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Sustainable change.

## Impact of parking restrictions on e-scooter usage in Copenhagen

13-09-2022



# Agenda

1. Project background
2. Background on parking restrictions
3. Methodology
4. Data collection and analysis
5. Insights from relevant previous studies
6. Recommended actions to be taken by e-scooter operators
7. Conclusion

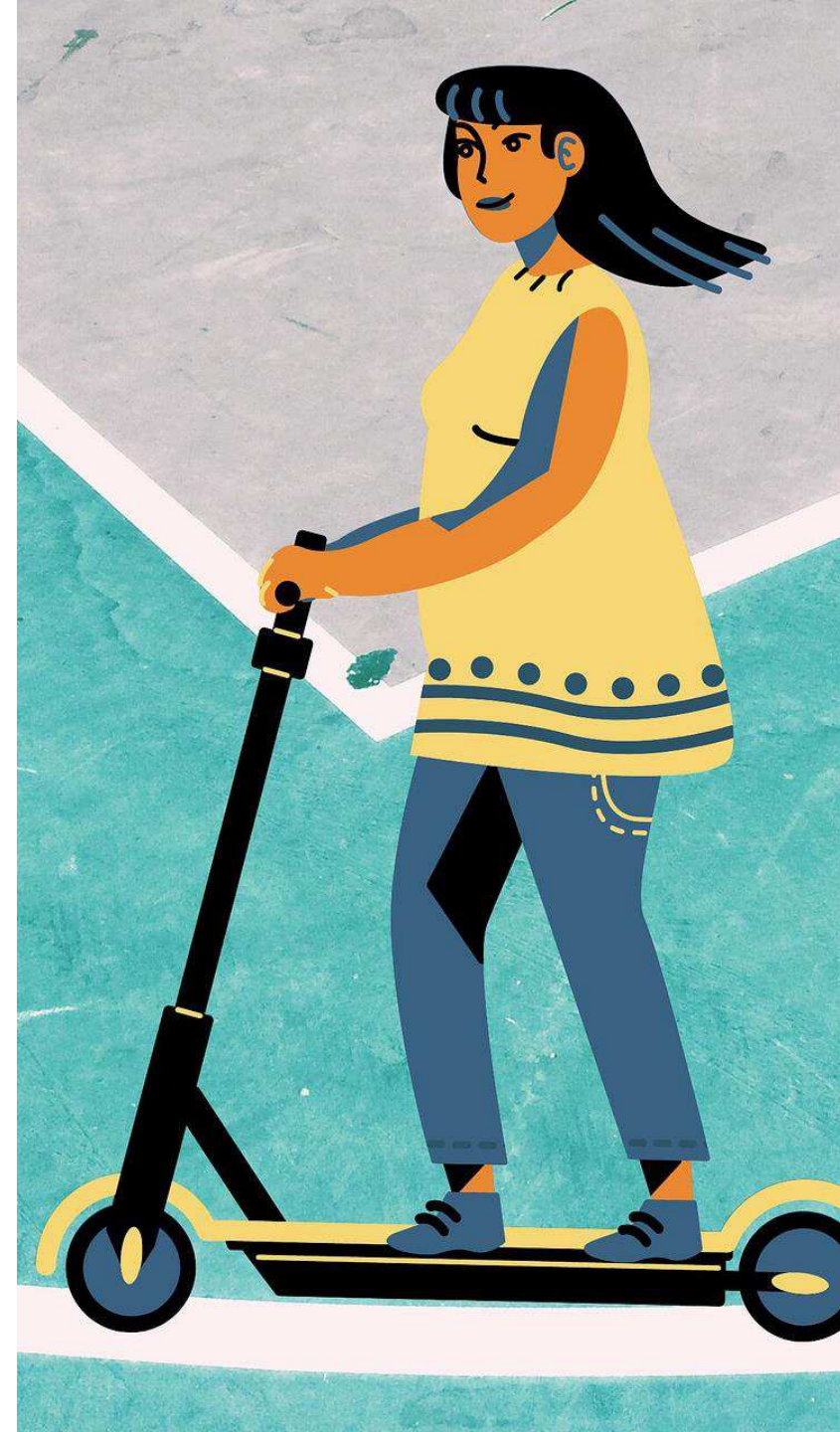
# Project background

E-scooters have become part of the urban mobility options on offer in numerous cities, including Copenhagen. Parking restrictions are currently limiting the value of these mobility services in parts of Copenhagen, most importantly in Indre By - the city center.

With congestion, air pollution, and car ownership all rising, the Nordic Micromobility Association (NMA) wishes to contribute to Copenhagen's ambition of being carbon neutral by 2025. They believe that their e-scooters can contribute positively to a sustainable solution for traffic-reduction and wish to be a lever in creating a better city for all Copenhageners and visitors. This however requires supportive regulations.

Ramboll has been tasked with examining the impact of parking restrictions on e-scooter use, as well as to provide suggestions of how e-scooters could be reintroduced in the restricted zone. The work is based on analysis of user data from Copenhagen and other Scandinavian cities.

This report summarizes the findings.



# Background on parking restrictions

# The City of Copenhagen has put parking restrictions in place for e-scooters

## **New national rules regarding parking of smaller rental vehicles**

On January 1st, 2021, the rules regarding parking of smaller rental vehicles without a permanent place of business were changed, according to the Amending of the Public Roads Act, etc., the Private Public Roads Act and the Traffic Act of 21.12.2020. Smaller rental vehicles are bicycles and e-scooters.

## **Copenhagen's parking restrictions**

The Citizens' Representation in the City of Copenhagen has changed the framework and tariffs for setting up e-scooters.

The new rules mean that providers who want to set up e-scooters in the city must have an agreement with the municipality. In addition, a prohibition zone has been introduced, in parts of Vesterbro, Østerbro, Amager, Christianshavn and in the entire "Indre By" - inner city, which among the operators – and in the rest of this report - is referred to as the restricted zone (see map on page 6).

## **Designated parking areas**

The e-scooters must be parked in the 242 (+ 178) designated parking areas when the trip ends, and it is no longer possible to rent the e-scooters or end a trip in the restricted zone.

Users can still use the e-scooter throughout the city and park it temporarily while the taximeter is running, but it is no longer possible to leave the e-scooter to a new user as before in the restricted zone, unless it is on private land.



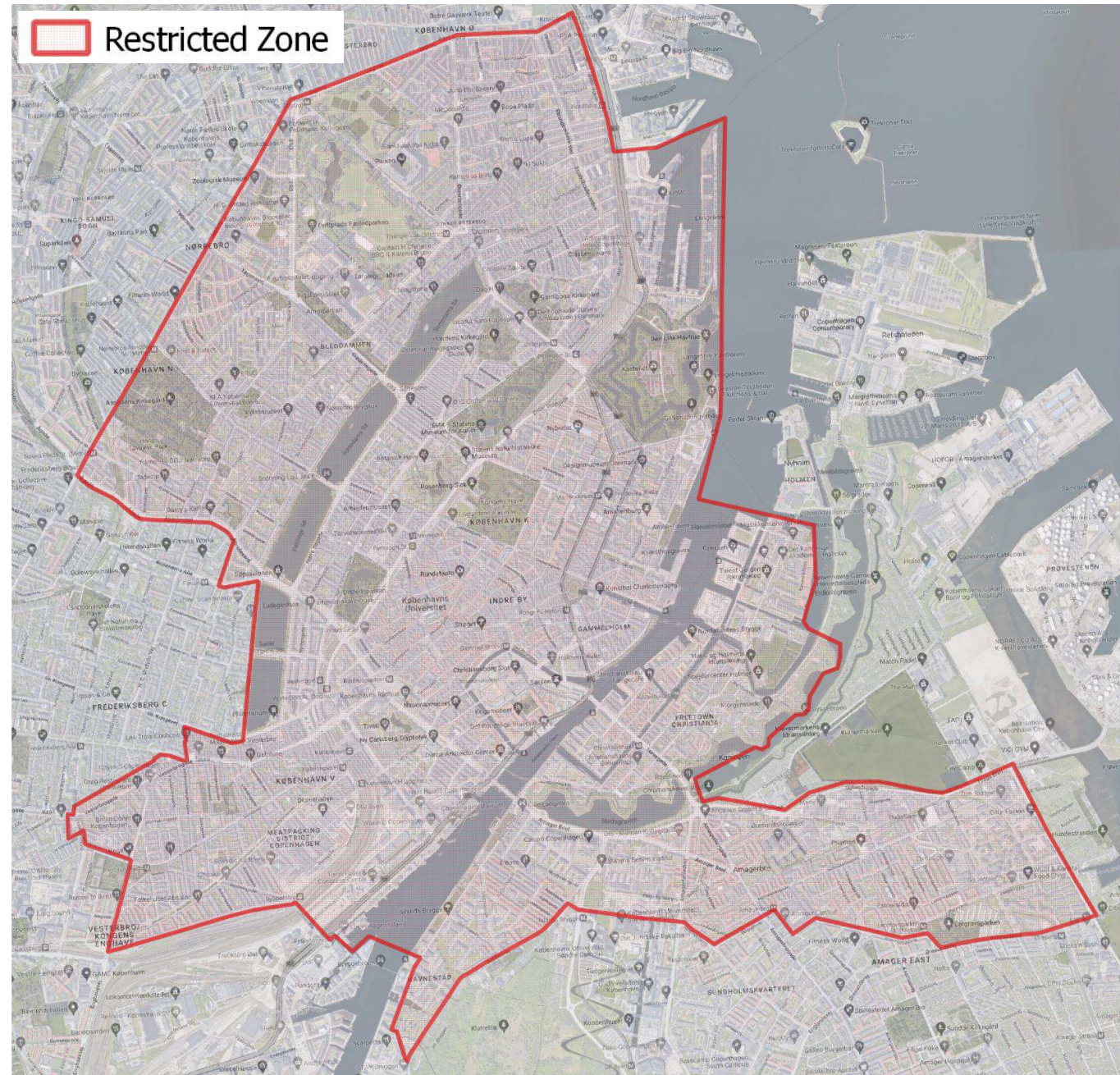
# The restricted zone covers a large part of central Copenhagen

The restricted zone represents parts of Vesterbro, Østerbro, Amager, Christianshavn and in the entire "Indre By" – the inner city of Copenhagen.

Source: Map made by Rambøll based on [restricted zone as presented by the City of Copenhagen](#)

Rambøll

Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Rambøll in 2022.



# The City of Copenhagen has contracted four e-scooter providers to service the city

## Four e-scooter providers allowed

The administration has decided on a maximum of 3,200 e-scooters which may be set up in the municipality outside the restricted zone.

They have made an agreement with 4 providers for the installation of 800 e-scooters each. The four providers are Bolt, Lime, TIER and Voi. The agreements are valid for three years and a new round opens in 2024.

## Enforcement and fines

To ensure that the new rules are complied with, the politicians have decided that two (2 working daytime and 2 evening/nighttime) of the municipality's parking guards are dedicated to carry out regular checks of parked e-scooters. If they encounter e-scooters that are set up outside the parking areas and which are not under rental, the e-scooters are registered and will later be removed if they have not been moved by a user or the operators in the meantime. If removed, the provider in question can pick up the e-scooter but must pay DKK 338 per. unit in compensation.

Sources: the City of Copenhagen

Rates: <https://www.kk.dk/dagsordener-og-referater/Borgerrepr%C3%A6sentationen/m%C3%B8de-20052021/referat/punkt-16>

Guidelines: <https://www.kk.dk/dagsordener-og-referater/Borgerrepr%C3%A6sentationen/m%C3%B8de-20062019/referat/punkt-21>

Action options: <https://www.kk.dk/dagsordener-og-referater/Borgerrepr%C3%A6sentationen/m%C3%B8de-08102020/referat/punkt-12>

## Evaluation and test period

The City of Copenhagen's parking areas is being evaluated after the run-in period, which ran until June 2022. During which the administration was able to gain experience regarding the data collaboration with the providers, the size of the tariffs and the virtually delimited parking areas for e-scooters. The Technical and Environmental Committee are to be informed about the evaluation in the autumn of 2022.

# Methodology



# This report has been developed through interviews, data analysis and by reviewing previous studies

Interviews were conducted with both the City of Copenhagen and the e-scooter operators active in the Copenhagen, Oslo and Stockholm markets.

Aggregated data from e-scooter operators active in Copenhagen was analyzed

Previous studies were consulted to contextualize data and findings in interviews

## **The City of Copenhagen has been asked the following questions during the interview**

How does the City of Copenhagen handle agreements with the e-scooter providers?  
What are the existing restrictions?  
What are the concerns?  
What are the possibilities for removing parking restrictions in especially Indre By?  
What is the ideal scenario for the City of Copenhagen?

More info on the data analysis on page 10.

## **The different e-scooter providers in Copenhagen, Oslo and Stockholm have been asked the following questions**

Are there parking restrictions deployed in x city? If yes, since when?  
What were the city's main concerns / Why did the city implement parking restrictions for e-scooters?  
How did your company address parking restrictions?  
What alternative solution to parking restrictions does your company see?  
Other questions:  
Does a helmet regulation exist in the city?  
How do you address possible conflicts between e-scooters and bikes on bike lanes?

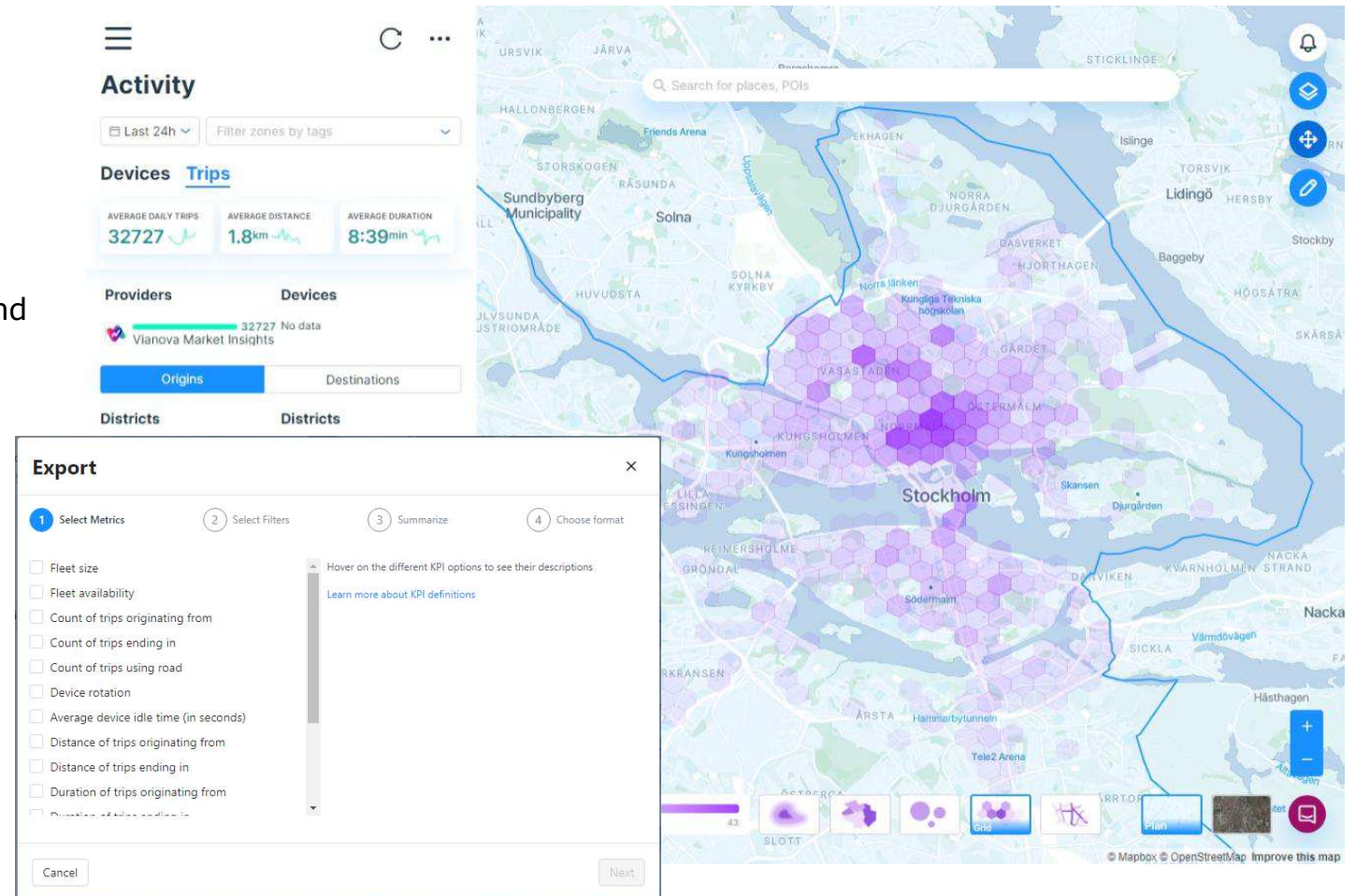
# The analysis is based on operational data provided by the e-scooter providers on the Cityscope platform from Vianova

The analysis is based on Cityscope\* data and includes:

- Prior vs post parking restriction analysis
- Trip length distribution
- Hot spots (prior to the restricted zone) analysis
- Operational data comparison between Stockholm, Oslo and Copenhagen

## \*Cityscope

is a database and digital platform developed by Vianova to bridge the gap between cities and mobility operators. The aim being to foster collaboration, and facilitate modal shift toward more sustainable and accessible modes of transport.



Cityscope database interface and data export function (<https://cityscope.vianova.io/>)



# Data Collection and Analysis



# Interview with the City of Copenhagen



# Insights into parking restrictions for e-scooters based on the interview with the City of Copenhagen

The interview was conducted with Andreas Skjoldborg Lorentzen, Legal Consultant from the City of Copenhagen in June 2022.

- Overall, it seems that the new system works, and that the e-scooters are largely parked correctly within the designated parking zones.
- No e-scooters have been removed by the city so far. While the parking guards have registered e-scooters parked outside the zones, they have been picked up either by new users, or the operators within the next couple of days.
- Politicians are currently more worried about the many rental bikes which are causing problems.
- The providers are welcome to make arrangements for parking zones on privately owned land in the restricted zone.
- The removal of car parking spots in the public space might meet resistance, but if well documented and argued for, it could potentially be accepted by politicians in the future.

- A reopening of the restricted zone is not unthinkable, as there is a focus on getting cars out of the city center.
- If the providers can demonstrate that e-scooters are not moving users from walking and cycling, but rather from using a car, e-scooters would probably be more welcomed.
- It is not enough that the operators can demonstrate whether the e-scooters are being used. They need to document who uses them, what purpose they serve and what positive effect they bring the city.

*"The operators need to be able to tell us who uses the e-scooters, what they are used for, and instead of what alternative transport mode they are used."*

(Andreas Skjoldborg Lorentzen)

# Key take-aways from the interview with the City of Copenhagen

If the operators want the reopening of the restricted zone, they need to:

- In general, have a clear explanation of *why* e-scooters are relevant in Copenhagen. How they contribute positively to multimodal transport modes in the city and what needs they fulfil.
- Provide data which shows:
  - that they are able to handle the current restrictions without error (parking in designated zones, removal of unused and default e-scooters, etc.).
  - by who, for how long, when and why the e-scooters are used, and especially which transport mode the users swap from.
- Come with concrete suggestions of where they would like parking zones in the restricted zone and how this would be feasible.
- Clearly showing why these spots are essential and who would be using them.
- Appeal to the City of Copenhagen.

*"The ideal scenario for the City of Copenhagen would be if e- scooters were used by locals who would else have used a car."*

Andreas Skjoldborg Lorentzen, Legal Consultant,  
City of Copenhagen, June 2022





## Interviews with e-scooter operators

# Insights on e-scooters in Oslo and Stockholm based on interviews with the operators active in those geographies

## In Oslo

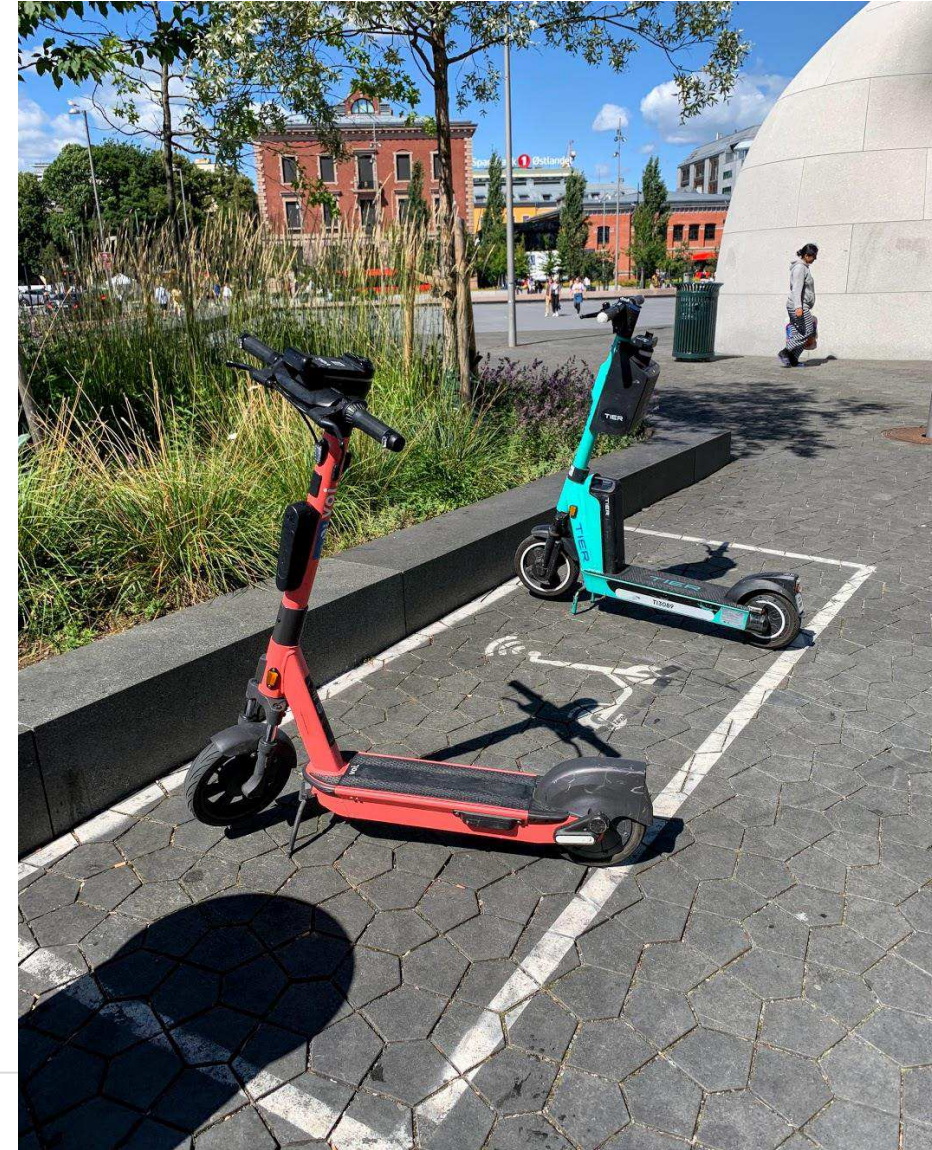
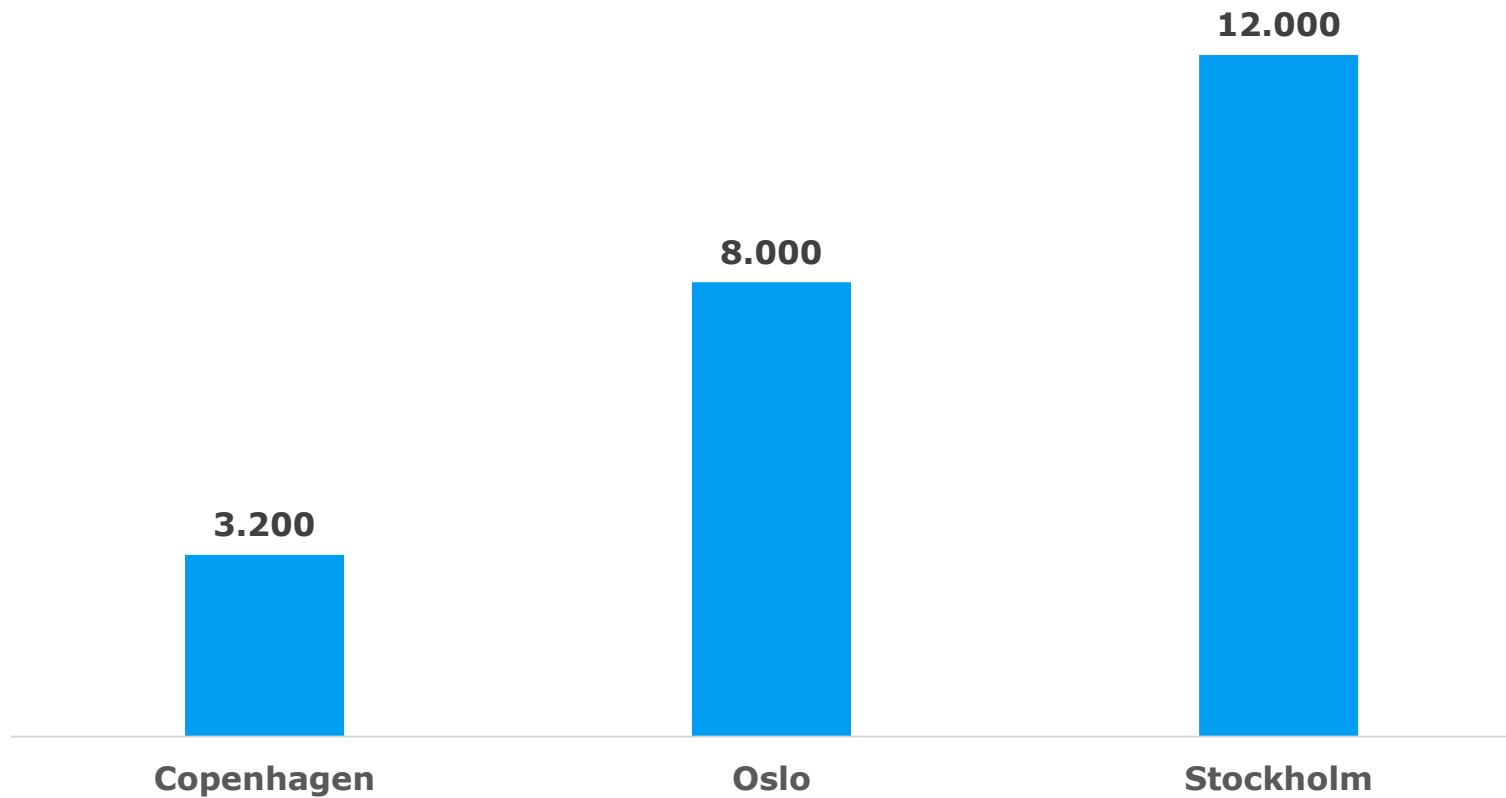
- The politicians in Oslo have made very clear tenders and contracts which show how the commitments will be enforced. This creates stability for the operators.
- Restrictions exist on number of e-scooters allowed in the city center (to avoid clutter and parking problems) while more are allowed in the rest of the city.
- The decreased number of operators and e-scooters has resulted in fewer complaints, and the e-scooters contribute to a better mix of modes of transport in the city.
- Oslo has 8,000 e-scooters divided among three operators.

## In Stockholm

- Stockholm has implemented parking restrictions in some areas of the city center.
- E-scooters are used approx. 5-10 times a day in Stockholm. Being rarely idle could suggest that they are used regularly.
- Stockholm has 12,000 e-scooters divided among seven providers.
- In Sweden e-scooters are classified as bicycles (unlike in Denmark).
- Regulation states that e-scooters/bikes can be placed anywhere where they are not obstructing for a maximum of 24 hours at a time. These regulations are not strongly reinforced.
- A proposal was made stating that by August 1<sup>st</sup>, 2022, e-scooters will only be allowed in dedicated parking spaces.
- By September 1, 2022, e-scooters will no longer be allowed to ride on pavements in Sweden.



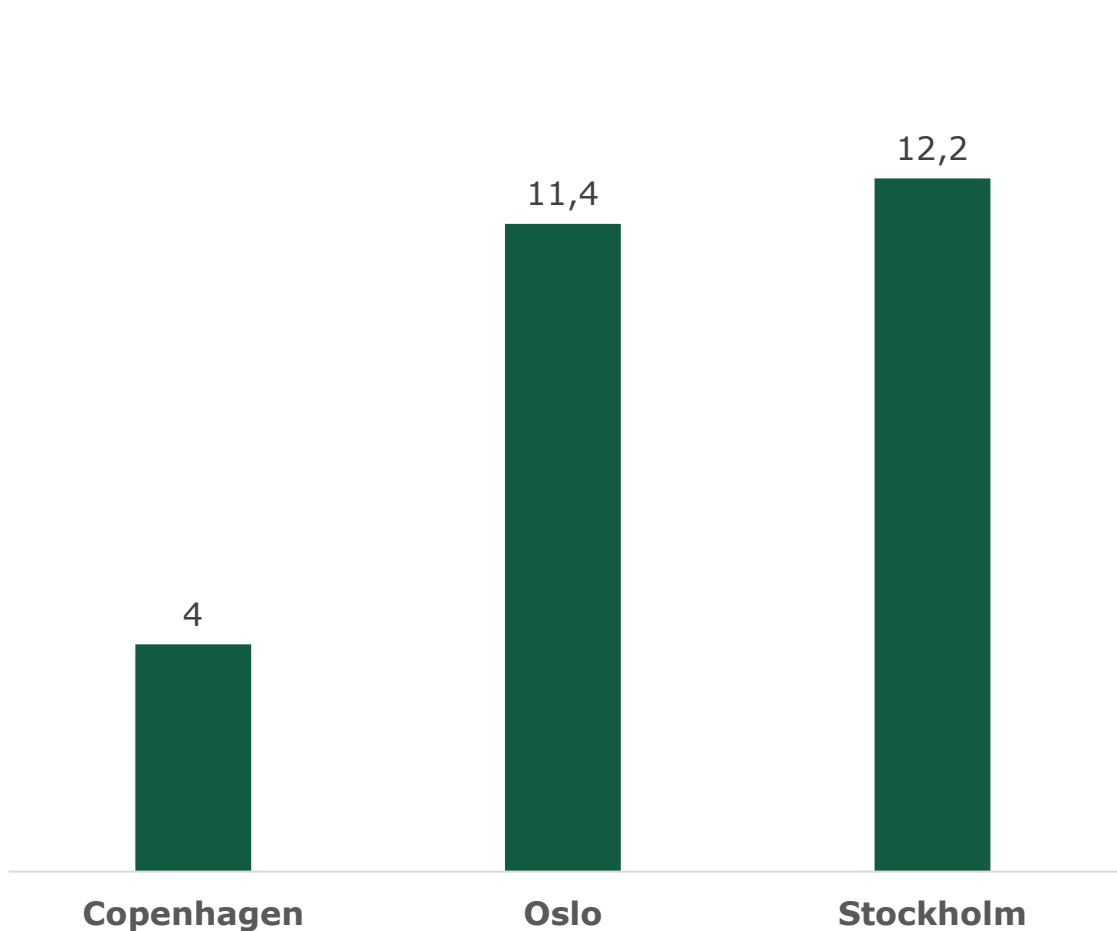
The contractual cap on number of e-scooters in the three Scandinavian capitals vary considerably in spite of the many similarities of these cities





# The contractual cap on the number of e-scooters per 1000 inhabitants in the three Scandinavian capitals varies considerably in spite of the many similarities of these cities

The low number of device per 1,000 inhabitants in Copenhagen means that the current level of service from e-scooter is much lower in Copenhagen than in the other Scandinavian capitals.



# Extracts from interviews with operators active in Copenhagen

## Common view from operators

- The interviewed operator representatives agree that *"we were all new to this"* and the free-floating solutions in 2019 were too loose. Regulation is welcome but needs to accommodate new micromobility solutions.
- Dedicated parking zones in close proximity to each other (preferably 75 m range and maximum 100 m) are desirable in the restricted zone.
- Having similar rules in all Nordic markets would be the preferred option – standardized regulations and common commitments like in Oslo are desirable.

## Different approaches

- Some operators prefer charging docks, others prefer parking racks or parking spaces marked with paint.

*"We would like a pilot scheme, where we are allowed to operate in the restricted zone for a period of for instance eight months, so we can showcase that we are capable of making a great service - catering to the needs of a lot of Copenhageners."*

One of the operators



# Key take-aways from interviews with operators active in Copenhagen

## Dedicated parking zones

Painted area with signs can be adapted. Alternatively, it can be done by having dedicated charging docks or parking racks. A cap on the number of e-scooters allowed in a single parking area should also be applied.

## Use of e-scooters at public transport nodes

Studies from abroad\*, and Denmark\*\* show that commuters use e-scooters for first and last mile – thus a need to open zones to transit nodes.

## Increased fleet cap

Operators wish to have more than the 3,200 allowed e-scooters in the city. (Stockholm has a cap at 12,000).

## Range of 75-100 m between parking zones in the restricted zone

Operators wish for more parking zones: now approx. 300 spots in Copenhagen compared to 6,000 in Stockholm

*"From an operational perspective it's easier to change batteries, and repair. From the city's perspective it's easier to handle. And from the user point of view: if you can park it within 75 m you can jump on wherever you want to."*

(One of the operators)

## Make a roundtable amongst politicians and operators to discuss:

- what are the actual concerns (disregarding solutions/ experiences from the past)?
- how can the providers address these issues and what are the sanctions if the rules are not followed?

Suggestion to have a non-biased party to look at the data and make a model which could work for both the operators and the city/politicians.

### Sources:

\*Fearnley et al. (2020) "Delte elsparkesykler i Oslo. En tidlig kartlegging" (<https://www.toi.no/getfile.php?mmfileid=52254>)

\*C. Antoniou (2021) White paper – Micro-mobility and Public Transport Synergies

\*\*DSB pilot project, Kørmitt (<https://www.dsbdigitalabs.dk/cases/kormitt>)



Other relevant input from interviews



# Operators are making efforts to communicate with the users to increase safety and are capable of implementing adjusted parking policies into their operations

## Behavioural solutions

- Organizing campaigns regarding good parking practices.
- Making online traffic schools to teach how to ride safely.
- Arranging helmet campaigns and giving out free helmets.

## Technical solutions

- Making it only possible to park within designated zones.
- Having riders to take picture of parked e-scooter at the end of a ride to ensure good parking.
- Using technologies which prevent two people riding on one e-scooter.
- Implementation of helmet recognition technologies.
- Installing devices to increase safety (e.g., brake lights) on new generations of e-scooters.



Sources:

Voi, Let's get it right campaign ( <https://www.voiscooters.com/lets-get-it-right/>)  
Spin "Addressing improper parking <https://www.spin.app/blog-posts/spin-valet-addressing-improper-parking-and-improving-accessibility-in-cities>  
Bolt "Safety guide" ( <https://blog.bolt.eu/en/electric-scooter-safety-guide/>)  
Lime "Helmet Academy" ( <https://www.li.me/en-dk/why/safety>)



# Operators have taken actions to support the new helmet regulations in Denmark and also have the capabilities to implement a new parking policy

- Since January 1st, 2022, it is mandatory to wear a helmet when riding motorized (e-)scooters and other small motorized vehicles in Denmark\*.
- While it is the responsibility of the user, communication by the operators is paramount.

Different approaches exist by the operators:

- Helmet campaigns – giving out free helmets
  - Helmets available on the e-scooters
  - Technical feasibility of having face recognition (to ensure helmet is worn before e-scooter use is activated)
- Helmet regulations are a logistical challenge both for e-scooter users and the operators, but different approaches exist and are used by the operators to accommodate for it.
- The helmet regulations have contributed negatively to ridership of e-scooters in Copenhagen.

Source:

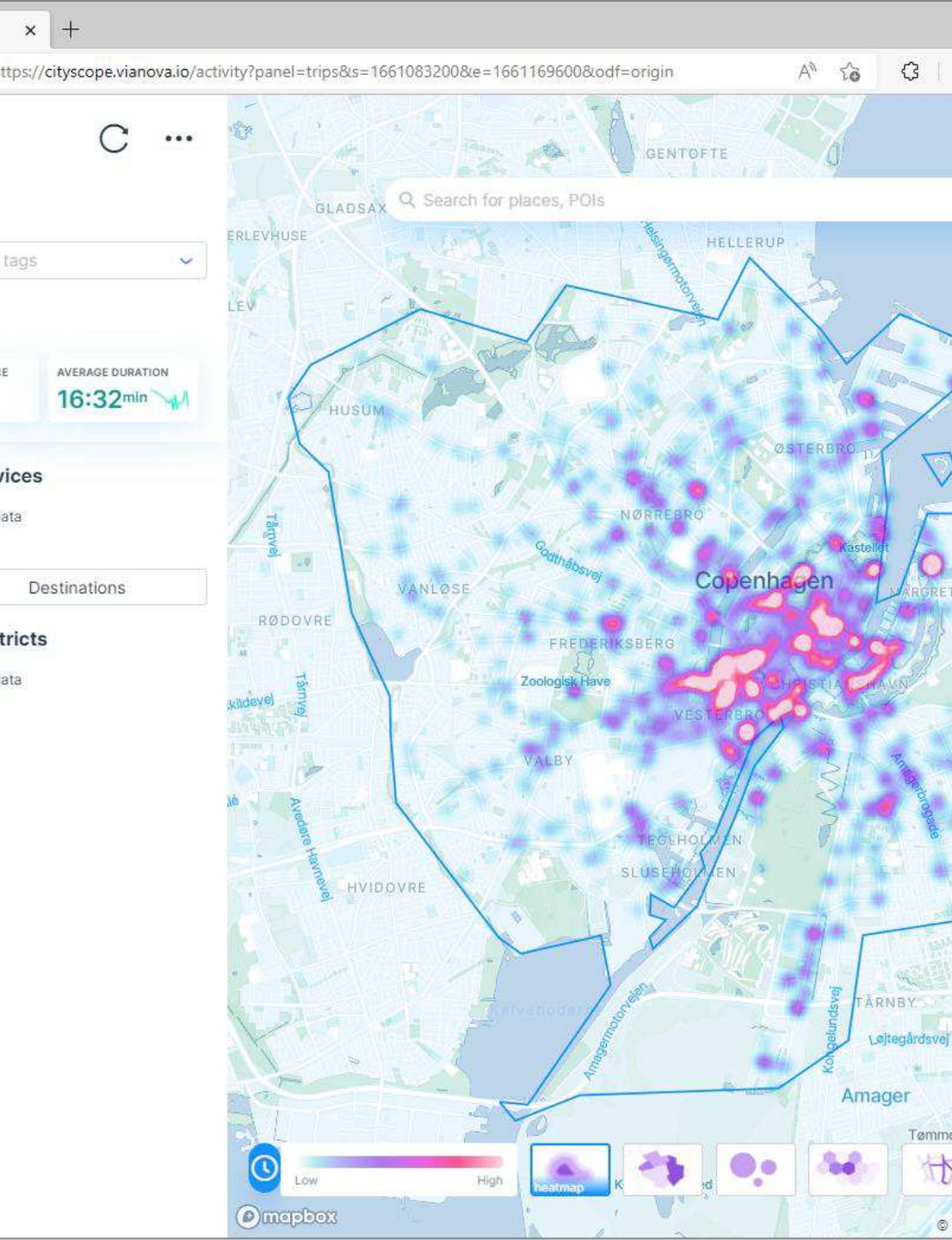
\*Danish Ministry of Transport (<https://www.trm.dk/nyheder/2020/husk-hjelmen-naar-du-koerer-paa-motoriseret-loebehjul>)

Ramboll

Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Ramboll in 2022.



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# Analysis on Vianova's Cityscope Data



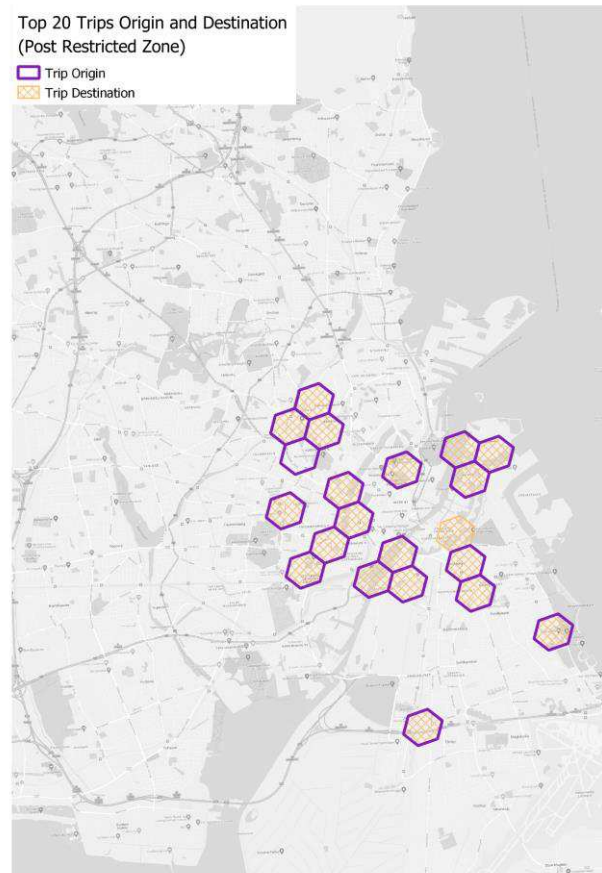
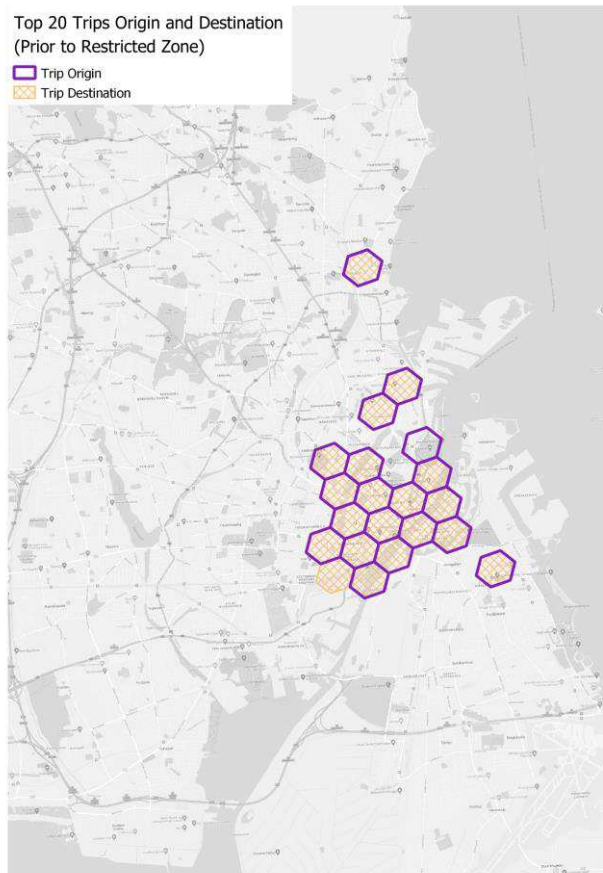
# Disclaimer

- To preserve confidentiality of commercially sensitive information, the data provided by the operators was aggregated and anonymised by a third party prior to doing the analysis.
- As the Ramboll team worked with aggregated data, it is difficult to conclusively comment on the quality of the raw data provided by the operators. The risk for inconsistencies in data may thus exist and affect the analysis.
- As the operation data received is in an aggregated format, some details and flexibilities are lost. This has limited the type and level of detail of the data analysis.





# Top 20 Trip Origin and Destination changed materially after the parking restriction was put in place



- The maps show where the top 20 origins and destinations of trips are in Copenhagen. Top 20 areas cover more than 50% of the total daily trips.
- Prior to the parking restriction, most of the trips in Copenhagen were originating and ending within the current restricted zone.
- Post to the introduction of the parking restriction, trips' origin and destination were more scattered across the city. This includes the areas where e-scooters were not significantly utilised in 2020.
- The two maps show, that the travel pattern of e-scooters has changed due to the parking restrictions. It also shows that parking restriction excludes the majority of e-scooter demand.

# The Copenhagen e-scooter scene changed substantially when the parking restrictions were introduced

	Copenhagen (2020)	Copenhagen (2022)
Daily ridership	*	1,381**
Number of Devices	*	1,573**
Device Rotation	1.79**	0.87**
Average trip length (km)	1.9**	2.77**
Average trip duration (minutes)	11:03**	21:42**

\* Statistics come from partial dataset instead of full dataset, and for anonymity purposes, the numbers are not shown

\*\* Numbers are calculated based on partial dataset

## Observations

- Introduction of the restricted zone in Copenhagen has reduced the utilisation of e-scooters. Analysis of 2020 data shows that most of the 20 most frequent start and end points for e-scooter trips are within the restricted zone (see page 27). Furthermore, the analysis also revealed that between 61 and 63% of all 2020 trips originated and ended within the restricted zone.
- Device rotation is a measure of how many times a device is used in a day. The lower rate of device rotation compared to 2020 shows that the restricted zone hinders the use of e-scooter as a mobility option.
- Longer trip length and duration can be a result of:
  - Change in trip behaviour due to limitations on start and end points
  - Less spontaneous trips

# Copenhagen has a far lower e-scooter activity level than Stockholm and Oslo

	Copenhagen (2022)	Stockholm (2022)	Oslo (2022)
Daily ridership	1,381**	38,081	37,520
Number of Devices	1,573**	9,661	7,283
Device Rotation	0.87**	3.94	5.15
Average trip length (km)	2.8**	1.9	1.7
Average trip duration (minutes)	21:42**	10:33	7:48

\*\* Numbers are calculated based on partial dataset

## Observations

- Copenhagen has lower usage of e-scooters than the other Scandinavian capitals with daily ridership at around 3,6 % of the level observed in Stockholm and Oslo.
- Device rotation is much lower in Copenhagen than in
- The high device rotation in Stockholm and Oslo - despite the high number of devices - shows that e-scooters are used regularly in the other Scandinavian capitals and seem to have become part of the urban mobility solutions in those cities.
- Trip length distribution and trip duration in Copenhagen are higher than in the other Scandinavian capitals after the introduction of the restricted zone. This suggests a behavioural change of how e-scooters are used after the introduction of the restricted zone.

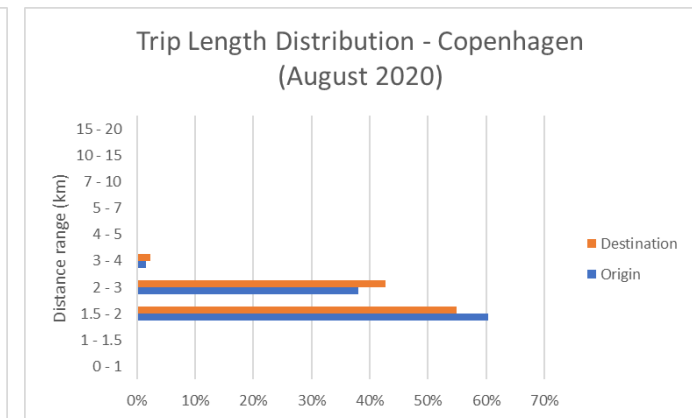
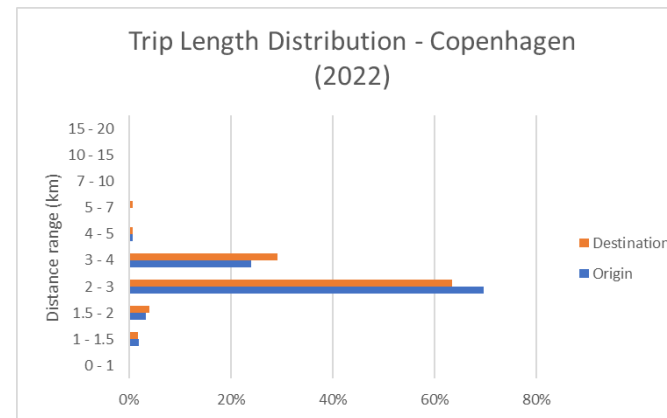
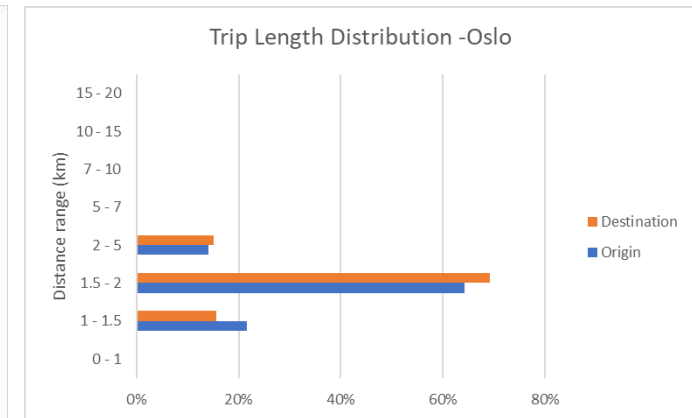
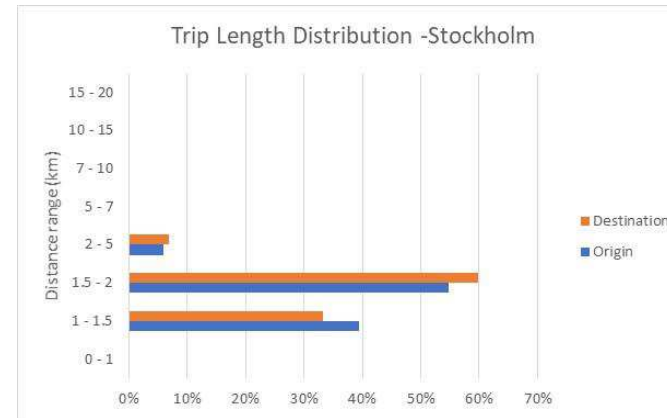


# Copenhagen e-scooter rides had a similar length to Oslo and Stockholm, but that changed with the introduction of parking restrictions

- In Stockholm, 55-60% are travelling between 1.5-2 km
- In Oslo, 64-69% are travelling between 1.5-2 km
- In Copenhagen
  - Before the ban (August 2020): 55%-60% travelled between 1.5-2 km
  - After the ban (2022): 63-70% are travelling between 2-3 km

The trip length distribution comparison shows that Copenhagen had more similar trip behaviour to the other Scandinavian capitals prior to the introduction of the restricted zone.

While the average trip length in Copenhagen prior to the restricted zone fell in the grey zone of walking and cycling, the current trip length is more similar to cycling distance.



# The Copenhagen e-scooter scene changed substantially when the parking restrictions were introduced

To the right there is a summary of some of the key data points supporting this finding



Trip length distribution

Prior	1.5-2 km
Post	2-3 km



Prior distance is more similar to Stockholm and Oslo



Device rotation

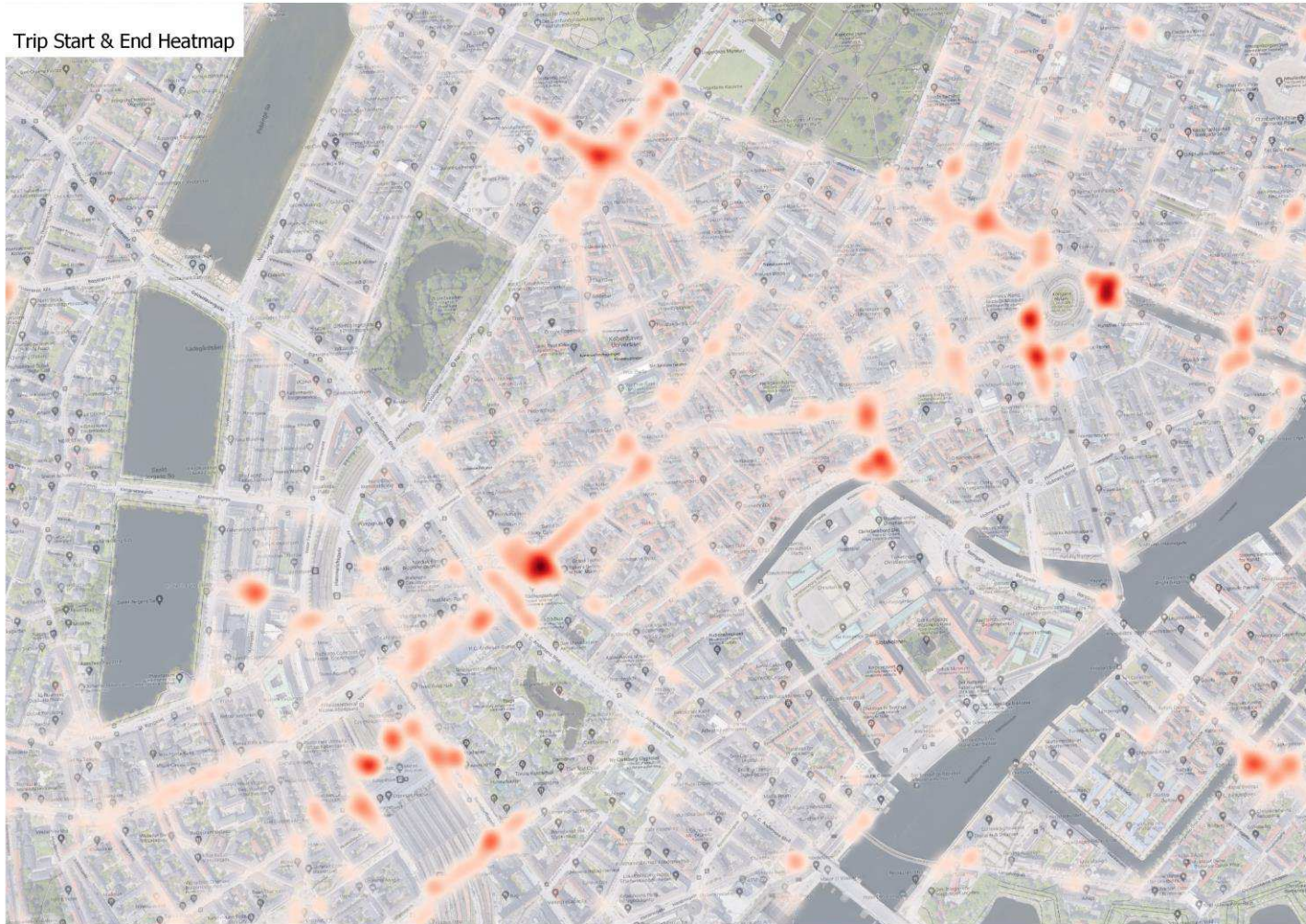
Prior	1.8
Post	0.9



Duration

Prior	11 minutes
Post	22 minutes

# The highest density of start and end points for e-scooter trips in the city center of Copenhagen are close by public transport stations with only a few exceptions



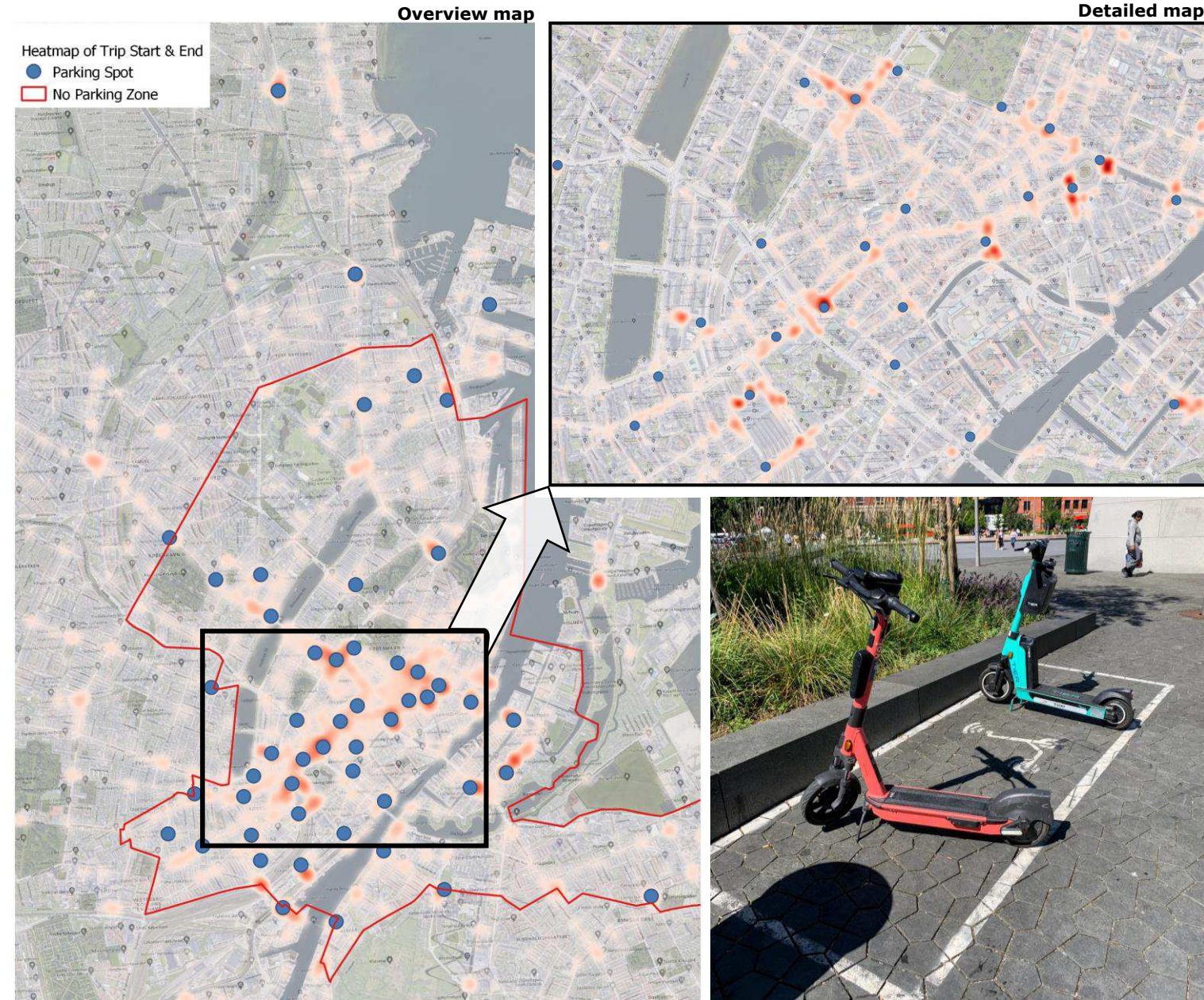
- The heatmap is based on origin and destination data in Copenhagen from the operators in August 2020 prior to parking restrictions.
- The map shows where most e-scooters in Copenhagen were rented from and to the city center.



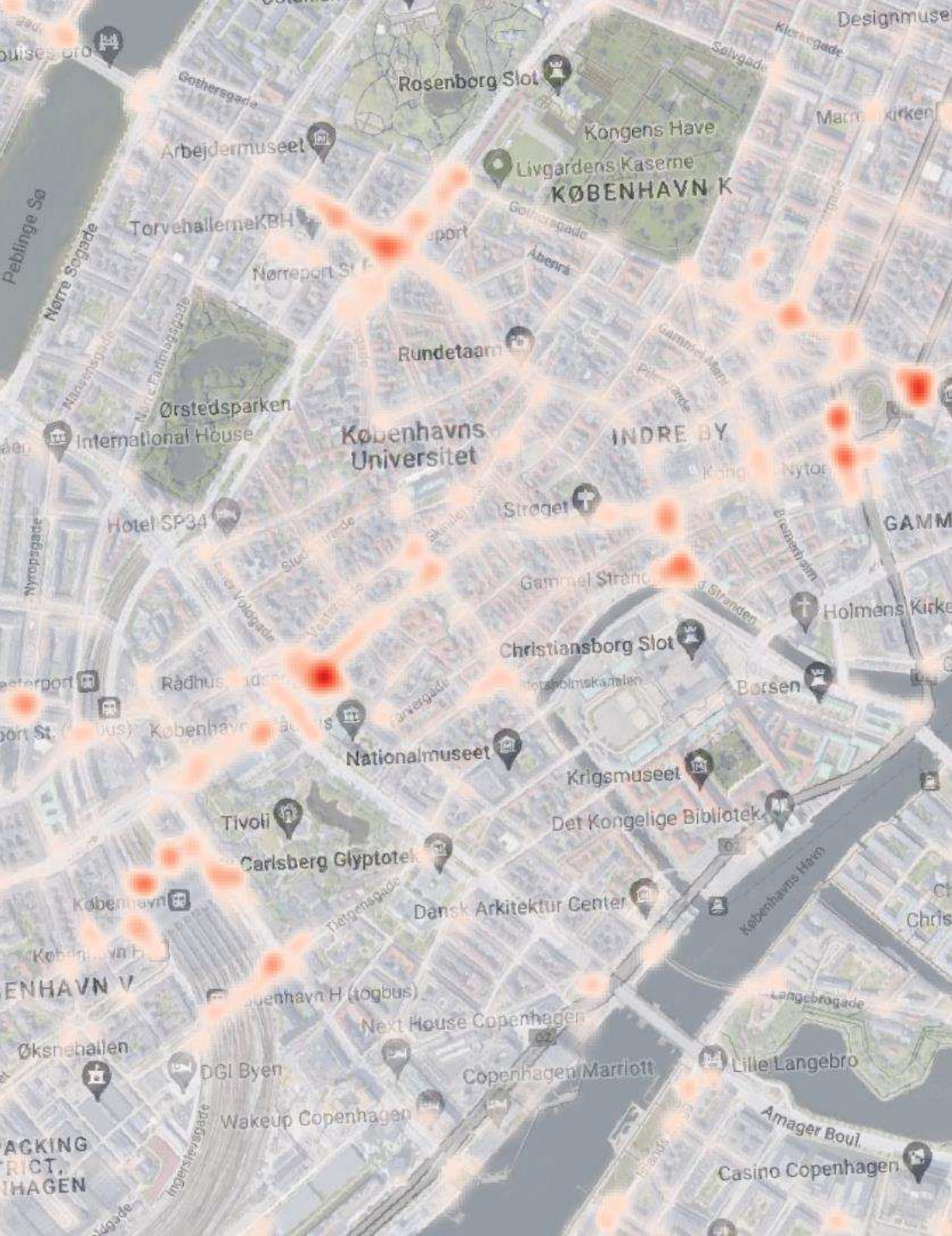
# Converting 46 car parking spots to e-scooter parking zones could serve 23% of the e-scooter traffic

Ramboll has carried out an analysis of the current car parking spots in Copenhagen and correlated these to the heatmap of trips originating and ending in the city center.

- 46 converted parking spots covers 23% of total trips (based on 2020 data and the assumption of a 100 m capture radius).
- By implementing dedicated parking spots, coverage increase can be expected due to behavioural change amongst users.
- The precise position and size of these parking spots should be refined according to local analysis and detailed public space surveying.
- The new parking zones for e-scooters should be designed to become an integral part of the urban landscape (see previous studies "Visual example of e-scooters as integral part of urban furniture", on page 40).







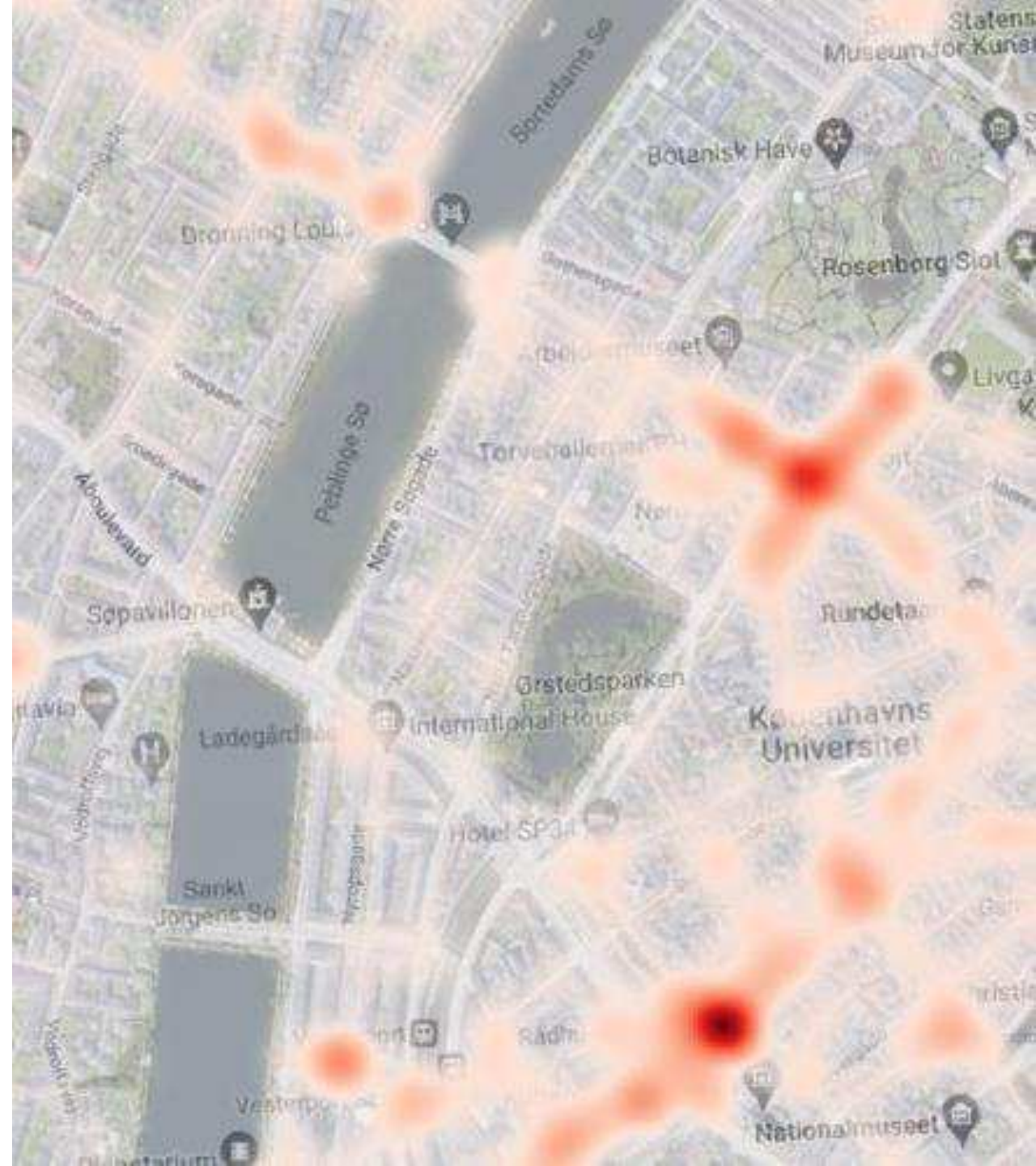
In addition to converting car parking to e-scooter parking zones there are several other areas e-scooter parking zones could be implemented



# E-scooter parking zones could help alleviate congestion in busy transport modes during rush hours

E-scooters could help alleviate congestion on major bus routes during rush hours, to leave space for those who need it most.

As an example, more e-scooter parking possibilities along the 5C bus route could be considered.





# E-scooter parking zones could help improve accessibility to public transport stations

Heatmap analysis shows high demand around S-train and metro stations, for example Nørreport, Nørrebro and Østerport stations.

As mentioned earlier, various studies show that bundling public transport with e-scooter can potentially move people from using a car to public transport.







E-scooter parking zones could help supplement public transport stops with poor connectivity such as “Havnebussen”

As an example, the harbour bus stops are often located relatively far from other public transport modes, and e-scooters could here be the connector of missing links.

# Insights from relevant previous studies



# Findings from a Demand Analysis of e-scooter operation in Copenhagen

- The study looks at mobility patterns and their relation to first and last mile, area accessibility, mode substitution, and predicting service opportunities for better urban planning and policy making.
- The study found that trips characteristics are quite diverse, with average distance of 1,575 km and duration of 12.5 minute.
- It suggests that around **17k trips would not be made if e-scooter service was not available**, indicating induced demand and the change in how citizens move in the city.
- During the 2019-2020 period, **27.8% (25.0%) of trips start (end) less than 50 m from a bus stop; for the S-train and metro stations, a distance of 200 m was considered.**
- Trips in central Copenhagen where the concentration of housing, public transportation hubs, jobs and services, and food and beverage spots is higher than in other neighbourhoods, account for 90% of all Voi trips. The remaining 10% of trips are distributed between the neighbourhoods outside of central Copenhagen.

Source:

Machine Learning for Mobility & Liveability ApS (2021) Demand Analysis of Voi's Operation in Copenhagen

Ramboll

Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Ramboll in 2022.



# Findings from Demand Analysis in Copenhagen (continued)

- The chart shows that “recurrent Danes” comprise 68% of all trips despite being only 30% of the registered users. “Occasional Danes” (20%) are the second largest segment and use the service once or twice throughout the day.

→this suggests that **e-scooters are used as part of daily mobility form by Copenhageners.**

The analysis was based on data prior to parking restriction which gives undistorted insight on the characteristic of e-scooter user.

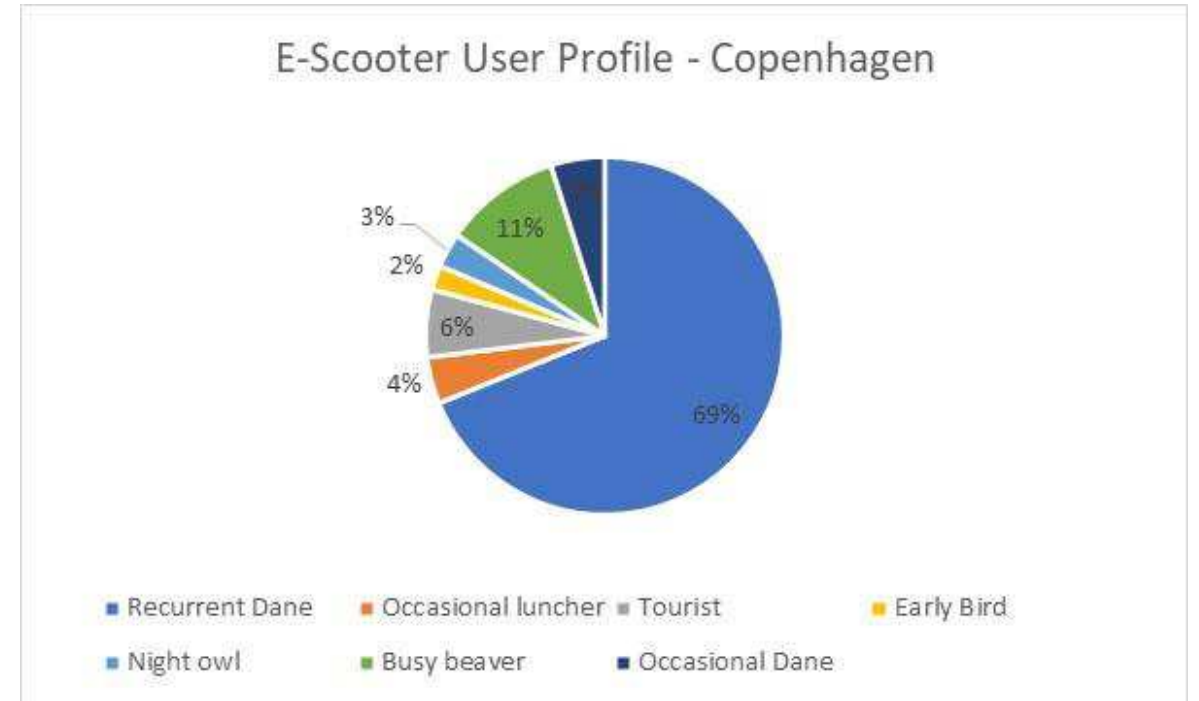


Figure made by Ramboll based on data from Voi report

Source:  
Machine Learning for Mobility & Liveability ApS (2021) Demand Analysis of Voi's  
Operation in Copenhagen

Ramboll

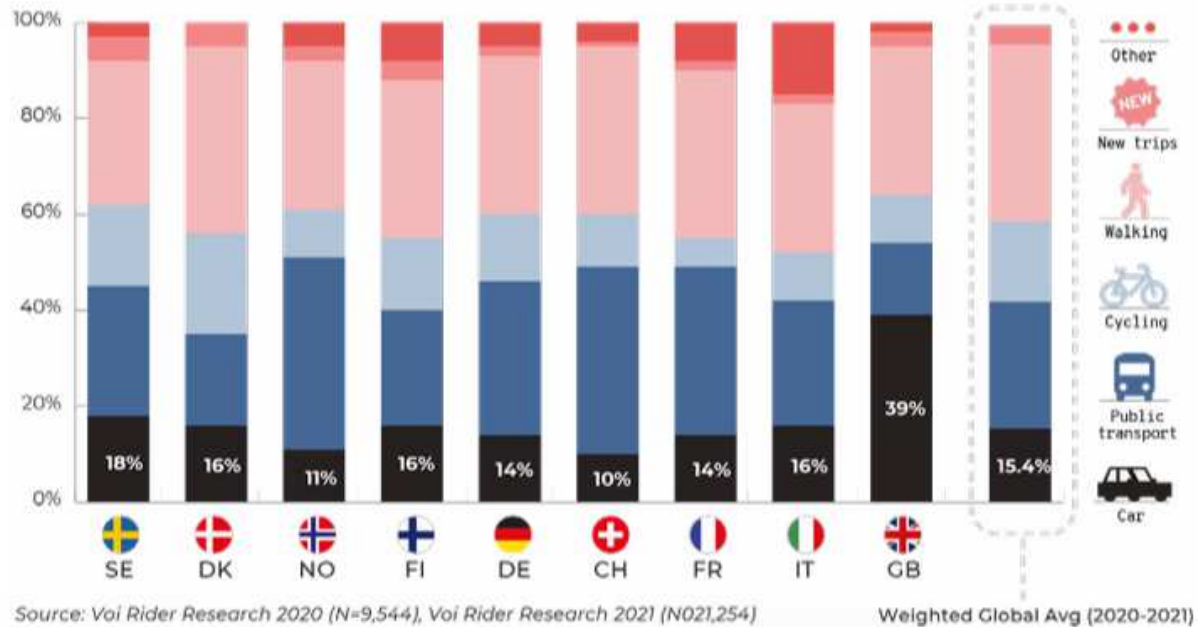
Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Ramboll in 2022.

# 16 % of e-scooter trips replace car trips in Denmark

Survey conducted across Europe and UK from previous study reveals that **16% of the e-scooter users in Denmark shifted from car** which is slightly higher than Europe average of 15.4%

## Car replacement rate

We know from surveying over 30,000 riders across Europe and the UK that, on average, 15.4% of Voi rides have replaced car trips since January 2020. When asked what mode of transportation they would have taken if they had not taken a Voi, this diagram shows what riders in different countries said:



Source: Voi Vision Statement, 2022

<https://www.voiscooters.com/wp-content/uploads/2022/06/Voi-Vision-Statement-2022.pdf>



# Nudging users can cause them to change their travel behaviour

- In a nudging experiment performed by TØI in 2022, results demonstrate that nudging users through changing information in multimodal interfaces can be an effective way of switching users away from cars, at no cost to the user.
- The study concludes that although the behavioural change was initiated by the nudge experiment, it was eased by having a multimodal interface in the used app.
- Interfaces where numerous modes of transport are integrated can play an important role for mode shifts by:
  - centralising mode specific information in one app and thus improving accessibility for the user
  - allowing nudges to influence travel behaviour.

Source:  
Johansen (2022) Reducing car use through e-scooters: A nudging experiment, TØI, (<https://www.toi.no/publications/reducing-car-use-through-e-scooters-a-nudging-experiment-article37444-29.html>)



# Visual example of e-scooters as integral part of urban furniture

**RESIDENTIAL STREETS**  
**Copenhagen**

The Social Democrat mayor, Sophie Hæstrop Andrsen won the 2021 Copenhagen election on the back of a promise to remove one third of all parking places in the city and give back space to its residents. The reality is, however, that this 'cycling city' still suffers from too many cars than the parking infrastructure can cater for. This results in cars piling up on residential streets which doesn't help the quality of life for people living there.

This proposal, on Ægirsgade, showcases what Copenhagen's residential streets could look like if they were made for living instead of cars. One third of parking is removed, the street is made one directional with freed up road space replaced by integrated street play spaces, micromobility parking and new outdoor dining areas.



**1 Integrated parking**  
Improperly parked electric scooters can be dangerous to other road users. Studies show that parking solutions such as racks and painted parking bays can significantly improve parking behaviour, especially when located in convenient locations. Such as right outside residents' doors and integrated in with other street furniture.

**2 Street play spaces**  
The prevalence of childhood obesity is increasing markedly with time spent outside inversely related to obesity. Providing play facilities on the street increases children's physical activity levels, social interactions and general wellbeing. They also create more *cohesive communities* amongst neighbouring families.

**3 Outdoor shop display**  
Our residential streets should support both the residents and local businesses that call them home. With excess space reclaimed from cars, there is also room for ground floor shops to expand onto the street through outdoor displays. This both provides more opportunities for businesses to sell their wares, but also activates the street through increasing activity.

**4 Cargo bike access**  
Cargo bikes are becoming increasingly attractive for families living in urban environments. Their relative affordability compared with other types of electric vehicles, means that people can still take children to schools, do shopping or even undertake heavy tasks such as transporting furniture, makes them a perfect complement to car-free living.

**5 Shared car space**  
Shared car services are becoming a viable alternative to private car ownership while also providing several city benefits. Studies have shown that a single shared car can *replace up to nine* privately owned cars, thereby reducing parking demand in dense urban cores and freeing up space for people. Shared car users also tend to make fewer journeys by car.

- Designing shared spaces in a smart way can potentially include e-scooter parking without taking space from other public activities.
- Previous study by one of NMA members gives example of how e-scooter parking can be designed as part of the urban furniture.

Source: Voi Vision Statement, 2022  
<https://www.voiscoters.com/wp-content/uploads/2022/06/Voi-Vision-Statement-2022.pdf>





# Factors affecting e-scooter mode substitution

In a study by Fearnley (2022) the following observations were made:

- The longer an e-scooter trip was, the more likely it was to replace motorized modes of transport.
- If users had access to three or more public transport departures per hour where they live, e-scooters were more likely to replace public transport trips.
- Users substituted e-scooters for public transport when e-scooter were the quickest, most reliable, cheapest, and most flexible alternative.
- In Oslo, e-scooter trips mostly replaced public transport and to a lesser degree car use and walking, which is likely due to longer trip distances and city car restrictions.

Source:

Fearnley, Nils. 2022. "Factors Affecting E-Scooter Mode Substitution." *Findings*, June. <https://doi.org/10.32866/001c.36514>.



# Potential of e-scooter use for getting to and from public transport

## In Germany\*

In a pilot project executed in Stuttgart in 2020, insights were obtained into the potential synergies of micromobility and public transport.

- the number of S-Bahn Stuttgart users that planned a route with an e-scooter in the Mobility Stuttgart app by S-Bahn Stuttgart increased threefold.
- 35% increase in number of S-Bahn Stuttgart tickets purchased by e-scooter users terminating at the Bad Cannstatt station
- number of last-mile e-scooter trips was increased by more than 250% in the Bad Cannstatt station, after parking racks were installed

*"It is crucial that researchers, operators and policy makers collaborate in understanding the potential impact of shared e-scooters and MaaS platforms in shaping urban mobility."*

(Prof. C. Antoniou)

Sources:

\*C. Antoniou (2021) White paper – Micro-mobility and Public Transport Synergies

\*\*Fearnley, Nils, Espen Johnsson, and Siri Hegna Berge. 2020. "Patterns of E-Scooter Use in Combination with Public Transport." <https://doi.org/10.32866/001c.13707>.

\*\*\* DSB pilot project, Kørmitt (<https://www.dsbdigitallabs.dk/cases/kormitt>)

## In Norway\*\*

Based on a study in Oslo, it was found that shared e-scooters may complement public transport by offering a solution to the first/last mile problem by easing and increasing the radius of trips. The study argues that e-scooters can play a role in complementing and supporting public transport and even more so, if the two modes are integrated further.

## In Denmark\*\*\*

In a DSB pilot project, Kørmitt, 25% of the commuters who have a combined e-scooter and public transport pass (about 150 people) said that they are now using the e-scooter instead of a car for first and last-mile.

# Several studies find positive effects of e-scooters



Cities want to reduce the negative effects of congestion. At the same time, there is a strong desire to make it easier to get from one place to another as conveniently as possible. Micromobility can make it easier for people to move around town on short trips, ideally reducing vehicle congestion and parking demand.\*

The balanced use of public space in the city is a major concern raised by many of the municipalities. Fewer cars driving in the city center also means reduced parking demand, specifically, reduced demand for street and curb space. Rather than crowding already stressed sidewalk areas with bicycle and e-scooter parking, reclaimed curb side space anticipated due to reduced car parking demand should continue to be used for vehicle-to-walking transitional activities, such as parking of micromobility vehicles. When done in an organized manner this can also support other goals.\*

A pilot initiative in Stuttgart showed that synergies between shared e-scooters and public transport led to a 35 % increase in public transport ridership. The initiative also found that physical parking infrastructure at the train station can reduce clutter with e-scooters.\*\*



# ACHIEVING SUSTAINABLE MICRO-MOBILITY

GREEN PAPER APRIL 2020

The following key Performance Indicators for measuring e-scooter performance can be used to monitor the success of a revised parking policy



# Proposed KPIs to use by the City of Copenhagen when evaluating the parking restrictions

Based on Ramboll Green Paper (2020) "Achieving Sustainable Micro-Mobility"

## Management:

- Which model is used to manage micromobility (voluntary cooperation, pilot program, permitting/licensing scheme)?
- Effectiveness of the mechanisms used to manage micromobility
- Number of city staff assigned to the micromobility program per ride

## Connectivity:

- Share of micromobility trips that would otherwise be a car trip
- Share of micromobility trips greater than 1 km that would otherwise be a walking trip
- Share of micromobility trips combined with public transport
- Share of users who say that micromobility "makes it easier to get around town"

## Climate:

- Share of micromobility trips that would otherwise be a fossil fuel car trip
- Share of micromobility trips less than 1 km that would otherwise be a walking trip
- Lifecycle carbon footprint of micromobility vehicle
- Share of users who say micromobility "facilitated access to public transport" versus "replaced a public transport trip".
- Trip purpose of "new" micromobility trips

## Costs:

- Elements that are considered in the overall program costs to the city
- Cost of the program to the city per ride
- Cost per ride for operators
- Pricing structure

# Proposed KPIs to use by Copenhagen when evaluating the parking restrictions (continued)

Based on Ramboll Green Paper (2020) "Achieving Sustainable Micro-Mobility"

## Acceptance:

- Value of the system to the community
- Importance of specific infrastructure elements or policies to improve acceptance
- Clarifications between users and non-users

## Safety:

- What safety training is advertised/offered?
- Reported injuries per total rides per year
- Micromobility crashes as a percent of all motor-vehicle crashes
- Riding profiles/safety elements that led to crashes/injuries

## Compliance:

- Degree of rider compliance with local regulation
- Citations issued to users for non-compliance/total rides
- Types of compliance concerns noted by the public
- Initiatives to improve compliance
- Policies and fines used to improve compliance

## Data access:

- Existing data sharing agreement with operators
- Data sharing platforms used
- Types of data collected

Source:  
Ramboll's Green Paper 2020 – "Achieving Sustainable Micro-Mobility"

Ramboll

Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Ramboll in 2022.

# Proposed KPIs to use by Copenhagen when evaluating the parking restrictions (continued)

Based on Ramboll Green Paper (2020) "Achieving Sustainable Micro-Mobility"

## Equity:

- Trip starts/ends in lower income census tracts
- Ridership by age, gender, race, ethnicity, disability, and income status from surveys
- Pricing and payment options provided by operators
- Incentives or penalties applied for noncompliance

## Innovation:

- Number of tests and pilot projects
- Involvement of local community
- City's policy on supporting innovation in transportation
- Public survey: "Does micromobility contribute to innovation?"

## Economic development:

- Number of trips ending along main street / total trips
- Trip volumes along commercial corridors
- User trip purpose
- Number of local business customers arriving by e-scooter/micromobility

Source:  
Ramboll's Green Paper 2020 – "Achieving Sustainable Micro-Mobility"

Ramboll

Report based on interviews, data analysis and desk research commissioned by Nordic Micromobility Association and performed by Ramboll in 2022.





# Recommended actions to be taken by e-scooter operators

# Suggestions for the operators on how to address the action items proposed by the City of Copenhagen

## **Show how e-scooters contribute positively to multimodal transport modes in the city and what needs they fulfil**

- In a DSB project, Kørmit\*, 25% of the commuters who have a combined e-scooter and public transport pass (about 150 people) said that they are now using the e-scooter instead of a car for first and last-mile.
- The number of last-mile e-scooter trips was increased by more than 250% in the Bad Cannstatt station in Stuttgart\*\*, after parking racks were installed.
- Surveys\*\*\* across Europe and UK show that in average 15.4% e-scooter rides have replaced car trips since January 2020.

## **Provide data which shows that the operators are able to handle the current restrictions without error and by who, for how long, when and why the e-scooters are used**

- 2020 data shows "Recurrent Danes" constitute 68% of all trips despite being only 30% of the registered users. "Occasional Danes" (20%) are the second largest segment and use the service once or twice throughout the day.
- Most trips occur between 2 and 3 km and are taken through-out the day.

## **Come with concrete suggestions of where the operators would like parking zones in the inner city and how this would be feasible**

- Convert single car parking spots into e-scooter parking within the restricted zone.
- Painted spots, racks or charging docks.
- Strategically placed parking spots to improve connectivity, e.g. provide missing link for public transport stops with low connectivity such as harbour bus stops.

## **Appeal to the City of Copenhagen**

- Having similar rules in all Nordic markets would be the preferred option – clear expectations and rules like in Oslo are desirable.
- A pilot scheme with dedicated parking in selected areas in the restricted zone is recommended
- Researchers, operators and policy makers must collaborate in understanding the potential impact of shared e-scooters and MaaS platforms to shape the future of urban mobility

### Sources:

\*DSB pilot project, Kørmit

\*\* C. Antoniou (2021) White paper – Micro-mobility and Public Transport Synergies

\*\*\*Voi Vision Statement, 2022

# Next Step for the e-scooter operators based on the needs of The City of Copenhagen as described in this report

Need	Action
Showcase concrete data of where, how much, and by who the e-scooters are used and instead of which other transport form.	Data sharing between operator and the City of Copenhagen, e.g. utilisation of Cityscope in Stockholm. Suggest inclusion of e-scooter in one of Movia's rejsevaneundersøgelser and to use the data provided in DTU's Transportvaneundersøgelse.
A better understanding of where and how big the designated parking zones in the inner city should be.	Detailed analysis of data of before and after parking restrictions from all providers and detailed public space survey to determine: precise number, location and size of parking spots, and number of e-scooters allowed in the restricted zone.
Common ground agreement and exchange of expectations between operators and the city.	Organize a roundtable discussion between politicians and operators with a neutral moderator to find compromise which works for all.
Finding a compromise that works for all – users, operators and the City of Copenhagen.	Set up a trial where e-scooters are allowed also in the restricted zone for x period of time, with x number of hubs to evaluate compliance against set KPIs.
Win-win solution.	Suggest standardized regulations and setting clear KPIs which ensure good continuous collaborations.



# Conclusions

# Conclusions

With the current cap on the number of e-scooters in Copenhagen, the level of service is only 1/3 compared to Stockholm and Oslo's level of service.

Copenhagen's restricted zone excludes more than 60% of potential e-scooter users.

Device rotation post to the restricted zone is lower than prior which suggests that the restricted zone hinders the inclusion of e-scooter as an attractive micromobility option.

Most users (55-60 % in Stockholm and 64-69% in Oslo) use the e-scooter for a trip of between 1.5-2 km. This suggests that e-scooters are used for trips which lay in the grey zone between walking and cycling.

Copenhagen had similar trip length pattern as the other Scandinavian capitals prior to the introduction of the restricted zone. The restricted zone has changed the trip pattern and behaviour of e-scooter users in Copenhagen.

All operators agree that mandatory parking zones in the restricted zone is needed.

Converting 46 car parking spots scattered around Copenhagen into e-scooter parking can potentially serve at least 23% of e-scooter trips (approx. 1,200 /day) and potentially make the car less interesting as a mobility option in the restricted zone.

Strategically placed e-scooter stops in public spaces such as public transport stations/stops can increase mobility and connectivity.

Having dedicated parking zones (either painted and/or with docks and racks) is desirable within a reasonable distance from each other, to alleviate cluttering and parking issues in the restricted zone.

Helmet regulations are a logistical challenge both for e-scooter users and the operators, but different approaches exist and are used by the operators to accommodate for it.

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