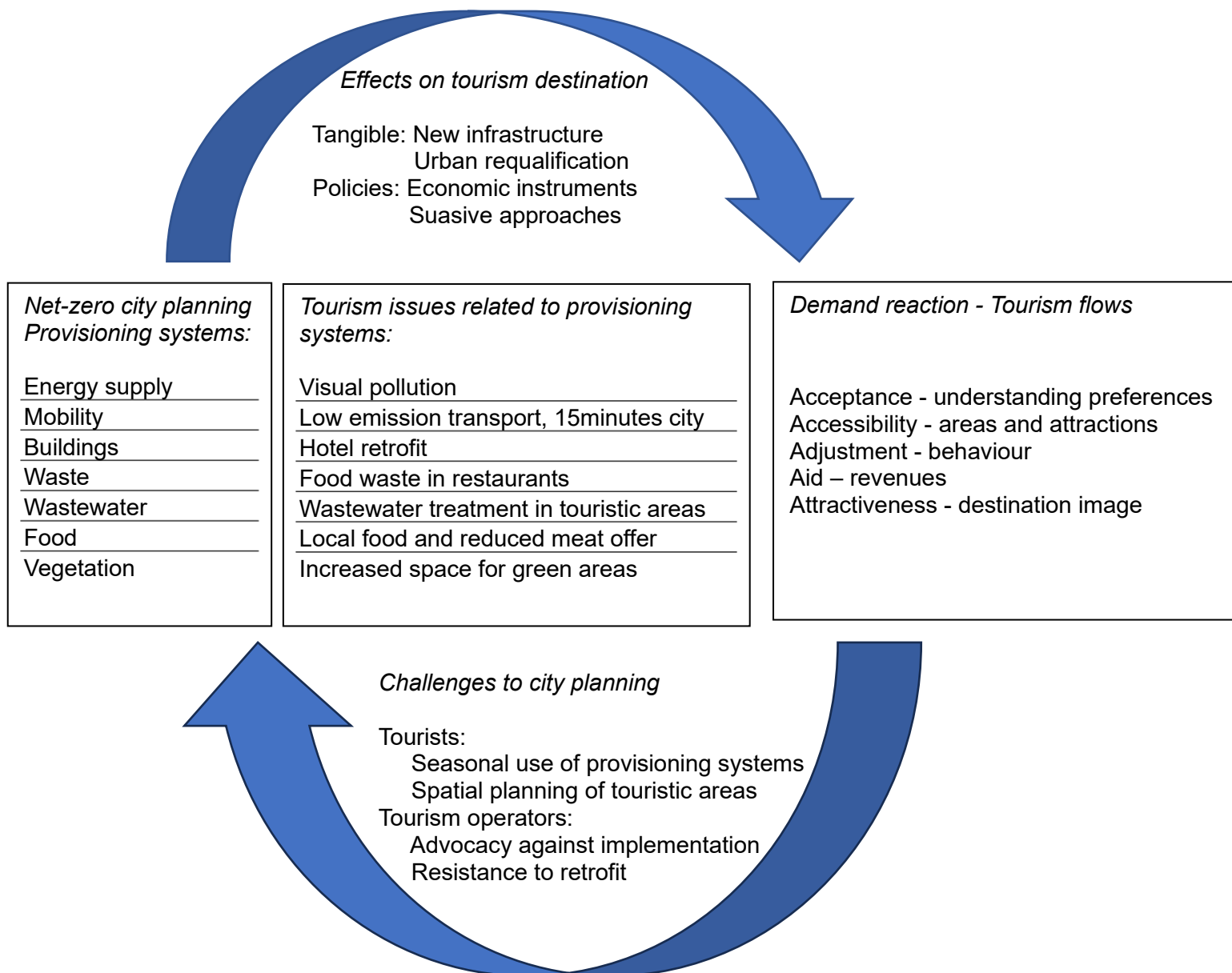
#### 7. Vegetation

Green areas and natural environment are important elements of the livability of cities and the attractiveness of tourist destinations. Leveraging on the carbon uptake of the vegetation; by planting trees, arranging rooftop gardens and urban farming are existing practice also in the hotel sector. Urban design of green spaces is often resulted with the reduction of parking places (Nieuwenhuijsen, 2021). While this trade-off is desired by net-zero policies, it can alter the accessibility and consequently the visitation of attractions. Pro-environmental initiatives affect destination image (Bilynets et al., 2023), therefore, major requalification of touristic areas could lead to green repositioning of the city. While sustainability is on the agenda of most destination management organizations, perceived image change is under-researched in this domain.

### Conceptual framework of net-zero city planning and urban tourism

Tourism policies need co-implementation with net-zero plans by considering the tourist usage of diverse neighborhoods of a destination. Following this claim, Figure 1 provides a conceptual framework to aid further research in the net-zero urban tourism nexus. It identifies the tourism issues related to cities' decarbonization plans within seven provisioning areas, and points out the effects of tangible changes (urban requalification, new infrastructures) and policies, such as economic instruments and suasive approaches, on tourism demand. Research directions regarding the response of tourism demand are categorized in five A's.: 'Acceptance' refers to research on understanding tourists' preferences, 'Accessibility' encompasses research on time, effort and cost associated with reaching the destinations and attractions. 'Adjustment' reflects on the change in tourist behavior induced by net-zero policies. 'Aid' refers to the impact of interventions on tourism revenues, and 'Attractiveness' delves into perceived image of the destination. Furthermore, net-zero polices can be challenged by the existence of seasonal tourist flows in the city. Regarding new infrastructures, their capacity needs to adjust to tourism seasonality and their spatial planning in touristic areas should take into consideration tourists' needs and preferences. Tourism operators can advocate tourists' acceptance against the implementation of green investments. The resistance and financial burdens of hoteliers to retrofit are key issues in subsidizing mitigation efforts. Comprehensive research of this framework could better support pro-climate policies with destination management, and just transition for local tourism operators.

Figure 1. Conceptual framework of net-zero city planning and urban tourism



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