

mobil.TUM 2024 – The Future of Mobility and Urban Space, April 10-12, 2024

## Parking supply and parking policies in European cities – An assessment based on public data

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Keywords: *parking space, parking strategies*

This work addresses the following topic(s) from the Call for Contributions:  
(Please check at least one box)

- Placemaking to integrate urban spaces and mobility
- Promoting sustainable mobility choices in metropolitan regions
- Governing responsible mobility innovations
- Shaping the transition towards mobility justice
- System analysis, design, and evaluation
- other: \_\_\_\_\_

### Problem statement

Competition for urban space is increasing, due to continued growth of car ownership in most cities, the promotion of walking and cycling, new mobility offers and climate adaptation requirements (Gössling et al., 2016; Guo, 2013). The number and design of parking facilities is a central element in gaining space for alternative uses of urban space. However, knowledge about where and how much space is used for parking is limited. As no simple and exact estimation approach exists and parking data collection is complex, only few cities have parking space inventories and those mainly contain public parking spaces.

### Research objectives

This paper investigates parking supply in European cities, its relation to parking policies and its impact on mobility behaviour. For this purpose, we collected parking data of nine Western European cities through different online platforms and compared the cities' parking situations based on this public data. We especially aim to analyse the space consumption of on-street parking and discuss interrelations with other parking characteristics and mobility behaviour.

### Methodological approach

To analyse the space consumption of parked cars and related factors we evaluated data from nine European cities: Aachen, Cologne, Copenhagen, Geneva, Gent, Groningen, Hamburg, The Hague and Zurich. These cities were selected as they publish georeferenced data on public parking supply in large parts of the city. Using GIS software, we combined the data with spatial-structural data and defined comparable study areas covering central parts of the cities. To gain a more holistic picture of the parking situation, we further collected information on off-street parking supply, municipal parking policies and costs. Based on this data, we applied descriptive and statistical analyses to investigate the link between these parking factors as well as their interrelations with car ownership and car use.

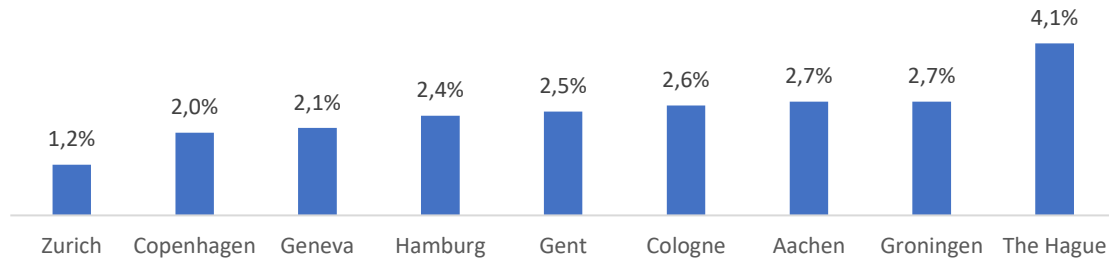
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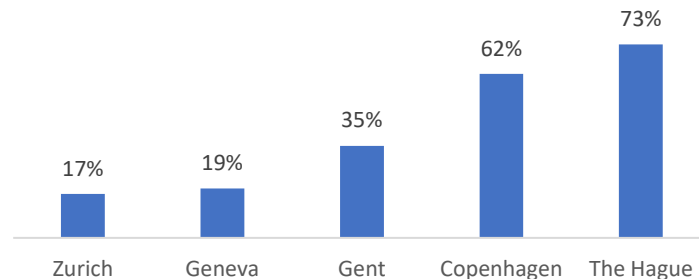
## Results

The on-street parking space inventories of the selected cities show that despite differences in city size and population density, most of the cities have a similar supply of on-street parking in the inner-city area. With approximately 2000-2500 parking stands/km<sup>2</sup>, 2.0 to 2.7 % of the total area is occupied by on-street parking spaces (see Figure 1). In contrast, it is striking that Zurich has particularly few on-street parking spaces (1200 parking stands/km<sup>2</sup>) and The Hague offers a particularly large number of on-street parking stands (3800 parking stands/km<sup>2</sup>).



**Figure 1:** Share of surface area occupied by on-street parking spaces [%]

However, these differences in public parking supply do not allow conclusions on the overall parking supply, as off-street parking spaces might also differ between the cities. Even though data on private parking spaces is rare, literature and internet research can give hints. Our research indicates that Zurich and The Hague both have comparatively few parking spaces in public parking garages, but differ strongly in terms of private parking spaces, which probably changes the total space consumption of parking spaces considerably. Figure 2 shows the estimated share of on-street parking in the overall parking capacity (own evaluation based on Canton de Genève, 2012; City of Basel et al., 2017; City of Den Haag, 2021; City of Gent, 2018; Rambøll, 2019; Willi, 2016). For the missing cities, no estimations of private off-street parking spaces could be found.



**Figure 2:** Estimated share of on-street parking spaces in overall parking capacity [%]

Besides those differences in parking supply, the cities' parking strategies also differ, which might impact the future parking supply. The Hague's parking strategy (City of Den Haag, 2021) focuses on ensuring high accessibility and an equilibrium between demand and supply. Conversely, cities like Zurich (Stadt Zürich, 2023) aim to use parking management as a tool for sustainable transport development by limiting the overall parking supply, among others by restricting the number of private parking spaces allowed in new developments. Based on these strategies, we qualitatively categorized the cities according to the restrictiveness of their parking policies. Besides those strategic papers, we considered pricing as an important component of current parking politics.

Based on the collected data, we analysed interrelations between parking supply and policy factors as well as their impact on residents' mobility behaviour with descriptive and correlation analyses. These analyses revealed that cities with less public parking spaces tend to have more restrictive parking strategies. Furthermore, higher costs for residential parking permits go along with lower car ownership rates and lower shares of motorized individual transport of the residents. In contrast to that, we could not observe a clear correlation between the residents' mobility behaviour and the restrictiveness of the parking strategies as well as the on-street parking supply. This might be caused by the fact that the status quo of parking supply may not reflect more recently developed parking strategies and that scarce on-street parking capacities are often compensated by a large amount of off-street parking. Furthermore, our small city sample, the poor data situation regarding private parking spaces and the possibly complex and multivariate interactions between the parking variables complicate the assessment.

Our results show that parking systems in cities are complex structures of on- and off-street parking influenced by historical developments as well as current parking costs and future parking strategies. For a holistic comparison of the parking situation in different cities, a comprehensive database is needed. However, today only few cities possess and publish data on on-street parking spaces and even fewer have estimations of private parking spaces. Despite these restrictions, we could obtain quite comprehensive pictures of the parking situation in the considered cities. They reveal great differences in parking supply and parking strategies and significant correlations between on-street parking supply and parking strategies as well as between residents' parking costs and their mobility behaviour.

## References

- Canton de Genève (2012) *Plan Directeur du Stationnement* [Online]. Available at <https://www.ge.ch/document/plan-directeur-du-stationnement> (Accessed 9 October 2023).
- City of Basel, City of Bern, City of Luzern, City of St. Gallen, City of Winterthur and City of Zurich (2017) *Städtevergleich Mobilität: Vergleichende Betrachtung der Städte basel, Bern, Luzern, St. Gallen, Winterthur und Zürich im Jahr 2015* [Online]. Available at [https://www.stadt-zuerich.ch/ted/de/index/taz/publikationen\\_u\\_broschueren/staedtevergleich\\_mobilitaet\\_2015.html](https://www.stadt-zuerich.ch/ted/de/index/taz/publikationen_u_broschueren/staedtevergleich_mobilitaet_2015.html) (Accessed 9 October 2023).
- City of Den Haag (2021) *Parkeerstrategie Den Haag 2021-2030* [Online]. Available at [https://denhaag.raadsinformatie.nl/document/10165482/1/RIS308711\\_Bijlage\\_Parkeerstrategie\\_Den\\_Haag\\_2021-2030](https://denhaag.raadsinformatie.nl/document/10165482/1/RIS308711_Bijlage_Parkeerstrategie_Den_Haag_2021-2030) (Accessed 9 October 2023).
- City of Gent (2018) *Evaluatie Parkeerplan Gent* [Online]. Available at [https://stad.gent/sites/default/files/page/documents/20180302\\_EvaluatieParkeerplan.pdf](https://stad.gent/sites/default/files/page/documents/20180302_EvaluatieParkeerplan.pdf) (Accessed 9 October 2023).
- Gössling, S., Schröder, M., Späth, P. and Freytag, T. (2016) 'Urban Space Distribution and Sustainable Transport', *Transport Reviews*, vol. 36, no. 5, pp. 659–679.
- Guo, Z. (2013) 'Does residential parking supply affect household car ownership? The case of New York City', *Journal of Transport Geography*, vol. 26, pp. 18–28.
- Rambøll (2019) *Kortlægning af Ikke-kommunal parkering i Københavns Kommune* [Online]. Available at <https://www.kk.dk/sites/default/files/2022-02/14.02.22%20-%20svar%20til%20Marcus%20Vesterager%20%28A%29%20om%20parkeringspladser%2C%20prisf%C3%B8lsomhed%20og%20bilejerskab.pdf> (Accessed 9 October 2023).
- Stadt Zürich (2023) *Stadtverkehr 2025: Bericht 2022* [Online]. Available at [https://www.stadt-zuerich.ch/ted/de/index/taz/publikationen\\_u\\_broschueren/stadtverkehr\\_2025\\_bericht\\_2022.html](https://www.stadt-zuerich.ch/ted/de/index/taz/publikationen_u_broschueren/stadtverkehr_2025_bericht_2022.html) (Accessed 10 October 2023).
- Willi, E. (2016) *Verdichtung und Parkplatzplanung: Potenziale am Beispiel der Stadt Zürich: SKM-Veranstaltung vom 28. November 2016, Aarau*, Stadt Zürich, Tiefbauamt, Verkehr + Stadtraum [Online]. Available at [https://skm-cvm.ch/cmsfiles/3\\_willi\\_stadt\\_zurich\\_1\\_1.pdf](https://skm-cvm.ch/cmsfiles/3_willi_stadt_zurich_1_1.pdf) (Accessed 9 October 2023).