Selling electric vehicles: The role of in-store design

Dr. Moritz Loock

”Automotive retailing and car dealerships are currently facing many challenges - but if the potential of prosumer insights© for the expansion of the presentation and the product ranges is utilized the opportunities are huge."

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In a nutshell

An online-survey conducted in October 2023 (111 participants*) regarding EVs, pretesting the role of car dealerships with two different forms of product presentation yields following results

- Car dealerships can effectively inform customers about salient advantages of EVs if they adjust their product presentation, using a “prosumer display”
- Car dealerships profit from more informed customers
- Consumers` evaluation of electric vehicles (EVs) is linked to their car dealership choice

* Subsample from a larger sample (n=512, Germany); participants of the subsample are new car owners only to control for potential variance among new and used cars, leased and company cars users

Many of the arguments in favor of EVs require elaborated explanation and go beyond the car itself

- Diffusion of electric vehicles (EVs) is central to climate action as EVs enable prosumption (production and consumption) of renewable energy and co-adoption with photovoltaic (Liang, Qiu, & Xing, 2022),
- provide storage and ancillary services (Thompson & Perez, 2020)
- contribute to lowering CO_2 emissions (Ejeh, Roberts, & Brown, 2023; Peiseler & Cabrera Serrenho, 2022) and lowering costs (Crabtree, 2019; Ejeh, Roberts, & Brown, 2023)

- With electric vehicles the energy and transport sector are becoming increasingly intertwined, and as Rana Adib, Executive Director REN21, says: “The energy transition will not happen without a transport transition” (https://www.ren21.net/energy-transition-transport-transition/).

Utilizing this advanced information can be effective for promoting EVs (I) …

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Does solar power add value to electric vehicles? An investigation of car-buyers' willingness to buy product-bundles in Germany

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Product bundling
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ABSTRACT

This paper investigates customers' willingness to buy potential bundle offers made up of an electric vehicle (EV) and community solar power. According to literature, the bundling of products with high complementarity in a single offering, such as EVs and solar power, can create added value for customers, resulting in a higher willingness to buy compared to a situation in which customers have to buy both products separately. Further, literature also suggests that the adoption of EVs and solar power can be increased by financial policy incentives. To test whether community solar adds value to EVs for customers, an experimental online survey that applied a within-subject design was conducted. Additionally, the experimental online survey was extended with a between-subject design to test for the effect of emphasizing financial policy incentives on willingness to buy the bundle. A representative sample of German customers (n = 488) provided empirical evidence for added value creation through bundling community solar with an EV in the form of a significantly higher willingness to buy the bundle compared to that for an EV alone. The between-subject analysis of the effect of emphasizing financial policy incentives revealed no further effects on customers' willingness to buy the bundle. To increase the adoption of electric cars, practitioners should increasingly rely on combined offers of solar power and electric cars, while politicians should create a framework fostering the creation of such bundle offers on the supply side, instead of only providing financial incentives to consumers.

1. Introduction

In the last few years, the use of electric mobility has significantly increased in many countries due to various factors such as political support schemes, a rise in product offers, a decline in price, and also because some people want to make a positive contribution to the environment [1,2]. In order to make a positive environmental contribution in terms of reducing CO2 emissions to help meet the global emission targets defined in the Paris agreement, many studies — but also governmental and other public entities - have pointed out that e-mobility needs to be coupled with charging for decarbonized electricity [3–6].

Consequently, people who already have an electric vehicle (EV) or are interested in buying one are increasingly looking for green electricity solutions for charging their EV at home. When it comes to renewable energies, many studies have illustrated that customers have strong positive preferences for solar power [7–10]. For instance, work by Cousse & Wüstenhagen [11] and Delmas et al. [12] showed that people who are interested in buying an EV are similarly interested in solar power (and vice versa), and are therefore likely to purchase both, but not necessarily at the same time.

Recently, companies such as Tesla and Sonnen from Germany have recognized the increase in customer demand for combined offers of EVs and renewable energy, and have therefore started offering bundles made up of an EV and solar-power charging applications [13–15]. Furthermore, a study from Priessner & Hampl [2] revealed that combined offers of an EV and solar-power charging for homeowners increase intention to buy in comparison to purchasing a standalone EV. This is a particularly interesting finding, since it also means that bundle offers could increase the diffusion of EVs and solar power at the same time, which are, according to the emission gap report of the United Nations [6], both highly relevant goals in terms of meeting global emission targets.

Additionally, marketing literature suggests that products which are complimentary, such as EVs and solar power, and are offered together for a single price in a bundle, increase customer value due to their benefits to customers, such as their complementarity, reduced risk, or increased convenience [16]. In some cases, the added value of a combination packaged as one product even leads to a greater willingness to

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The flexible prosumer: Measuring the willingness to co-create distributed flexibility

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Consumer behavior
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ABSTRACT

Rising shares of fluctuating renewables increase the need for flexibility in the power market. At the same time, the emergence of the prosumer has created new opportunities for co-creation of distributed flexibility. As of yet, there is surprisingly little empirical analysis in terms of whether individuals are actually ready to co-create flexibility, and if so, under which conditions these resources can be mobilized by grid operators or electricity supply companies. We address this gap in the energy economics literature with three studies analyzing in total 7′216 individual decisions in a series of choice experiments with 902 study participants in three main domains of residential energy prosumption: (1) solar PV plus storage, (2) electric mobility, (3) heat pumps. We develop a novel measure of the prosumers' willingness to co-create flexibility, and solicit their preferences for power supply contracts with varying levels of flexibility to derive implied discomfort costs. Our results indicate that current and potential electric car and solar PV users exhibit a higher willingness to co-create flexibility than heat pump users. Reaping the potential in those two domains requires taking the prosumer perspective into account when designing policy instruments and creating adequate business models.

1. Introduction

Matching supply and demand over time is a key challenge in power markets. In traditional electricity markets, demand has largely been taken for granted, while the necessary flexibility has been built into the supply side through peak power plants and centralized storage. Increasing shares of fluctuating renewable energies have enhanced the need for flexibility to avoid imbalances in the power system. Established and new companies develop novel business models to provide flexibility (Helms et al., 2016). Decentralization trends in the energy market offer new opportunities for matching supply and demand in a distributed manner. Distributed flexibility provision can take different forms: Shifting demand and supply over time and/or building up local storage capacity. Successfully mobilizing flexibility in distribution grids can help to delay or avoid investments in extending centralized grid infrastructure (Gordijn and Akkermans, 2007; Veldman et al., 2013), resulting in cost efficient energy systems and allowing smooth integration of renewables (Denholm and Hand, 2011). While centralized sources of flexibility (e.g. gas-fired power plants or hydropower reservoirs) are well understood, the tendency of decentralized electricity consumers becoming prosumers (producers and consumers at the same time, cf. (Bergman and Eyre, 2011; Kotler, 1986; Toffler, 1980)) provides a potentially valuable source of – so far underutilized – flexibility (Gordijn and Akkermans, 2007; Kubli, 2017; Veldman et al., 2013). Decentral prosumers can provide flexibility by optimizing the timing of their electricity production and consumption, and by making decentralized storage available (e.g. through investing in batteries or providing heat reserves through a more flexible heating behavior). A better understanding of whether and under which conditions prosumers are actually ready to contribute to flexibility provision is important if these resources are to be mobilized.

This paper empirically investigates prosumers' willingness to co-create flexibility with a series of studies across three main domains of energy use: (a) solar PV plus storage, (b) electric vehicles, (c) heat pumps. By conducting three choice experiments with a unique sample of actual and potential flexible prosumers in Switzerland (N = 902), we aim to answer the following two research questions:

1. To what extent are prosumers willing to co-create flexibility?
2. Are there differences between the three technology domains?

Our paper makes three main contributions to the extant literature on smart grids and flexibility in the power market. First, we answer the call for "putting people in the loop" (e.g. Sowe et al., 2016) and for

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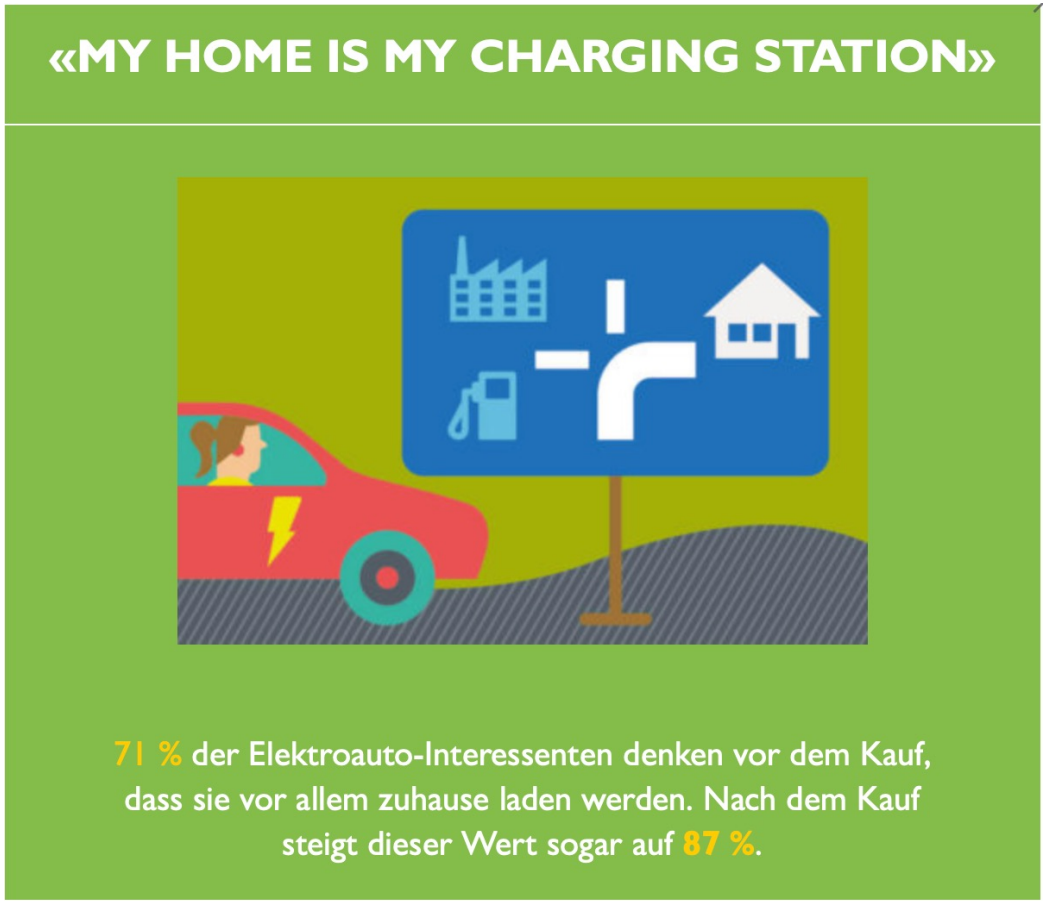
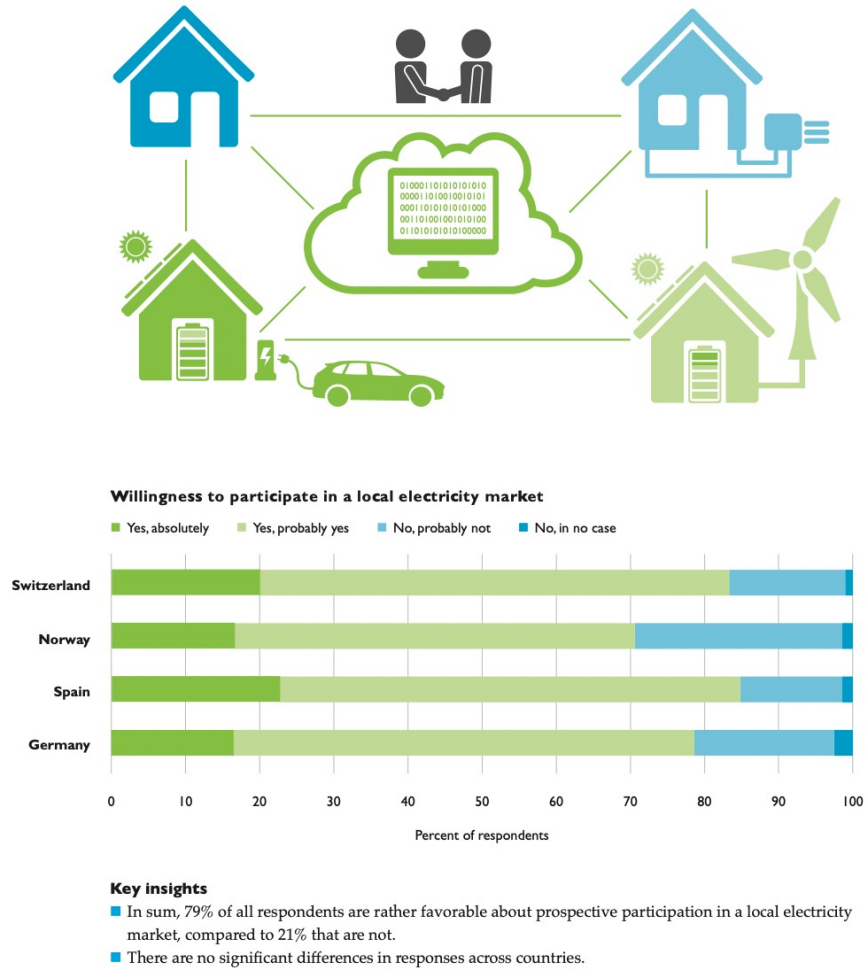
Utilizing this advanced information can be effective for promoting EVs (II) …



Quelle: Wüstenhagen et al (2021)
https://iwoe.unisg.ch/de/kundenbarometer/#highlights



Quelle: Reuter & Loock
https://www.alexandria.unisg.ch/252125/1/Broschuere_Empower_WEB.pdf

… but it is challenging to provide such comprehensive information at the point-of-sale

- Extensive text-based explanation exceeds capacity load of individuals within car dealerships and interactive, time-consuming explanation through trained sales-personnel can be challenging due to limited availability of qualified personnel and financial limitations.

- Thus, it is of interest to explore more effective, heuristic alternatives that reduce information complexity and succeed in communicating the value-added of EVs in a prosumer context

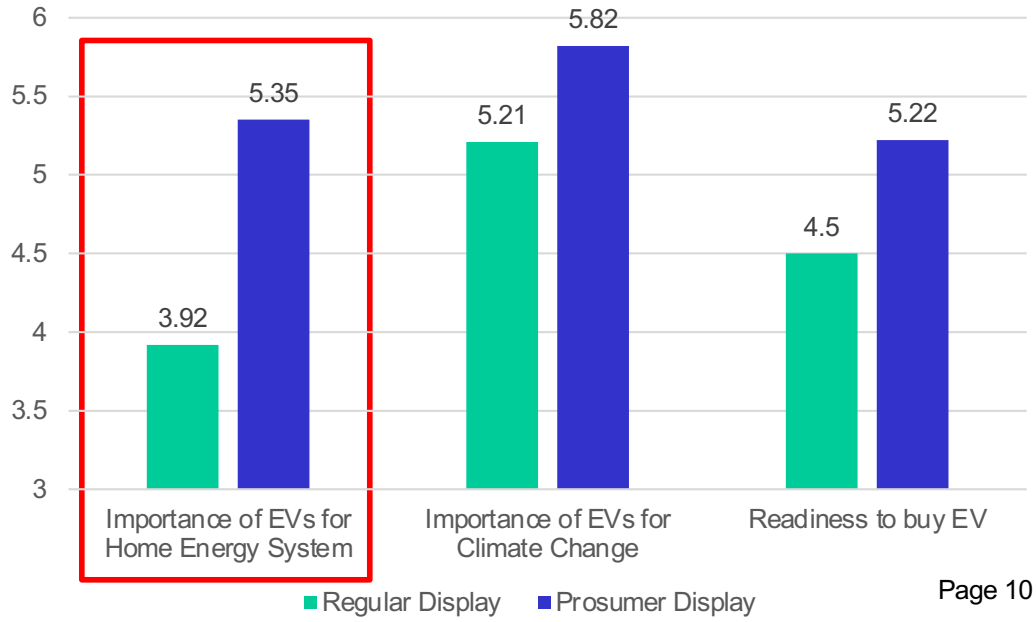
- This research elaborates the role of instore-design by addressing following research questions: **How can «prosumer-based» in-store design promote diffusion of electric vehicles?**

Regular EV presentation: Easy to implement but limited explanation of salient EV features

A novel, explanation-based presentation (the “prosumer display”): An investment into informing customers - but is it effective and does it pay?

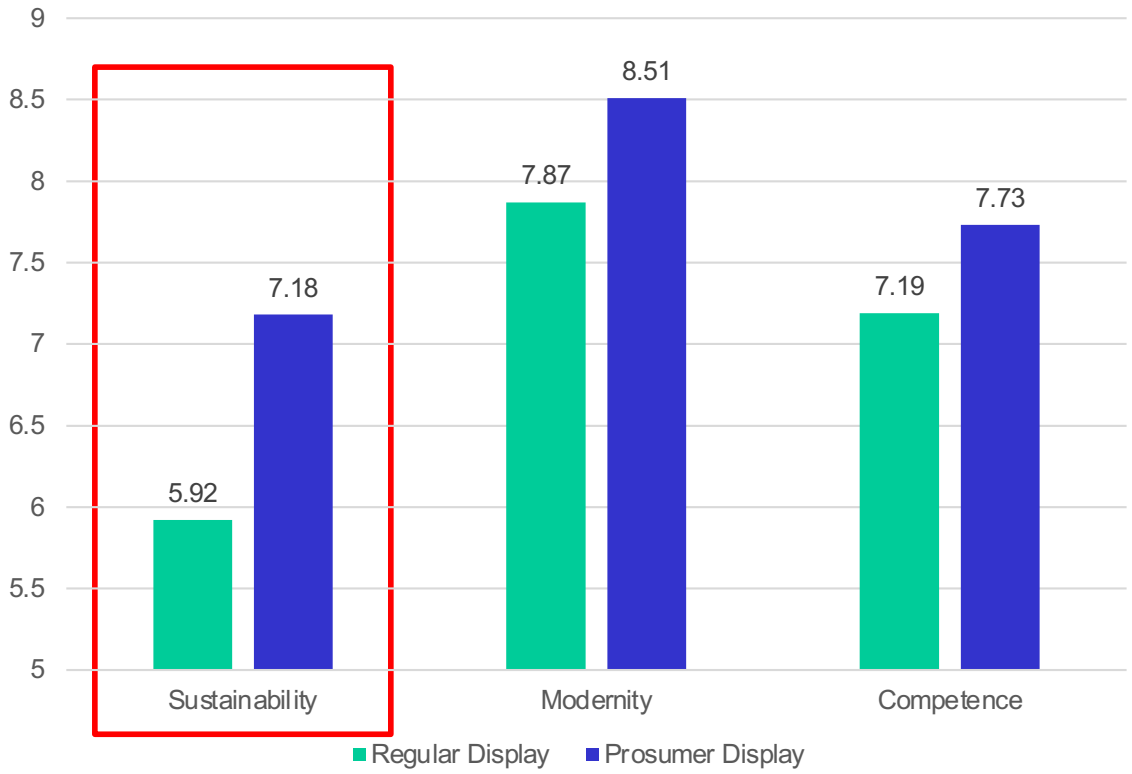
Results: Switching from regular EV presentation to an explanation-based presentation (the “prosumer display”)

- Car dealerships can help customers to better understand the role of EVs for home energy systems if they use an explanation-based EV presentation (the “prosumer display”) instead of a regular EV presentation
- Customers exposed to an explanation-based presentation (the “prosumer display”) regard EVs more important for the energy system at home.



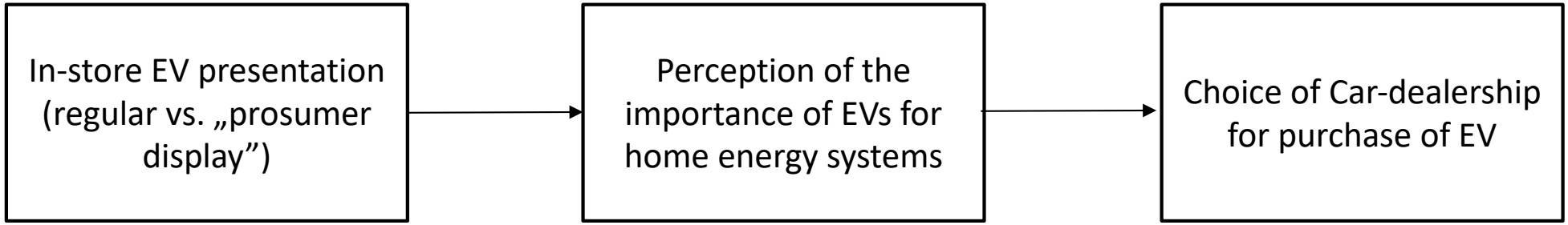
Car dealerships profit from more informed customers (I)

- Early evidence that in a real-store environment this effect spans over various dimensions of the evaluation of the car dealership from a customer point of view, such as how sustainable, modern and competent a car-dealership is perceived



Car dealerships profit from more informed customers (II)

- Following a more elaborated understanding of the relevance of EVs for home energy systems, customers are more likely to choose the car dealership for the purchase of an EV



Explanatory model that is emerging from the pretest

```
REGRESSION
      /VARIABLES= Inwiefern_halten_Sie_Elektroautos_aufgrund_der_im_Bild_darges
      /DEPENDENT= Würden_Sie_das_Autohandelsunternehmen_auf_dem_Bild_welches
      /METHOD=ENTER
      /STATISTICS=COEFF R ANOVA.
```

Modellzusammenfassung (Würden_Sie_das_Autohandelsunternehmen_auf_dem_Bild_welches)

R	R-Quadrat	Korrigiertes R-Quadrat	Standardfehler der Schätzung
,27	,07	,06	3,29

ANOVA (Würden_Sie_das_Autohandelsunternehmen_auf_dem_Bild_welches)

	Quadratsumme	df	Mittel der Quadrate	F	Sig.
Regression	90,46	1	90,46	8,38	,005
Residual	1154,99	107	10,79		
Gesamt	1245,45	108			

Koeffizienten (Würden_Sie_das_Autohandelsunternehmen_auf_dem_Bild_welches)

	Unstandardisierte Koeffizienten		Standardisierte Koeffizienten		
	B	Standardfehler	Beta	t	Sig.
(Konstante)	4,61	,54	,00	8,55	,000
Inwiefern_halten_Sie_Elektroautos_aufgrund_der_im_Bild_darges	,28	,10	,27	2,89	,005

Implications and next steps

- The online pretest suggests that car dealerships can effectively inform customers about salient advantages of EVs if they adjust their product presentation, using a “prosumer display” and that car dealerships may profit from more informed customers

- Following the results of this pretest the prosumer display appears an interesting instrument to promote sales of electric vehicles; an investment into a prosumer display appears beneficial for car dealerships and can be an interesting instrument to improve market positioning (e.g. for incumbents or new entrants)

- It is suggested to replicate this online pretest in a real store environment and develop adjusted versions of the prosumer display, that account for specific needs of car brands and dealership locations

Sample of the online pretest*

Sind_Sie...._Q4

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	männlich	61	55,0%	55,0%	55,0%
	weiblich	50	45,0%	45,0%	100,0%
Gesamt		111	100,0%		

In_welche_Altersgruppe_fallen_Sie_Q2

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	18-35 Jahre	28	25,2%	25,2%	25,2%
	36-50 Jahre	25	22,5%	22,5%	47,7%
	51-65 Jahre	37	33,3%	33,3%	81,1%
	66-80 Jahre	21	18,9%	18,9%	100,0%
Gesamt		111	100,0%		

Was_ist_Ihr_höchster_Bildungsabschluss_Q46

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	(Fach-) Hochschulabschluss/ Diplom/ 2. Staatsexamen	14	12,6%	12,6%	12,6%
	Bachelor/ Bakkalaureus	6	5,4%	5,4%	18,0%
	Fachhochschulreife/ Fachabitur ohne FH-Studium	5	4,5%	4,5%	22,5%
	Haupt-/ Volksschulabschluss/ 8. Klasse POS ohne Lehre/ B.-Ausbildung	1	,9%	,9%	23,4%
	Haupt/ Volksschulabschluss/ 8. Klasse POS mit Lehre/ B.-Ausbildung	35	31,5%	31,5%	55,0%
	Mittlere Reife/ Realschule/ 10. Klasse POS ohne Abitur	32	28,8%	28,8%	83,8%
	allg. Hochschulreife/ Abitur	12	10,8%	10,8%	94,6%
	höherer akademischer Abschluss	6	5,4%	5,4%	100,0%
Gesamt		111	100,0%		

Fahren_Sie_ein_KFZ_Q47

		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Neuwagen	111	100,0%	100,0%	100,0%
Gesamt		111	100,0%		

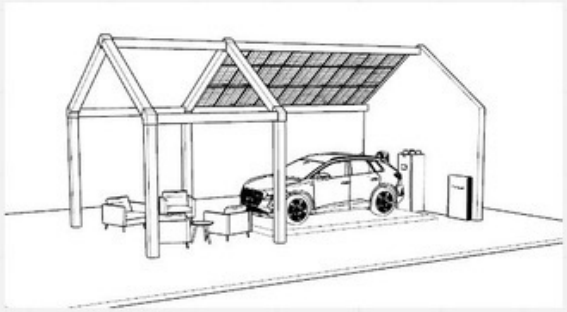
Welche_Antriebsart_hat_Ihr_Haupt_KFZ_Q48

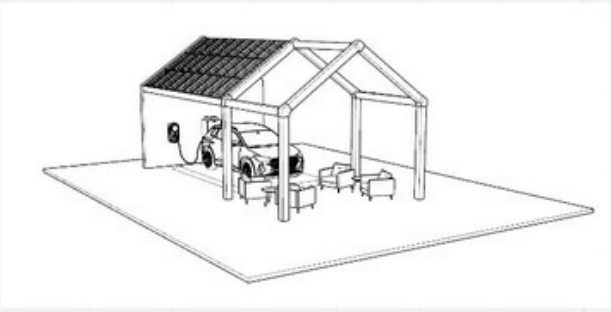
		Häufigkeit	Prozent	Gültige Prozente	Kumulierte Prozente
Gültig	Benzin Motor	96	86,5%	86,5%	86,5%
	Diesel Motor	15	13,5%	13,5%	100,0%
Gesamt		111	100,0%		

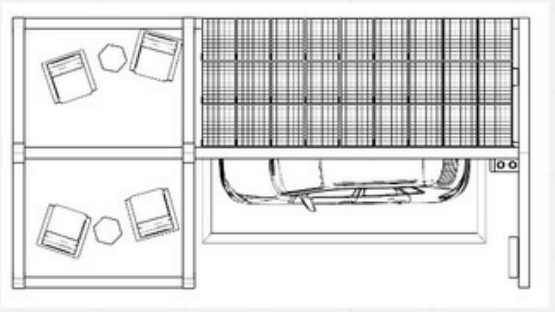
* Subsample from a larger sample (n=512, Germany); participants of the subsample are new car owners only to control for potential variance among new and used cars, leased and company cars users

Prosumer Display© : Adaptable to match specific brand needs

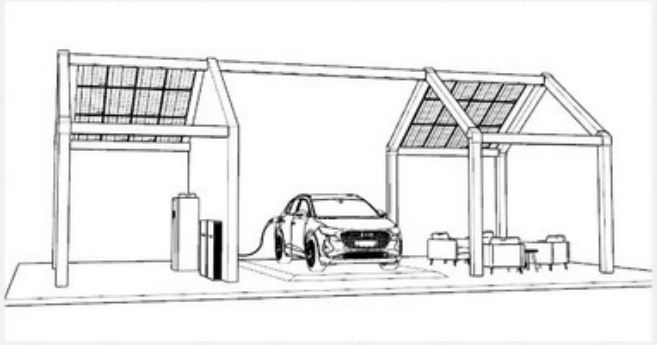
VARIANTE 1

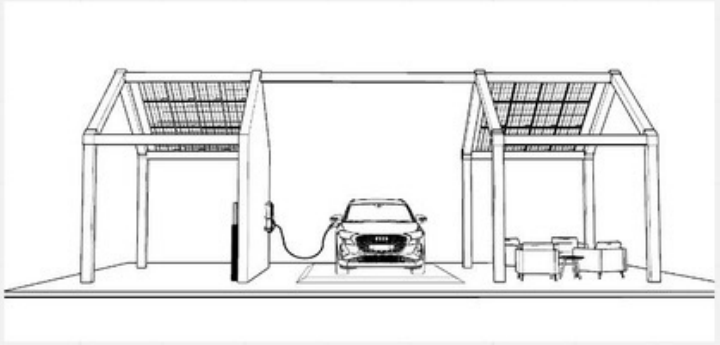


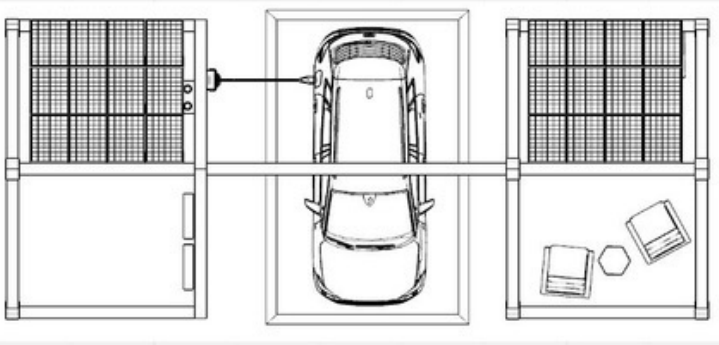




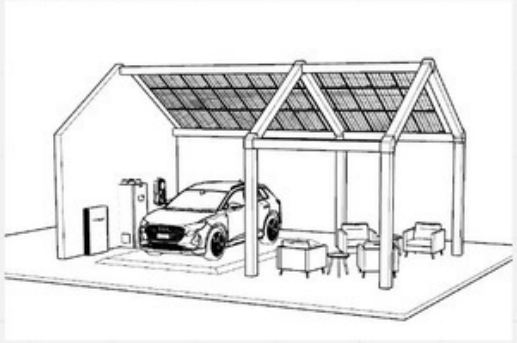
VARIANTE 2

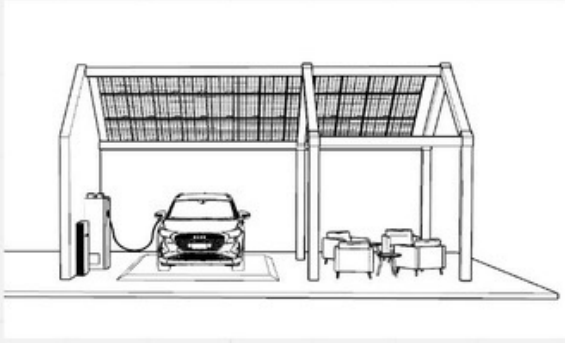


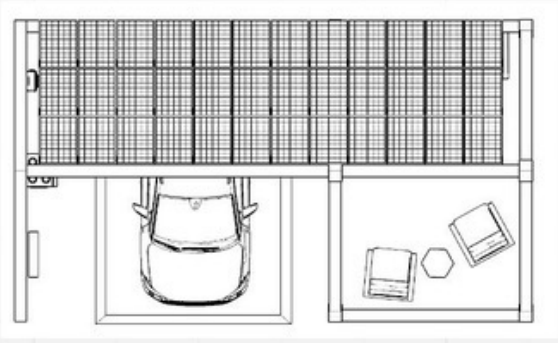




VARIANTE 3







Prosumer Display©: www.mann-objecta.de

- Presentation concept for the sales promotion of electric cars and prosumer assortments with exhibition elements on the topics of energy, climate protection and e-mobility
- Based on well-founded research findings on prosumers at the interface of e-mobility, energy and sustainability
- Modular in different forms (also smaller versions); can be used throughout Europe ready to plug in; adaptable to different brand needs