

EXCERPT

EV Benchmarking Study 2023



Electric cars from the DACH market EV drivers' perspective

for
Mercedes-Benz AG
28/11/23

UScale GmbH
www.uscale.digital

EV Benchmarking Study 2023

Initial situation



Compared to combustion engines, which have been optimised for over 100 years, battery-electric vehicles are still in their infancy.

What new use cases arise from electric driving?
How must the e-specific concepts be designed? To be successful in competition, manufacturers need systematic customer feedback as early as possible.

This study describes in detail the usage habits, problems and recommendations of 4,522 e-car drivers in Germany.

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EV-specific use cases and features requested

Driving



- Range
- Eco-modes
- Regenerative braking
- Driving and functional noises

Display and operating concept



- Range indicator
- Charging indicator
- Energy Monitor
- Other displays in the cockpit

Navigation system



- Functions used
- Usage habits
- Problems
- Recommendations

Connect app



- Functions used
- Usage habits
- Problems
- Recommendations

Charge management



- Route Planning, Thermo-Mgmt.
- Charging settings, charging capacity
- Charging mgmt., charging problems
- Accommodation of charging cable, position of charging port

Heating and air conditioning



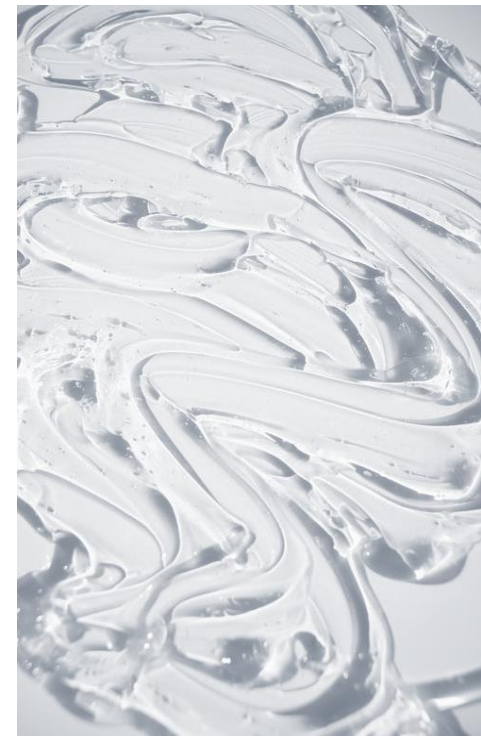
- Pre-conditioning, heating, air conditioning
- Usage behaviour
- Problems
- Recommendations

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Survey structure

Owners of e-cars were asked about EV-specific features according to...

Usage habits	"How often do you use ...?" "Which of the following functions do you use...?"
Problems	"Have you already had problems with ...?" "What kind of problems have you had?"
Concept maturity	"How mature are the technical concepts of your [brand] ... regarding ...?"
Recommendations to manufacturers	"Do you have any recommendations to [brand] on ...?"



Methodology

Target group

Sample:

- Target group: Drivers of Battery Electric Vehicles (BEV)
- Total sample: N = 4,522
- Holding period: Average approx. 12 months
- Company car share: 16%

Survey:

- Survey: online
- Countries: DACH
- Recruitment: Social Media
- Questionnaire: 87 questions, of which: 16 free text questions
- Interview duration: approx. 20 - 25 min
- Field phase: April - May 2023



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Added value of the study for manufacturers

Product management

The studies show product managers which features are used how and what problems users have with them. This helps in the prioritisation of features and the definition of customer benefit criteria.

Concept quality and quality management

Currently, there are no cross-competitive quality studies with EV-specific focus and sufficient sample. The study enables the development of requirements for concept quality and provides important input for error correction.

Development

The study cannot prescribe technical criteria, but it enables the derivation and calibration of technical specifications via clients:

1. Confirm own concepts: Which concepts are confirmed by customers and can be further blocked and rolled out?
2. Revise own concepts: Which concepts need to be adapted and if so, how?
3. Learning from competitors' concepts: Which competitors' concepts are viewed positively and should be examined for an acquisition?



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Possibilities for detailed analysis

Manufacturer with few vehicles in the study

The study shows problem areas of the brands with sufficient market share. Manufacturers with only a few vehicles in the study can understand the complaints about the vehicles and check their own product concepts or specifications for possible similar problems.

Deep Dives 1: Verbatims

This document is a summary of all brands. The details with over 20,000 pre-clustered open mentions of the participants help with the exact analysis.

Deep Dives 2: Follow-up survey

UScale has the contact details of almost half of the participants. This means that in many cases personal contact can be established between the manufacturer and the EV driver.

Deep Dives 3: Oversampling

UScale offers to carry out the present survey, adapted if necessary, also with the manufacturer customers.



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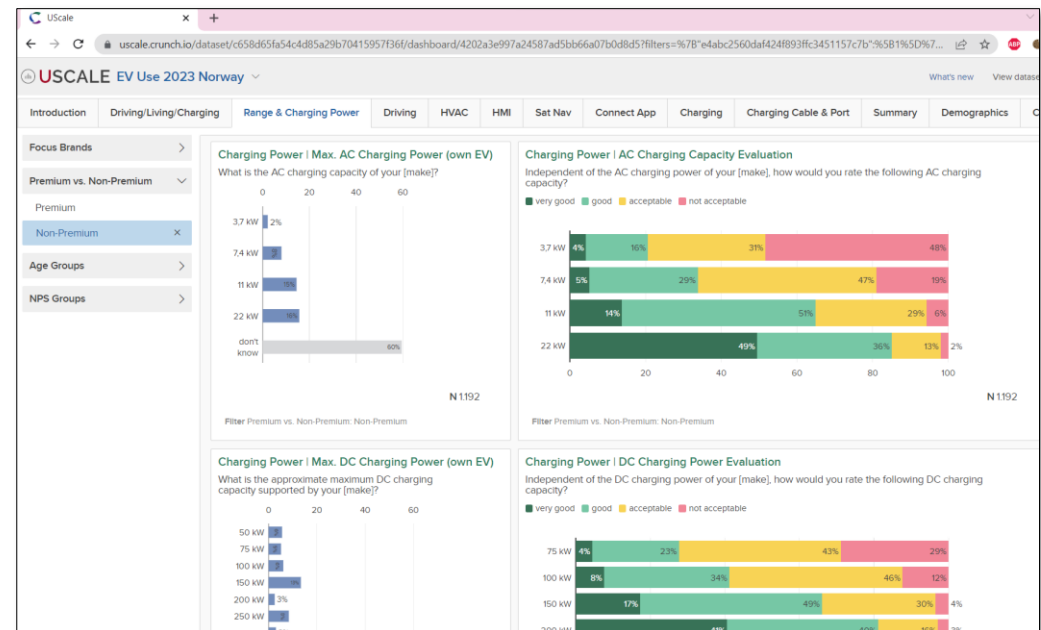
Database for own analysis

Deep dives to individual brands, models and subgroups.

This document only shows splits at brand level and no verbatim mentions.

The associated dashboard shows the differences at model level and verbatim mentions for each model.

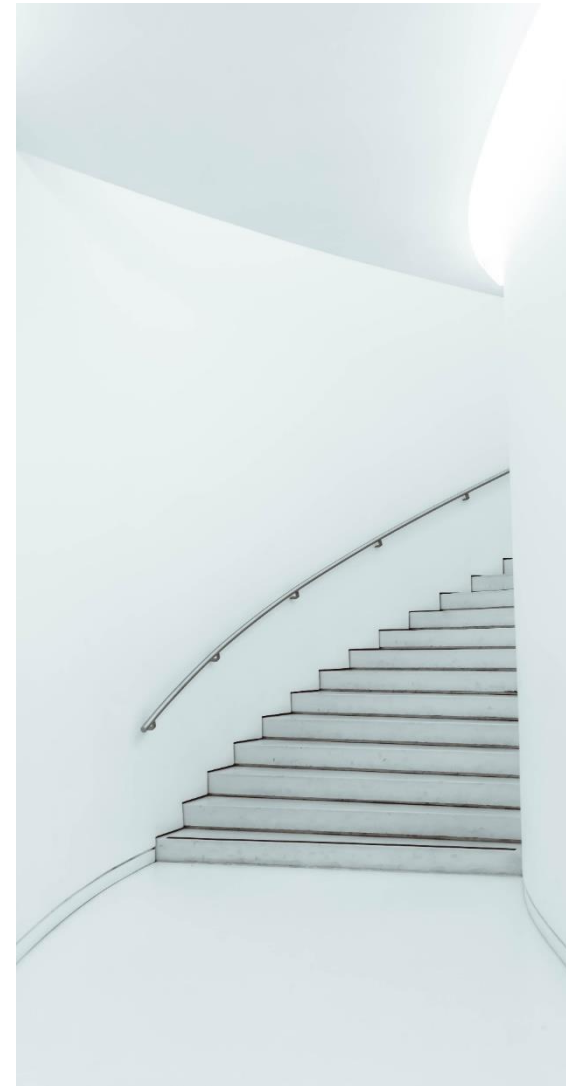
To register, please contact kontakt@uscale.digital.



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Management summary

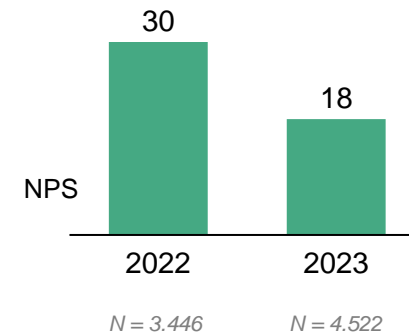
1

Significant decline in the recommendation rate (NPS).

Although the technology is improving, the NPS values across the entire market are declining.

With the entry of new customer groups, expectations and thus demands on manufacturers are rising faster than vehicles are getting better.

Net Promoter Scores (NPS) 2023
(brands weighted according to market share)



Management summary

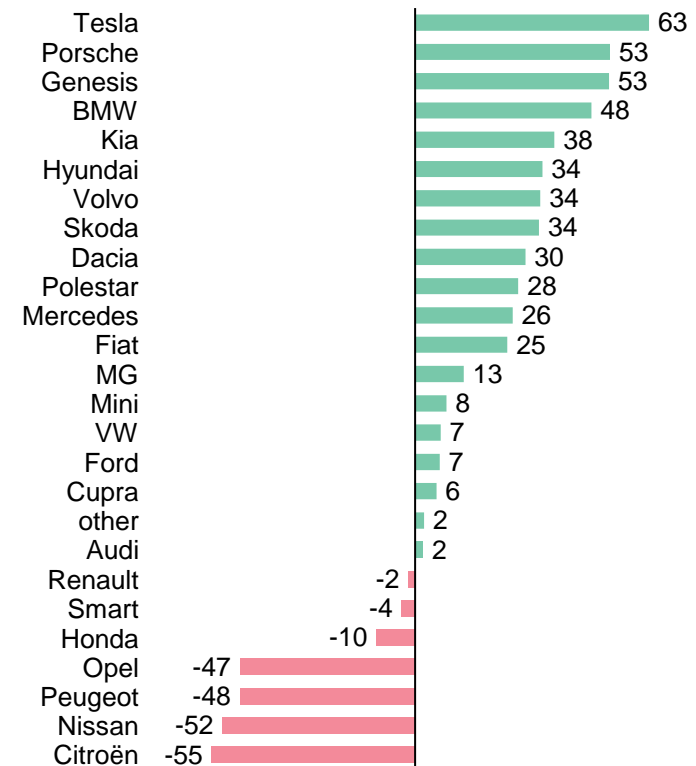
2

Very big differences between the brands.

While Tesla is once again convincing on many topics that are important for EV drivers, other brands are lagging behind with some new models.

Besides Porsche and BMW, the Korean brand group around Hyundai is particularly convincing.

Net Promoter Scores (NPS values)



N = 29 - 787 per brand

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Management summary

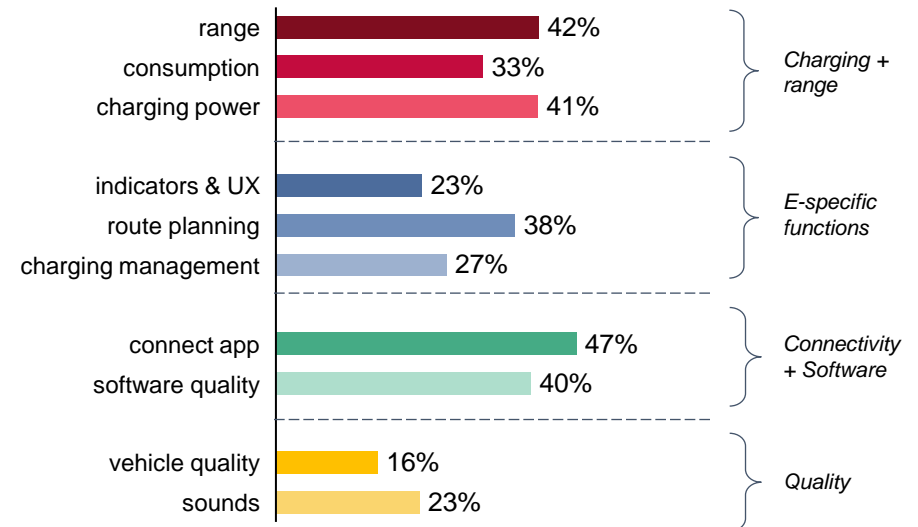
3

Great need for action in all e-specific topics.

The respondents see three major thematic areas with a particular need for action:

1. Range and charging capacities.
2. E-specific functions, such as route and charge planning and displays.
3. Software and connectivity, especially the functionality and reliability of the Connect app.

Topics with a particular need for action:



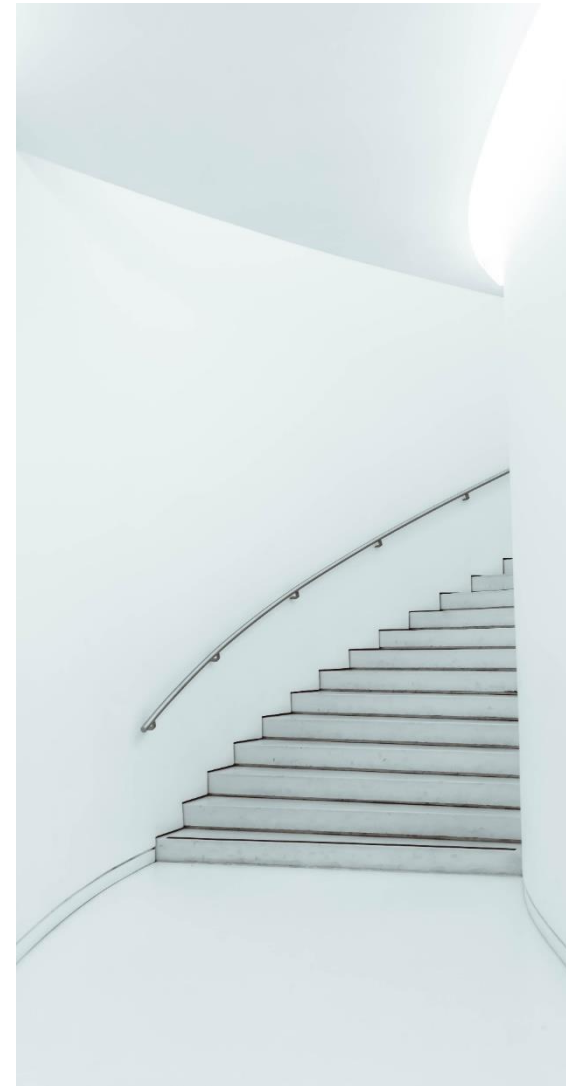
N = 4.522

"In summary:
What should [brand] work on as a priority?"

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Target group

Motivation

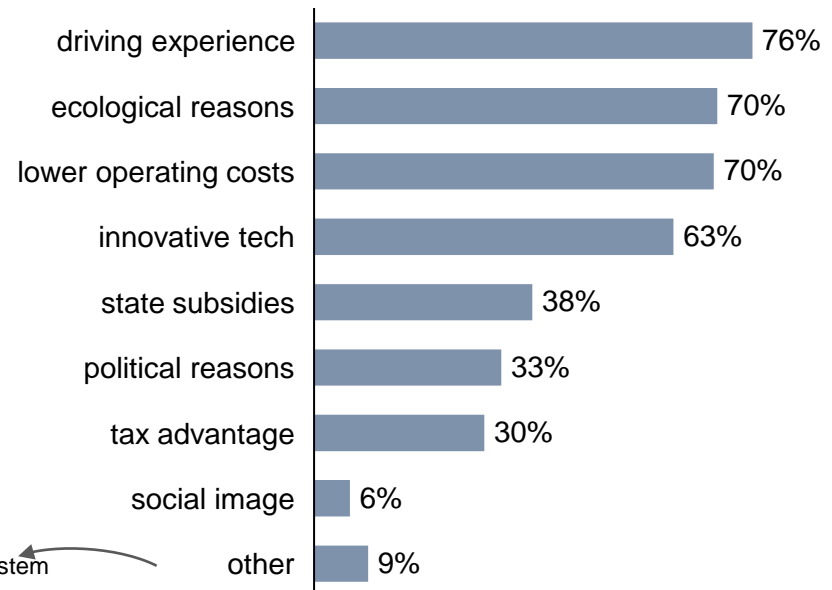
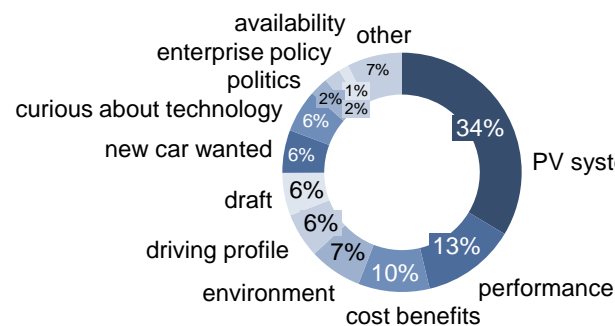
For the first time, fun to drive is more important than sustainability.

The most important reasons for an e-car lie in the triad of driving experience, sustainability and cost aspects.

While in previous years ecological motives were in the foreground, this year ecology was "overtaken" by fun to drive.

Among the others, coupling with the PV system is mentioned most frequently.

*"What was the main reason for you to get involved with e-cars?"
(multiple selection possible)*



N = 4.522

Target group

Brands

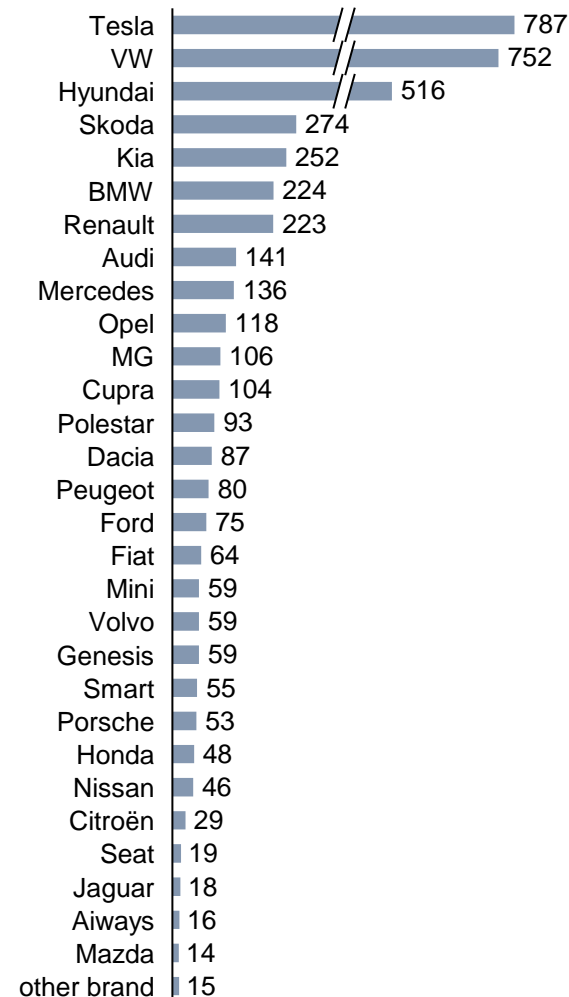
All relevant brands included in the study. Brand representations weighted by market share according to the German Federal Motor Transport Authority (KBA).

The brand distribution follows the slowly increasing model range of e-vehicles in the market.

The survey was conducted without quotas. All graphs on problems and concept maturity in this document are therefore weighted according to the market share of the brands. The weighting was based on the manufacturers' market shares in 2022 in Germany according to the KBA.

The graphs in this document include all brands with a sample above 30. As an exception, Citroen has been included in the evaluation with a sample size of 29, but marked with *.

"What kind of e-car do you have (brand)?"



N = 4.522

Target group

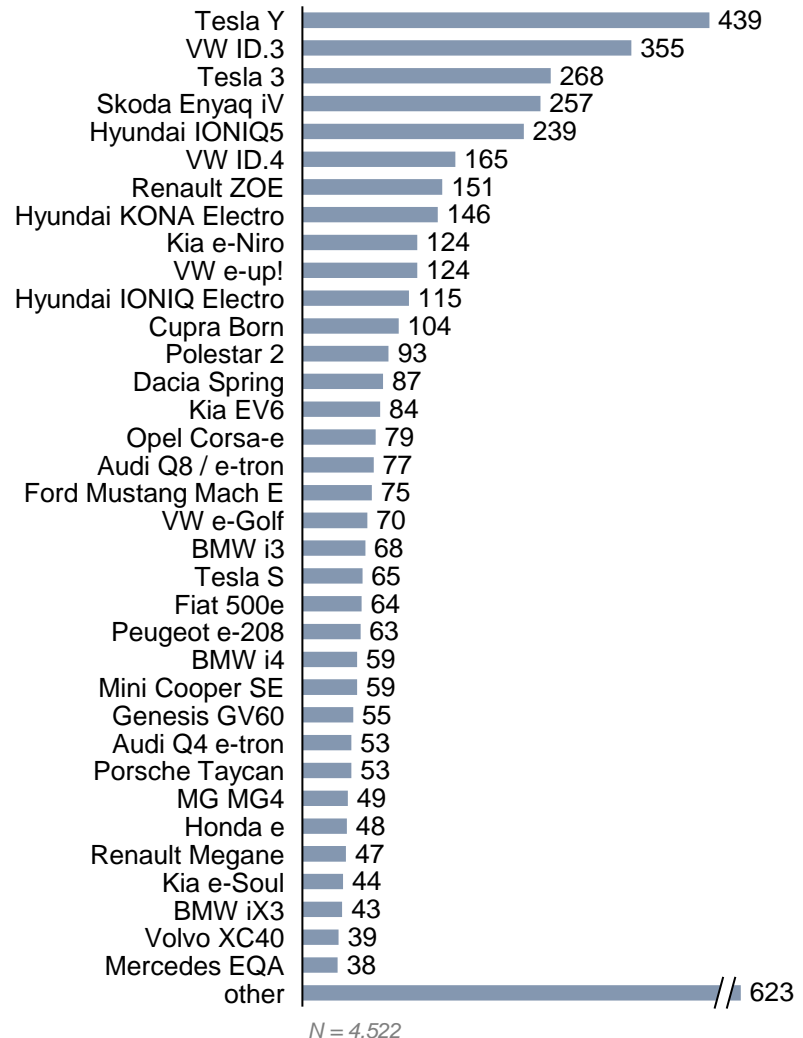
Models

Models with sufficient market share in the sample.

All graphs on problems and concept maturity are weighted by brand market share.

There is no weighting by model within the brand.

"What kind of e-car do you have (model)?"



Target group

Company car

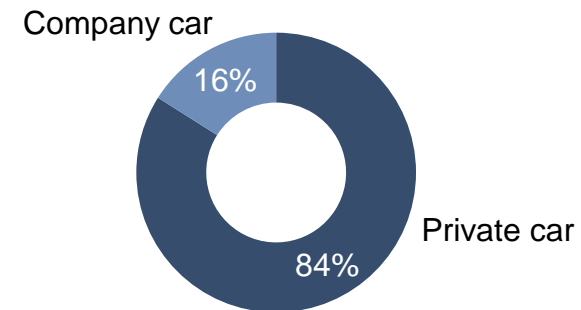
The share of company cars is still low.

In contrast to combustion vehicles, the share of company cars with e-cars in the study is only 16%.

With the market launch of further models in the typical German company car segments, this share is expected to increase in the medium term.

Compared to 2022, the share of company cars has not changed.


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

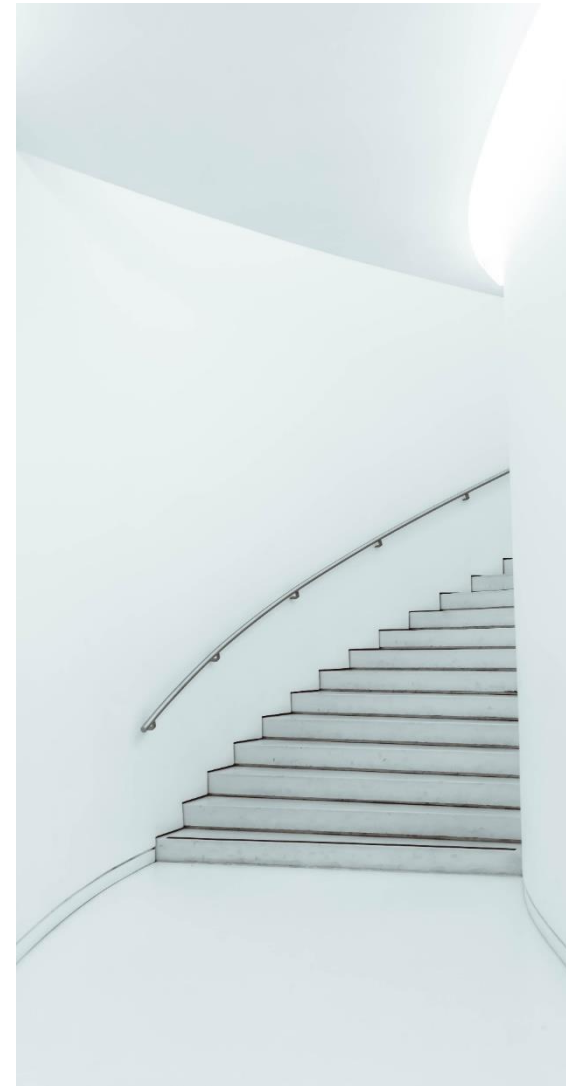


N = 4.522

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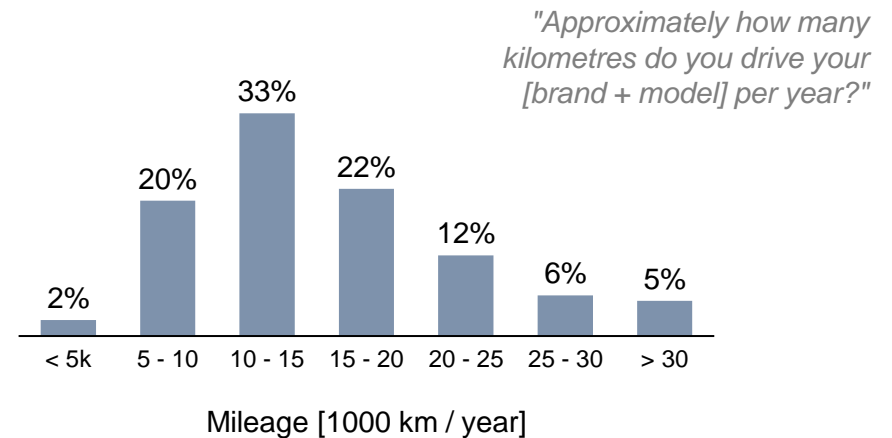
Driving behaviour

Mileage

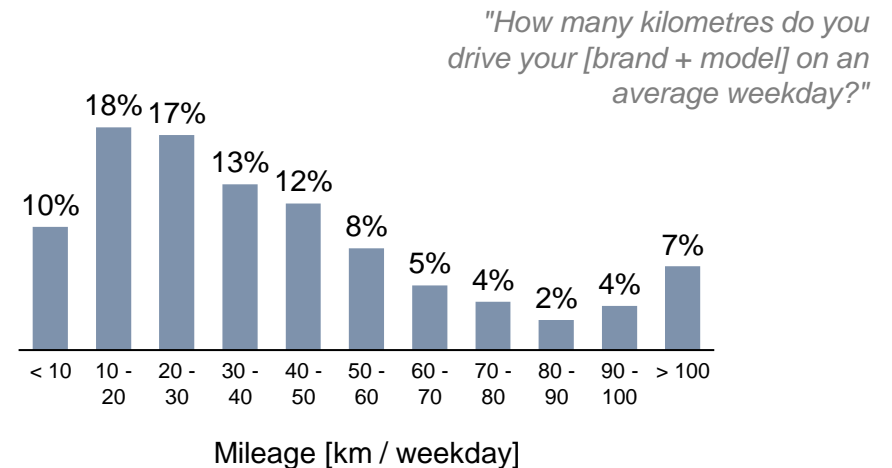
E-cars with higher average mileage than combustion engines.

The average annual and weekday mileage is higher than that of combustion vehicles at 12,670 km/year*.

The mileage was queried in the clusters shown, which is why no average values can be determined.



N = 4.522




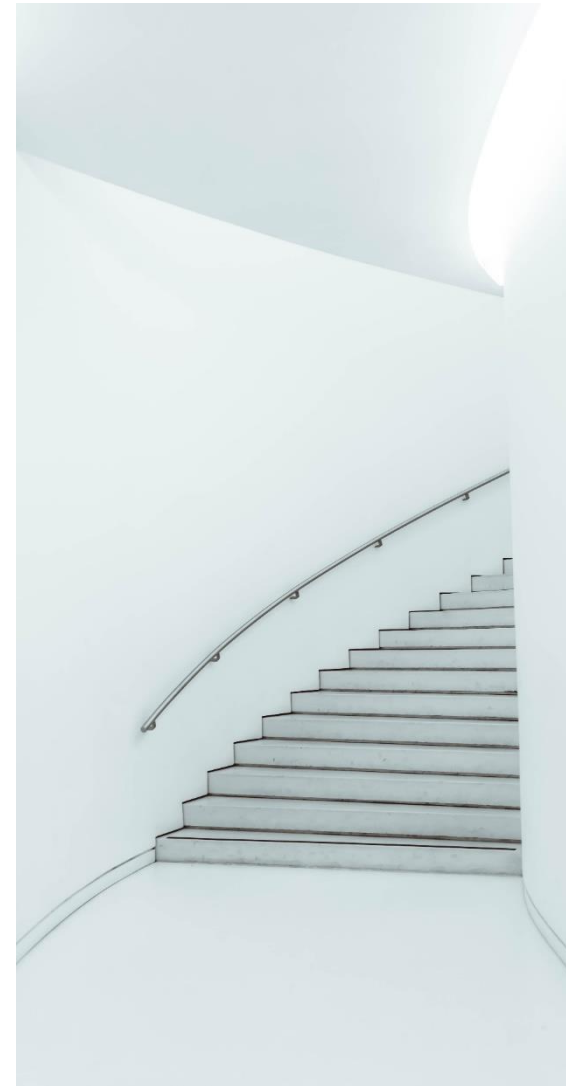
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* DAT Report 2023

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Range

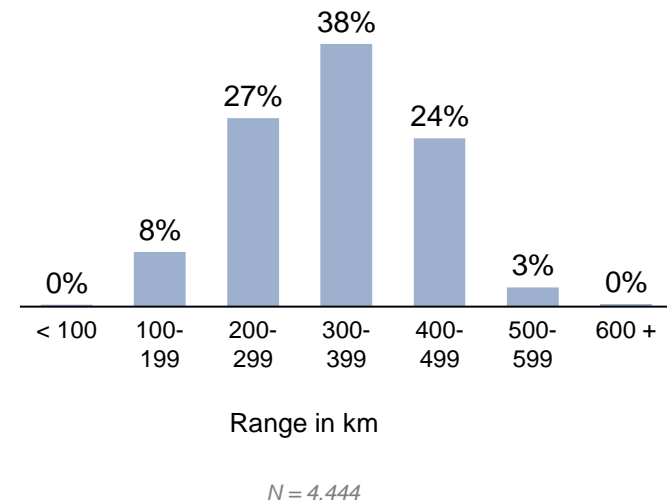
Real ranges

Slightly increased ranges.

The actual range of the e-cars of the respondents is 323 km on average (weighted average over market shares).

Compared to last year, the range has only slightly increased by 4% (12 km).

"What is the "real" summer range of your [brand] approximately?"



Range

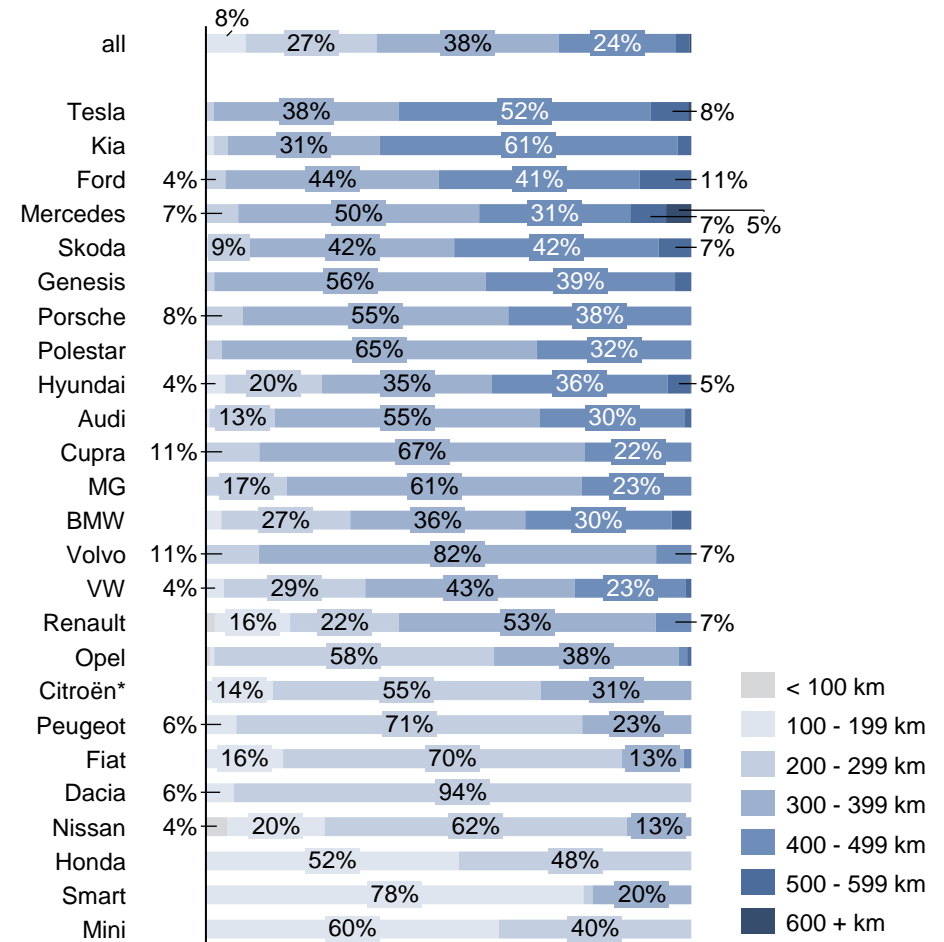
Real ranges

First-placed Tesla is followed by two non-premiums, Kia and Ford.

The actual ranges of the models differ greatly.

The top 10 places are occupied by six premium and four non-premium brands. The Korean manufacturer Hyundai is represented in the top 10 with all three of its brands.

"What is the "real" summer range of your [brand] approximately?"



N = 29 - 768

* small sample (N < 30)

Range

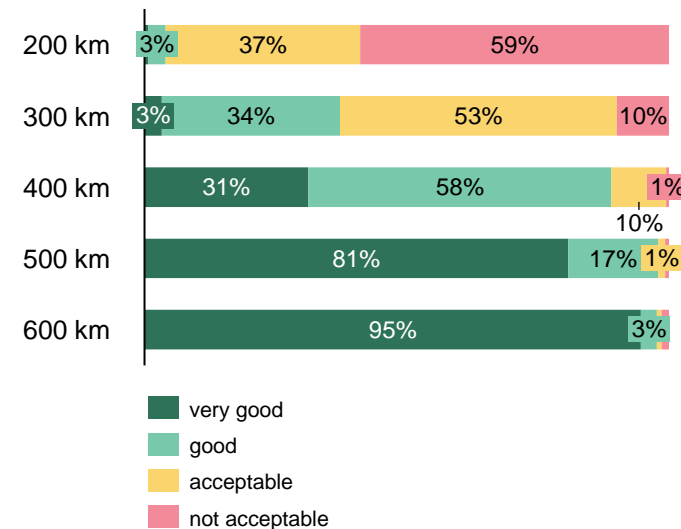
Range assessment

WLTP ranges beyond 400 km good, beyond 500 km mostly very good.

WLTP ranges of around 300 km are rated critically by the vast majority. WLTP ranges above 400 km are rated good or very good by around 90% of respondents.

Compared to last year, the proportion of "very good" ratings in all areas falls by 1 to 4%, so expectations are rising.


*"Regardless of the range of your e-car:
How would you rate the following
"real" summer ranges for an all-
electric vehicle?"*

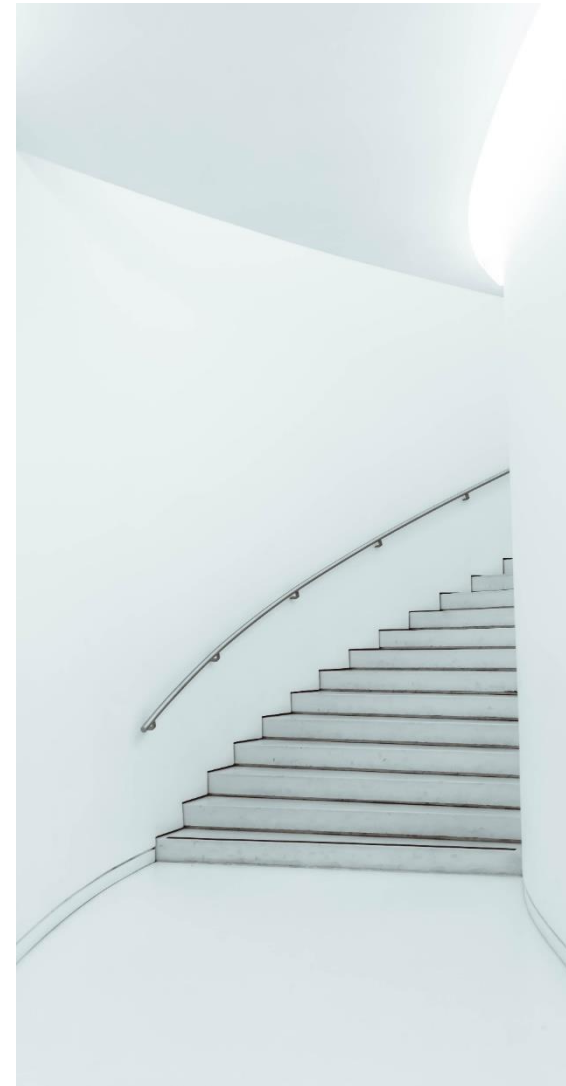


N = 4.522

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Eco mode Feature

Eco-mode used by nearly half of the respondents.

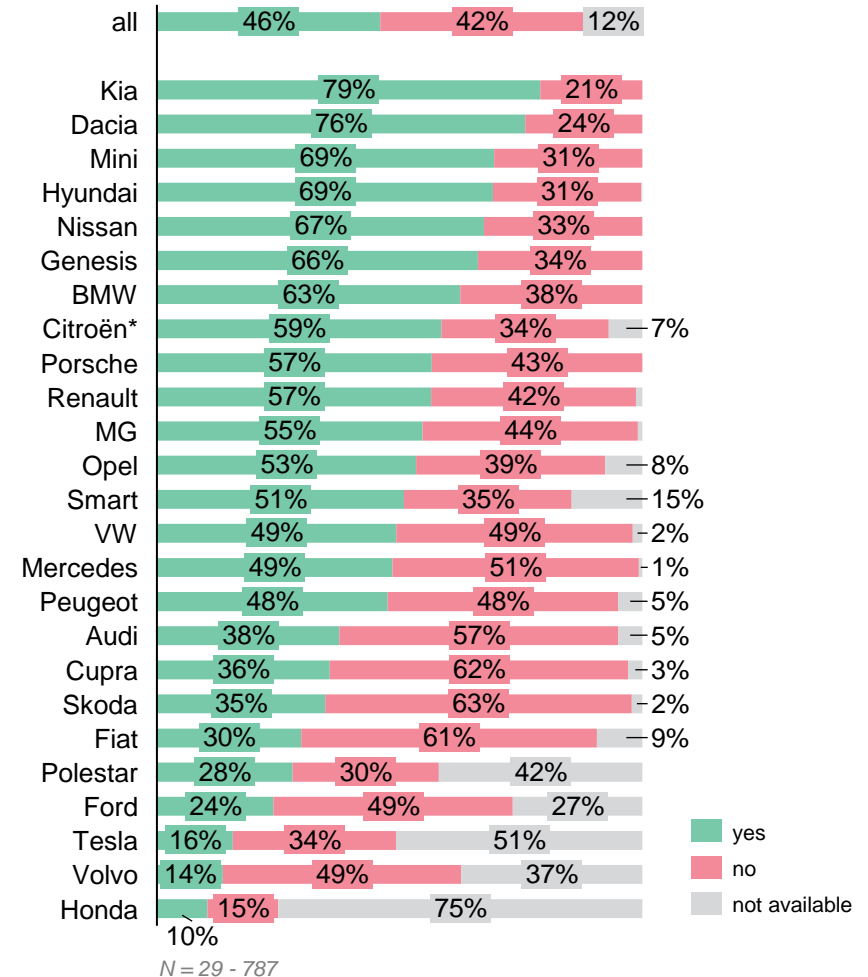
The vast majority of respondents own a vehicle with an Eco Mode. Around half also use the Eco Mode.

Striking:

- Drivers of vehicles with long ranges, such as Kia and Genesis, also often use Eco Modes.
- Even drivers of premium brands use the Eco Mode.
- Polestar and Volvo, two brands that have been particularly criticised for their high fuel consumption, do not have an Eco Mode to a large extent.

* Small sample (N=29)

*"Do you use Eco Mode in your [brand] for more range?"
(Other designations may be used for your [brand]).*



Eco mode Problems

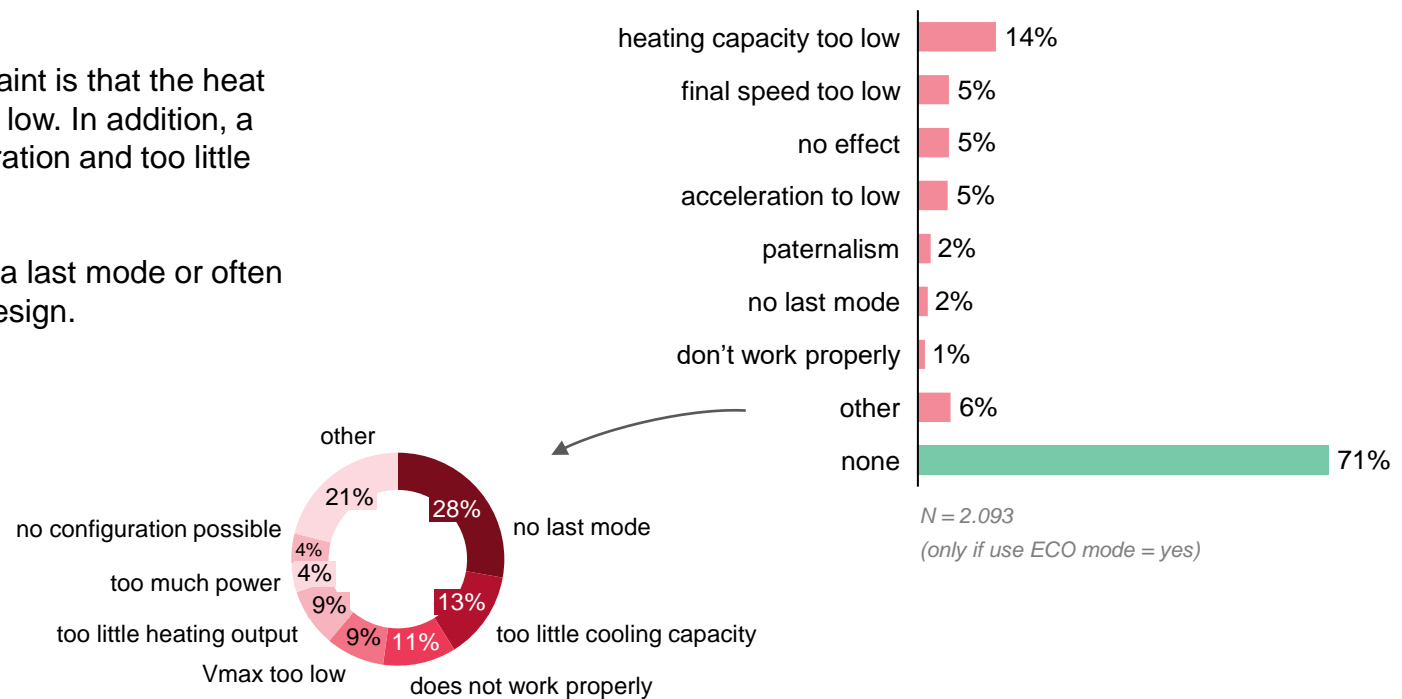
Too little heating power as the main problem of the Eco mode.

70% of users say they have no problems with the eco mode.

The most frequent complaint is that the heat output in eco mode is too low. In addition, a low final speed or acceleration and too little effect are criticised.

The other mentions miss a last mode or often criticise the conceptual design.

*"Have you had any problems using the Eco Mode?"
(multiple selection possible)*



Eco mode

Concept maturity

On average, medium need for action on the Eco Modes.

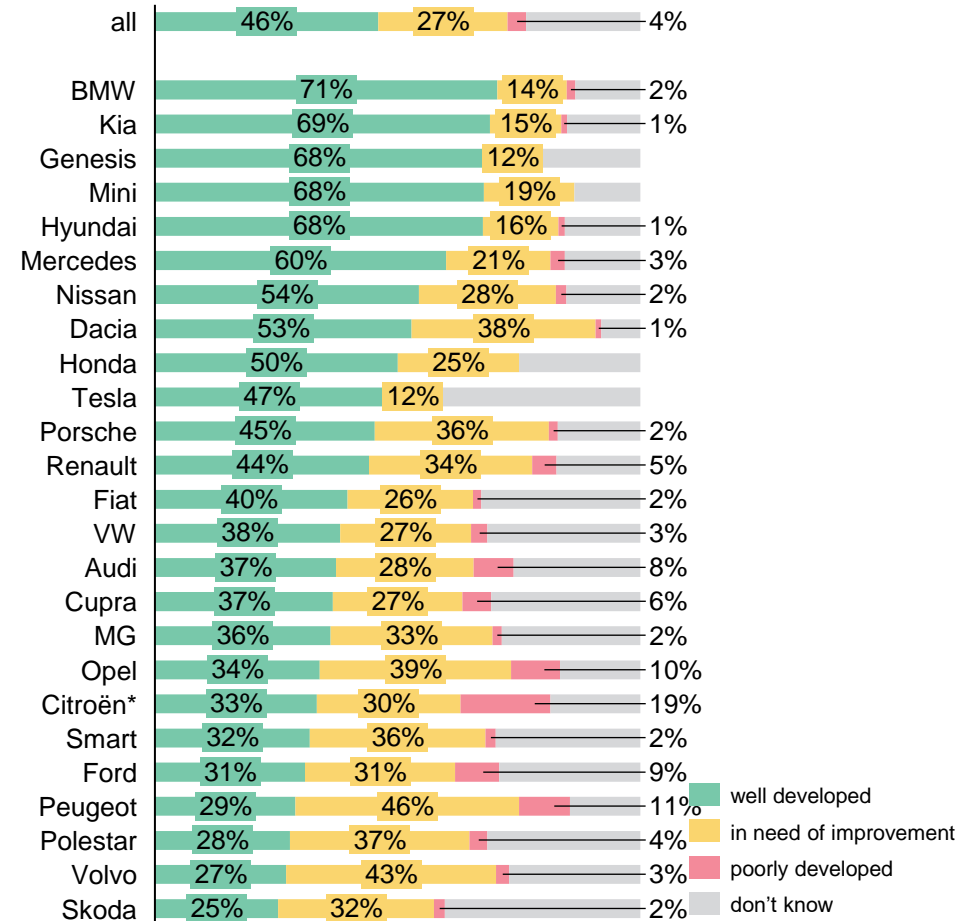
The weighted mean across all responses at

- 1 = poorly developed
- 2 = in need of improvement
- 3 = well developed

is **2.59** points.

2022 for comparison: 2.53 points.

"How mature are your [brand + model]'s technical concepts on Eco Mode?"



* Small sample (N=29)

N = 12 - 737

(only if ECO mode is used ≠ no ECO mode available)

Eco mode

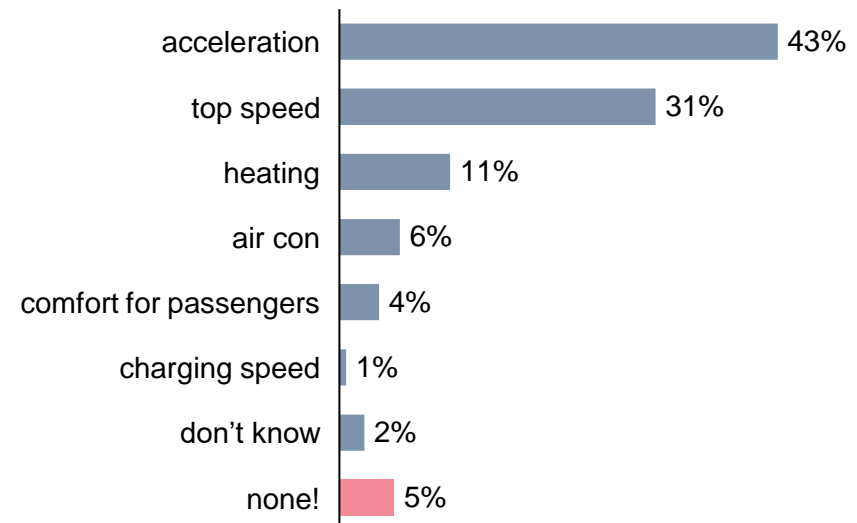
Accepted restrictions

*Restrictions on driving performance accepted by many.
Interventions in charging speed not acceptable.*

Only 5% of the respondents completely reject restrictions through the Eco Mode in favour of the range.

Of the remainder, around three quarters accept limitations in performance, and almost one in ten accepts limitations in air conditioning.

"Which restrictions in favour of range do you find most acceptable?"



N = 3.926

(only if ECO mode is used ≠ no ECO mode available)

Eco mode

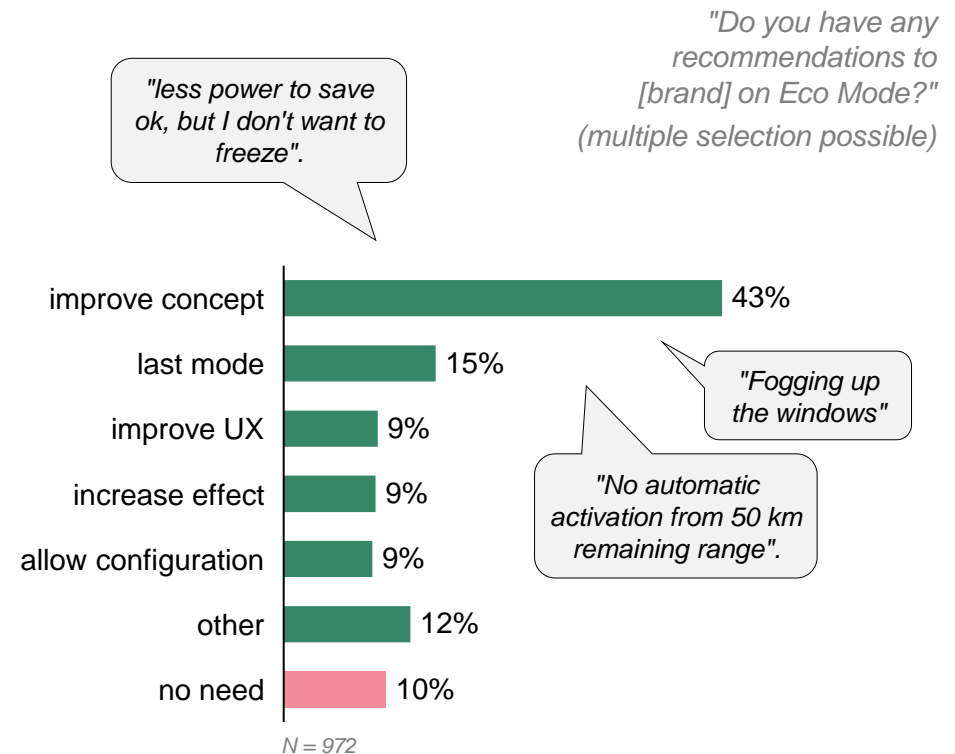
Recommendations

Greatest need for action in the revision of the concept.

Over 40% would like to see an improved concept.

Concrete improvements relate to the introduction of a last mode, better UX and higher savings through the eco mode.

One in ten says he has no need for the Eco Mode.



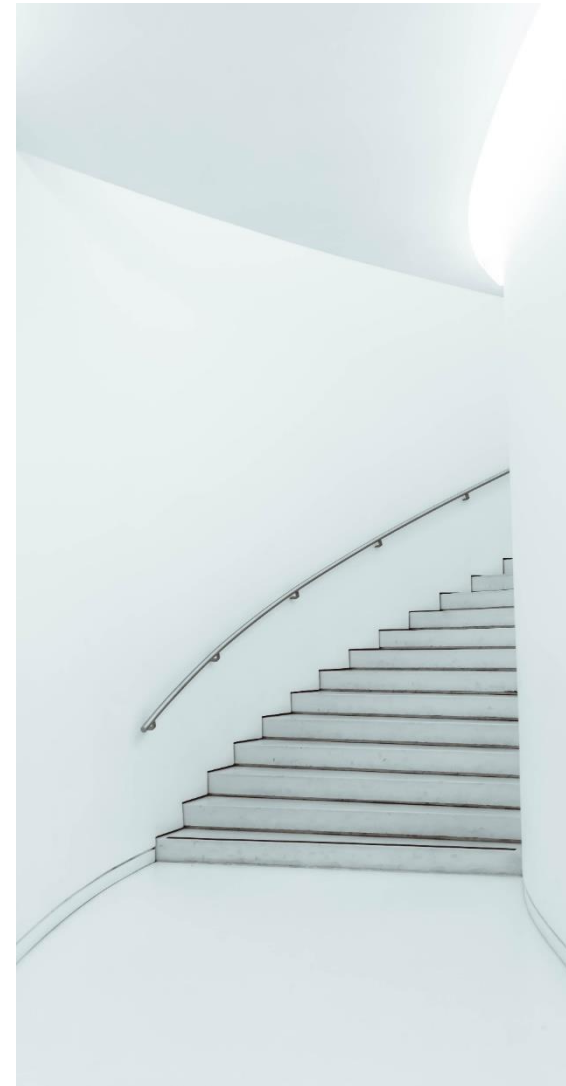
Access to all clustered verbatims
in the (English) dashboard

* At the time of the survey in April 23, the average temperatures in Germany were 13°C.

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Overall assessment

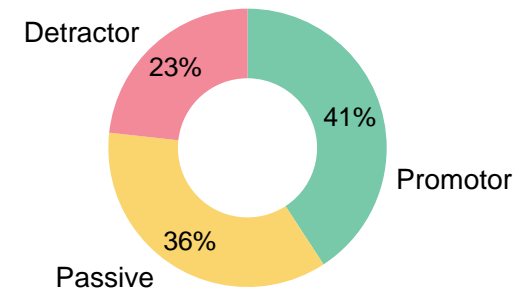
Net Promotor Score (NPS)

For the first time, NPS values are clearly decreasing.

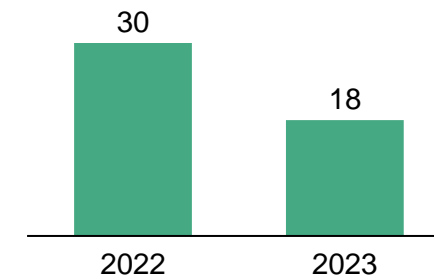
Despite many new models and improvements in many areas, the NPS score for the overall field is falling compared to 2022.

With the entry of new customer groups, the expectations of EV drivers are rising faster than the vehicles are getting better.

*"In summary:
How likely is it that you would recommend
your [brand] to a friend or colleague?"*



N = 4.522



Overall assessment

Net Promotor Score (NPS)

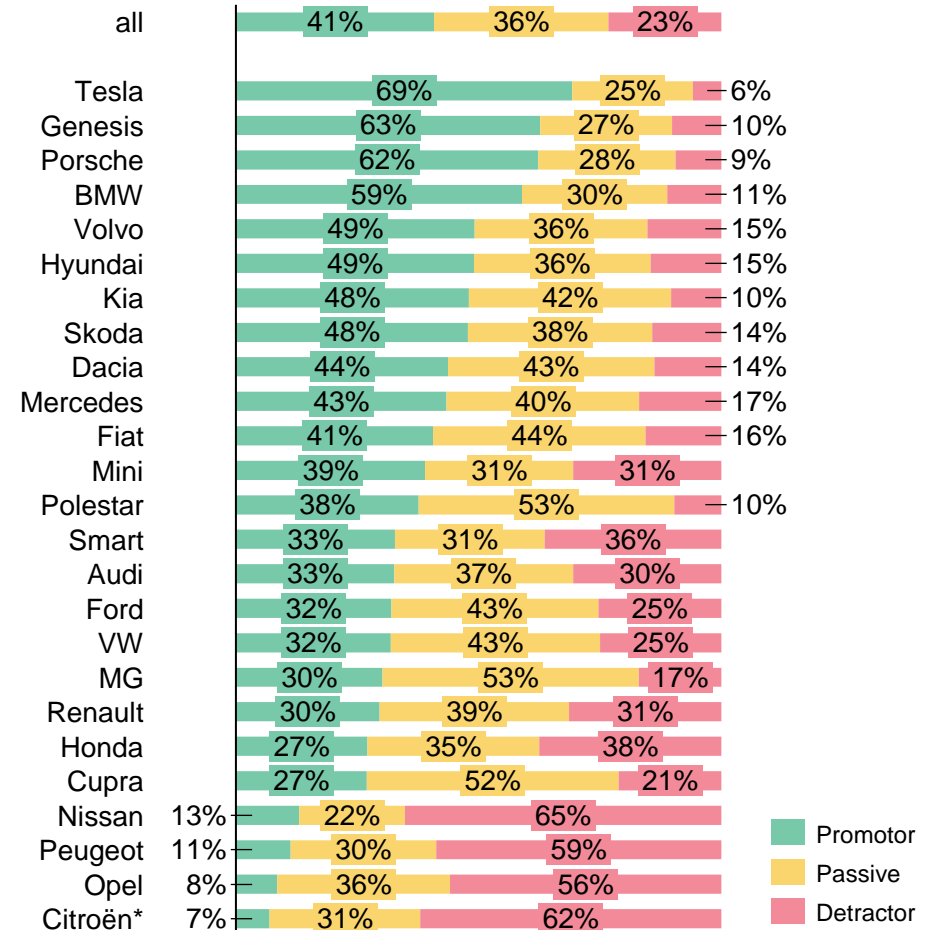
"In summary:

How likely is it that you would recommend your [brand] to a friend or colleague?"

Big differences in the brands.

The differences in NPS values between the brands are enormous:

- Tesla 63
- Porsche 53
- Polestar 28
- Genesis 53
- Kia 38
- BMW 48
- Dacia 30
- Skoda 34
- Hyundai 34
- Volvo 34
- Fiat 25
- Mercedes 26
- MG 13
- Cupra 6
- VW 7
- Ford 7
- Audi 2
- Mini 8
- Renault -2
- Smart -4
- Honda -10
- Opel -47
- Peugeot -48
- Citroën* -55
- Nissan -52



N = 29 - 787

* Small sample (N=29)

Summary

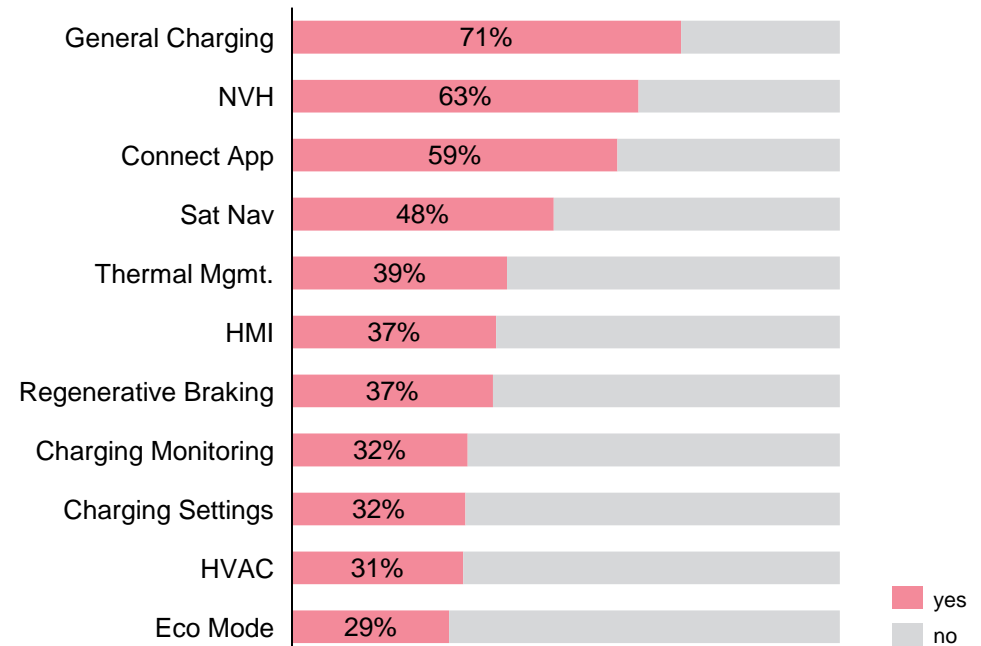
Problems

Problems with charging, noise and the Connect app as the most frequent complaints.

The respondents mention high problem frequencies across all areas.

The biggest complaints are about charging, annoying noises and the Connect app.

"Have you already had problems with ...?"



N = 1.762 - 4.522

Overall assessment

Problems (brand comparison)

"Have you had any problems with...?"

Many problems, big differences between the brands.



Summary

Concept maturity

"How mature are the technical concepts of your [brand] regarding ...?"

(sorted by "poorly developed", w/o don't know)

8 der 10 Top-Themen mit Handlungsempfehlungen sich auf die Ladestation und das Lademangement, bzw. die Connect-App der Fahrzeug-Hersteller.

Auch wenn sich viele Bewertungen gegenüber letzten Jahr leicht verbessert haben, zeigen insgesamt kritischen Einschätzungen, dass die spezifischen Bedarfe der eFahrräder immer noch nicht in den Fahrzeugkonzepten abgebildet sind.



Summary

Final recommendations to manufacturers

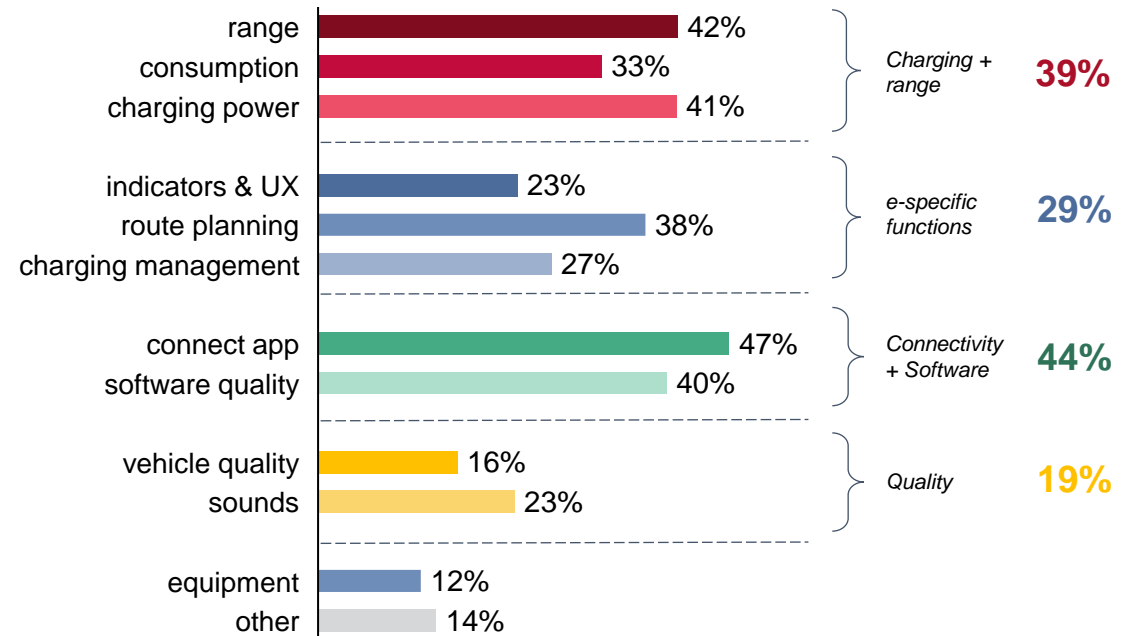
Clear recommendations to the car manufacturers.

In total, the respondents see a need for priority action in many areas.

However, there are major differences between the brands (see following pages).

*"In summary:
What should [brand] work on
as a priority?"
(multiple selection possible)*

Reading example:
42% believe that OEMs should
work on range as a priority.



N = 4.522

Overall assessment

Recommendations (brand comparison)

"In summary:

What should [brand] work on as a priority?"

(multiple selection possible)

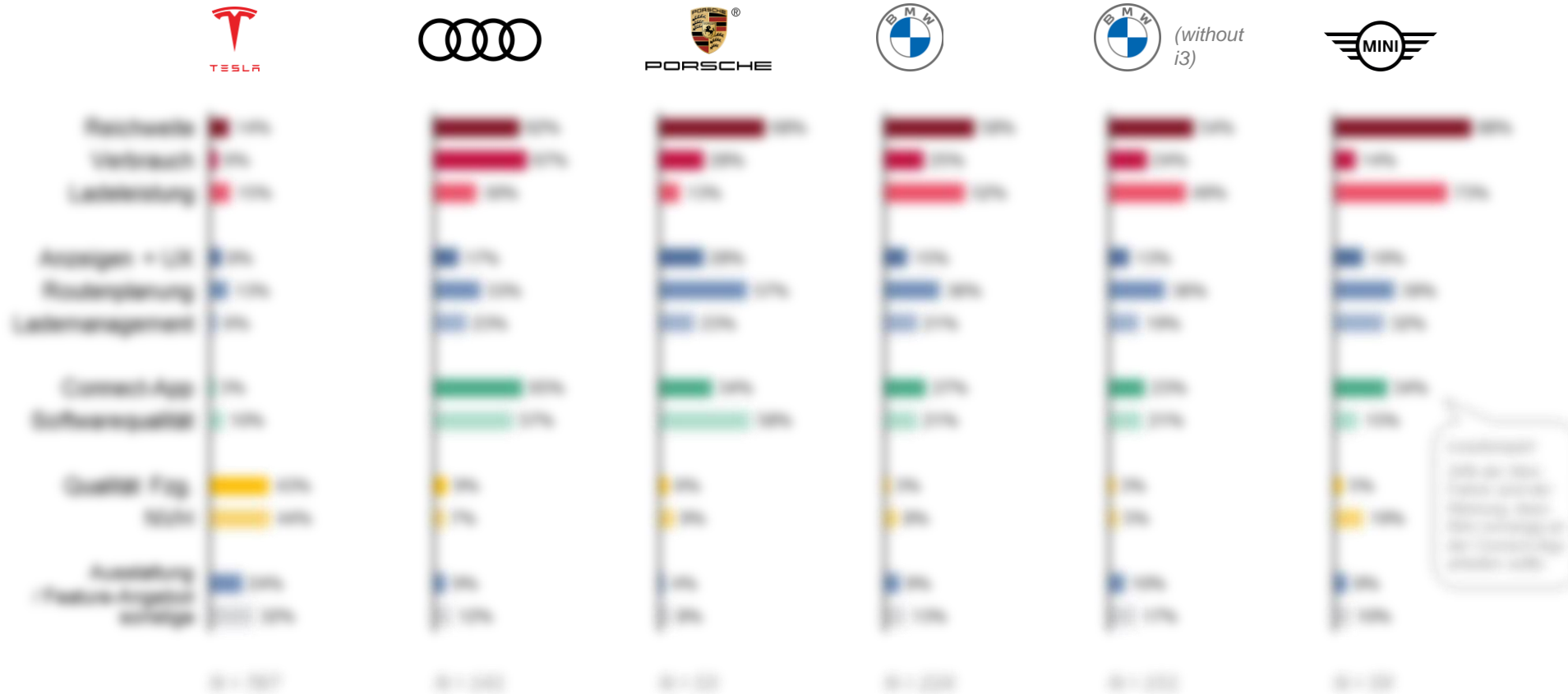


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Final recommendations to manufacturers

Big differences between the brands.

*"In summary:
What should [brand] work
on as a priority?"
(multiple selection possible)*



About UScale

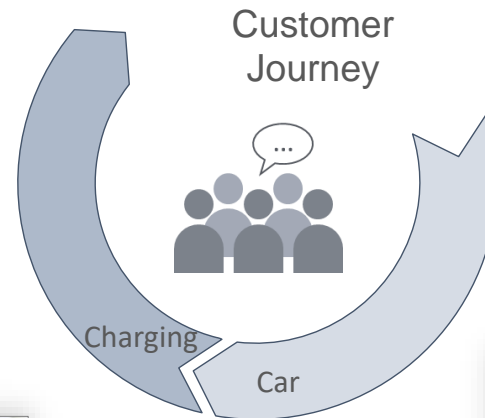
- UScale advises manufacturers of vehicles and charging technology, energy suppliers and service providers on the customer-oriented design of offers and the development of KPI systems for customer perception.
- UScale's work is based on customer insights studies on all touchpoints of the e-mobile customer journey and a development framework for product market fit for digital and innovative products.



- UScale is the only provider of a panel specialised in e-mobility with over 8000 panellists in the German-speaking region.
- UScale makes the customer perspective tangible for managers, engineers and IT'ers.
- UScale has extensive industry knowledge of the e-mobility ecosystem.
- UScale combines extensive experience with the challenges of corporates with the agility of a start-up.

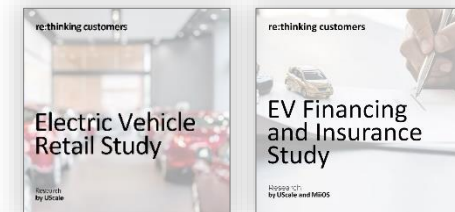
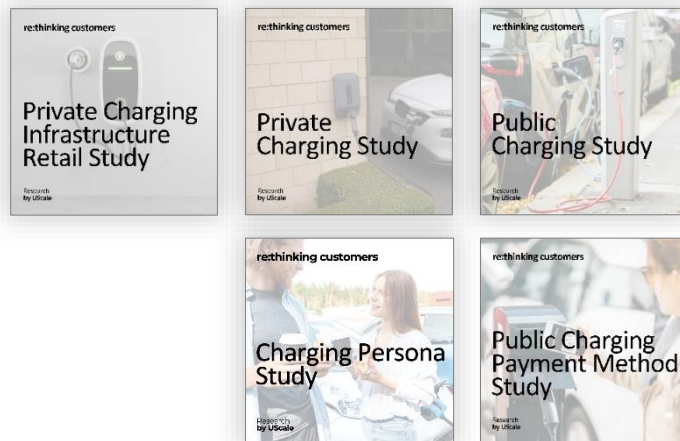
UScale focus studies

Business models



Buying and driving

charging





SCALE YOUR USER
SCALE YOUR BUSINESS



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