

Charging free floating shared cars in metropolitan areas

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Electric Vehicle Symposium (EVS30)

Stuttgart

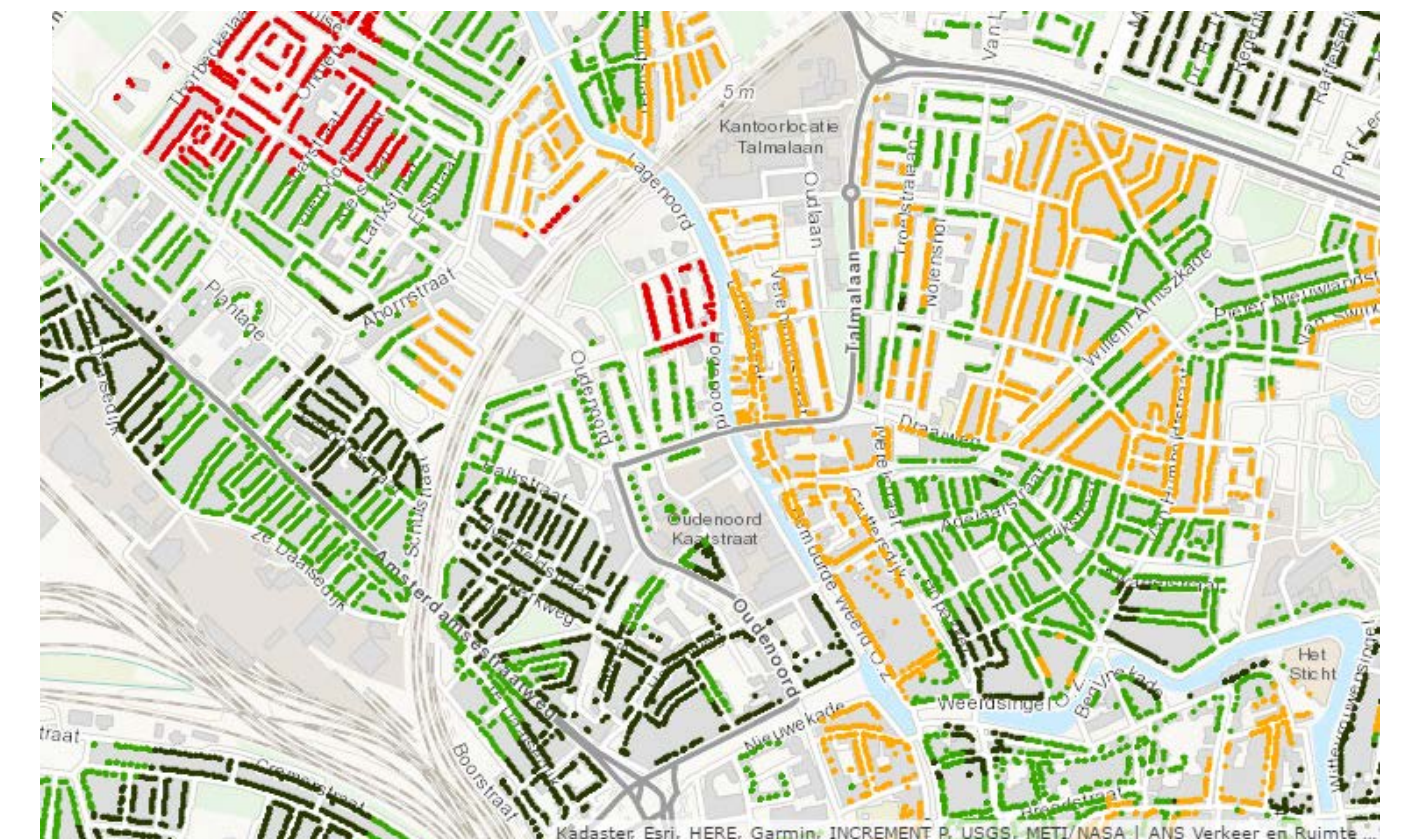
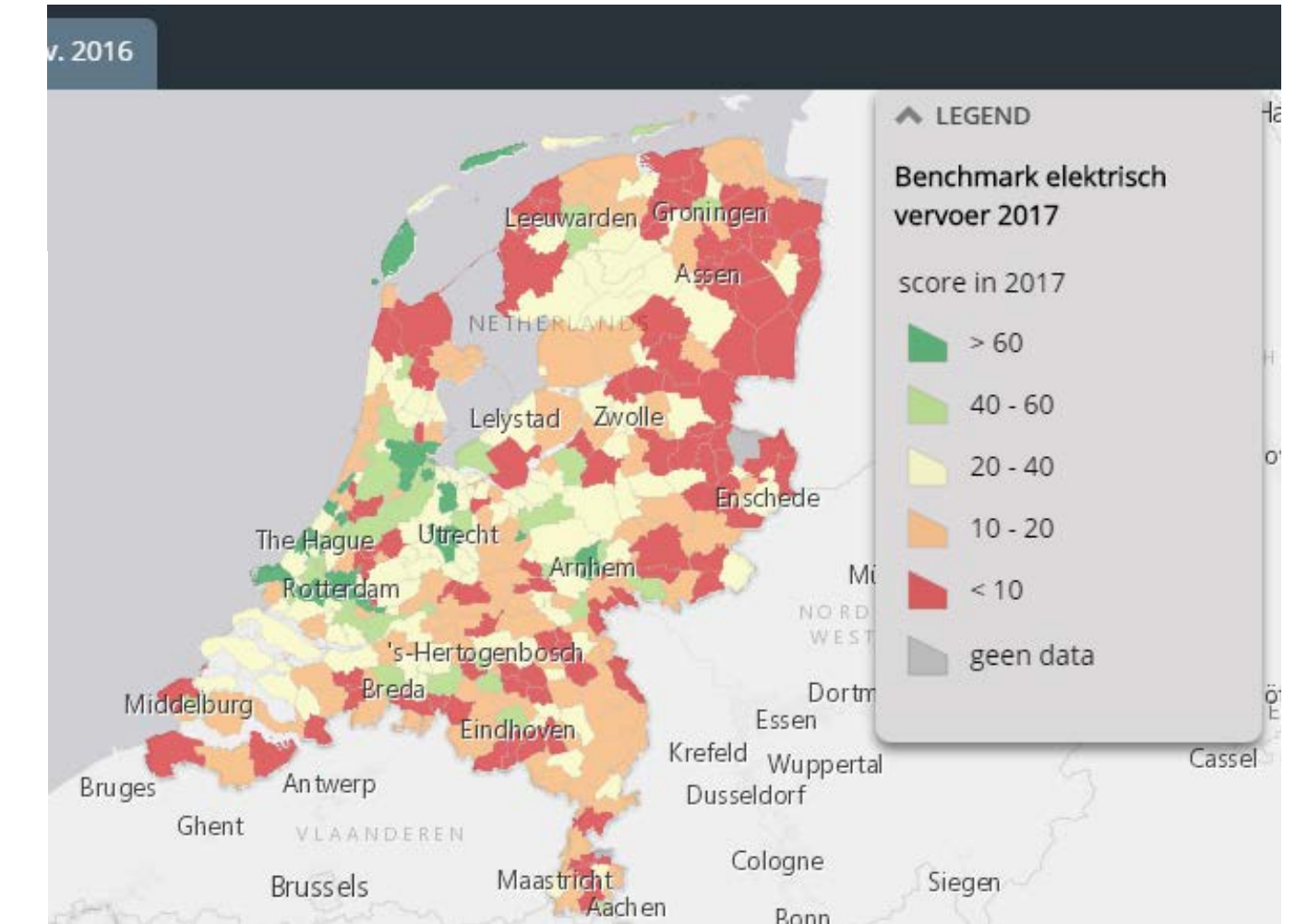
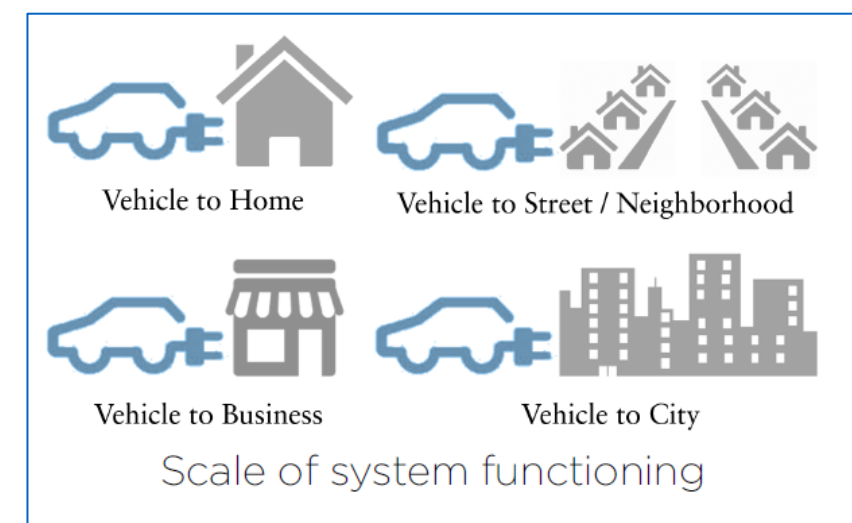
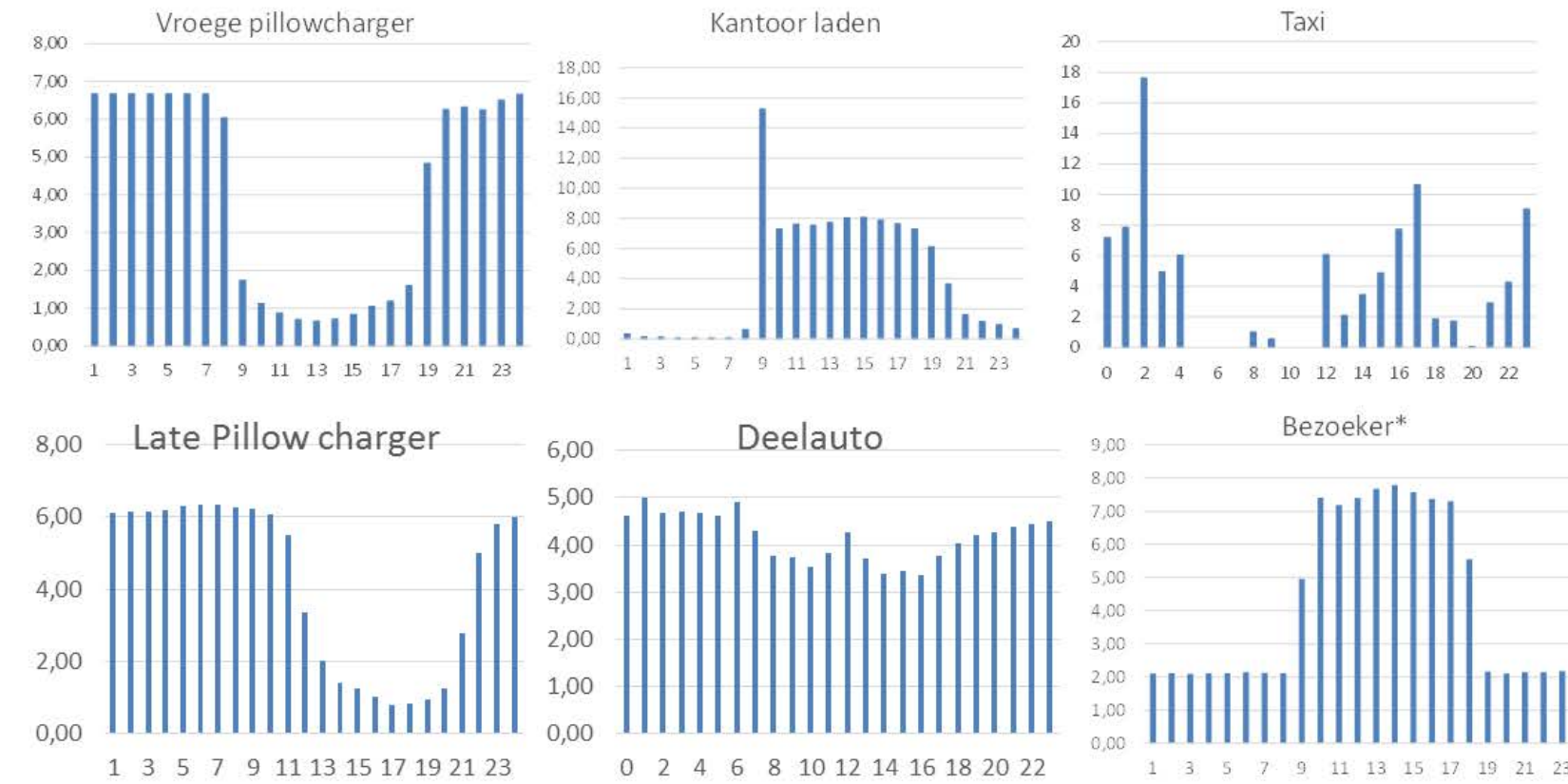
October 9-11, 2017



Hogeschool van Amsterdam
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About

OVER
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Consultancy on Urban Planning and Energy Transitions (~55fte)

- Advised over 80 Dutch municipalities with charging networks
- Forecasting models on Electric mobility and charging networks
- Hands on experience regarding Smart Charging
- Founder of Social Charging and ParknCharge

Applied research on charging infrastructure (~10fte)

- Monitoring and data analytics
- Vehicle2grid projects
- Forecasting and simulation of charging behavior
- Smart charging analyses

EV Segments & particular charging needs



Background

Question of City of The Hague:

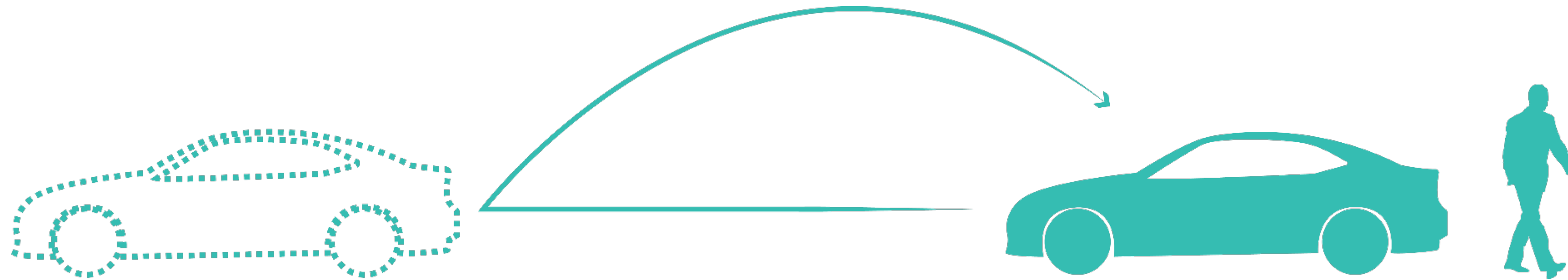
- *How to anticipate usage of our (public) charging infra by free floating e-carsharing schemes (FFECS)?*

Approach:

1. Identify most likely “business areas”
 - based on typical characteristics of FFECS users
2. Utilization of freefloating carsharing system:
 - based on data on carsharing scheme in Amsterdam
 - 3months (2016) for 300 e-cars (61.000 rides):
 - (i) location, (ii) SOC, (iii) y/n charging
3. Optimization of charging infrastructure in The Hague (case)

1 Identifying attractive neighborhoods of carsharing schemes

'Two-way' carsharing

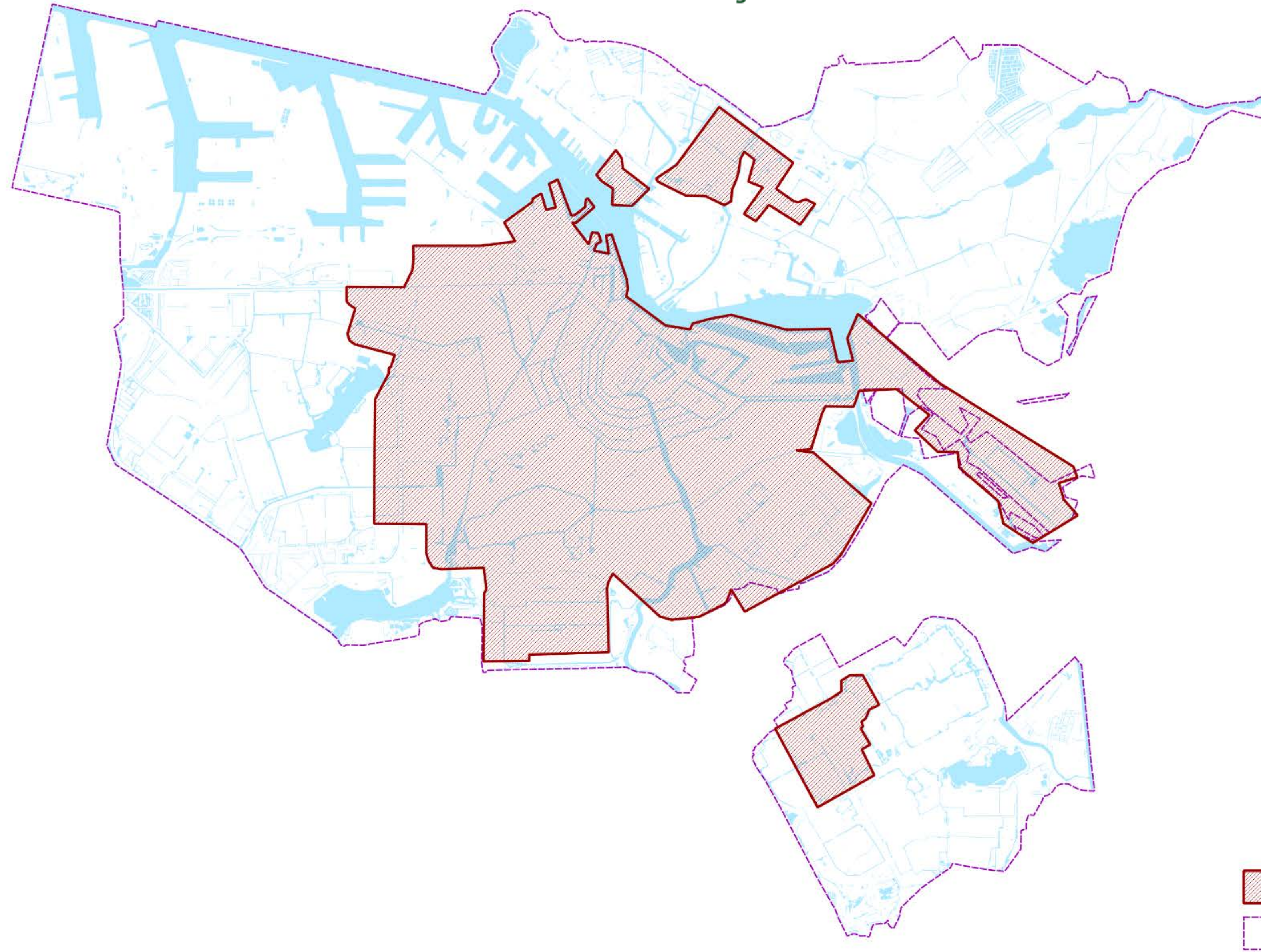


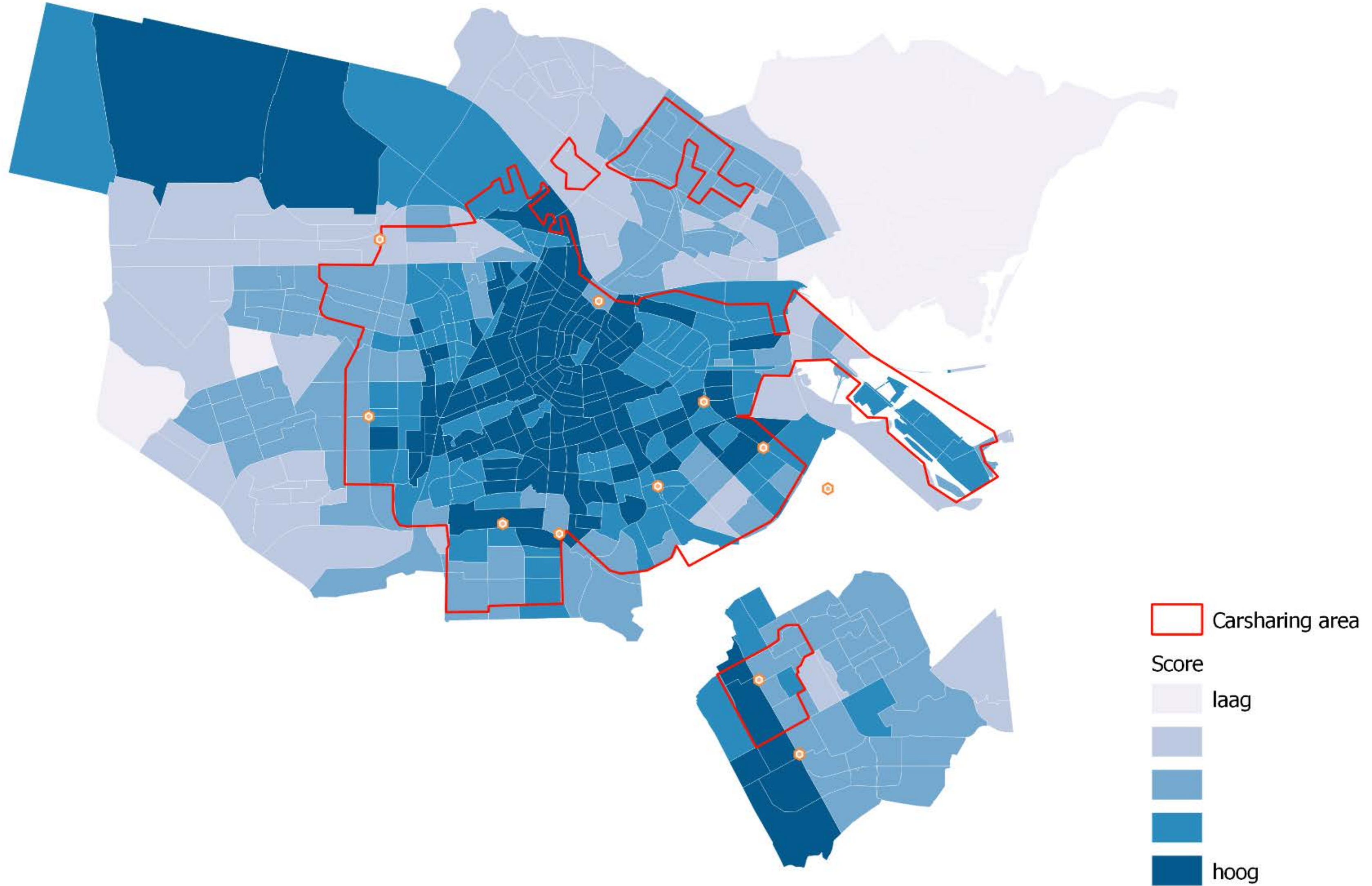
'One-way' carsharing



Typical Users of Free Floating Carsharing

- *<45years*
- *No car ownership*
- *Higher education & high income*
- *Densily populated areas*
- *Strong public transport*
- *Large operational area of carsharing scheme*



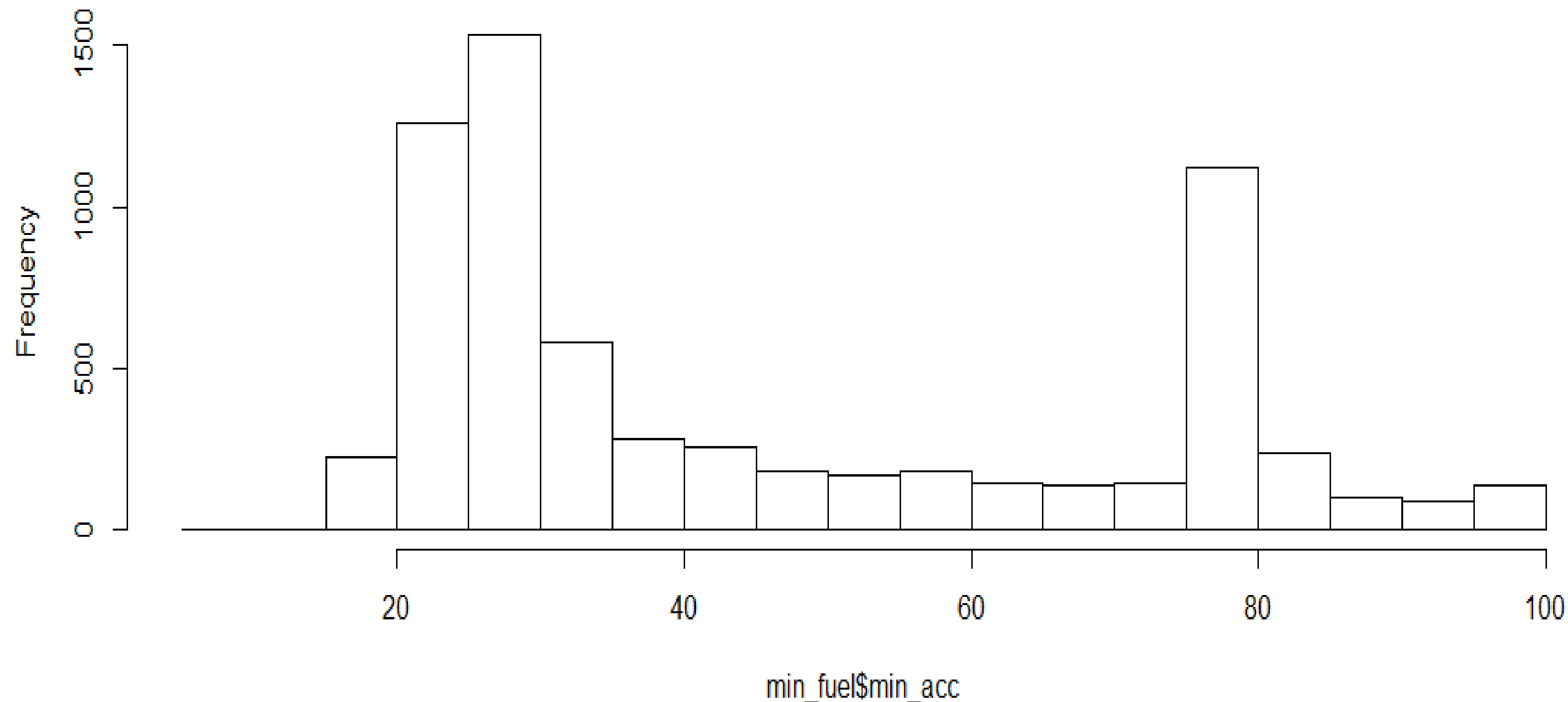


2 Analysing the utilization of the carsharing scheme

- Which percentage of rides start/end at a charging station?

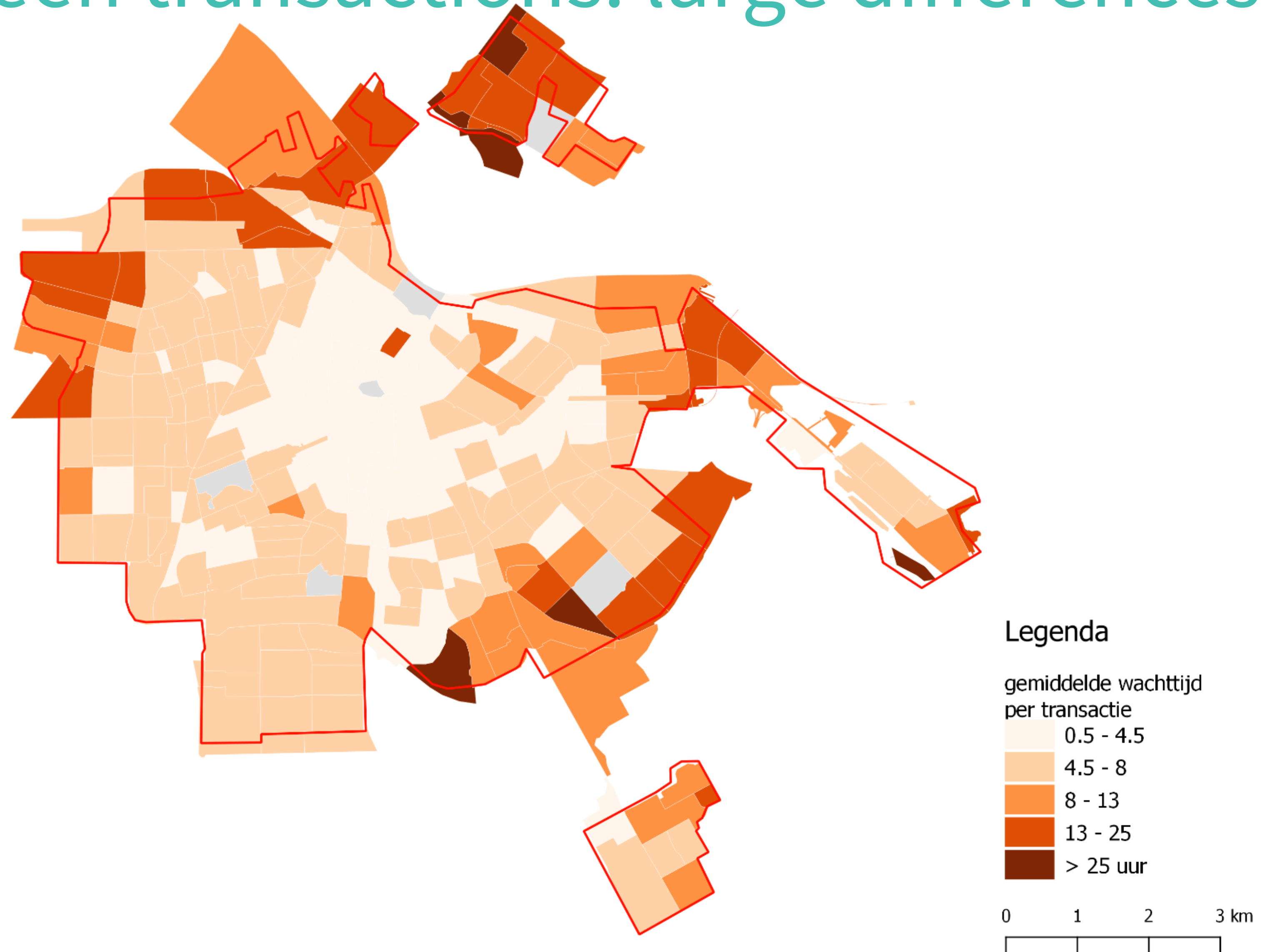
Only 11% of all rides end at a charging station (approx. 6500 charging sessions)

Histogram of min_fuel\$min_acc



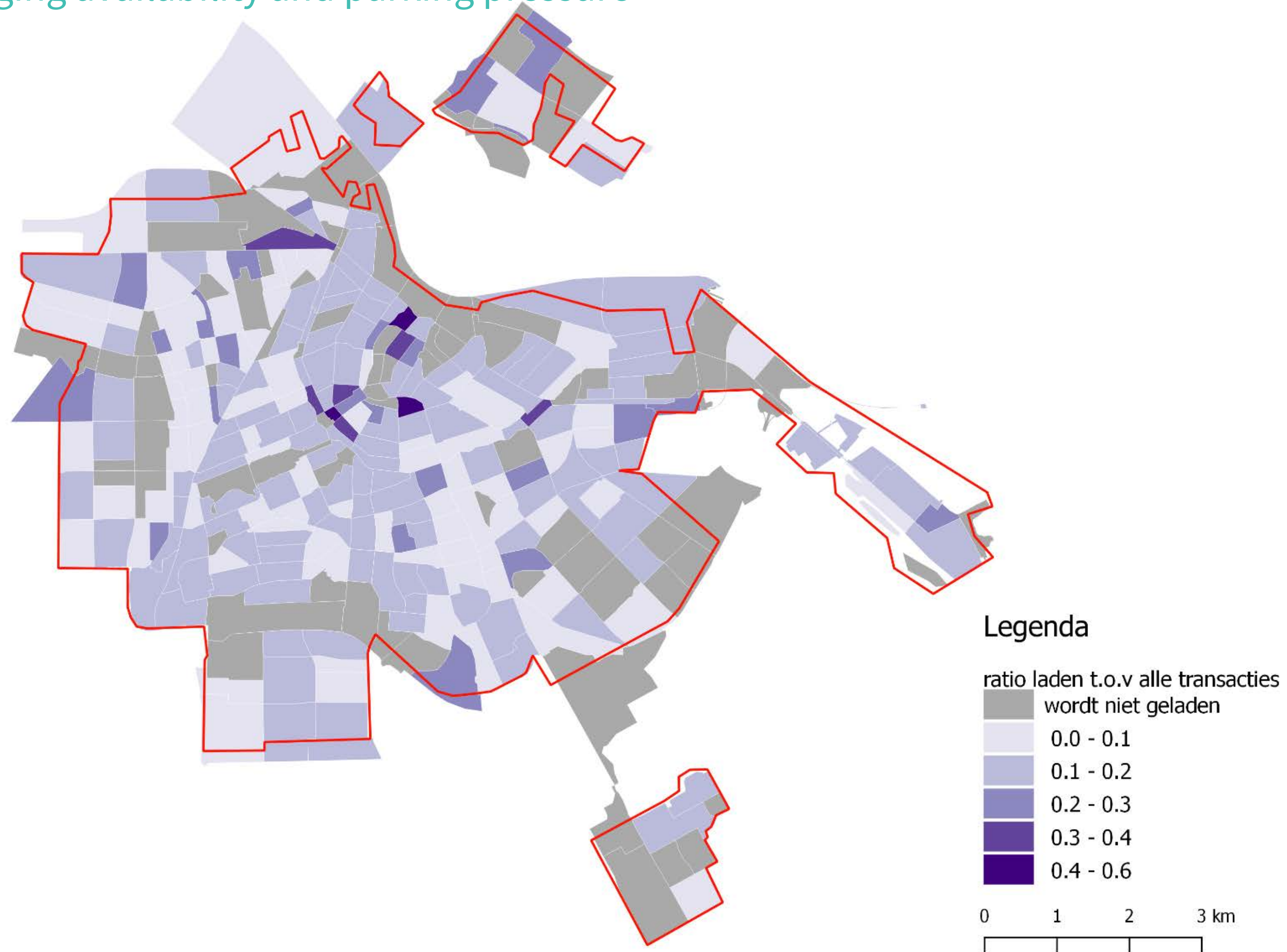
- Battery level <30% leads to most connections (incentive scheme; free time)
- 75-80% peak difficult to explain
- Charging locations and car ownership correlated (hypo: high parking pressure)

Time between transactions: large differences



Preferred locations for charging:

Depending on a.o. charging availability and parking pressure



Location characteristics

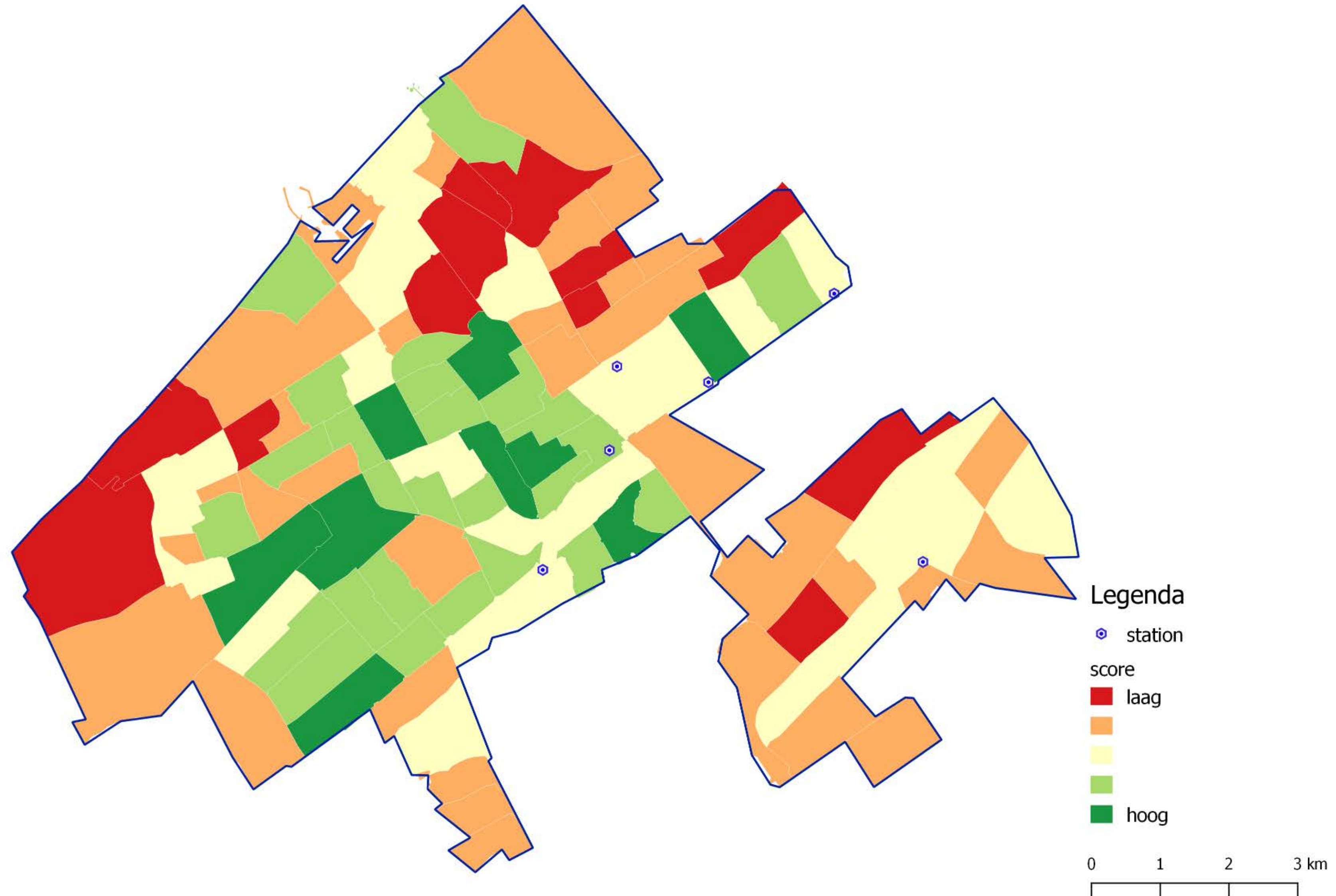
Three factors found that positively influence charging of FFECs:

1. Larger roads (+18% transactions)
2. Train stations (+30% transactions)
3. Charging hub (more than 1 connection and charging pole): +193%

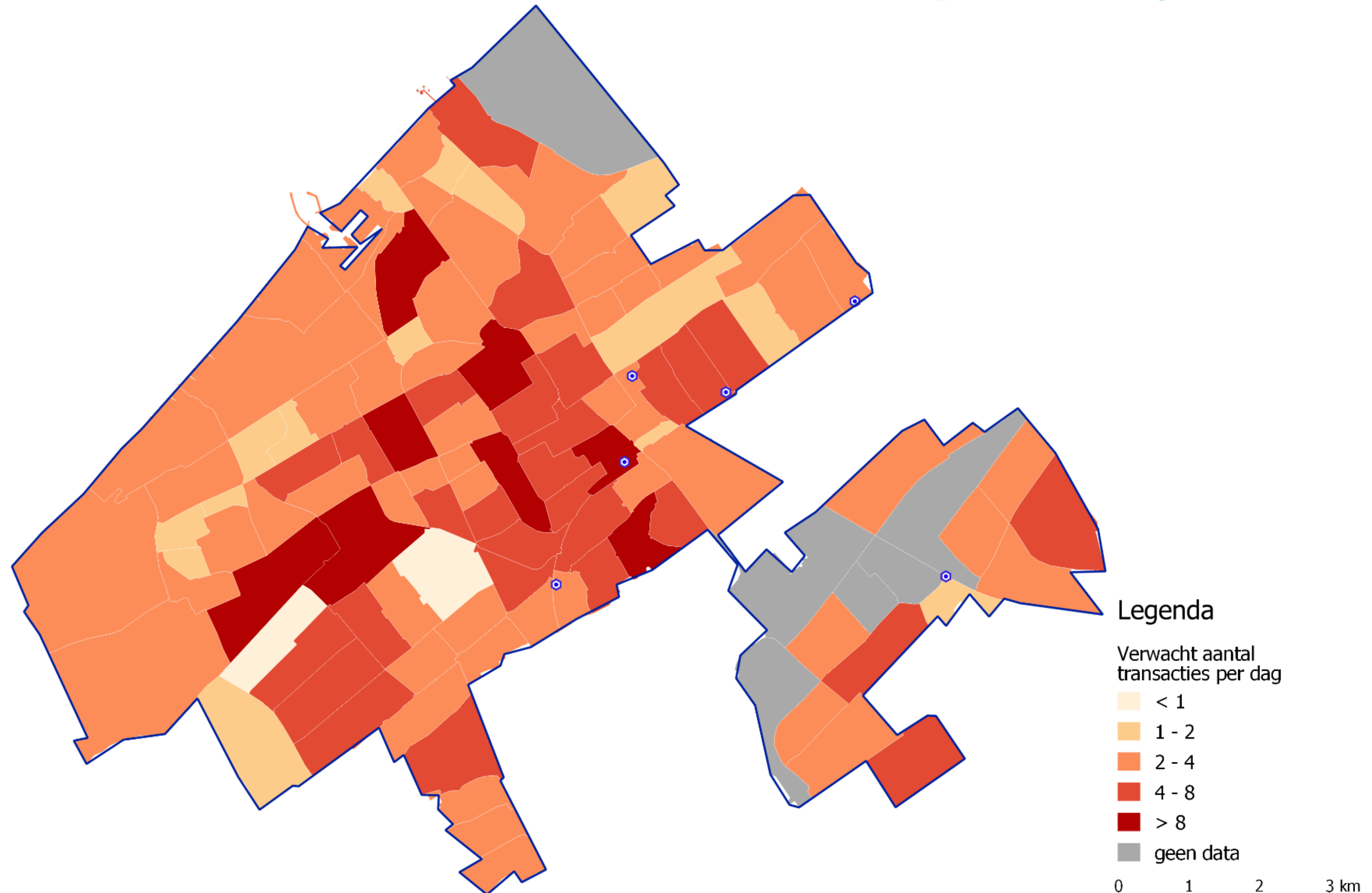
3 Optimizing charge infrastructure in The Hague for FFECS

- Assuming a carsharing scheme of 175-220 cars
 - 4-5 cars per km² (green & yellow areas)

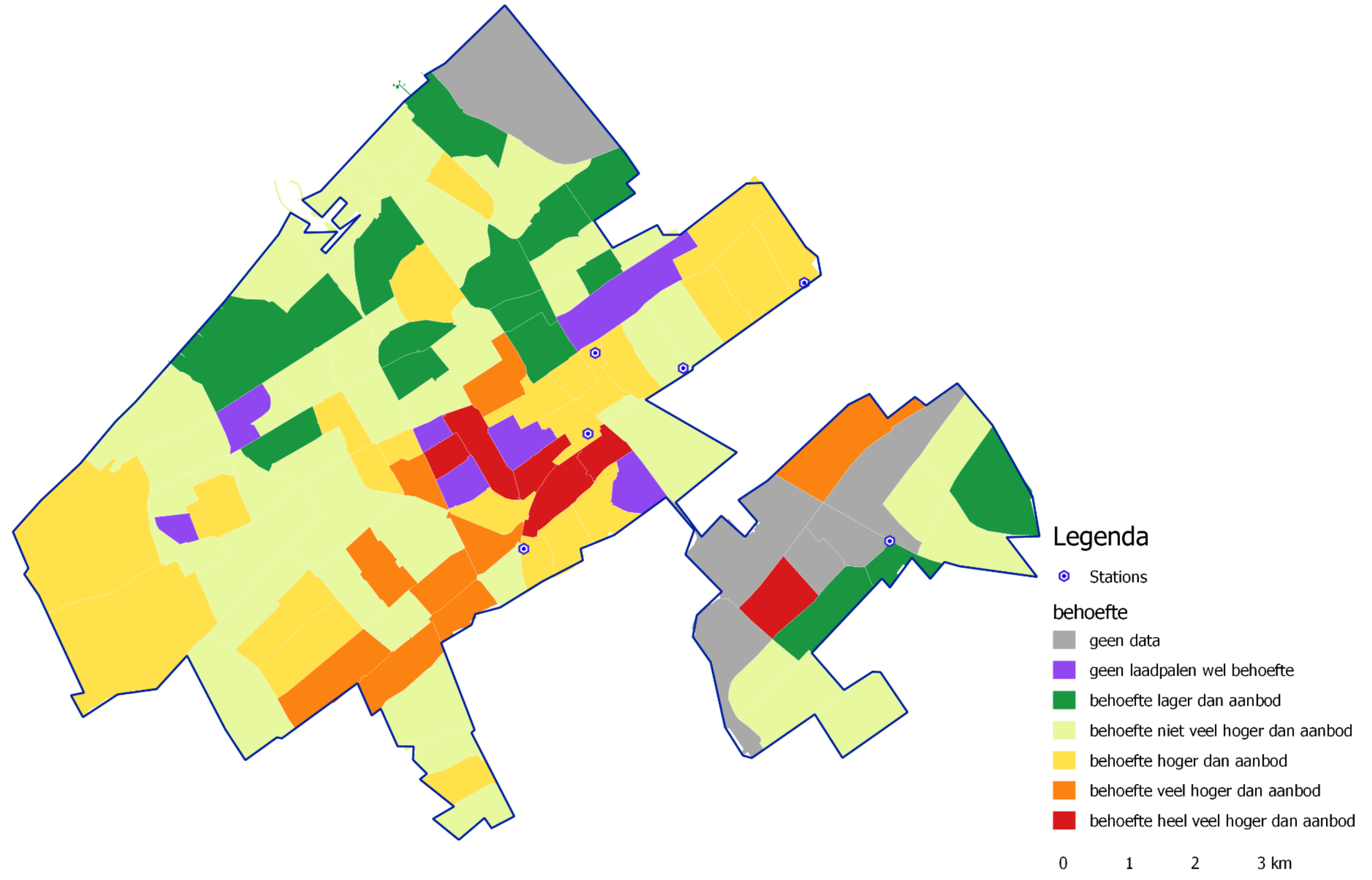
Most attractive neighborhoods for car sharing



Expected amount of transactions per day



Suitability of charging infrastructure



Conclusions

- Urgency for dedicated charging infrastructure:
 - Attractiveness of neighborhoods
 - FF ECS-utilization data
- The Hague is suitable city for a free floating e-carsharing scheme:
 - Demographics & Good urban density
 - Robust charging network with buffer capacity
 - However; expansion of network advisable.
- Success factors for charging points for FF ECS:
 - Charging plazas
 - Charge points located adjacent to larger roads
 - Proximity to train stations.

ARCHI 2018 | February 8th, 2018

2nd Symposium Applied Research on Charging Infrastructure



Call for abstracts! * opens soon *



Organizing partners:



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