

# MAKING IT HAPPEN TOGETHER

## PILOT CHARGE & REPARK

FUTURE OF CHARGING EINDEVENEMENT, 12 APRIL 2024



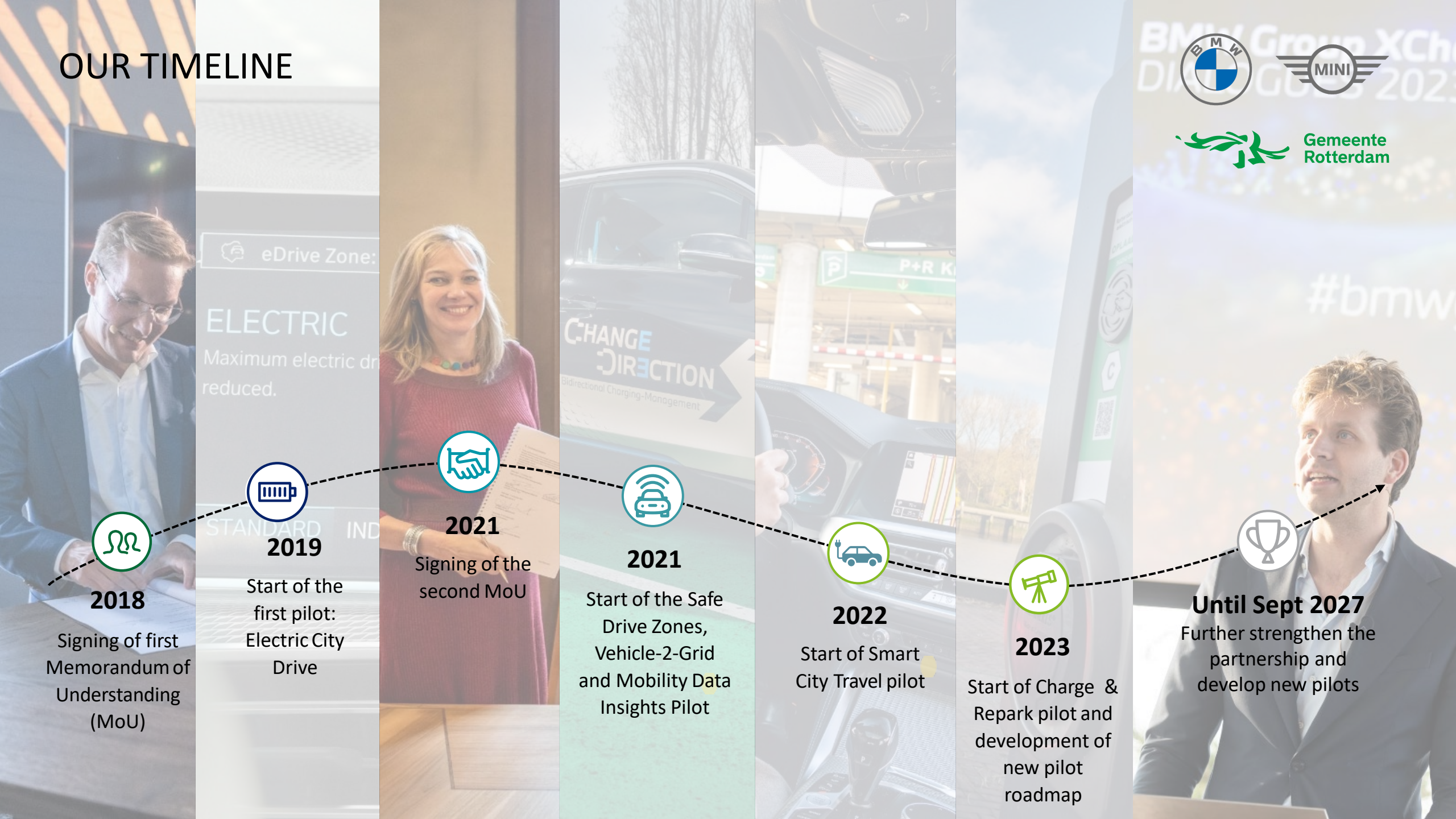
Gemeente  
Rotterdam



DOUWE KOOL (BMW NEDERLAND)

JOHN AKKERHUIS (GEMEENTE ROTTERDAM)

# OUR TIMELINE



**2018**

Signing of first Memorandum of Understanding (MoU)



**2019**

Start of the first pilot: Electric City Drive



**2021**

Signing of the second MoU



**2021**

Start of the Safe Drive Zones, Vehicle-2-Grid and Mobility Data Insights Pilot



**2022**

Start of Smart City Travel pilot



**2023**

Start of Charge & Repark pilot and development of new pilot roadmap



**Until Sept 2027**

Further strengthen the partnership and develop new pilots

# ONZE SAMENWERKING – WAT WILLEN WE BEREIKEN?



Gemeente  
Rotterdam

We hebben gezamenlijk ambities

De MoU gaat over samen leren, kennis  
uitwisseling en communicatie

Mobility transition

Data driven mobility

E-mobility

We garanderen wetenschappelijk onderbouwd  
onderzoek

We streven naar implementatie van pilot lessen

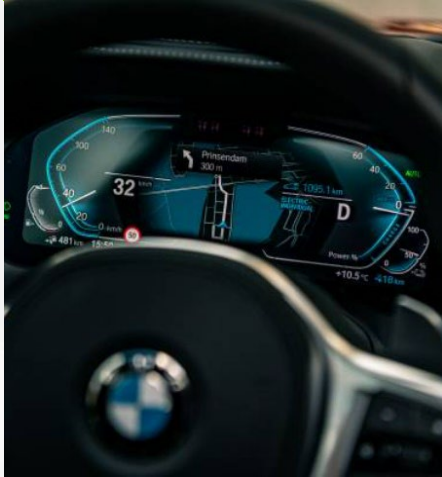
Klanten feedback is de kern

Voortgaande versterking van de samenwerking

Centraal staat de  
**leefbare stad: een  
veiliger en duurzamer  
Rotterdam**

# PREVIOUS PILOTS HAVE LED TO SCALABLE SOLUTIONS AND INSIGHTS

## Mobility transition



## Data driven mobility



## E-mobility



Pilot description

### Electric City Drive [\(video\)](#)



Stimulate drivers to enter the city center sustainably by driving in the electric mode

### Smart City Travel [\(video\)](#)



Stimulate drivers to enter the city center sustainably by using P&R's and shared and public transport

### Safe Drive Zones [\(video\)](#)



Stimulate safer driving in specific traffic situations and areas, such as school zones

### Vehicle to Grid [\(video\)](#)



Test how the use of batteries and bidirectional charging cars could stabilize the electricity grid

### Charge & Repark [\(video\)](#)



Stimulate drivers to repark their car after an on-street charging session, ideally in a parking garage

Result

Has been scaled to >150 cities in Europe and the US

Generated insights in how to stimulate multimodal travel

Research being carried out to the effects of ISA

Follow-up opportunities being explored

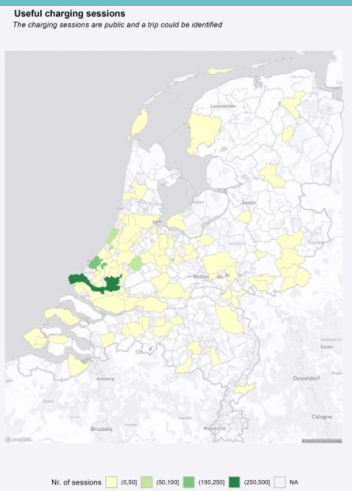
Scaling opportunities to other cities being explored

# CHARGE & REPARK

Rotterdam en NL

januari-september 2023

## HOE REAGEERT MEN OP VERSCHILLENDE TYPEN BERICHTEN OM DE VOLGELADEN AUTO TE VERPLAATSEN





CHARGE & REPAK

MY BMW

di 19:49

BMW i3s 120 – volledig opgeladen:  
100% bereikt om 19:31.



Gemeente Rotterdam

# Verplaats uw BMW en ...



... maak ruimte voor iemand anders.

... 80% van de E-rijders verplaatst zijn auto wanneer deze is volgeladen.

... help het zoekverkeer in de straten verminderen.

... help de stad om de groeiende vraag naar oplaadpalen bij te houden.

... draag bij aan een schonere lucht.

... contribute to a sustainable environment.

ALTRUISME

CITY.

ENVIRONMENTAL.

# SAMENWERKING MET HOGESCHOOL VAN AMSTERDAM – FUTURE OF CHARGING

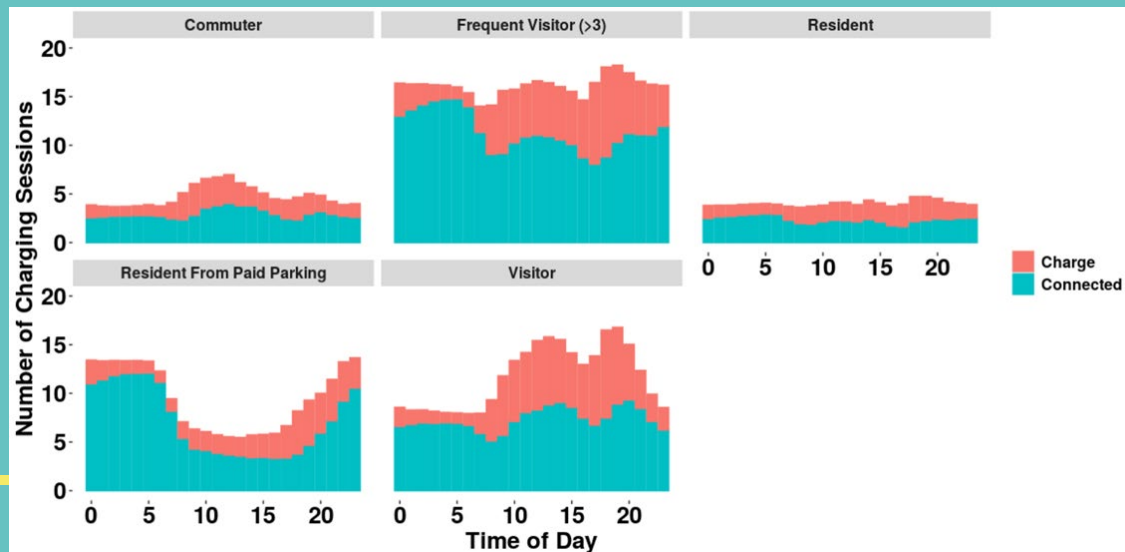
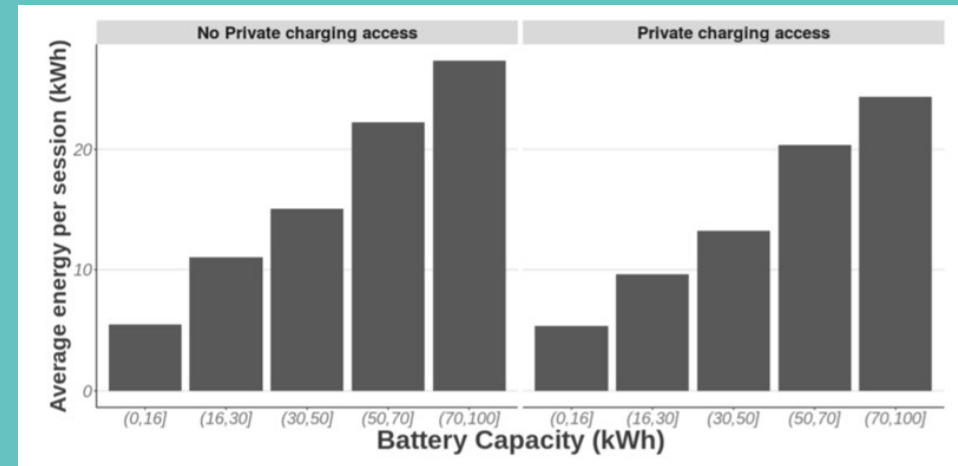
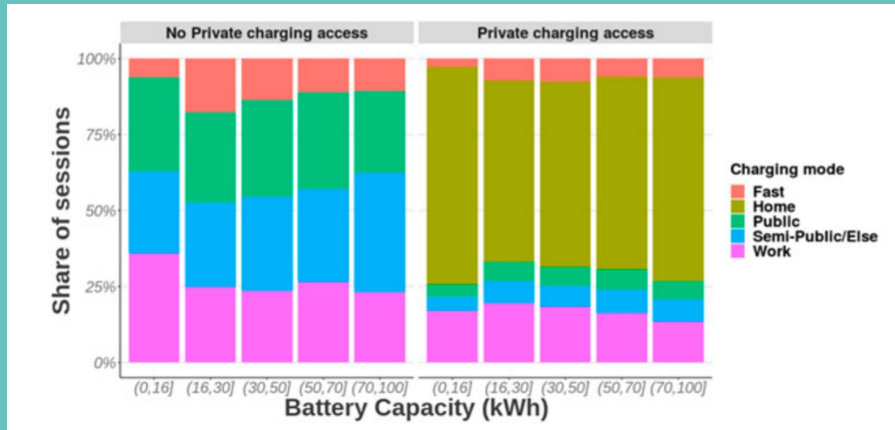


CHARGE & REPAIR

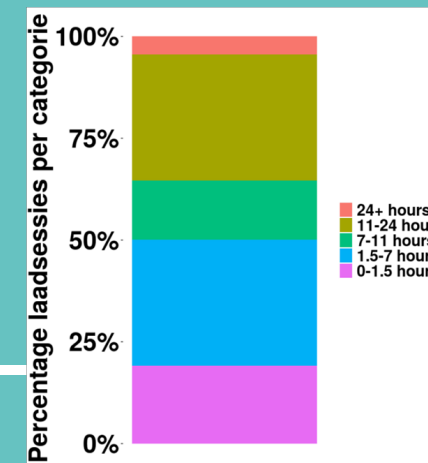


Gemeente Rotterdam

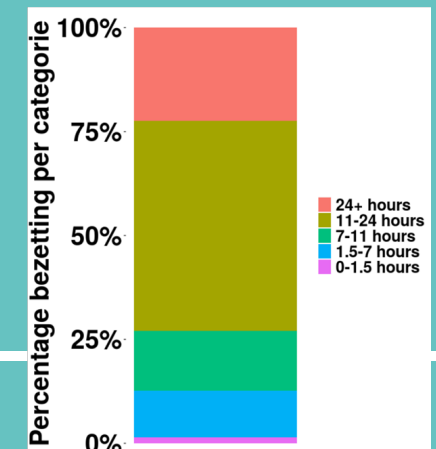
## BASIS SITUATIE GOED IN BEELD GEBRACHT



Number of sessions

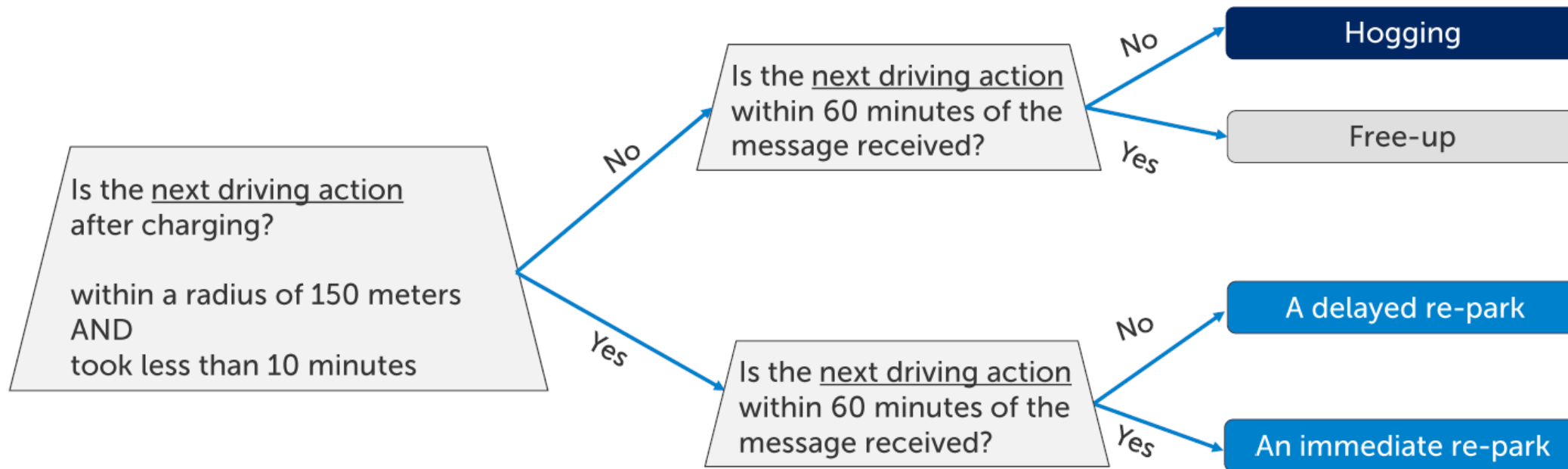


Hours of occupancy



## CHALLENGES.

**What is reparking?** moving your car because of nudge vs. moving your car because you want to go anyways





## KEY FINDINGS.

- **Premium parking:** ~9% started charging with SoC > 80% of which 40% in urban areas
- **Nudging works:** altruism-type nudges can motivate users to re-park their car and thus reduce 'charging hogging':

“80% of the electric car drivers move their car when it is fully charged”

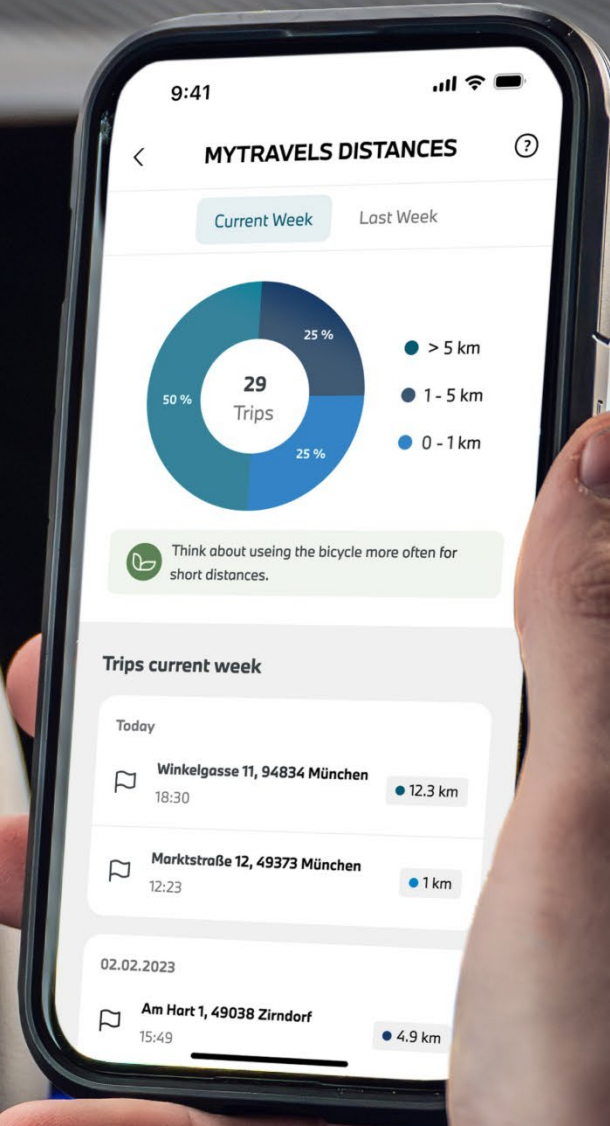
- **Nudging works best in:** afternoon / evening and in urban areas
- **No impact of weather** on chance of re-parking
- **No impact of vehicle type** on chance of re-parking\*

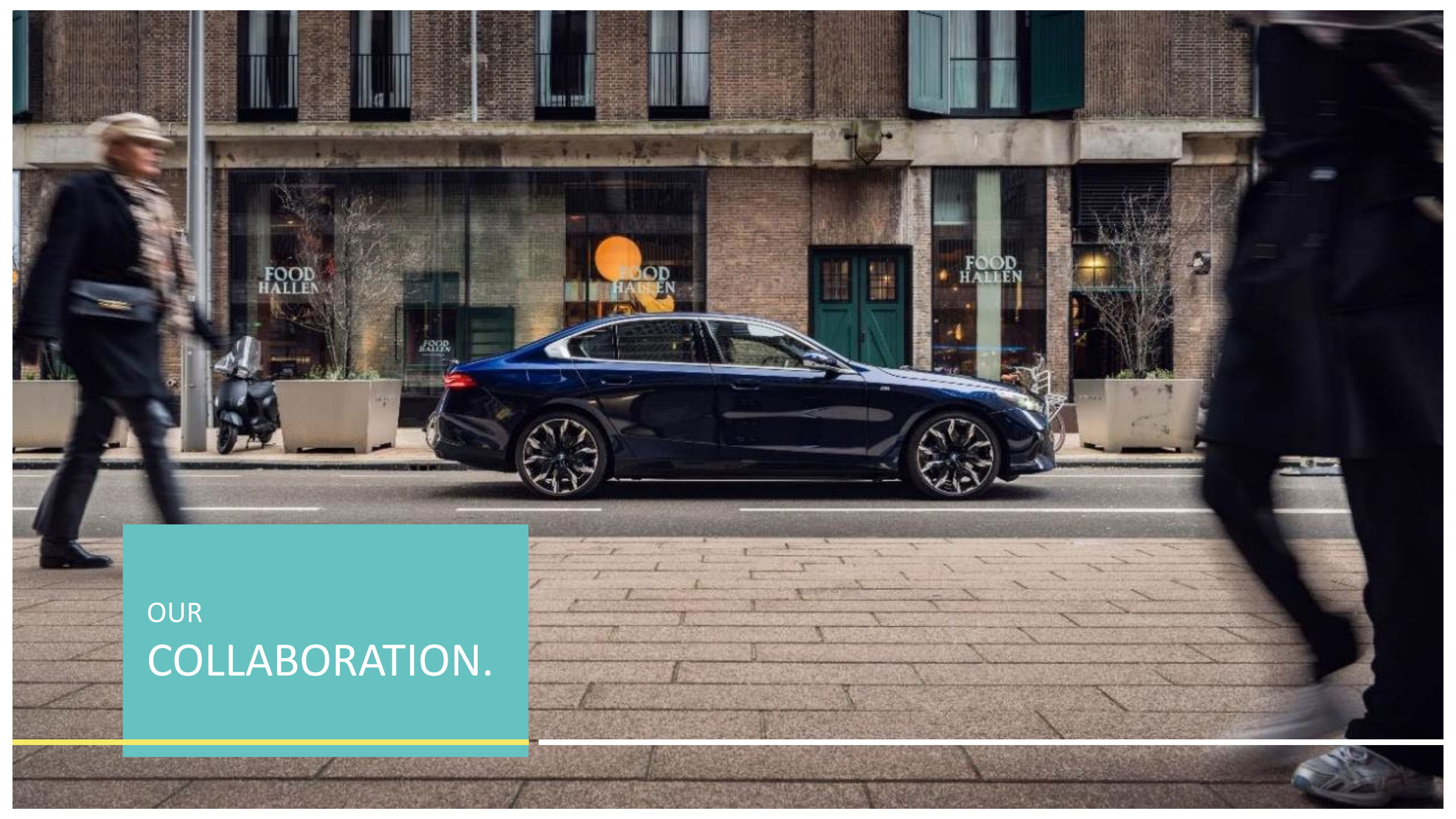
## POTENTIAL IMPACT EN NUANCE.

- Users spend 3 hours per charging session on average, while the time connected to a charging station is about 10,5 hours. This suggests 7,5 hours of overstaying the session.
- The push-notification could nudge users to move their vehicle within 1 hour after charging, leaving 6,5 hours of charging capacity for others.
- Extrapolation to 650.000 xEV's in NL results in 5,9 million additional free hours at charging stations.
- **Nuance:** i.e. limited grid capacity, load-balancing, peak-shaving, V2X may require longer connection times and lower charging speeds on average.

## MY TRAVELS.

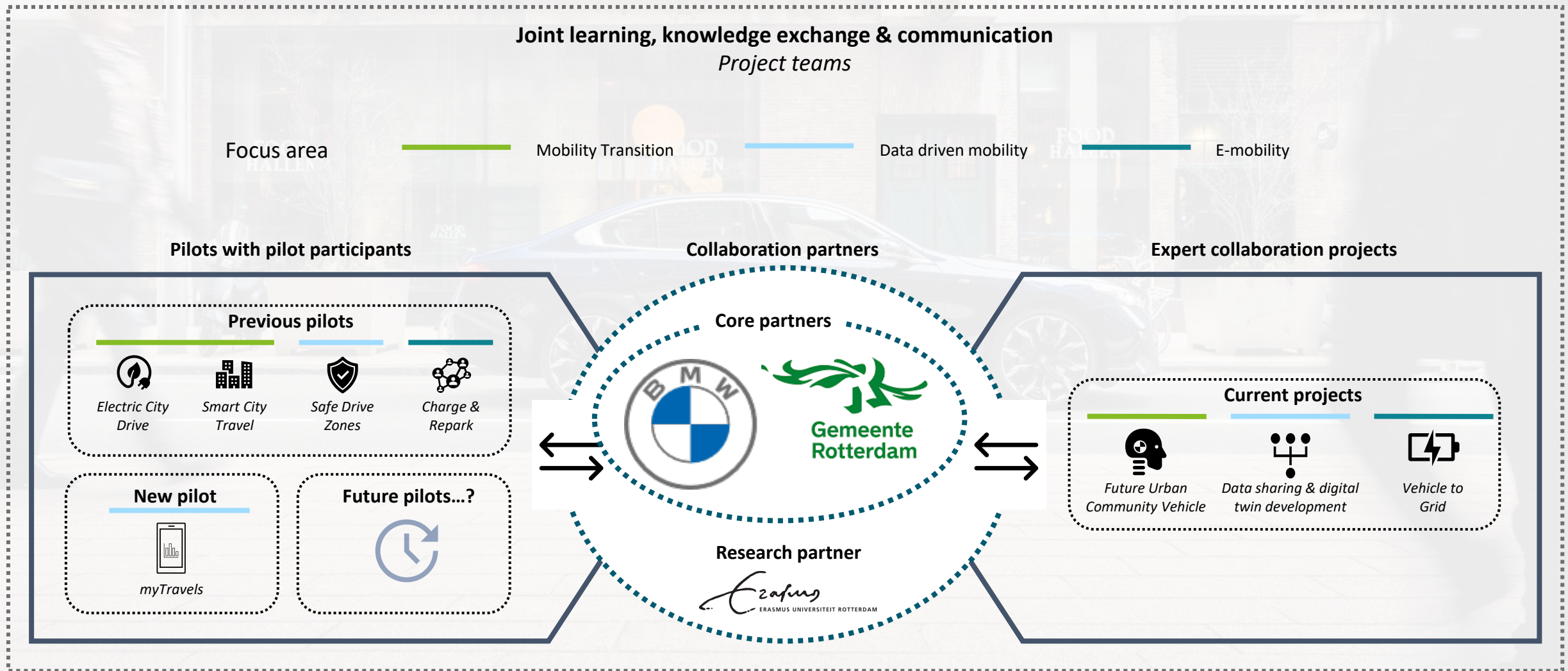
- Invite sent to 45.000 BMW drivers (BMW with OS7 or higher)
- MINI drivers will be approached in Q3/Q4 after ramp-up of J01 and U25
- Personalized insights into travel patterns
- Information about alternative travel options
- Useful feedback on daily trips and routes





OUR  
COLLABORATION.

# COLLABORATION OVERVIEW



# Key takeaways

## Outcomes of the experiment

### A message with altruism-type nudges can motivate users more to re-park their car

- ▶ Messages can work both in a positive or negative way.
- ▶ The altruism message creates a significantly higher chance in re-parking than the city and environmental messages.
- ▶ There is no significant difference between the base message and the altruism message, however there is a positive association.

### The chance on re-parking is higher in the afternoon/evening and in urban areas

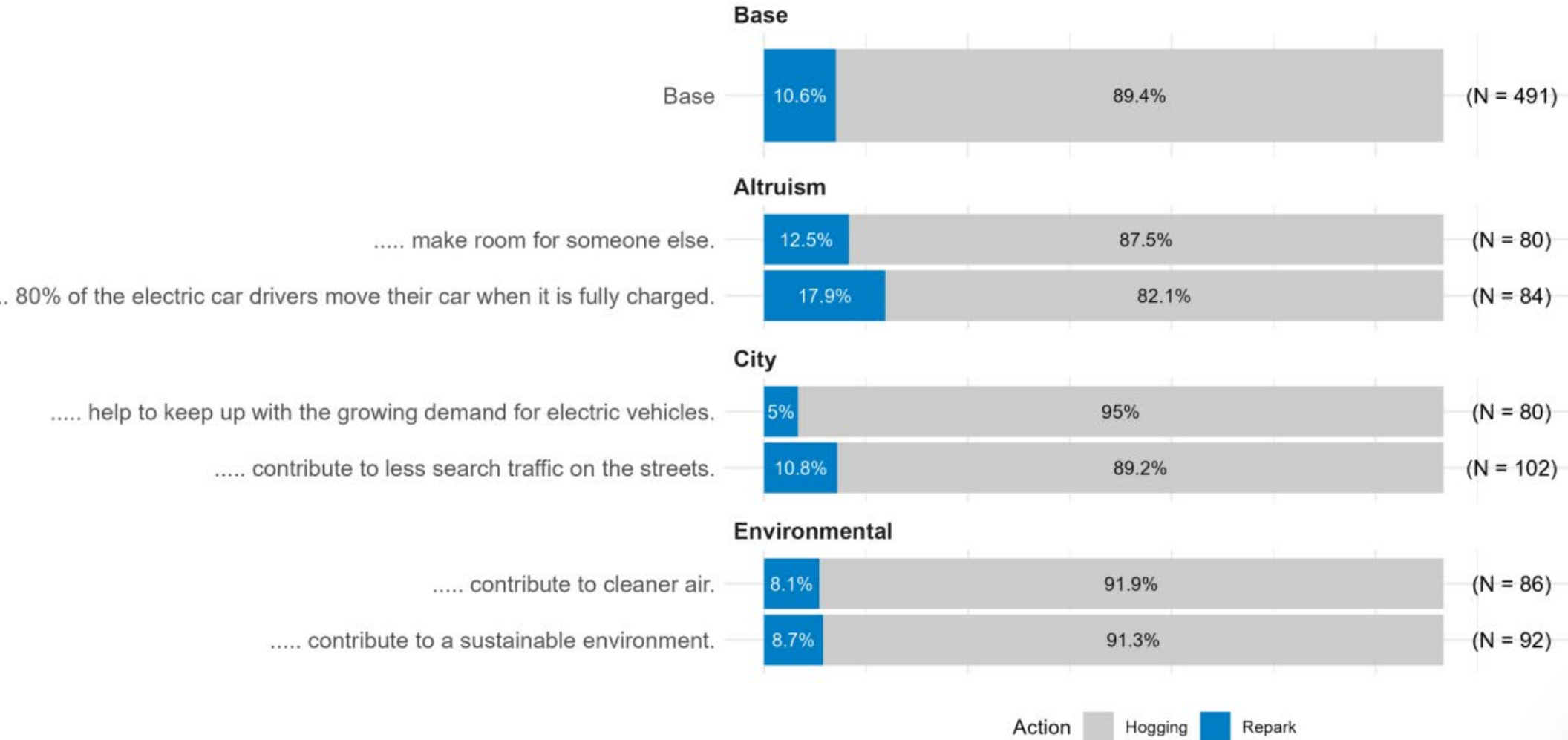
- ▶ Higher chances of people reparking if charging is finished between 13:00 and 23:00.
- ▶ The hogging time is longer between 13:00 and 23:00, therefore a change in behavior can have a huge impact
- ▶ Higher changes of people reparking in urban areas.
- ▶ Higher changes of reparking if people re-park their car more frequently.

### Whether and type of vehicle do not have impact on the chance of re-parking

- ▶ Rain does not seem to affect the chances of reparking.
- ▶ There does not seem to be a significant difference between BEV and PHEV users.

# Impact of single nudges

Useful charging sessions without "free-up" and parking nudge (N = 1,015)



# Key takeaways

## Outcomes of the experiment

### PHEV drivers charge in general more than BEV drivers

- ▶ PHEV drivers charge even more on a public charging station than BEV drivers

### Participants charge longer on public charging stations than on private locations.

- ▶ The median of the charging time is:
  - ▶ Public: 2 hours and 24 minutes
  - ▶ Private: 1 hour and 46 minutes

### Participants start charging their car most frequently during the day and on weekdays

- ▶ The charging pattern at public station is slightly different than at private stations, with peaks in the morning [8:00-10:00] and in the afternoon [15:00-18:00]

### Participants sometimes use a charging station as a premium parking spot

- ▶ About 8.8% of the charging sessions happens when the SoC is 80% or higher
- ▶ The sessions when the SoC is 80% or higher take place for about 40% of the time in urban areas.

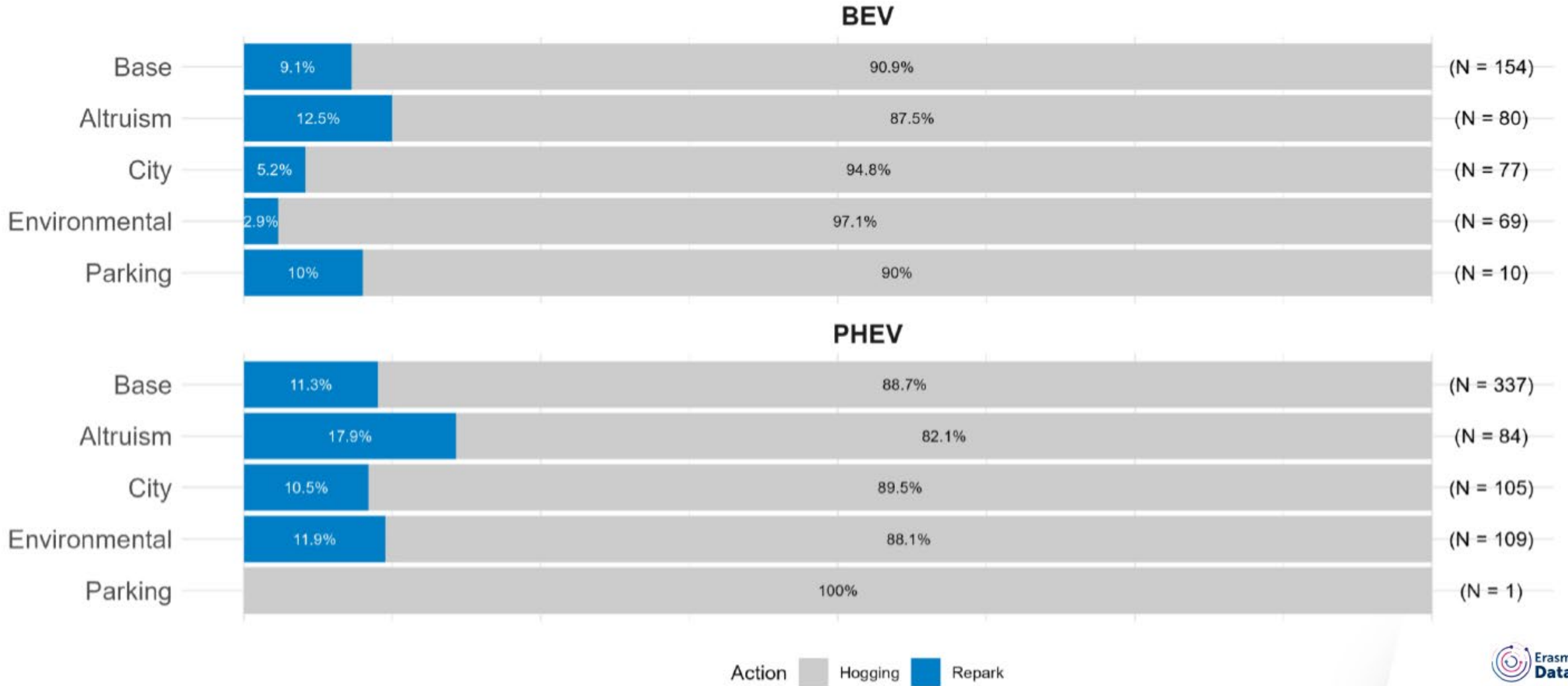


# Overview of messages and nudges

	English	Dutch	German
First part of the message (equal for all)	Your <b>_VARO_</b> is charged. Please move your car now. <b>NUDGE</b>	Uw <b>_VARO_</b> is opgeladen. Verplaats uw auto nu. <b>NUDGE</b>	Ihr <b>_VARO_</b> is aufgeladen. Parken Sie ihr Auto jetzt weg. <b>NUDGE</b>
Second part of the message ( <b>NUDGE</b> )			
Altruism	80% of the electric car drivers move their car when it is fully charged.	80% van de elektrische rijders verplaatst zijn auto als hij vol is	80 % der Elektroautofahrer bewegen ihr Auto, wenn es geladen ist.
	Please move your car now and make room for someone else.	Verplaats uw auto nu en maak plek voor een ander.	Fahren Sie jetzt Ihr Auto weg und machen Sie Platz für ein anderes.
Environmental	Please move your car now and contribute to a sustainable environment.	Verplaats uw auto nu en draag bij aan een duurzame leefomgeving.	Bewegen Sie Ihr Auto jetzt und leisten Sie einen Beitrag zu einer nachhaltigen Umwelt.
	Please move your car now and contribute to cleaner air.	Verplaats uw auto nu en draag bij aan een schonere lucht.	Bewegen Sie Ihr Auto jetzt und erhalten Sie saubere Luft.
City	Please move your car now and help to keep up with the growing demand for electric vehicles.	Verplaats uw auto nu en help de snelgroeiende laadbehoefte bij te benen.	Bewegen Sie Ihr Auto jetzt und helfen Sie dazu bei, mit der wachsenden Nachfrage nach Elektrofahrzeugen Schritt zu halten.
	Please move your car now and contribute to less search traffic on the streets.	Verplaats uw auto nu en zorg voor minder zoekverkeer.	Bewegen Sie Ihr Auto jetzt und reduzieren Sie den Suchverkehr.
Parking	Please move your car to one of the suggested parking garages. There is enough space available.	Verplaats uw auto naar een van de voorgestelde parkeergarages. Er is voldoende plek beschikbaar.	Bewegen Sie Ihr Auto auf einen der vorgeschlagene Parkhausen. Platz ist ausreichend vorhanden.
	Please move your car to one of the suggested parking garages. There is enough space available, and it is cheaper.	Verplaats uw auto naar een van de voorgestelde parkeergarages. Er is voldoende plek beschikbaar en het is goedkoper.	Bewegen Sie Ihr Auto auf einen der vorgeschlagene Parkhausen. Platz ist ausreichend vorhanden und es ist billiger.

# Impact of clustered nudges

Useful charging sessions without "free-up" (N = 1,026)



# Impact of single nudges

Useful charging sessions without "free-up" and parking nudge (N = 1,015)

