## USCALE

Excerpt

## eMobility Vehicle Study 2022

Data instead of opinions: e-cars from the customer's point of view

UScale GmbH www.uscale.digital



# eMobility Vehicle Study 2022



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 the electric drive? 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 around 3400 e-car drivers.



## eMobility Vehicle Study 2022 Goal: EV-specific use cases

#### Driving

- Range
  - ECO modes
  - Braking behaviour (recuperation)
  - Driving and functional noises

#### Navigation system



- Functions used
- Usage habits
- Problems
- Recommendations

#### Display and operating concept-



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

#### Connect app



- Functions used
- Usage habits
- Problems
- Recommendations

#### Charge management



- Route planning
- Charging settings, programming
- Charging management, problems
- Accommodation of charging cable, position of charging port

#### Heating and air conditioning

- \* 22.0° \* #
- Usage behaviour features (preconditioning etc.)
- Problems
- Recommendations



# eMobility Vehicle Study 2022 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?"
Troubles	"Have you already had problems with?" "Can you briefly describe the problems?"
Concept maturity	"How mature are the technical concepts of your [brand] regarding?"
Recommendations to manufacturers	"Do you have any recommendations to [brand] on?"





### eMobility Vehicle Study 2022 Added value of the study for manufacturers

#### **Product management**

The studies show product managers how features are used 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. <u>Confirm own concepts</u>: 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. <u>Learning from competitors' concepts</u>: Which competitors' concepts are viewed positively and should be examined for an acquisition?





### eMobility Vehicle Study 2022 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: Literal mentions**

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.





## eMobility Vehicle Study 2022 Database for own analysis

#### Deep dives through different splits

This document only shows splits at the brand level and no verbatim mentions. The associated dashboard shows the differences with several different splits and verbatim mentions on all brands.

LINK to UScale Dashboards: https://dashboard.uscale.digital/





## eMobility Vehicle Study 2022 Content

(1) Management summary



(2)

- Sample
- (3) Survey results
  - 1. Driving
  - 2. Operating and display concept
  - 3. Navigation
  - 4. Connect app
  - 5. Charging
  - 6. Heating and air conditioning
  - 7. Overall rating & recommendations





## Sample **Target group**

#### Sample:

- Owners: inside of battery electric eVehicles (BEV)

N = 3,446

16%

Median: 12 months

- Total sample:
- Holding period:
- Company car share:

#### Survey:

- Survey:
- Countries:
- Recruitment:
- Questionnaire:
- Interview duration:
- Field phase:

Online German-speaking countries (89% Germany) Social Media 85 questions, of which: 16 free text questions 20 - 25 min April - May 2022





## Sample Models

Models with sufficient market share represented with sufficient sample. Tesla 3 overrepresented.

Tesla is also more strongly represented in the study at model level than would have been expected according to their market share.

All graphs on problems and concept maturity are weighted by brand market share. There is <u>no</u> weighting by model within the brand.





# Sample Weighting according to market shares

The sample is not fully representative of the brands' market shares. Results on problems and concepts are therefore weighted according to market share.

The basis for the weighting was the registration figures for battery electric vehicles in 2021 in Germany.

BEV market shares according to KBA\*:



\* KBA new vehicle registrations 2021 (Report FZ8)



# Sample Vehicle age

eCars in the study are on average one year old.

At the time of the survey, the vehicles were exactly one year old on average (median).

The respondents therefore have sufficient experience to give qualified and differentiated feedback.

"When was the initial registration of your [make + model]?"





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  - 5. Charging
    - Charging power
    - Route and charge planning
    - Charging settings
    - Charging monitoring and charging problems
    - Charging cable storage
    - Charging socket position
  - 6. Heating and air conditioning
  - 7. Overall rating & recommendations





# Charging monitoring and charging problems **Monitoring charging process**

"How do you usually monitor whether the charging process is running properly?" (multiple selection possible)



## Charging monitoring and charging problems **Concept maturity** (charge monitoring)

On average, there is a high need for action on charge monitoring.

The weighted mean across all responses at

1 = deficient

2 = improvable

3 = good

is a value of 2.35 points for the charge monitoring.

Concept maturity has improved compared to 2021 (2.15 points).

small sample (N = 23-30
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\*\* Very small sample (N = 12-20)

\*\*\* weighted according to market share Registrations 2021

all***	48%	) )	39	%			
Tesla		95	%		4%	<u></u>	
Marcadas		74%		24	1%	-2%	
Poloctor		73%		2	5%	L 20/2	
Fuestai		73/0		26	0/	2 /0	
ria D		/ 1 /0 C70/		20	/0		
Porsche		67%		29%	o –	4%	
Audi	1	54%		32%	-	-2%	
Hyundai	e	53%		30%	-	-4%	
BMW	57	7%		34%	_	-9%	
Smart**	50%	6	39	9%	-	-11%	
Cupra**	42%		5	8%			
Skoda	38%		54%	, 5	_	-7%	
Honda*	36%		57%	5	-	-7%	
VW	36%		50%			-12%	
Mini*	35%		48%		17%		
Renault	31%		49%		17%		
Fiat	30%		52%		15%		
Dacia**	29%		59%		6%		
Seat**	27%		60%		13%		
Nissan	24%		56%		18%		
Ford	23%		61%		14%		well designed
Peugeot	19%	40%		40%			in need of
Aiways	18%	47%		32%	ó		improvement
Citroën**		39%		39%			poorly designed
Opel		55%		27%	0		don't know

"What do you think? How mature are the technical concepts of your [brand] regarding charge monitoring?"



# Charging monitoring and charging problems **Charging problems**

Two firsts of the sequentiers incomediate chargengers and the

The track control problem, and problem is a second to be a second

"Have you already had the following problems when charging?" (multiple selection possible)





## Charging monitoring and charging problems Charging problems (details)

Many different proteines with they protein a set of the rate protein a set of the rate protein a set of the rate protein of the rate of the protein of the rate of the

"Can you briefly describe the most important problem for you when charging?" (N = 1267)



Access to all 1267 clustered mentions in the (english speaking) UScale dashboard



## Charging monitoring and charging problems **Probable causes**

Man problem charging station.

"What do you think? What are the most common causes of charging problems?" (multiple selection possible)





## Charging monitoring and charging problems **Recommendations**

List with many clear recommendations.

"Do you have any recommendations about the shop?" (N = 924)





Access to all 924 clustered mentions in the (english speaking) UScale dashboard



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  - 7. Overall rating & recommendations





# Heating and air conditioning Use pre-conditioning

Pre-conditioning as standard.

"Do you use pre-conditioning in your [brand]?"

Only 3% of the respondents do not have pre-conditioning and 13% do not use it. This makes pre-conditioning a must-have in the e-car.





## Heating and air conditioning **Problems**

Pre-conditioning as the biggest problem.

65% of respondents have no problems with air conditioning or heating.

Compared to the problems with pre-conditioning, those with heating and cooling functions are minor.\*

"Have you had any problems with the operation or comprehensibility of the following functions (if any)?"



\* At the time of the survey in May 2022, outdoor temperatures averaged 15°C.



## Heating and air conditioning **Problems** (brand comparison)

High complaints about air conditioning.

Almost all brands show significant problems with heating or air conditioning.

Impressive again the performance of Tesla with the lowest complaint rate.

Reading example: 55% of all Opel drivers name at least one problem with the air conditioning.

\* small sample (N = 23-30)

\*\* Very small sample (N = 12-20)

\*\*\* weighted by market share Registrations 2021

"Have you had any problems operating or understanding [the HVAC] functions (if any)?"

all***		35%
Smart**		67%
Opel		55%
Peugeot		54%
Seat**		———————————————————————————————————————
Renault	-	———————————————————————————————————————
Aiways	-	——42%
Skoda	-	39%
Ford	-	37%
VW		
Citroën**		33%
Cupra**	-	33%
Nissan		30%
Hyundai		29%
Kia		28%
Audi		28%
Fiat		27%
Honda*		25%
Polestar		25%
Mercedes		22%
Dacia**	-	——18%
Mini*		17%
Porsche*	-	17%
BMW		11%
Tesla		



## Heating and air conditioning **Problems** (details)

Multiple problems.

"Can you briefly describe the most important air conditioning problem for you?" (N = 697)

Many heating and air conditioning problems are related to the app's connectivity.

The mentions also show many UX and concept topics with high relevance for daily use.



Access to all 697 clustered mentions in the (english speaking) UScale dashboard



## Heating and air conditioning Concept maturity (pre-conditioning)

On average, there is a high need for action on pre-conditioning.

The weighted mean across all responses at

1 = deficient

2 = improvable

3 = good

is a value of 2.37 points for pre-conditioning.

Concept maturity has deteriorated compared to 2021 (2.47 points).

k	small	sample	(N =	23-30)		

\*\* Very small sample (N = 12-20)

\*\*\* weighted according to market share Registrations 2021

"What do you think? How mature are your [brand]'s technical concepts for pre-conditioning?"

all***	48%		31%	13%	6		
Tesla		92%			7%		
Mercedes		79%		149	% —	-3%	
BMW		73%		20%	-	-5%	
Mini*		70%		17%			
Porsche*	6	67%		21%	_	-8%	
Polestar	6	4%		31%			
Audi	62	2%	2	2% -		-2%	
Kia	52%	<b>)</b>	23%			-17%	
Citroën**	50%		22%	-		-11%	
Ford	48%		30%		_	-14%	
Hyundai	47%		33%			-12%	
VW	44%		35%		_	-12%	
Honda*	43%		36%	-		-4%	
Skoda	41%		37%	-		-12%	
Dacia**	35%	35	%	-		-12%	
Nissan	35%	4	3%	_		-10%	
Cupra**	33%	25%	25	5%			
Fiat	33%	35%	6	13%			
Peugeot	28%	45%	)	22%			
Renault	25%	42%		22%			well designed
Aiways	21%	55%		18%	6		in need of
Seat**	20%	40%	2	7%			improvement
Opel	19%	46%		22%			poorly designed
Smart**	17%	39%		39%			don't know



## Heating and air conditioning Concept maturity (heating)

On average, medium need for action on heating.

The weighted mean across all responses at

1 = deficient

2 = improvable

3 = good

for heating is a value of **2.66** points.

The concept maturity has not changed compared to 2021 (2.69 points).

\* small sample (N = 23-30)

\*\* Very small sample (N = 12-20)

\*\*\* weighted by market share Registrations 2021

"What do you think? How mature are your [brand]'s technical concepts for heating?"

all***	70%	25%	-4%	
Mercedes	90%		<mark>7%</mark> -3%	
Polestar	89%		11%	
Tesla	89%		11%	
BMW	88%		<mark>9%</mark> - 2%	
Audi	85%	1:	<mark>3%</mark> ⊢1%	
Porsche*	83%	1	7%	
Honda*	82%	14	%	
Hvundai	78%	19%	<mark>∕ −</mark> 2%	
Kia	76%	219	<mark>∕                                    </mark>	
Citroën**	72%	22%		
Nissan	71%	27%	-2%	
Mini*	70%	26%	-4%	
Skoda	68%	28%	-2%	
Cupra**	67%	8% -	17%	
Seat**	67%	27%	-7%	
VW	67%	28%	-5%	
Ford	66%	34%		
Fiat	66%	28%		
Opel	57%	35%	6%	
Smart**	56%	33%	-11%	well designed
Peuaeot	53%	36%	<del>-</del> 9%	in need of
Renault	50%	40%	<del>-</del> 7%	improvement
Dacia**	35%	59%	-6%	poorly designed
Aiways	29%	61%	-11%	don't know



## Heating and air conditioning **Concept maturity** (air conditioning)

On average, medium need for action on air conditioning.

The weighted mean across all responses at

1 = deficient

2 = improvable

3 = good

is a value of **2.70** points for air conditioning.

The concept maturity has slightly deteriorated compared to 2021 (2.78 points).

\* small sample (N = 23-30)

\*\* Very small sample (N = 12-20)

\*\*\* weighted by market share Registrations 2021

"What do you think? How mature are your [brand]'s technical concepts for air conditioning?"

all***	73%	22% -	-3%	
Mercedes	93%	2%	-3%	
Tesla	89%	119	6	
BMW	89%	9%	-2%	
Polestar	86%	13%		
Audi	86%	11%	-1%	
Kia	83%	16%	<b>⊢</b> 1%	
Honda*	82%	14%		
Porsche*	79%	17%	-4%	
Citroën**	78%	17%		
Hvundai	77%	19%	-1%	
Ford	75%	25%		
Mini*	74%	17% -	-4%	
Seat**	73%	13% —	-7%	
Fiat	71%	24% -	-2%	
VW	70%	24%	-4%	
Skoda	70%	27%	-1%	
Cupra**	67%	8%	-17%	
Smart**	67%	28%	-6%	
Nissan	63%	31% -	-4%	
Opel	60%	31% -	-5%	well designed
Renault	57%	34% —	-6%	in need of
Peugeot	52%	40% -	-7%	improvement
Dacia**	41%	53%	-6%	poorly designed
Aiwavs	37%	61%	-3%	don't know



## Heating and air conditioning **Recommendations**

Great need for action on functions and concepts.

Many recommendations refer to the range of functions that are offered at all or can be set via the app.

In addition, according to almost a quarter of the respondents, the performance of the heating and air conditioning should be improved. "Do you have any recommendations on air conditioning?" (N = 714)



Access to all 714 clustered mentions in the (english speaking) UScale dashboard



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  - 6. Heating and air conditioning
  - 7. Overall assessment
    - Topics
    - Brand comparisons





# Summary Concept-ready

### Autochico for charging physicity and the Content age with the president rand to write:

I of the tag. If there is approximate and a strength of the tag. If the second strength of the second strength

"What do you think? How mature are the technical concepts of your [brand] regarding ...?"





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    - Topics
    - Brand comparisons





### **Overall assessment Net Promotor Score (NPS)**

Big differences between the brands. Tesla still in front.

#### The differences in NPS values between the brands are enormous:

- Tesla 81 .
- Polestar 80 ٠
- Kia 58 Skoda 58
- Ford 55
- Mercedes 54
- 52 BMW
- 46 Fiat
- Hyundai 43
- Porsche \* 42 40
- Seat \*\* Audi
- 37 Honda \* 36
- Cupra \*\* 33
- VW 30
- Citroen \*\* 28
- Mini 22
- 12 Dacia \*
- Renault 0
- Smart \*\* 0 Opel -22
- Aiways -
- 24 Peugeot - 28
- Nissan -57

\* small sample (N = 23-30)

\*\* Very small sample (N = 12-20)

\*\*\* weighted by market share Registrations 2021

"In summary: Would you recommend your [brand] to a friend or colleague?"

all***	18%	34%	6	4	49%	
Tesla	<mark>12%</mark>		8	4%		
Polestar	17%		8	31%		
Kia	8%	26%		66%		
Skoda	7%	28%		65%	, )	
Ford	7%	30%		63%	6	
Mercedes	9%	28%		63%	6	
BMW	11%	26%		63%	0	
Fiat	13%	28%		59	%	
Hyundai	10%	36%		5	3%	
Porsche*	17%	25%		58	%	
Seat**	13%	33%		5	3%	
Audi	12%	40%		48%		
Honda*	18%	29%		5	4%	
Cupra**	17%	33%		5	50%	
VW	15%	41%	6		45%	
Citroën**		619	%		33%	6
Mini*	13%	52	2%		35%	, 0
Dacia**	18%		53%		29	%
Renault	29	%	42%		29	%
Smart**	3	3%	33%		33%	6
Opel		43%		36%	2	21%
Aiways		42%		39%		18%
Peugeot		44%		41%		16%
Nissan		65%			27%	,
						8%

Detractor Passive Promotor



### Summary Final recommendations to manufacturers

## Clear recommendations to the car manufacturers.

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

In total, the respondents see a need for priority action in just under 4 out of 12 topic areas.

The EV drivers see in the three thematic blocks

- Charging and range
- E-specific functions and
- Connectivity and software

similar high need for action in each case.

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





### EV-Benchmark-Studie 2022 Final recommendations to manufacturers

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

Large differences between the brands.





### EV-Benchmark-Studie 2022 Final recommendations to manufacturers

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

Large differences between the brands.





### EV-Benchmark-Studie 2022 Final recommendations to manufacturers

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

Large differences between the brands.



### 

## **About UScale**

- UScale advises car manufacturers, utilities 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 aspects of eMobility and an evaluation procedure for the acceptance of digital services from the customer's point of view.



services from the customer's point of view.



- UScale is the only provider of a panel specialised in eMobility with over 7000 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 eMobility ecosystem.
- UScale combines extensive experience with the challenges of corporates with the agility of a start-up.

## 

SCALE YOUR USER SCALE YOUR BUSINESS



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