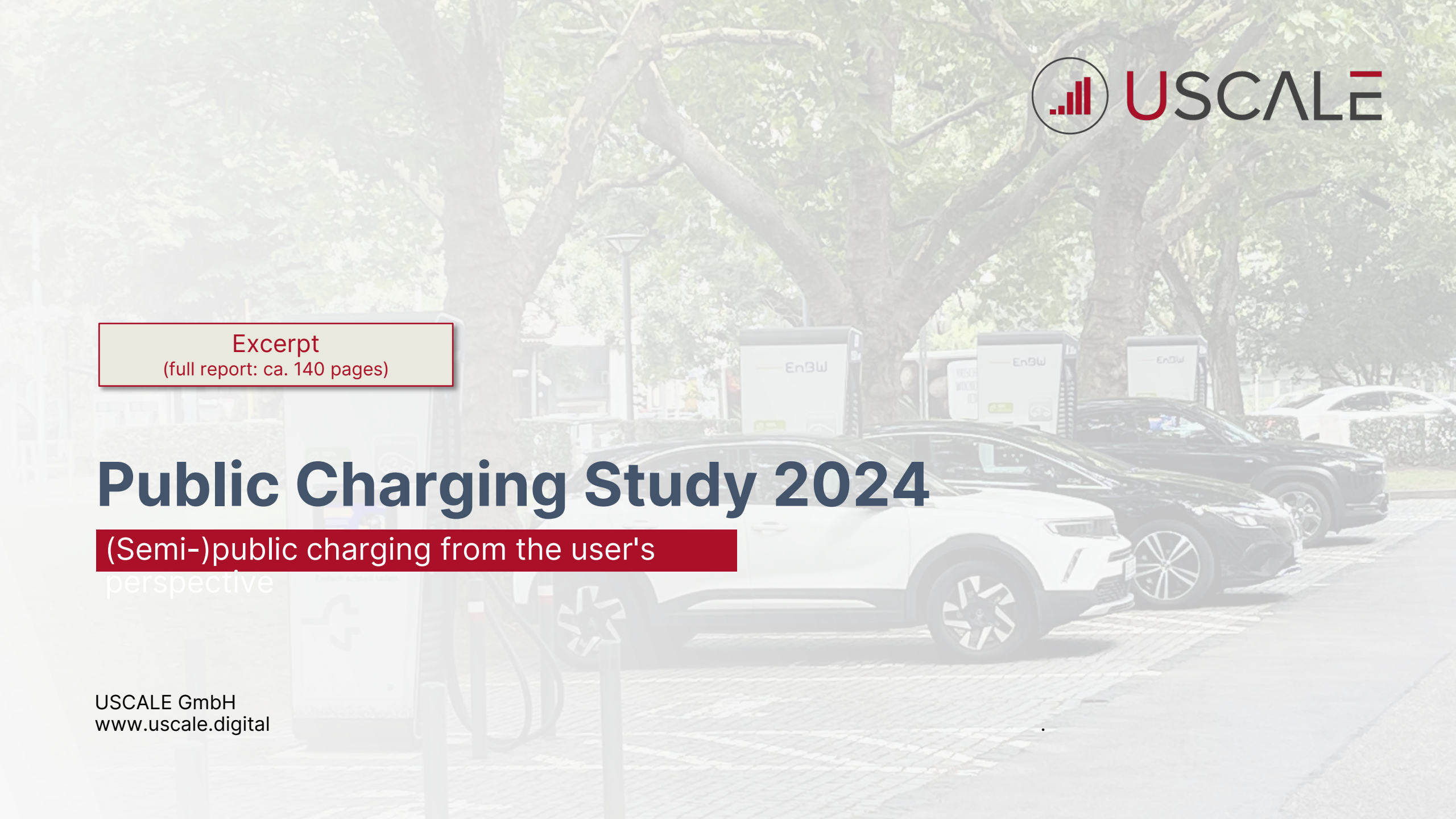


Excerpt
(full report: ca. 140 pages)

Public Charging Study 2024

(Semi-)public charging from the user's perspective

USCALE GmbH
www.uscale.digital

Objective

Initial situation:

- The growing market share of EVs is increasing the demand for public charging infrastructure and the expectations placed on providers.
- In order to develop and build the right charging services, providers in the market need to know the charging behavior and wishes of users.
- An important role is played by employers and retailers who are not yet realising their full potential.

Question:

- How and where do EV drivers charge today? What criteria do EV drivers use to decide where to charge? What influence does the charging price have?
- Which use cases for (semi-)public charging are particularly relevant and what is important?
- What problems do charging customers have today? What needs do they see?
- Are there differences between the target groups?

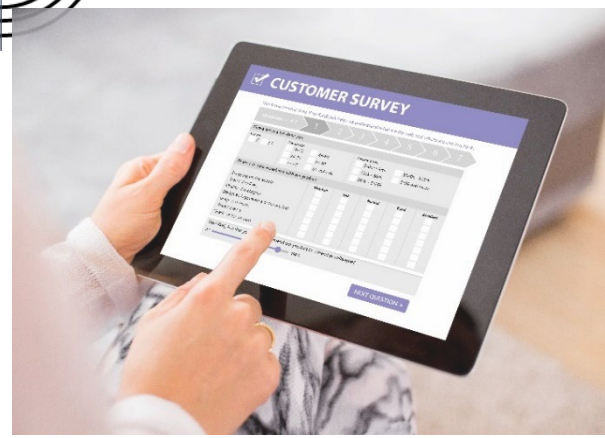
Target group

Survey:

- Target group: BEV drivers
- Survey: Online survey (CAWI)
- Market: Germany
- Recruitment: social media, access panel *
- Interview duration: 15 - 20 min
- Field phase: July - September 2024

Sample:

- Total sample: N = 2,986
  of which:
  - Charge @public: N = 1,756
  - Charge @retail: N = 1,033
  - Charge @work: N = 1,050



* The majority of participants in the social media panel are early EV adopters and tech-savvy individuals. The report refers to this group as INNOVATORS.

The participants in the Access Panel are generally less tech-savvy and only decided in favour of an electric vehicle at a later stage. The report describes this group as the NEXT SEGMENT.

Preliminary remarks on recruitment

The selection of survey participants

The eMobility market is in the ramp-up phase, i.e. the majority of current EV drivers belong to the group of so-called **innovators** and **early adopters** in the early phase. Only a small proportion of EV drivers come from the **early majority** group. *

Recruitment is based on the assumption that it is mainly innovators who can be reached in specialist forums and on **social media**, whereas the early majority can be reached in **access panels**. In recent years, we at USCALE have implicitly assumed this connection. We now have very strong confirmation of this assumption from the USCALE persona study: the majority of participants from the social media panel are "eco-enthusiastic techies", while the majority of access panel participants are spread across the other segments.

In this study, the ratio of social media to access panel study participants was **57 to 43**.

In the report, the two groups are representative of different adopter groups (social media panel = innovators and early adopters, access panel = later early adopters and early majority). If the results differ for both groups, they indicate a trend.

* This classification is based on Rogers' diffusion model (LINK).

Preliminary remarks on the programme structure

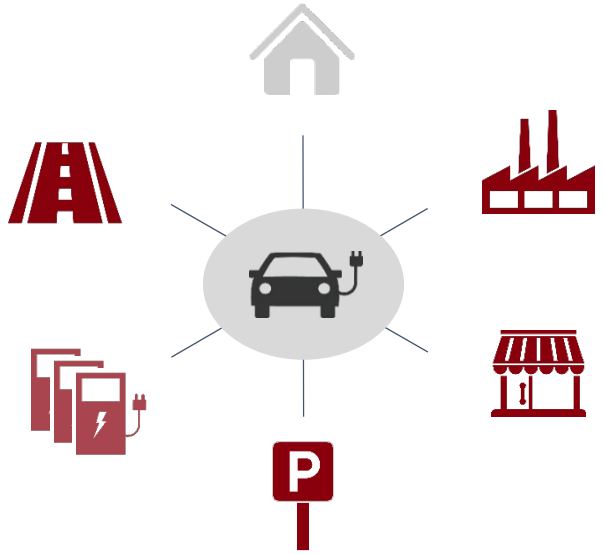
Who are the EV drivers?

The subject of this study is the (semi-)public charging behavior of EV drivers.

Before this document describes the charging behavior in public spaces, at the employer and in retail, Chapter 2 describes the living, driving and charging behavior of all respondents in detail. This is based on the feedback from 2,986 EV drivers surveyed.

Chapters 3, 4 and 5 then focus on EV drivers who charge (semi-)publicly. The data is based on the aforementioned subsamples.

Charging behavior at home is described in detail in the private charging study.



Chapter 2: all EV drivers

From chapter 3: only EV drivers who charge at public, retail or employer locations

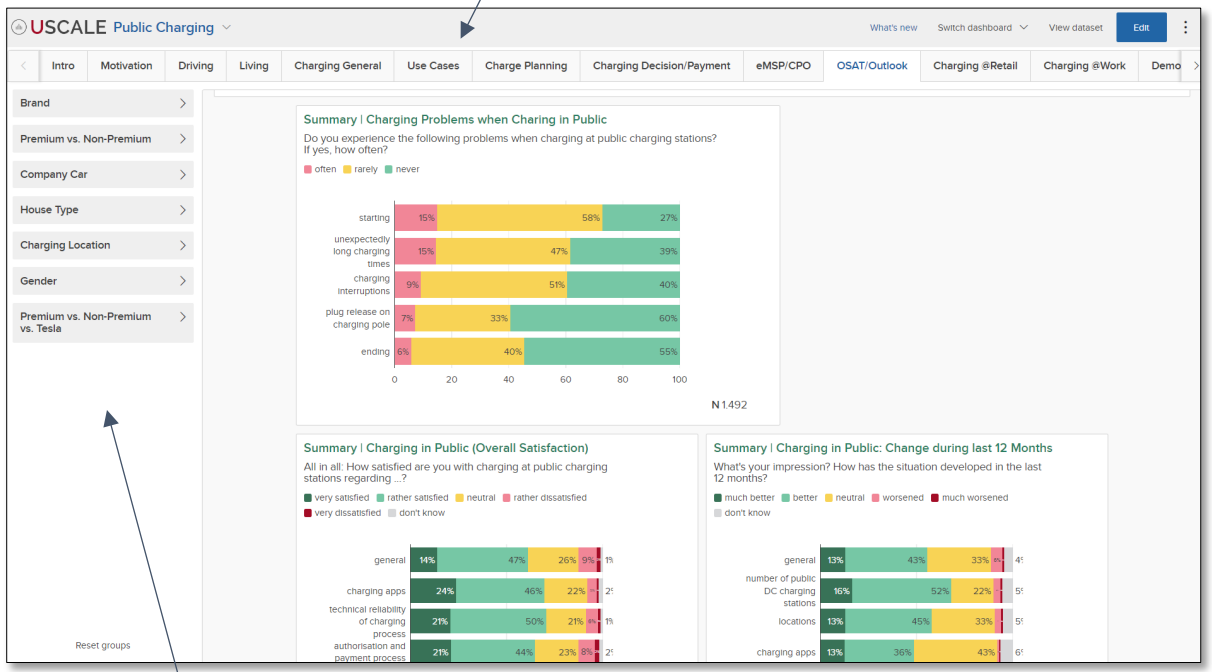
Study dashboard for your own analyses

Deep dives and brand splits

The breadth and depth of information in the focus studies is considerable.

The public charging study therefore also includes a dashboard for further splits. For example, differences between certain sub-target groups and certain brands can be displayed separately.

Subject areas



(sample presentation)

Filter options

Contents

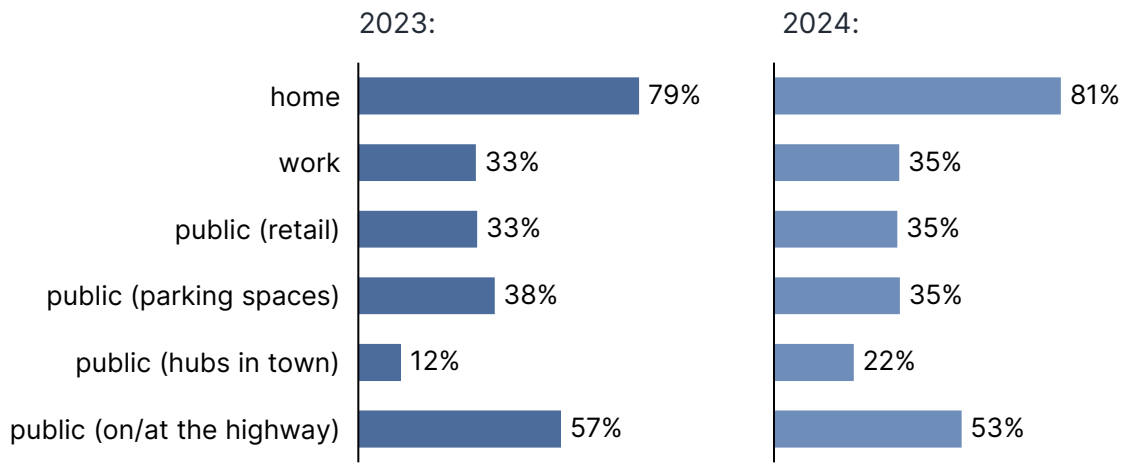
Management Summary

1

Growing share at most charging locations

Compared to 2023, charging at home, at work, in customer car parks and especially at charging hubs in urban areas will become more important.

Usage of the charging locations:



"Where do you charge your [EV]?"
(multiple answers possible)

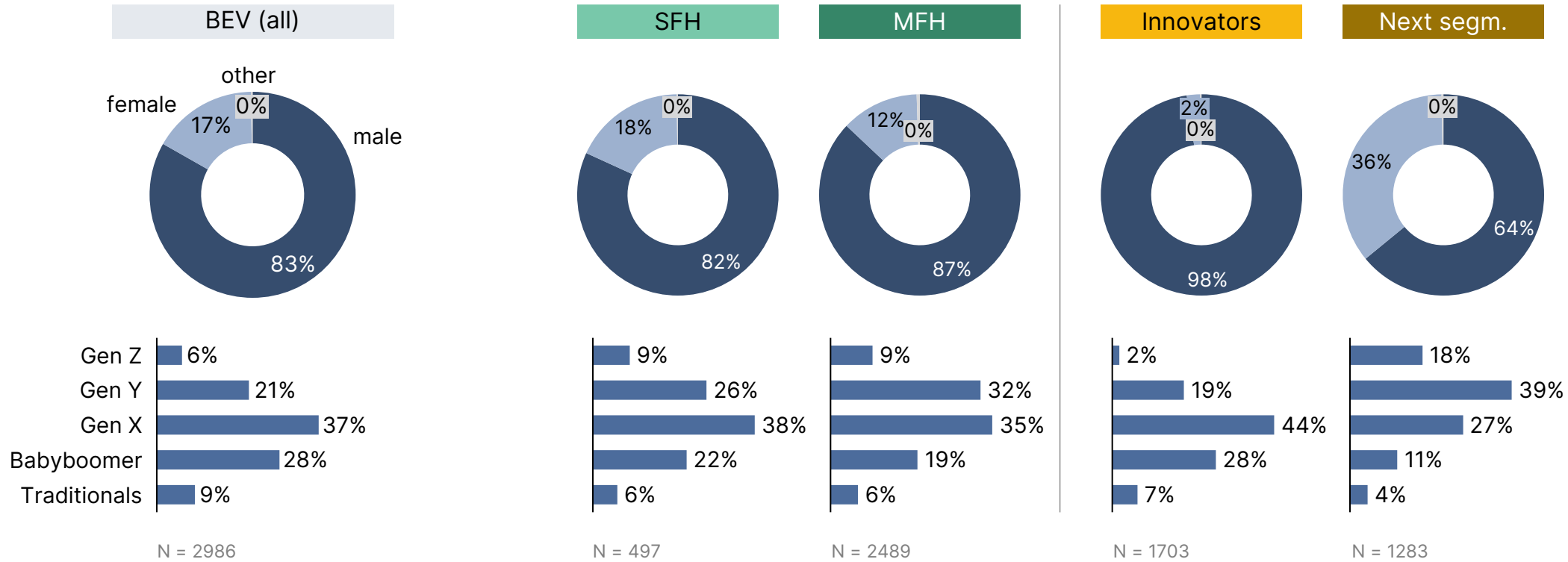
Contents

Gender and Age

The innovators are predominantly male. The proportion of women in the next segment corresponds to the proportion of women among new combustion car buyers.

"You are...?"

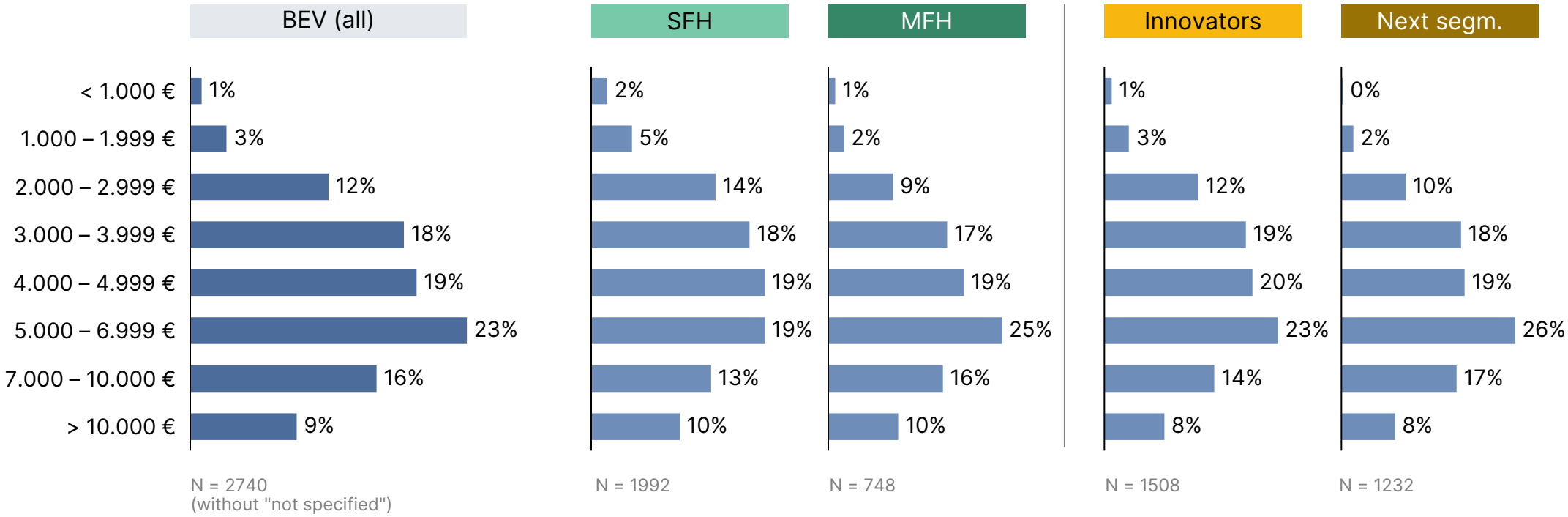
"How old are you?"



Income

59% of respondents have a net household income of € 5,000 or more.

"What is your net monthly household income?"

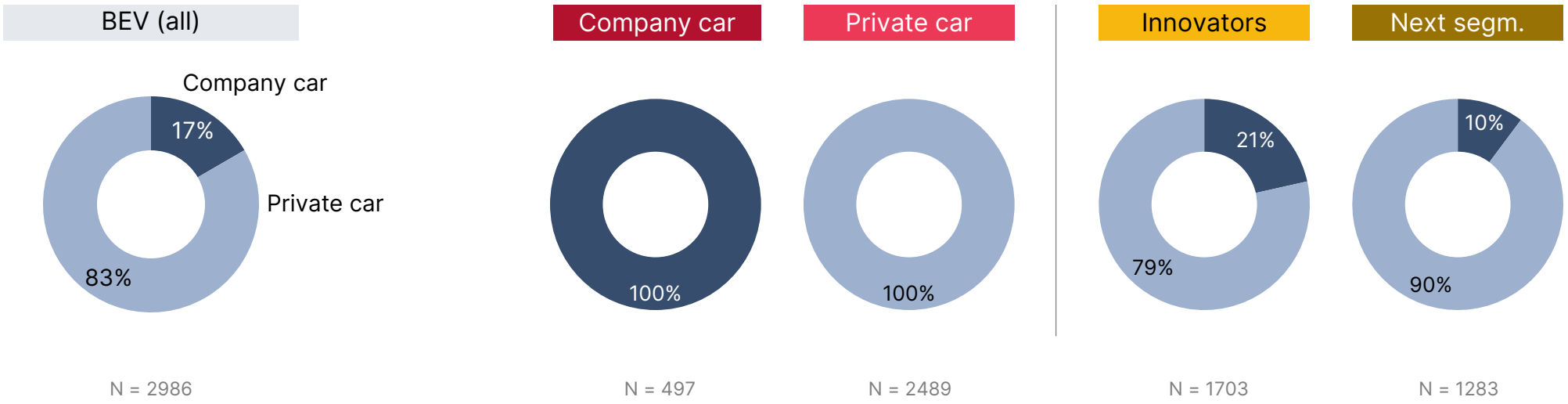


Contents

Company car

The proportion of company car drivers in the study is higher among innovators than in the next segment.

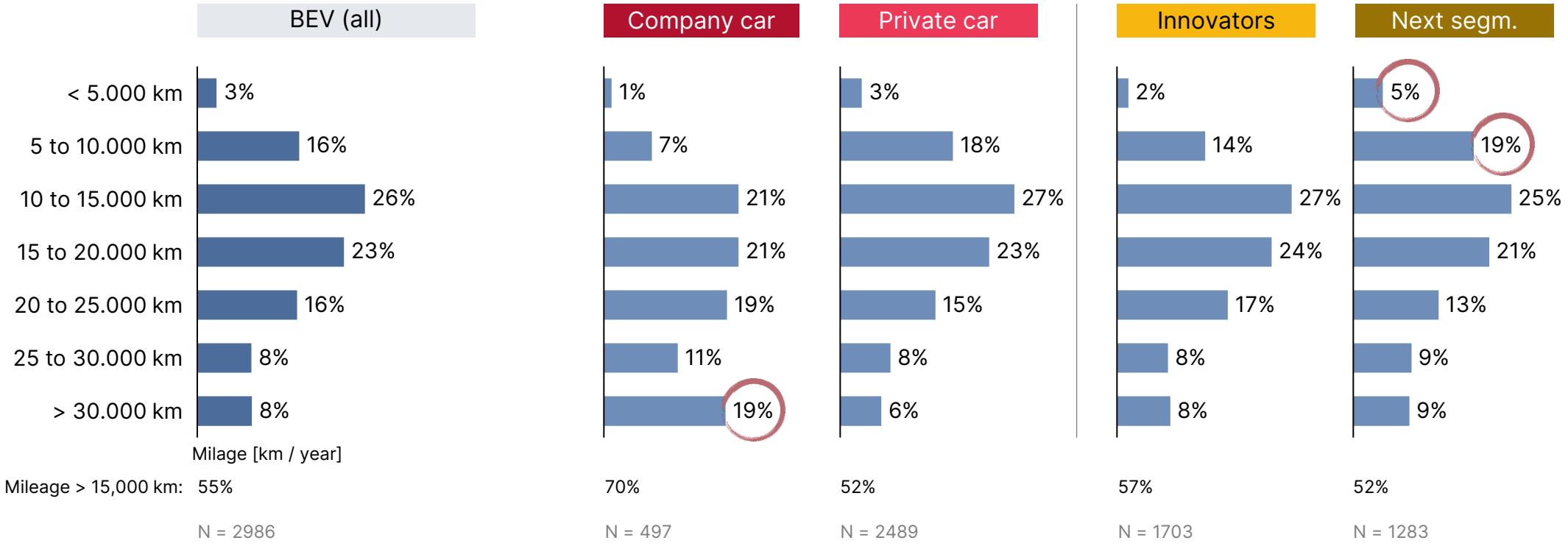
"Is your [make + model] a company car?"



Kilometres travelled (year)

eMobilists have a high mileage that is (still) higher than that of combustion engines. The next segment is slowly levelling out with combustion engines, i.e. it drives less than the innovators.

"Approximately how many kilometres do you drive with your [EV] per year?"

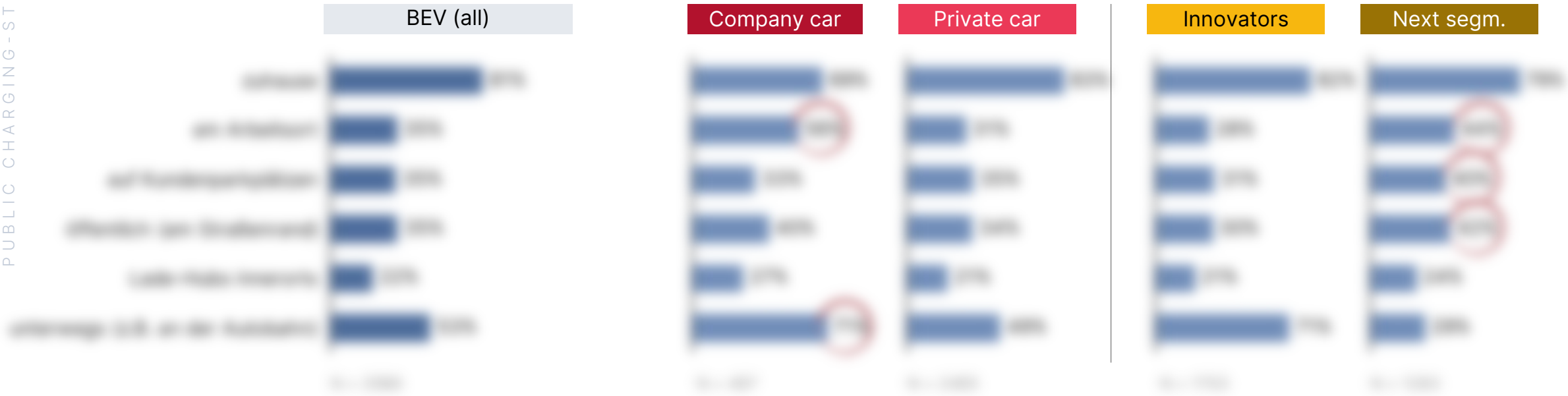


Contents

Charging locations

"Where do you charge your [EV]?"

(multiple answers possible)

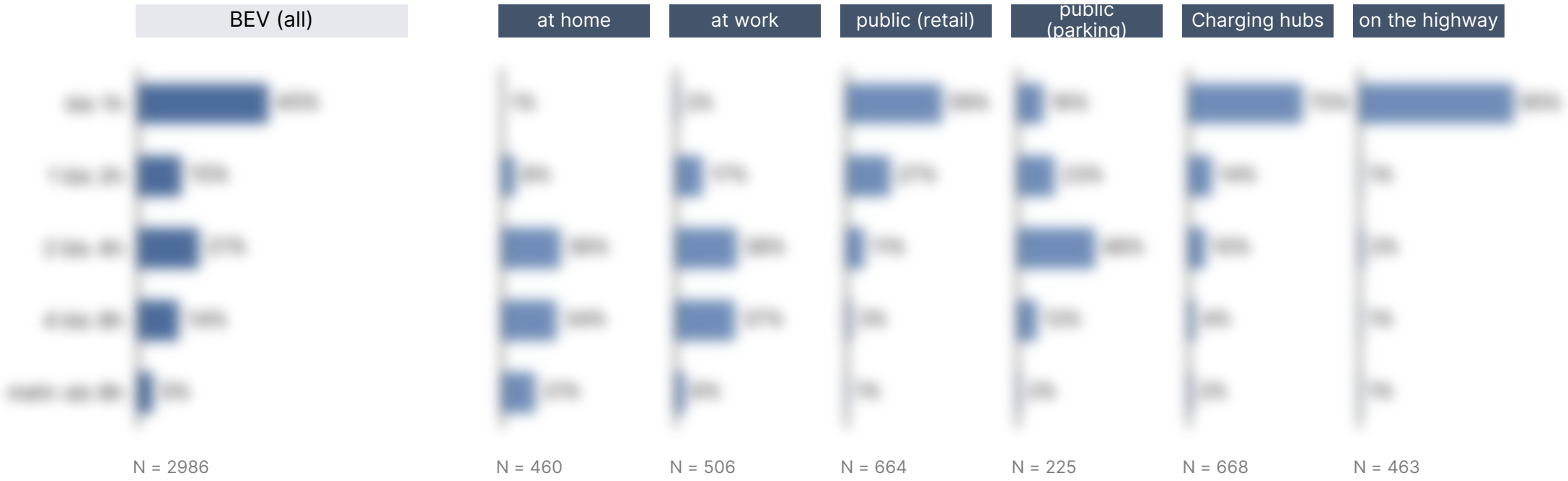


Charging time

[blurred]

"If you are charging [charging location]:

How long is your [EV] usually plugged in at this charging location?"

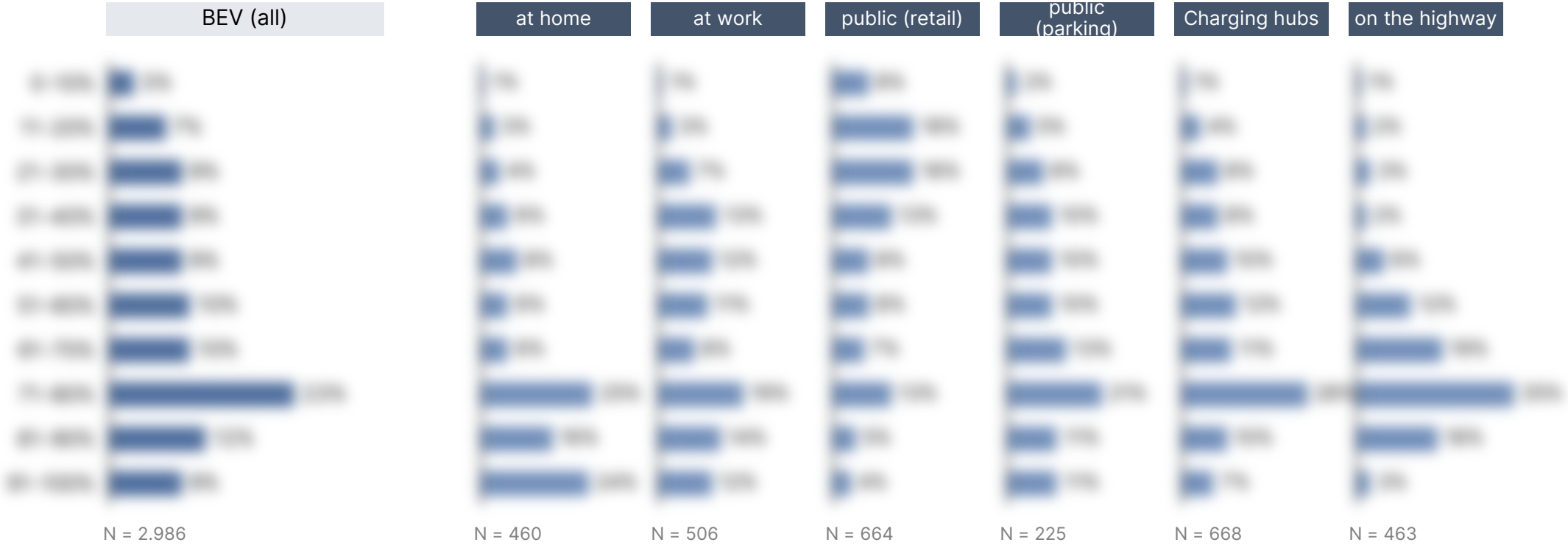


Energy shares

Auf Kundenparkplätzen wird tendenziell wenig Energie (nach)geladen, an anderen (halböffentlichen) Ladeorten dagegen deutlich mehr. Am meisten SoC wird zuhause geladen.

"If you are charging [charging location]:

What % SoC (battery capacity) do you usually charge when plugged in?"



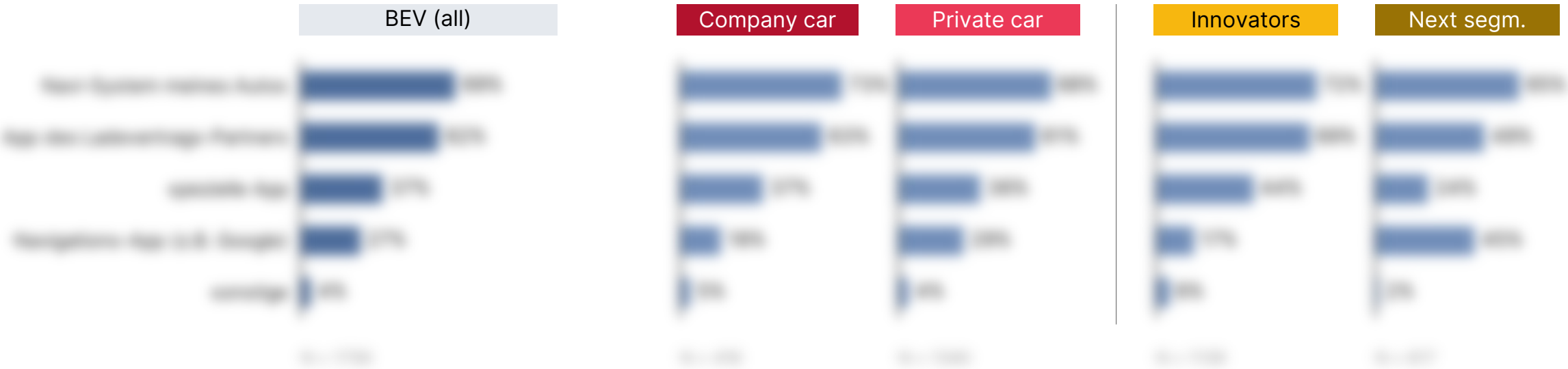
Contents

Charging station search: Systems

Die große Mehrheit nutzt das fahrzeugeigene Navigationssystem zur Ladesäulensuche.

"Which systems do you use to search for charging stations?"

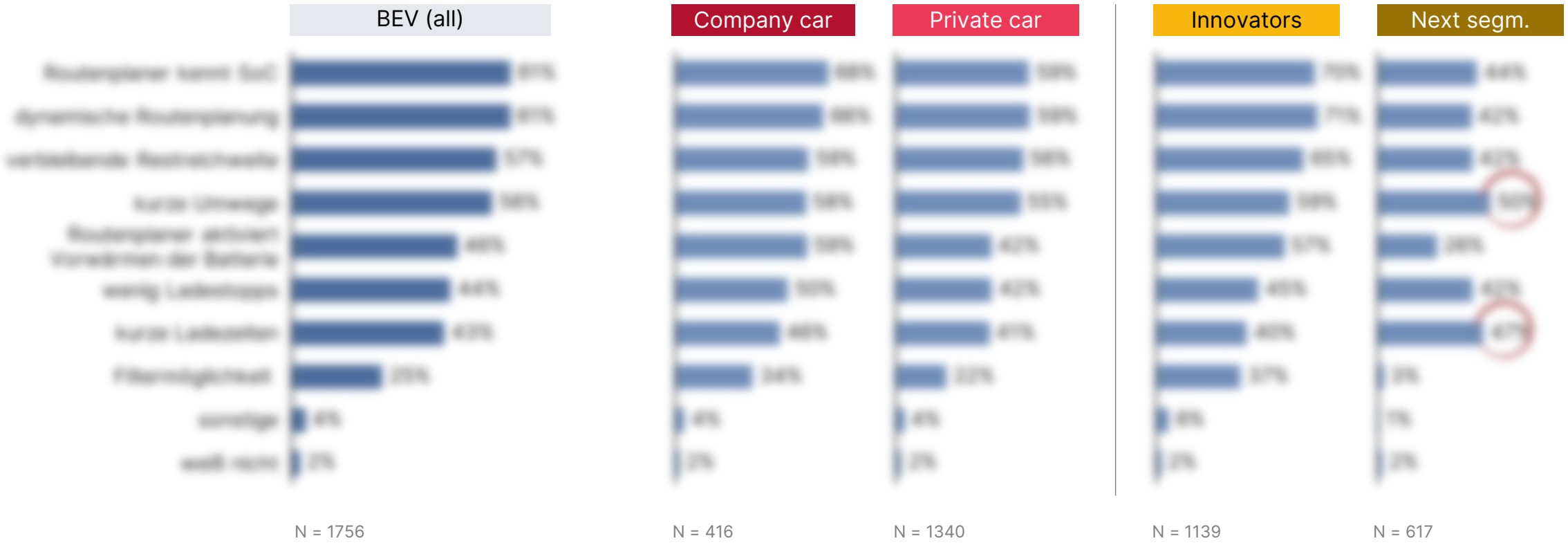
(multiple answers possible)



Route planning: Systems

Während Innovatoren eine hohe Integration und ausgefeilte Features schätzen, achtet das nächste Segment hauptsächlich auf kurze Umwege und kurze Ladezeiten.

"Which provider do you prefer to use?"



N = 1756 N = 416 N = 1340 N = 1139 N = 617

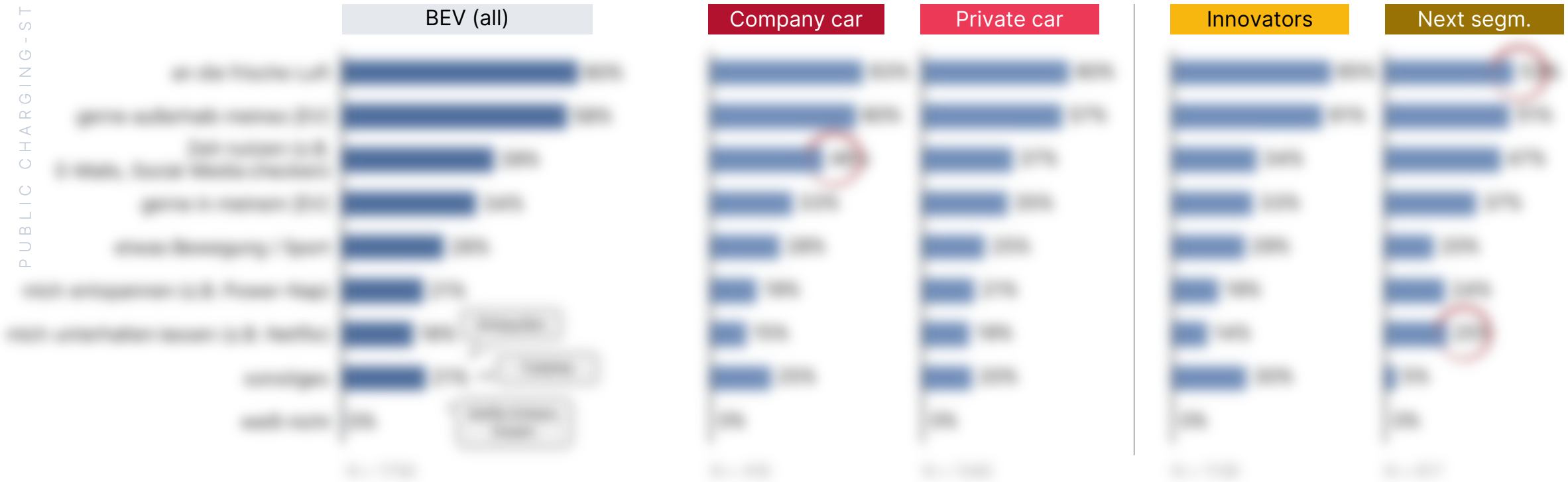
Contents

Boredom

Die Mehrheit verbringt die Ladezeit außerhalb ihres Fahrzeugs. Das nächste Segment ist jedoch häufiger im Auto und lässt sich unterhalten. Dienstwagenfahrer nutzen gerne die Zeit.

"How would you prefer to spend the waiting time during charging?"

(multiple answers possible)



Preliminary remarks on the conjoint method.

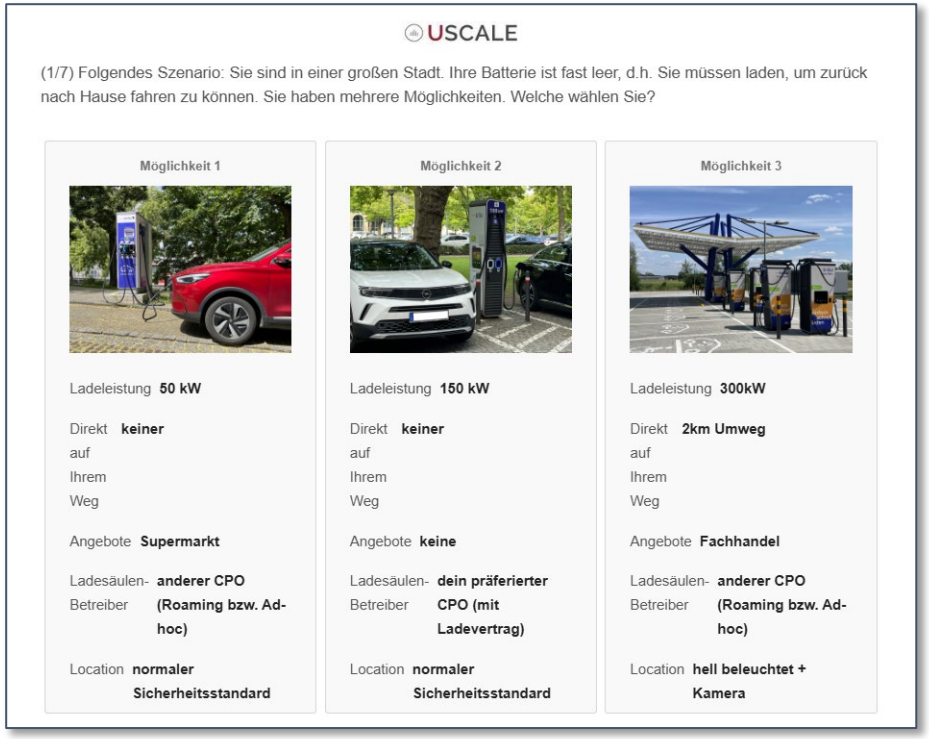
The conjoint method maps the charging decision.

For every charging decision, users weigh up several criteria against each other before making a decision.

In order to determine which criteria have which influence on the charging decision, the participants were repeatedly presented with different constellations in the survey from which they had to choose their preference.

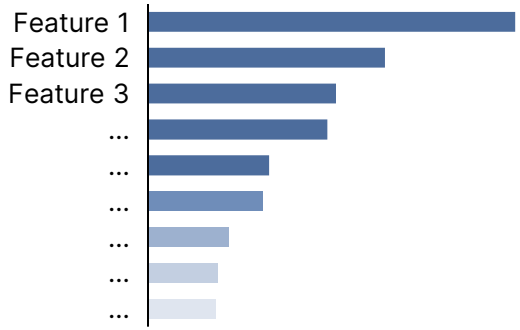
Each offer consisted of a combination of several features that were selected by an algorithm. The survey delivered thousands of individual evaluations, which were analysed as part of a multivariate analysis.

Example



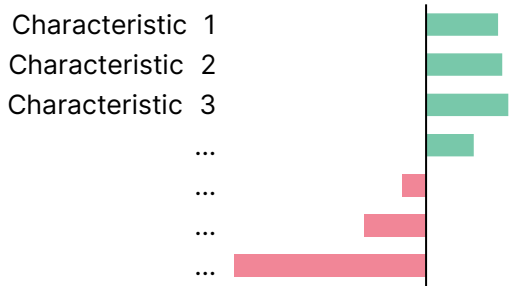
Preliminary remarks on the conjoint method

Importance of the features



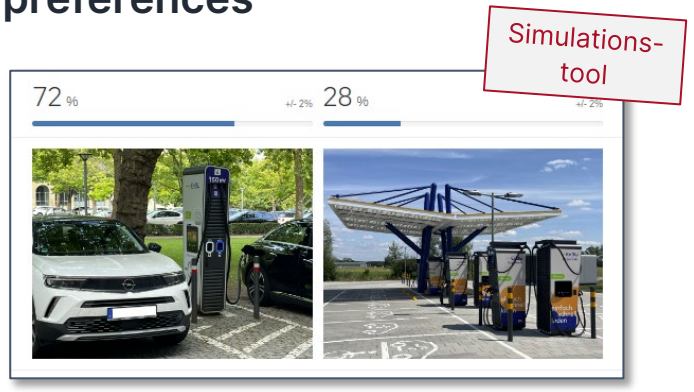
Calculation of partial benefit values for each individual characteristic. The sum of all partial benefit values is 100%.

Partial benefits of the characteristics



Calculation of the relative preferences for individual characteristics by normalising the average partial utility to the mean value of the characteristic.

Simulation of user preferences



For the simulation, the market potential is estimated (using the rule of three) in comparison to its alternatives.

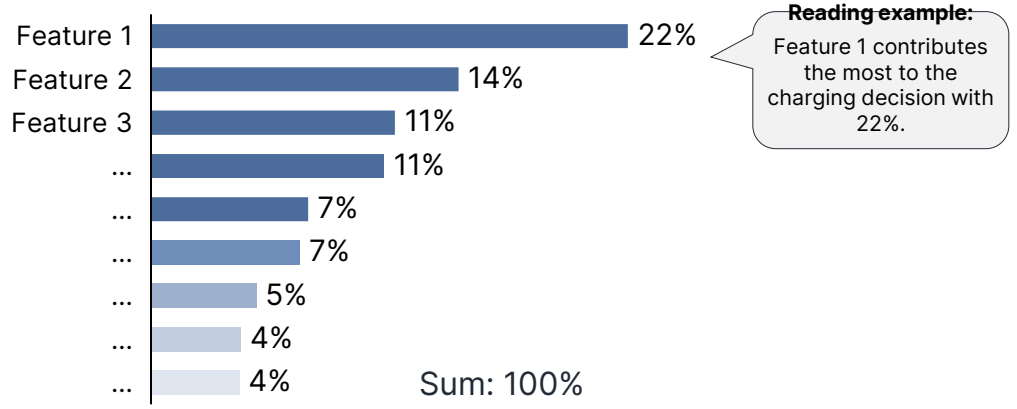
Preliminary remarks on the conjoint method.

Calculation of the relevance of individual characteristics via their partial benefit values.

Partial benefit values indicate how much benefit EV drivers attach to the individual features of a charging option and how much influence they have on the purchase decision.

Higher partial benefit values indicate greater relevance.

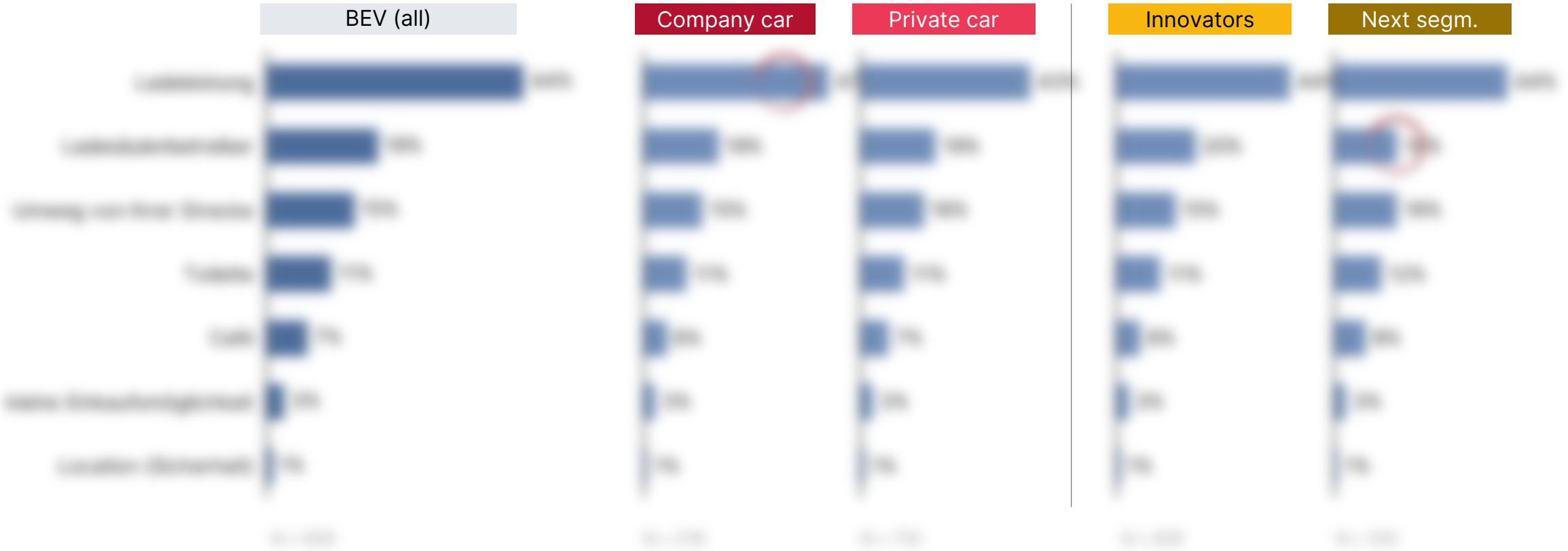
Partial benefit values:



Conjoint: Charging decision on the road

Im Use-Case „unterwegs laden" dominiert die Ladeleistung alle anderen Merkmale deutlich. Zusammen mit dem Zeitverlust durch einen möglichen Umweg bestimmt die Ladezeit die Entscheidung zu 60%. Der Betreiber (= Preis) und die Ausstattung kommen auf je rund 20%.

(calculated utility values of the charging decision)



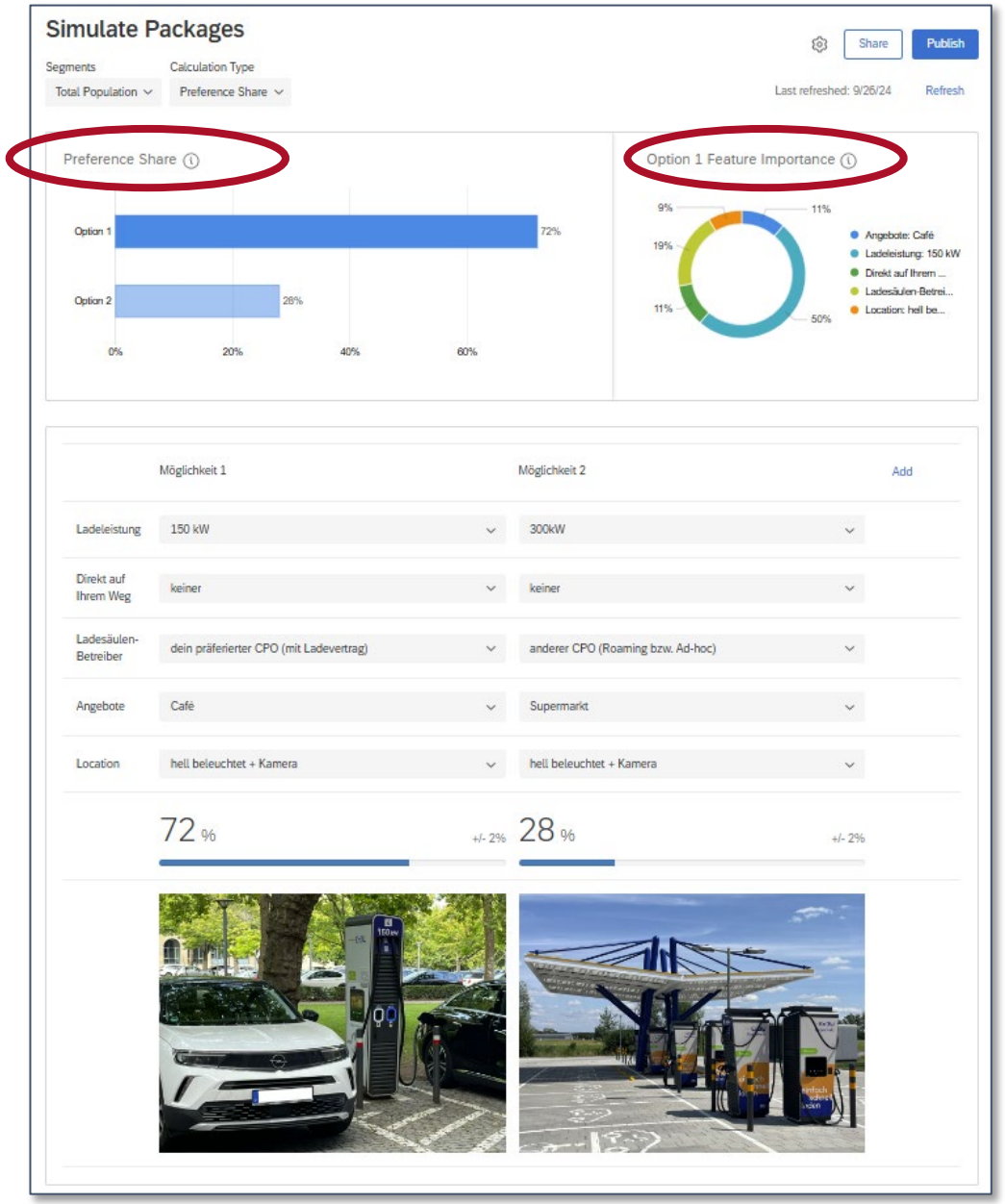
Preliminary remark on the simulator

Calculation of the market potential of various charging services

The potential market position of a product depends on the number and attractiveness of competitive offers. The market potential of a product can therefore only be estimated relative to its alternatives.

As the variety of feature combinations and target groups is infinite, the market potential is calculated in a simulation tool depending on all the features queried.

LINK to the simulator



Contents

Relevance of the charging locations

Weiterhin sind zuhause und der Arbeitsort am häufigsten der zentrale Ladeort, allerdings nehmen beide Anteile im nächsten Segment ab. Die öffentlichen Ladeorte nehmen an Bedeutung zu.

respective charging location = used:

"What role do the charging locations play in your charging behavior?"

Profile: Charging at the roadside

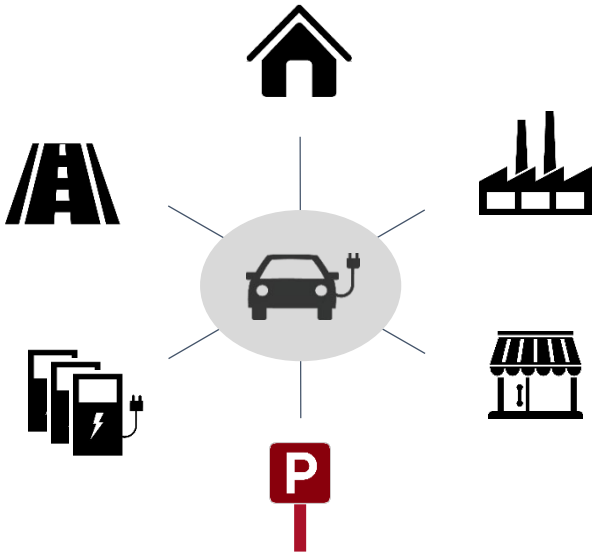
to the use case
"Charging at home"
(see private charging study)

USE-CASE:
Charging on route

USE-CASE:
Charging at the workplace

USE-CASE:
Charging hubs in urban areas

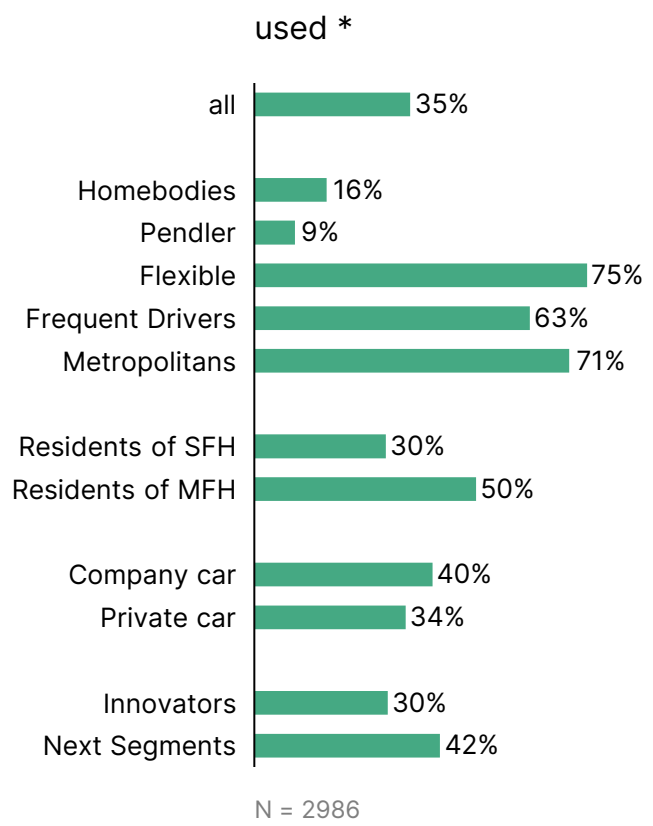
USE-CASE:
Charging at retail

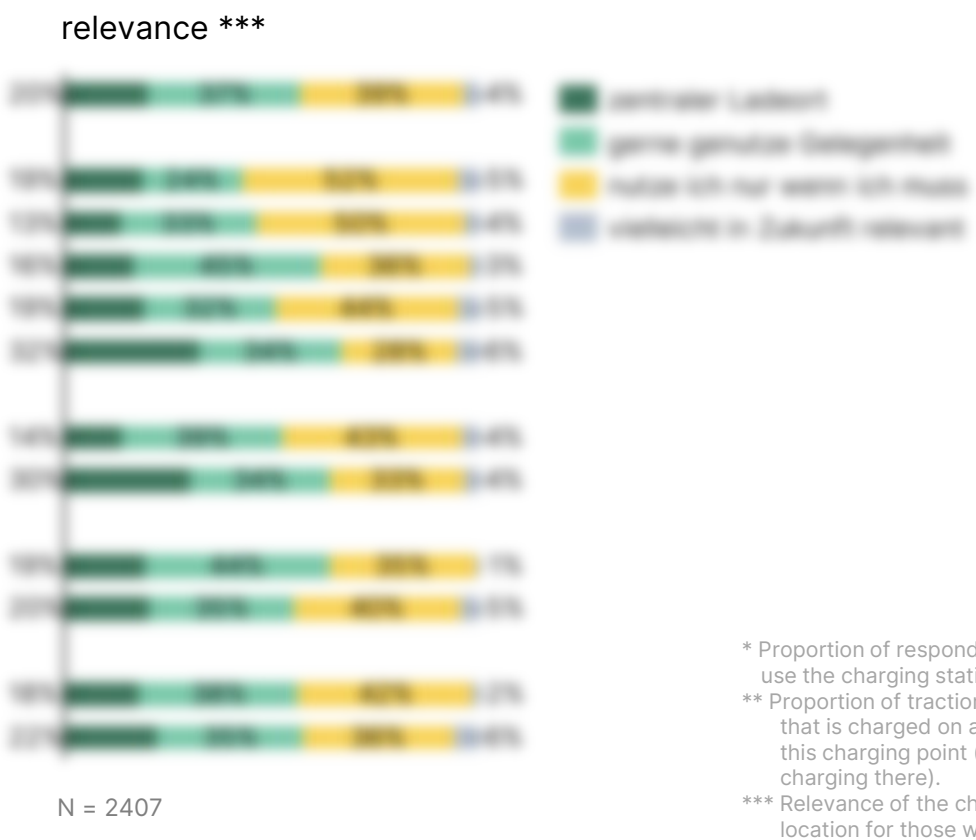


USE-CASE:
Public (at the roadside)

Profile: Charging at the roadside

35% charging at the roadside. The energy charged is low on average. For many city dwellers and apartment block residents, however, charging at the roadside is the central charging location.

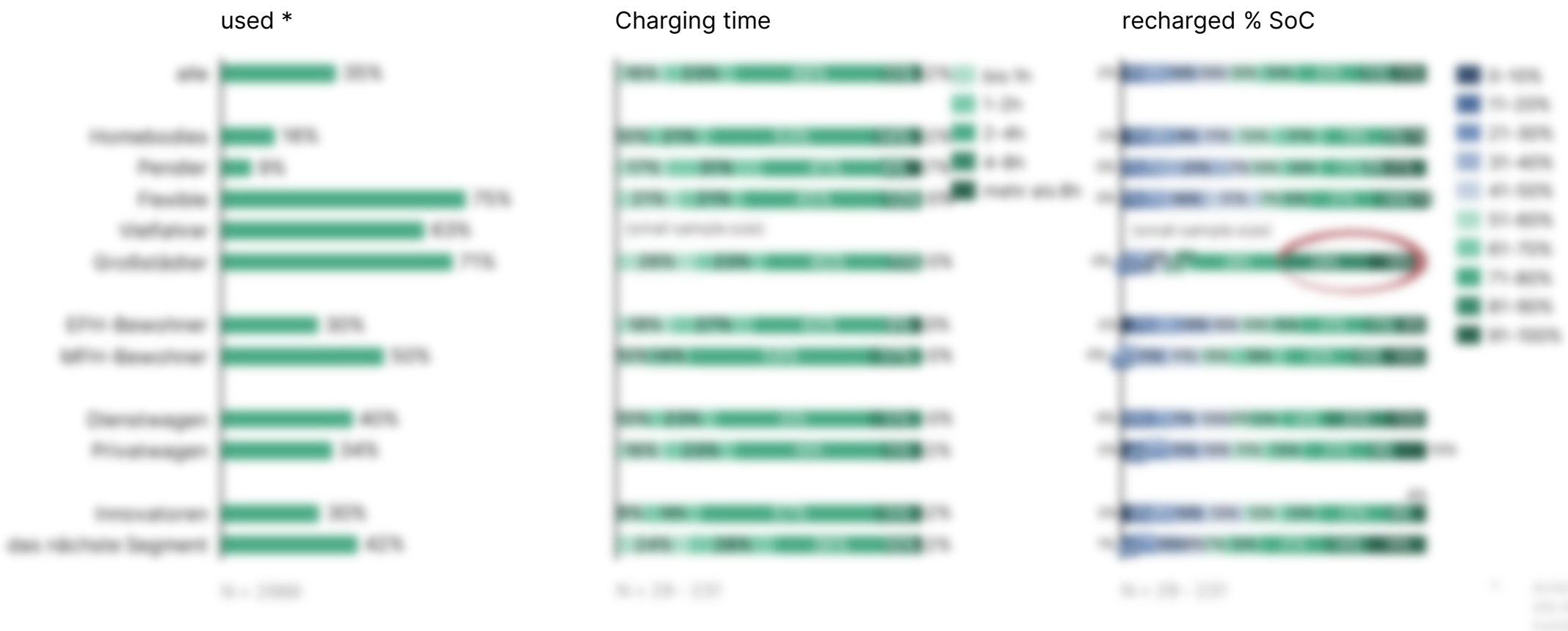




* Proportion of respondents who use the charging station.
** Proportion of traction current that is charged on average at this charging point (by those charging there).
*** Relevance of the charging location for those who use the charging location.

Profile: Charging at the roadside

Zu Ladedauer und am Straßenrand nachgeladenen Energiemengen ergibt sich vor allem für Großstädter ein anderes Ladeverhalten.



Contents

Frequency of charging problems

Alle Teilgruppen haben zu einem hohen Anteil die abgefragten Probleme erlebt. Das nächste Segment berichtet häufiger, kein Problem gehabt zu haben. Dies kann auf ein anderes Ladeverhalten oder eine andere Fehlerwahrnehmung zurückzuführen sein.

"Do you experience the following problems when charging at public charging points?

If so, how often?"

Contents

Reasons for unattractiveness/attractiveness of CPOs

Verfügbarkeit, Preis und Zuverlässigkeit sind die wichtigsten Gründe für die Attraktivität eines Ladeangebots im Retail.

Attractiveness = attractive or very attractive
"Why do you find the following provider attractive?"

Attractiveness = unattractive or very unattractive
"Why do you find the following provider unattractive?"

(multiple answers possible)

Note:
Different bases for both charts!

Reasons for unattractiveness
(for rating "Provider is (very) unattractive")

Reasons for attractiveness
(for rating "Provider is (very) attractive")

Ratings of the retail charging offers (1/3)

Vor allem Aldi überzeugt mit günstigen Ad-hoc-Ladepreisen. Lidl hat Probleme mit der Zuverlässigkeit.

"Why do you find the following provider attractive / unattractive?"

(multiple answers possible)

SCALE YOUR USER
SCALE YOUR BUSINESS

Dr. Axel Sprenger

Managing Operator
UScale GmbH

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