



University of St.Gallen

Institute of Responsible Innovation,  
Sustainability and Energy

## **Solar powered mobility at zero costs and zero emissions**

Research on new business models leveraging the convergence of the energy and automotive industry\*

Moritz Loock  
University of St.Gallen

*\*partly based on Loock, Everts, Pons-Seres de Brauwer, Scherbeck, & Wüstenhagen (2026), Marketing Review St. Gallen (forthcoming)*

# Objectives of this seminar

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- Highlight the role of business model research for solar powered mobility; elaborate on two iconic business models and how business model innovation moves beyond the icons.
- Present two research projects in more detail: (1) looks at efficiency of the EV sales process at car dealerships. (2) investigates how specifics of large e-mobility fleets influence optimisation strategies in electric power and energy reserve trading.
- Sharing learnings on the role of business research at the convergence of the automotive and energy sector and signal interest and openness for collaboration.



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# Agenda

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- **The role of business models and how companies are moving beyond two iconic business models\***
- Research project 1: Efficiency of the EV sales process at car dealerships
- Research project 2: Specifics of large e-mobility fleets and electric power and energy reserve trading
- Wrap-up



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*\* based on Loock, Everts, Pons-Seres de Brauwer, Scherbeck, & Wüstenhagen (2026), Marketing Review St. Gallen (forthcoming)*

# For most of the last century, energy and mobility were two distinct industries

Energy



Mobility



**Es gibt noch Dinge,  
auf die man sich  
verlassen kann.**



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# However, today the boundaries of both sectors are being redrawn

## Energy

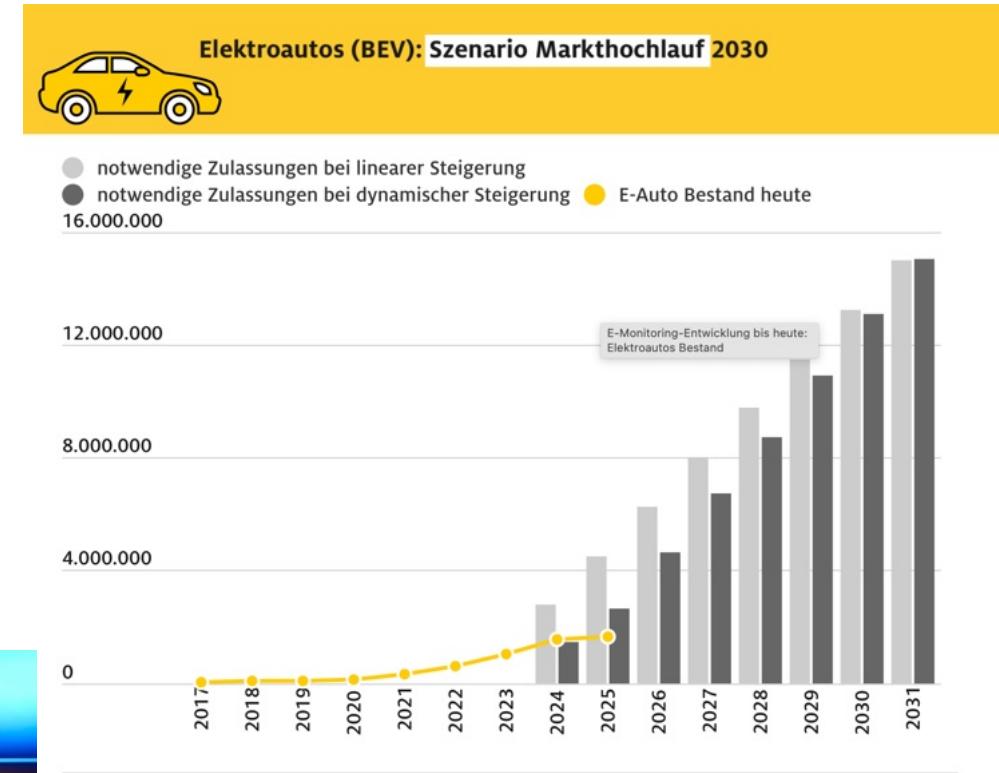
2024 → 2030

- 1 Mio. Smart Meter in Deutschland
- 3 Mio. PV-Anlagen in Deutschland (71 GW)
- 1 Mio. E-Autos auf deutschen Straßen
- 1 Mio. Wärmepumpen installiert
- Negative Preise auf Spotmärkten an 500 Stunden pro Jahr
- 60 Mio. Smart Meter in Deutschland installiert
- 9 Mio. PV-Anlagen in Deutschland (215 GW)
- 15 Mio. E-Autos auf deutschen Straßen
- 6 Mio. Wärmepumpen installiert
- Rund 1.500 Stunden mit neg. Preisen pro Jahr (+ variables Netzentgelt)

<https://spotmyenergy.de/>



## Mobility



<https://www.adac.de/news/e-monitoring/>

# Various energy and automotive companies have recently announced new product bundles

<https://de.renault.ch/elektroautos/r5-e-tech-electric.html>

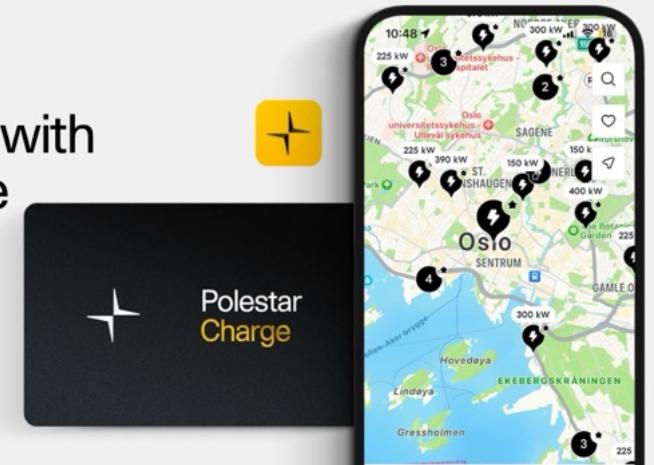


«Powerbox, a bidirectional charging station»

<https://media.renault.com/mobilize-v2g-where-the-future-electric-renault-5-becomes-a-source-of-energy/>

## Public charging with Polestar Charge

One solution for public charging.  
Over 1,000,000 charging points.



<https://www.polestar.com/uk/charging/charging-network/>



<https://www.enbw.com/elektromobilitaet/zuhause-laden>

Unser Top-Angebot fürs Laden zuhause und unterwegs



[Jetzt E-Mobilitäts-Kombi sichern](#)

Get the whole package from Octopus

Car, charger, energy.



Salary sacrifice  
Save your team up to 40% on a brand new EV.

Intelligent EV  
Our personal leasing offer

Power Pack Bundle  
Free home charging for your entire lease with Octopus Energy.

[https://octopusev.com/?utm\\_source=octopusenergy&utm\\_medium=webpage&utm\\_campaign=drivingpage](https://octopusev.com/?utm_source=octopusenergy&utm_medium=webpage&utm_campaign=drivingpage)

# These offerings show variance in their underlying business models

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- Business models are combinations of patterns that answer central questions of how a business creates and captures value (Gassmann & Frankenberger, 2025)
- Business models thereby define who the customers are and what value propositions are offered to customers, how the value is delivered, and how the monetization work

➤ *Technological possibilities resulting from the convergence of renewable energy and electric vehicles abound, the commercial success of these innovative new offerings hinges on their ability to provide value to EV drivers, hence the business model*



# Central questions have emerged from our studies that determine business models

## 1. Is the electricity self-generated or purchased?

In other words, does the consumer have solar panels on their roof, or do they buy renewable energy from the market?

## 2. Where does charging take place? At home, at work, or on the road?

## 3. What charging mode is used? Instant (“dumb”), smart unidirectional, or bidirectional (V2H/V2G)?

## 4. How is the charging process controlled? At the level of the car (e.g., EV software), the charging point, the home (e.g., home energy management system), or the grid?

## 5. What is the revenue model? Pay per use, monthly subscription, dynamic tariffs, or others?

## 6. Who owns the car?

Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	on the road
Charging Mode	instant		smart unidirectional (V1G)	smart bidirectional (V2H/V2G)
Control	Car	Charging point	Home	Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff	Other
Asset Ownership (Car)	Privately owned		Third-party owned	

# An icon is the «Early Electrifier» business model for home charging with privately owned solar PV

https://alois-mueller.com/e-mobilitaet-infrastruktur/



The screenshot shows the homepage of the Alois Müller website. The header features the company logo with a stylized 'M' and the text 'Alois Müller'. Below the header, there are navigation links for 'Privatkunden', 'Geschäftskunden', 'Über uns', 'Aktuelles', 'Karriere', and 'Kontakt'. The main content area has a yellow header with the text 'Energie von Zuhause für unterwegs' and an icon of a car with a plug. Below this, there is a large image of a red electric car connected to a home EVSE in front of a house with solar panels. A yellow button at the bottom left of the image says 'Jetzt Kontakt aufnehmen!'. To the right of the image, there is a text block about the benefits of electromobility and a list of advantages. On the far right, there are social media icons for email, phone, Instagram, and LinkedIn. At the bottom left, there is a QR code.

Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	on the road
Charging Mode	instant		smart unidirectional (V1G)	smart bidirectional (V2H/V2G)
Control	Car	Charging point	Home	Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff	Other
Asset Ownership (Car)	Privately owned		Third-party owned	

- Value proposition: This model is often expected to lower energy costs, mainly through charging with own solar energy. Enabling self-consumption, e.g. by bundling EVs and PV systems, can be a promising value proposition of either equipment providers or utilities partnering with OEMs.
- In countries like Switzerland, for example, around 60% of the population rent their homes, which limits their ability to install solar panels or access a privately owned parking space.



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Loock, Everts, Pons-Seres de Brauwer, Scherbeck, & Wüstenhagen (2026), Marketing  
Review St. Gallen (forthcoming)

# Another icon is the “Charging At Filling Station” business model for charging on the road

[https://app.gofast.swiss/assets/uploads/GOFAST\\_St\\_Gallen\\_West\\_38d1bed45a.webp](https://app.gofast.swiss/assets/uploads/GOFAST_St_Gallen_West_38d1bed45a.webp)



Asset Ownership (Energy)	Make		Buy
Charging Location	@ home		@ work
Charging Mode	instant	smart unidirectional (V1G)	smart bidirectional (V2H/V2G)
Control	Car	Charging point	Home Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff Other
Asset Ownership (Car)	Privately owned	Third-party owned	

- Value proposition: This model is often expected to provide very fast charging to minimize stop time, and it is frequently compared to the refueling time of cars with internal combustion engines (ICE).
- As long-distance travel is an important aspect of individual mobility, many business models of utilities or charging providers offer value through fast charging.

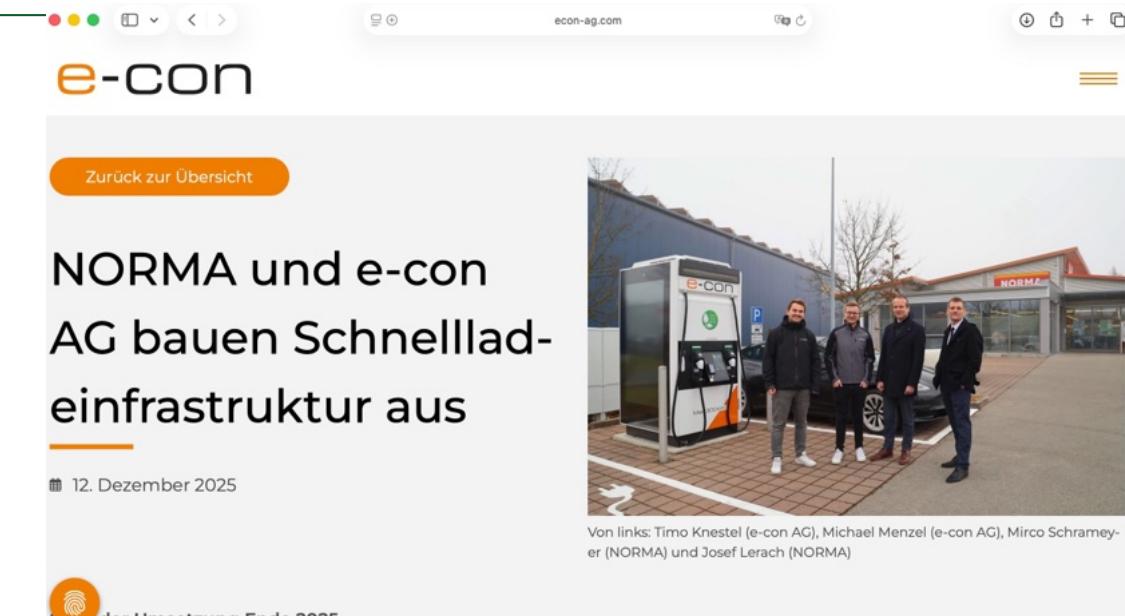


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Review St. Gallen (forthcoming)

# Companies are now moving beyond the two icons – refining «Charging At Filling Station”



The screenshot shows a news article from the e-con AG website. The headline reads: "NORMA und e-con AG bauen Schnellladinfrastruktur aus". The article is dated December 12, 2025. Below the headline, there is a photograph of four men standing next to a modern electric vehicle charging station. The station is white with orange and blue accents, and the e-con logo is visible. The background shows a building with a "NORMA" sign.

Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	on the road
Charging Mode	instant	smart unidirectional (V1G)		smart bidirectional (V2H/V2G)
Control	Car	Charging point	Home	Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff	Other
Asset Ownership (Car)	Privately owned		Third-party owned	

- For instance, improved revenue models, such as monthly subscriptions plans, offer significantly lower costs than pay-per-use models.
- In addition, some providers offer reduced charging rates based on more nuanced revenue models (e.g., retailers incorporating charging as part of their retail strategy).
- Furthermore, novel business models expand the scope of charging locations on the road beyond those within a single charging network, allowing drivers to conveniently use charging stations of different providers across Europe.



# Companies are now moving beyond the two icons – refining charging at home

THE MOBILITY HOUSE ➞  
Charging

Lagerdeals Ladestationen Zubehör ChargeLine Knowledge Center Vehicle-to-Grid Gewerbesp

Firmenwagen zuhause laden und abrechnen Abrechnung Produkte Kosten **Komplettlösung** Vorteile Video FAQ

## Du suchst für dich und deinen Arbeitgeber nach einer Komplettlösung?

Wir haben für alle Anwendungsfälle die richtigen Produkte – es kommt auf die individuellen Bedürfnisse und Voraussetzungen an, welche Systeme am besten funktionieren.

### Zuhause laden

- Wir bieten dir die passenden [Ladestationen](#)
- Du erhältst eine [Beratung & Installation](#) durch unser Elektrikernetzwerk
- Optional: Wir übernehmen für dich die Abrechnung

### Am Arbeitsplatz laden



[https://www.mobilityhouse.com/de\\_de/firmenwagen-zuhause-laden-abrechnen#produkte](https://www.mobilityhouse.com/de_de/firmenwagen-zuhause-laden-abrechnen#produkte)

Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	on the road
Charging Mode	instant		smart unidirectional (V1G)	smart bidirectional (V2H/V2G)
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- For instance, new models incentivize self-consumption with third-party owned cars (e.g., company cars) that are used privately and employers offer their employees specific home charging tariffs.
- Other examples include business models with different charging and steering models that combine self-consumption with smart charging and dynamic tariffs to reduce the cost of charging electricity that is not self-generated.

# Companies are now moving beyond the two icons –enabling smart charging

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Einfach...  
alles in einer App

Intelligent...  
die Wallbox, die mitdenkt

Sparen...  
mit dem dynamischen Tarif von SpotmyEnergy

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Deine Möglichmacher (Smart Meter, HEMS, dynamischer Tarif)

Fachgerechte Installation

Jetzt anfragen

\*Vorabangebot zeigt Richtpreis – Im Online-Check wird der finale Preis ermittelt, meist bleibt dieser unverändert. Am Ende entscheidest immer Du.

<https://spotmyenergy.com>

Smarte Wallbox – Lade clever statt teuer!

Anbieter und Käufer handeln Strom nach Angebot und Nachfrage  
Günstig bei viel Wind / Sonne, potenziell teurer bei hoher Nachfrage  
Profitiere von günstigen Zeiten mit dynamischem Tarif & smarter Wallbox

Senke Deine Stromkosten mit smarter Steuerung

Strompreis im Tagesverlauf  
Durchschnittlicher Arbeitspreis in Köln im Juni in ct / kWh

Kosten pro 100km  
Durchschnittswerte des Ministeriums für Wirtschaft und Energie & realisierte SpotmyEnergy Einsparung

13.75€ 5.27€ 2,55€

Benzin E-Auto Smarte Wallbox -52 %

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Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	on the road
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More information:

Loock, M. & C. Pons-Seres de Bauwer (2026):  
**The economics of smart EV charging at home: A review and research agenda,**  
R&R Sustainable Mobility and Transport

# Business model perspective: A tool for mapping research

## The economics of smart EV charging at home: A review and research agenda.

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Moritz Loock (moritz.loock@unisg.ch)

Institute for Economy and the Environment, University of St. Gallen (IWO-HSG), Müller-Friedberg-Str. 6/8,  
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**CHAPTER INFO.** ABSTRACT  
Keywords:  
Smart charging  
Electric vehicle  
Economic performance  
Flexibility  
Prosumers  
Optimisation logic

Homelock charging of electric vehicles (EVs) is the dominant charging location in Europe, yet research on optimisation strategies to reduce charging costs remains overly fragmented. This review provides a cohesive synthesis of the economics of EVs on the market at home to identify their key optimisation logic – market-driven, grid-connected, prosumers-oriented with distinct value dynamics. We propose a renewed research agenda offering researchers and policymakers a novel lens to evaluate smart charging strategies that align user needs with renewable energy integration.

**1. Introduction**  
Charging an electric vehicle (EV) at home is the most common charging location for the majority of users today<sup>1,2</sup>. Thus, increasing research efforts are being invested to investigate the economic performance of homeplace EV charging<sup>3,4</sup>. Studies have examined the role of dynamic electricity prices<sup>5</sup>, cost-replaceable network tariffs<sup>6</sup>, home energy management systems<sup>7</sup>, and rooftop solar PV systems<sup>8</sup> for lowering EV charging costs in residential settings. A key concern cutting across these efforts revolves around the question: how cheap can homeplace charging become?



Does solar power add value to electric vehicles? An investigation of car buyers' willingness to buy product-bundles in Germany  
Alexander Staub  
University of St. Gallen, Institute for Economy and the Environment, Winterthur, Switzerland

**ARTICLE INFO.** ABSTRACT  
Keywords:  
Electric vehicle  
Home charging  
Marketing

The paper investigates consumer willingness to buy product-bundles that come with an electric vehicle (EV). The main purpose of this study is to examine whether the purchase of an EV is more attractive when it is charged at home, and to what price car buyers are willing to pay for this additional value. In a hybrid setting, we ask car buyers to answer three questions about their willingness to buy an EV and their willingness to pay for a home charging bundle. We also ask them to evaluate the value of a home charging bundle for an EV.

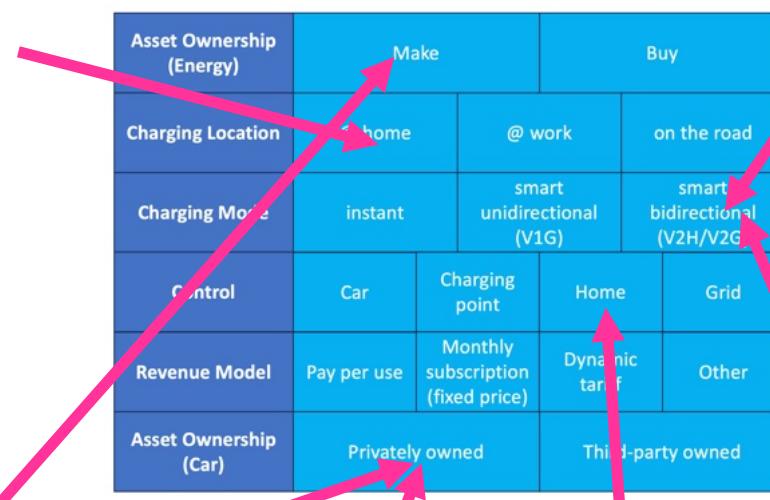
To test whether consumers are willing to pay for the value of a home charging bundle, we conducted a choice experiment. In this experiment, we asked car buyers to choose between an EV with a home charging bundle and an EV with a public charging bundle. We also asked car buyers to evaluate the value of a home charging bundle for an EV.

Results show that car buyers are willing to pay for a home charging bundle for an EV.

Keywords: electric vehicle, home charging, marketing, product-bundles

Received: 10 October 2015; Accepted: 14 February 2016; Accepted: 20 February 2016

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

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<sup>b</sup>Zürich University of Applied Sciences, Institute of Sustainable Development, Tiefenbrunnerstrasse 2, CH-8401 Winterthur, Switzerland

### ARTICLE INFO

Keywords:  
Solar photovoltaics  
Battery storage  
Vehicle-to-grid  
Consumer behavior  
Smart grid

### ABSTRACT

Rising shares of fluctuating renewables increase the need for flexibility in the power market. At the same time, the role of the prosumer has gained new importance in the co-creation of distributed flexibility. As a result, 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 216 individual decisions in a series of choice experiments with 902 study participants in three main domains of residential electricity use: (1) solar PV plus storage, (2) electric mobility, (3) heat pumps. We develop a novel measure of the prosumer's willingness to co-create flexibility, and validate their definition over supply contracts with varying levels of flexibility to derive implied discount rates. 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 renewables have enhanced the need for flexibility to avoid imbalances in the power system. Traditional consumers, such as households, have not been able to provide flexibility (Grootenhuis et al., 2016). Distributional 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 breaking up local storage capacity. Successfully mobilizing flexibility in distribution grids can help to delay or avoid investments in extending centralized grid infrastructure (Grootenhuis and Akkermans, 2007; Veldman et al., 2013), resulting in cost efficient energy systems and allowing smooth integration of fluctuating renewables. The role of decentralized consumers 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 Byrne, 2011; Kotler, 1986; Toffler,

1990) provides a potentially valuable source of – so far utilized – flexibility (Grootenhuis and Akkermans, 2007; Kubli, 2017; Veldman et al., 2013). Decentralized 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 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. Søe et al., 2016) and for

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# Agenda

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- The role of business models and how companies are moving beyond two iconic business models
- **Research project 1: Efficiency of the EV sales process at car dealerships**
- Research project 2: Specifics of large e-mobility fleets and electric power and energy reserve trading
- Wrap-up



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**Einfach...**  
alles in einer App

**Intelligent...**  
die Wallbox, die mithdenkt

**Sparen...**  
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**Nur 1.950€**

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dynamischer Tarif)

**Premium Wallbox**

**Fachgerechte Installation**

**Jetzt anfragen**

# Smarte Wallbox – Lade clever statt teuer

- 🕒 Anbieter und Käufer handeln Strom nach **Angebot und Nachfrage**
- 🕒 **Günstig** bei viel Wind / Sonne, potenziell teurer bei hoher Nachfrage
- 🕒 Profitiere von günstigen Zeiten mit **dynamischem Tarif & smarter Wallbox**

## Senke Deine Stromkosten mit smarter Steuerung

### Strompreis im Tagesverlauf

Durchschnittlicher Arbeitspreis in Köln im Juni in ct / kWh

Zeit	Strompreis (ct/kWh)
00:00	25
03:00	20
06:00	18
09:00	10
12:00	12
15:00	22
18:00	40
21:00	30

### Kosten pro 100km

Durchschnittswerte des Ministeriums für Wirtschaft und Energie & realisierte SpotmyEnergy Einsparung

Fahrzeug	Kosten pro 100km
Benzin	13.75€
E-Auto	5.27€
Smarte Wallbox	2.55€

**-52 %**

**Smarte Wallbox**  
Laden, wenn es für  
Dich am günstigsten ist!

Die intelligente KI-Steuerung von SpotmyEnergy lädt Dein E-Auto von ganz alleine zur günstigsten Zeit aus dem Netz – Damit kannst Du:

**Einfach. Intelligent. Sparen.**

\*Vorabangebot zeigt Richtpreis – Im Online-Check wird der finale Preis ermittelt; meist bleibt dieser unverändert. Am Ende entscheidet immer Du.

Asset Ownership (Energy)	Make		Buy	
Charging Location	@ home		@ work	
Charging Mode	instant		smart unidirectional (V1G)	
Control	Car	Charging point	Home	Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff	Other
Asset Ownership (Car)	Privately owned		Third-party owned	

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

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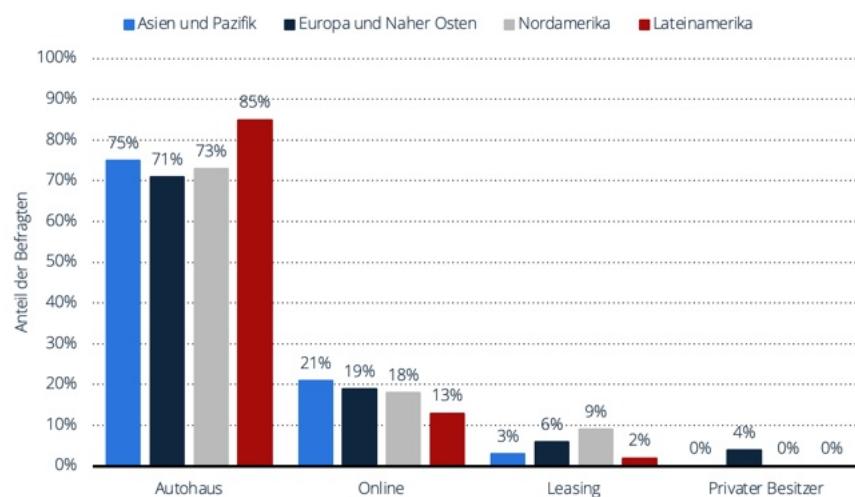
- Extensive text-based explanation exceeds capacity load of individuals within car dealerships and interactive, time-consuming explanation through trained sales-personnel can be challenging due to limited availability of qualified personnel and financial limitations.
- Thus, it is of interest to explore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



# ... furthermore: the EV sales process at car dealerships provides additional challenges (I)

## Wo haben Sie ihr E-Auto gekauft?

Umfrage: Kaufort für E-Autos nach Regionen im Jahr 2024



Hinweis(e): Nordamerika, Europa, APAC, MENA; ab 18 Jahre; 1.055 Befragte

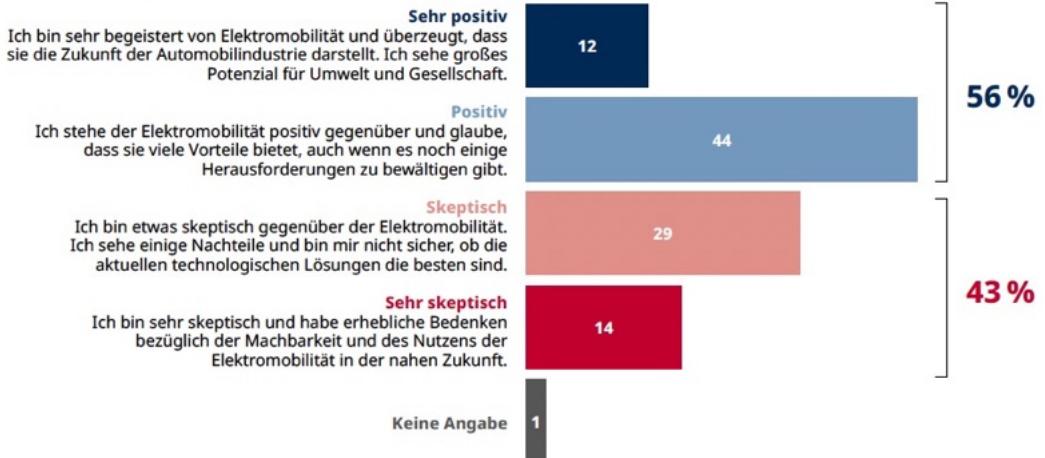
Weitere Angaben zu dieser Statistik, sowie Erläuterungen zu Fußnoten, sind auf [Seite 8](#) zu finden.

Quelle(n): PwC; [ID 1414976](#)

statista

ABB. 4: EINSTELLUNG DER VERKÄUFER/-INNEN ZUR ELEKTROMOBILITÄT

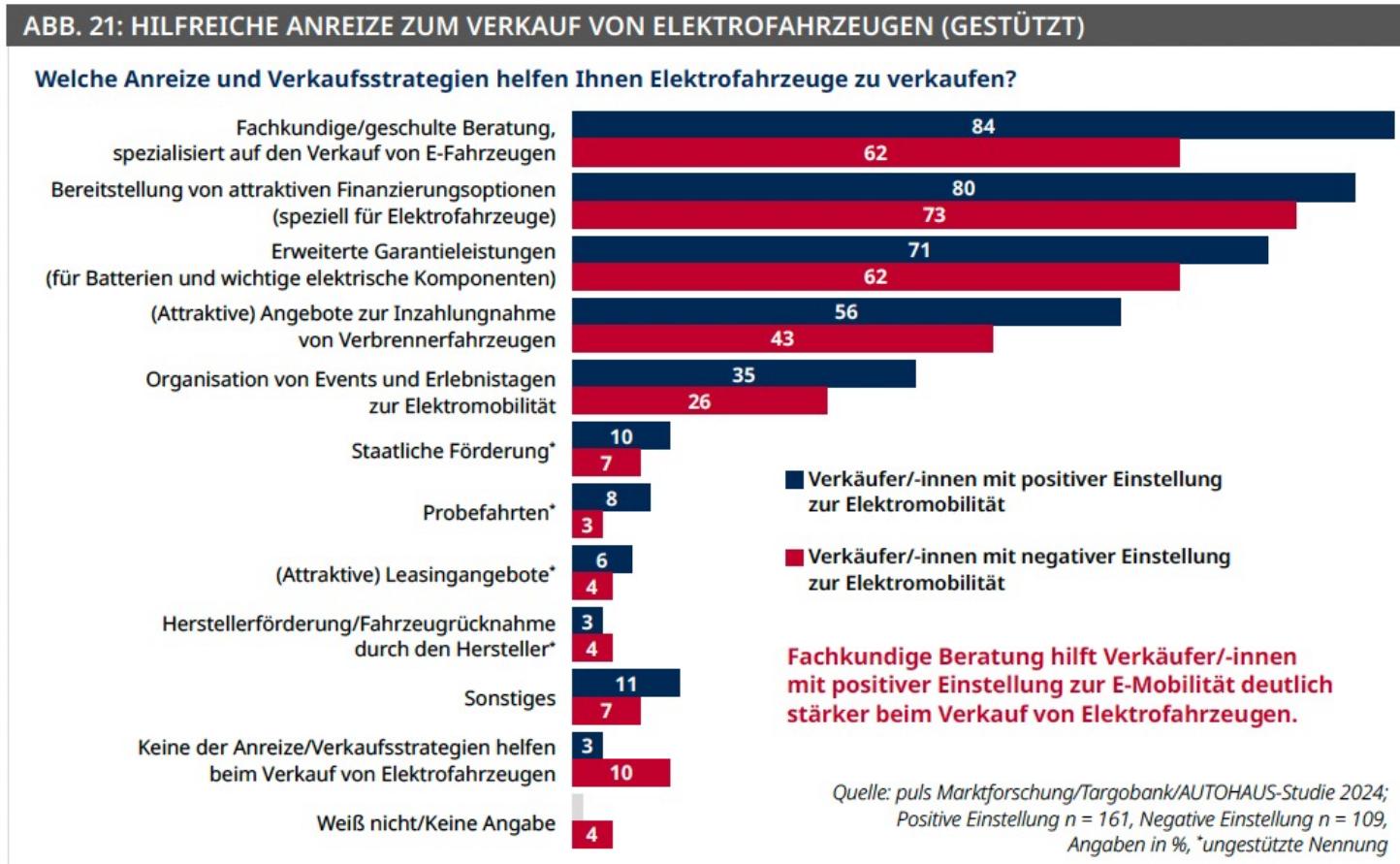
Wie stehen Sie persönlich grundsätzlich der Elektromobilität gegenüber?



Verkäufer/-innen stehen persönlich der Elektromobilität eher positiv gegenüber!

Quelle: puls Marktforschung/Targobank/AUTOHAUS-Studie 2024; Basis: Gesamt = 300, Angaben in %

# ... furthermore: the EV sales process at car dealerships provides additional challenges (II)



<https://media1.autohaus.de/fm/3478/targobank-verkaeuferstudie-2024.pdf>

# 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?



# 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%		

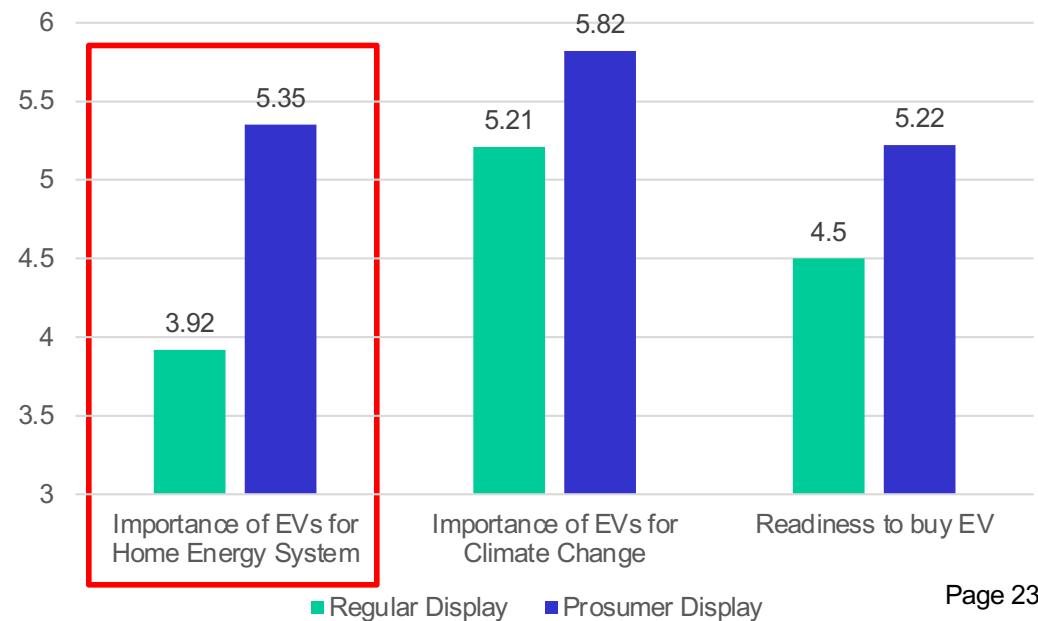
\* Subsample from a larger sample (n=512, Germany); participants of the subsample are new car owners only to control for potential variance among new and used cars, leased and company cars users

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



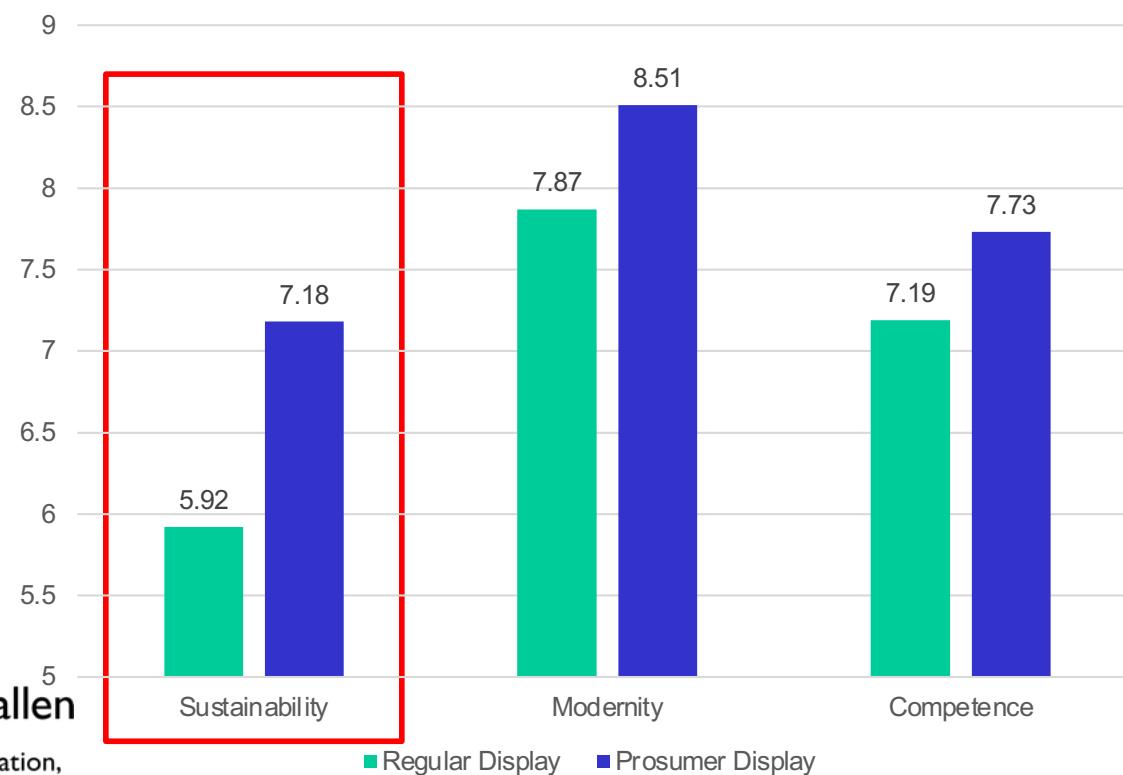
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- Car dealerships can help customers to better understand the role of EVs for home energy systems if they use an explanation-based EV presentation (the “prosumer display”) instead of a regular EV presentation
- Customers exposed to an explanation-based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



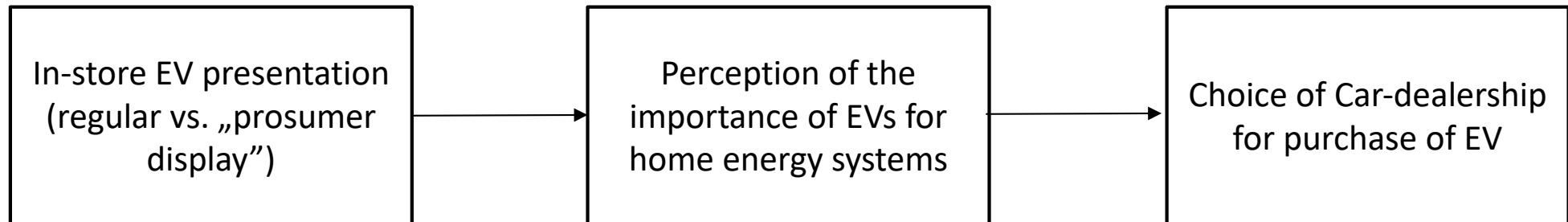
# Car dealerships profit from more informed customers (I)

- 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	t	Sig.
(Konstante)				
Inwiefern_halten_Sie_Elektroautos_aufgrund_der_im_Bild_darges	4,61	.54	.00	8,55 .000
	.28	.10	.27	2,89 .005



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# Implications and next steps (I)

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- 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



# Implications and next steps (II)



# Implications and next steps (III)

## Kurse



Markenübergreifende  
Verkaufsförderung von  
Elektroautos



Strommarkt Basics für den E-  
Autoverkauf

## Lektionen



Zuhause laden ist günstiger ist  
als auswärts tanken

0:00:32



Schlaues Laden macht es noch günstiger

0:00:31



E-Autofahren kostet weniger als 50 Cent/l

0:00:24



Der Wechsel zum Stromer spart  
hunderte EUR pro Jahr

0:00:21



Laden mit Strom macht unabhängig vom  
Benzinpreisanstieg

0:00:25

## EV Academy for Car Dealerships



Kundinnen und Kunden haben neue, Strommarkt spezifische Fragen und Beratungsbedarf. Die Fähigkeit Strommarkt Basics in die Beratung zu integrieren, wird zu einer wichtigen Verkaufskompetenz.

### Lernziele:

- Strommarkt Basics erarbeiten und für die Beratung im Autoverkauf nutzbar machen
- Einen Überblick geben über die spannenden Themen an der Schnittstelle von Mobilität und Strom
- Kompetenzen aufbauen für souveräne Beratungsgespräche an der Schnittstelle von E-Autos und Strommarkt

<https://mann-objecta.coachy.net>

# Agenda

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- The role of business models and how companies are moving beyond two iconic business models
- Research project 1: Efficiency of the EV sales process at car dealerships
- **Research project 2: Specifics of large e-mobility fleets and electric power and energy reserve trading**
- Wrap-up



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# EVs as company cars

Asset Ownership (Energy)	Make		Buy
Charging Location	@ home	@ work	on the road
Charging Mode	instant	smart unidirectional (V1G)	smart bidirectional (V2H/V2G)
Control	Car	Charging point	Home Grid
Revenue Model	Pay per use	Monthly subscription (fixed price)	Dynamic tariff
Asset Ownership (Car)	Privately owned	Third-party owned	

The screenshot shows a web browser window with the URL [amag-group.ch](http://amag-group.ch) in the address bar. The page is titled "AMAG Group AG". The main content features a large image of a car driving on a road with mountains and a solar panel array in the foreground. Overlaid on the image is the text: "Elektroautos als Firmenwagen: Unsere Flottenlösungen". The browser interface includes a toolbar with icons for refresh, search, and tabs, and a menu bar with "Medien", "Blog", "News", and "DE".

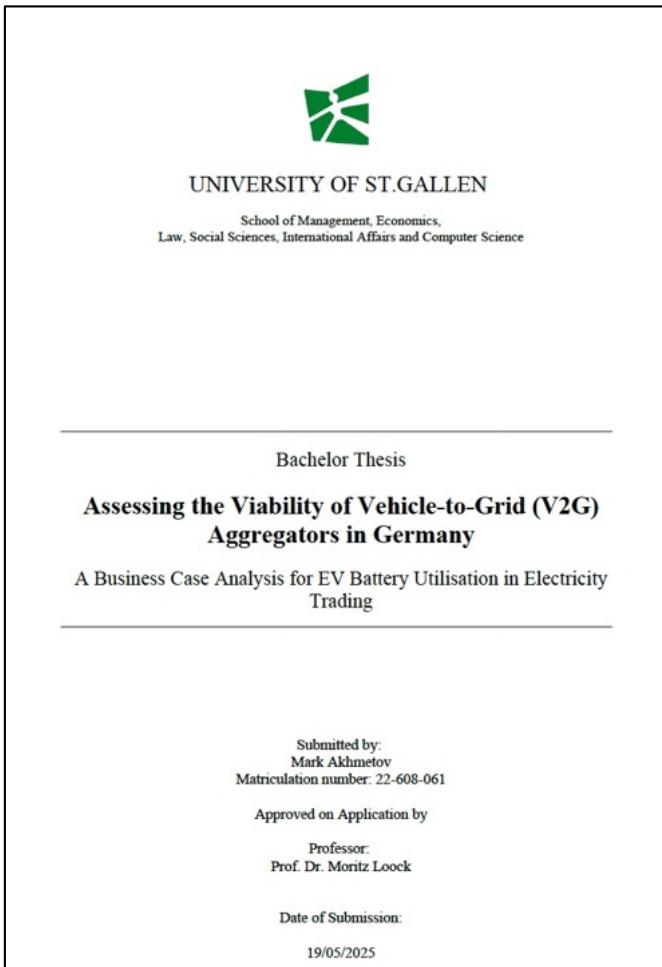


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<https://www.amag-group.ch/de/energy-und-mobility/loesungen/flottenloesungen.html>

# Aggregating and managing fleets of EV company cars



- Battery storage systems are increasingly deployed at large scale in flexibility and reserve markets.
- Recently, it has been argued that **aggregated electric vehicle (EV) fleets** could offer similar flexibility services.
- However, unlike large battery parks, e-mobility fleets are often less coherent:
  - They constitute of **fleet specific technology** (vehicles and charging equipment) and **fleet specific behavior** (e.g. different and changing charging and driving patterns), which in combination makes forecast an interesting challenge.
- At the same time, use for providing flexibility could be economically attractive, as the capital costs of the vehicles are not allocated to flexibility products, resulting in significantly lower opportunity costs compared to other power assets.



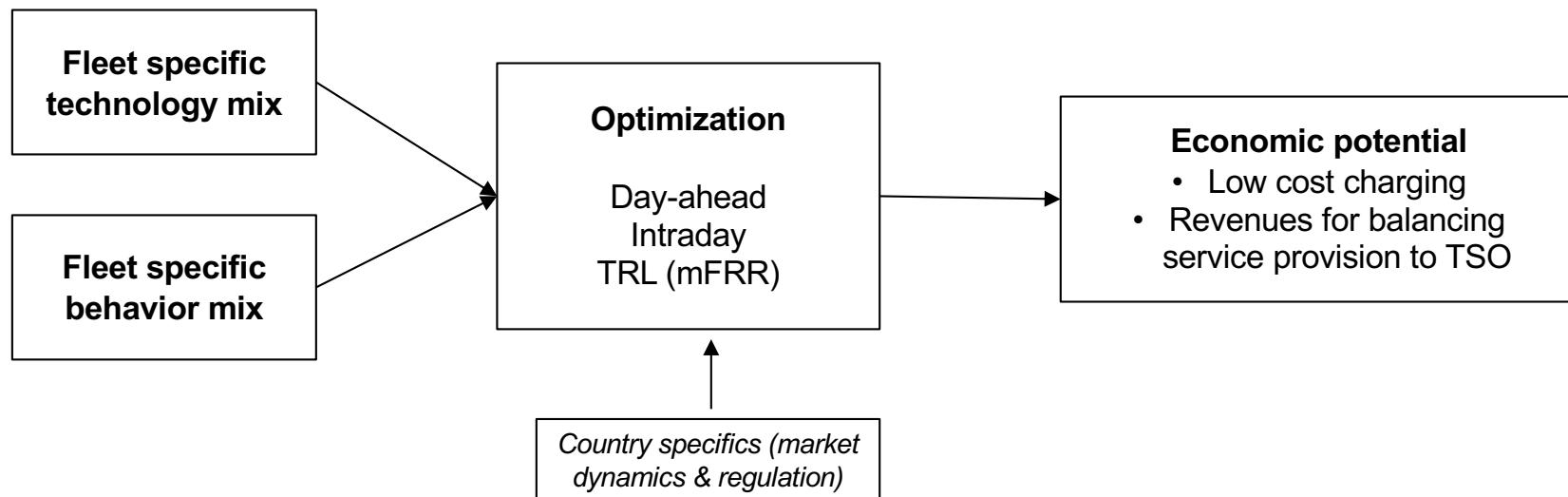
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# How do specifics of large e-mobility fleets influence optimization strategies in electric power and energy reserve trading?

- This paper draws on an analysis on a unique, large-scale database of an e-mobility fleet in Switzerland with fine-grained data of a fleet approx. 1'500 vehicles.
- In a first step a state-of-the art optimization model is derived from literature to assess the overall economic potential.
- In a second step, it is tested how different features of the fleet affect and change the optimization model and the economic potential as its outcome.

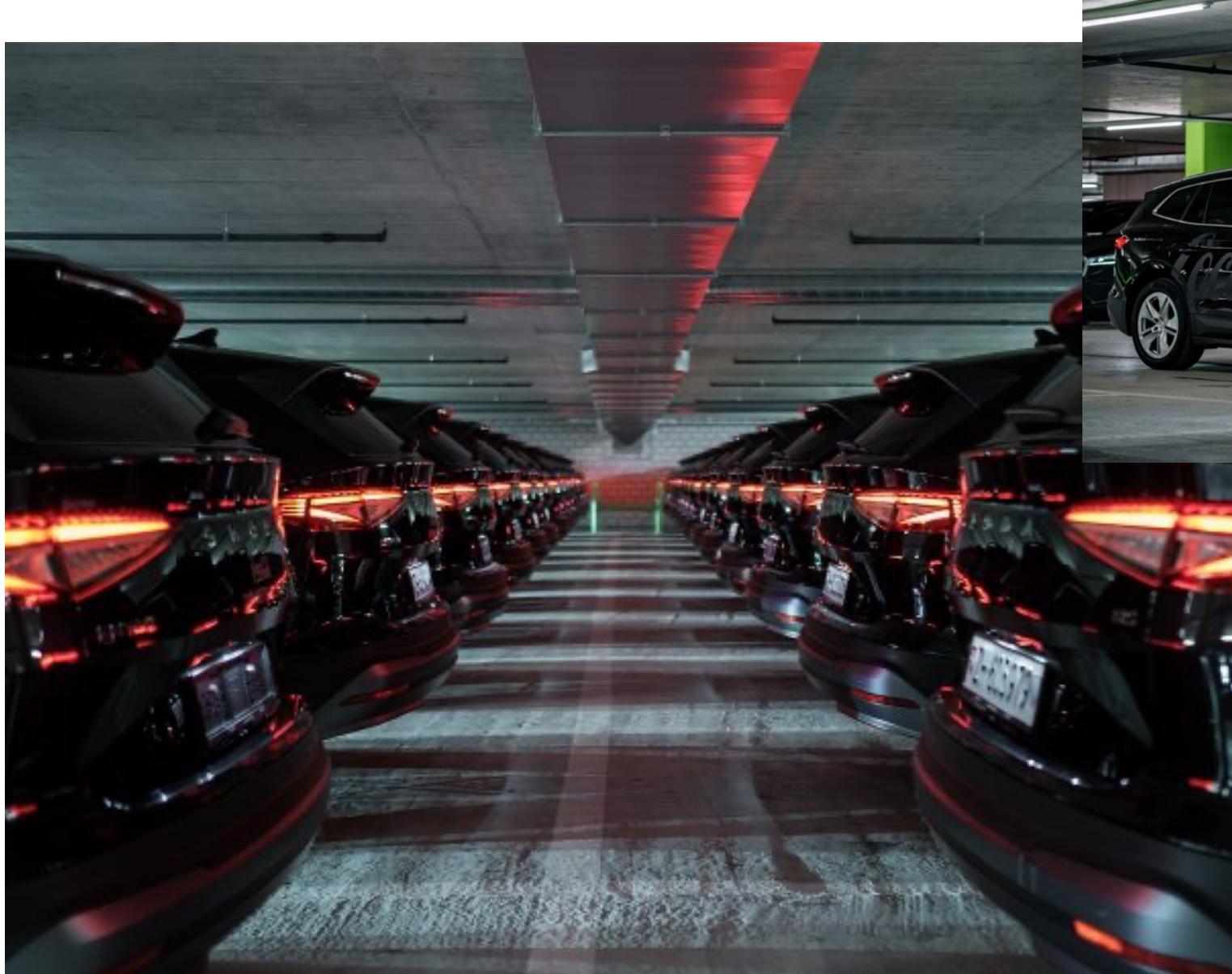


# Fleet specific subunit of around 100 ID.Buzz Cargo (with installer specific usage behaviour)



<https://www.amag-import.ch/de/flatten-einsatzfahrzeuge/corporate-fleet/erfahrungsberichte/helion.html>

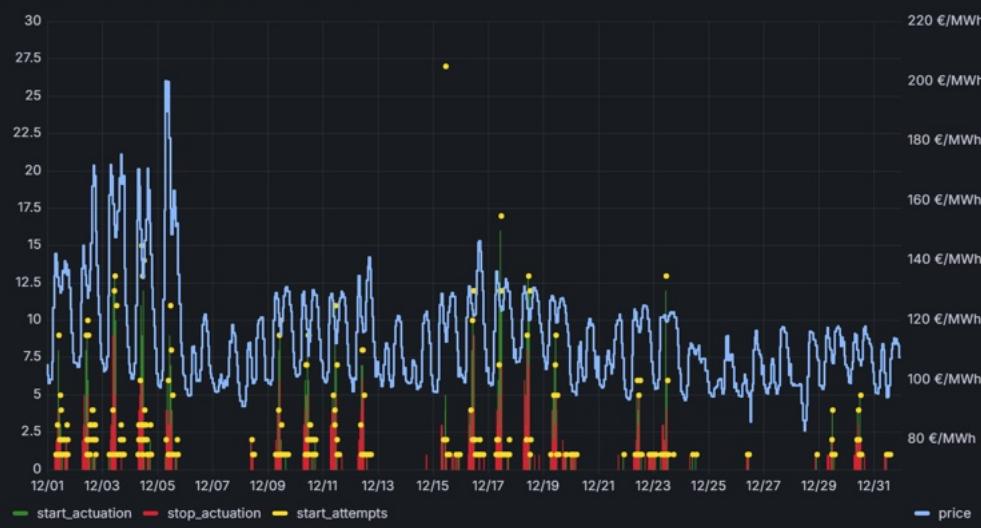
# Fleet specific subunit of around 177 Škoda Enyaq (with field service specific usage behaviour)



<https://www.amag-import.ch/de/flotten-einsatzfahrzeuge/corporate-fleet/erfahrungsberichte/coca-cola.html>

# Data snap-shot

Spot Price vs Actuated EVs vs Attempted Starts



Simulated Flexibility



A1	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
1	createdat	version	event	user	id	vehicle	id	vehicle	userid	vehicle	vendor	vehicle	reachable	vehicle	lastseen	vehicle	locationid	vehicle	information	brand
2	2025-08-01 00:00:01.665	2024-10-01	user	vehicle	updated	65710a2c-894e-4b78-be33-ff89345c-d2e	a18a969e-c12a-4195-92f8-ab7035a4582-65710a2c-894e-4b78-be33-ff89345d-c2e	0	1	0	0	0	0	0	0	0	0	0	0	
3	2025-08-01 00:00:04.844	2024-10-01	user	vehicle	updated	a8b8a59-14bc-440a-b8a0d2ded77	1769706e-c9d4-47b8-a2e4-71b3a85791c	a8b8a59-14bc-440a-b8b55-baa0d2ded77	5	5	5	5	5	5	5	5	5	5	5	
4	2025-08-01 00:00:06.557	2024-10-01	user	vehicle	updated	3464809e-0638-4462-877c-d1e49fc0d8e	3e81a1a3-c7b9-406a-9239-3389257052	3464809e-b638-4462-877c-d1e49fc0d8e	0	1	0	0	0	0	0	0	0	0	0	
5	2025-08-01 00:00:09.234	2024-10-01	user	vehicle	updated	7b77a8c-f4c-421-b846-7e721a09a6af	b15e393-11c4-47c0-6eaf	7b77a8c-f4c-421-b846-7e721a09a6af	0	1	0	0	0	0	0	0	0	0	0	
6	2025-08-01 00:00:12.061	2024-10-01	user	vehicle	updated	8fb9d2c-038e-403a-b8a2-25263c1c4e	0	0	0	0	0	0	0	0	0	0	0	0		
7	2025-08-01 00:00:15.361	2024-10-01	user	vehicle	updated	2d4657c8-17f5-4096-9ae3-3bcfab809739	0	0	0	0	0	0	0	0	0	0	0	0		
8	2025-08-01 00:00:19.661	2024-10-01	user	vehicle	updated	7a175755-6604-4464-9441-b85b95a717e8	0	0	0	0	0	0	0	0	0	0	0	0		
9	2025-08-01 00:00:19.871	2024-10-01	user	vehicle	updated	a9e95214-8bc1-a460-b6bb-82478323559	0	0	0	0	0	0	0	0	0	0	0	0		
10	2025-08-01 00:00:22.181	2024-10-01	user	vehicle	updated	85933dc-a363-4c3d-ad9	0	0	0	0	0	0	0	0	0	0	0	0		
11	2025-08-01 00:00:22.827	2024-10-01	user	vehicle	updated	0f85af01-0961-4110-a10d-94637327a4e6	0	0	0	0	0	0	0	0	0	0	0	0		
12	2025-08-01 00:00:23.088	2024-10-01	user	vehicle	updated	7d22131-7344-4232-9062-9b62c9d8a2b	0	0	0	0	0	0	0	0	0	0	0	0		
13	2025-08-01 00:00:24.112	2024-10-01	user	vehicle	updated	5f6104-5481-40b1-a542-0f69817b9c1	0	0	0	0	0	0	0	0	0	0	0	0		
14	2025-08-01 00:00:27.531	2024-10-01	user	vehicle	updated	044626b5-7202-44a4-9202-41186131861	0	0	0	0	0	0	0	0	0	0	0	0		
15	2025-08-01 00:00:27.684	2024-10-01	user	vehicle	updated	5d75880-10b8-4ccb-9c82-339eb6cc1c	0	0	0	0	0	0	0	0	0	0	0	0		
16	2025-08-01 00:00:28.795	2024-10-01	user	vehicle	updated	77137755-6004-4465-9411-b85b95a717e8	0	0	0	0	0	0	0	0	0	0	0	0		
17	2025-08-01 00:00:30.080	2024-10-01	user	vehicle	updated	2d601da3-752c-4991-899f-5155d9a5116	0	0	0	0	0	0	0	0	0	0	0	0		
18	2025-08-01 00:00:31.406	2024-10-01	user	vehicle	updated	3283a5f7-sech-4c-8f-8168-6fbaf22e90	0	0	0	0	0	0	0	0	0	0	0	0		
19	2025-08-01 00:00:32.947	2024-10-01	user	vehicle	updated	0f85af01-0961-4110-a10d-94637327a4e6	0	0	0	0	0	0	0	0	0	0	0	0		
20	2025-08-01 00:00:34.046	2024-10-01	user	vehicle	updated	2d83a7-783-7649-4406-23f7	0	0	0	0	0	0	0	0	0	0	0	0		
21	2025-08-01 00:00:40.373	2024-10-01	user	vehicle	updated	a469965-6109-4fc-a95c-0	0	0	0	0	0	0	0	0	0	0	0	0		
22	2025-08-01 00:00:42.533	2024-10-01	user	vehicle	updated	0931c184-8681-40e0-a654-b0f748d0b8a	0	0	0	0	0	0	0	0	0	0	0	0		
23	2025-08-01 00:00:49.890	2024-10-01	user	vehicle	updated	d459a06-015-4535-47c4-52d8	0	0	0	0	0	0	0	0	0	0	0	0		
24	2025-08-01 00:00:50.950	2024-10-01	user	vehicle	updated	c2451d3f-9356-4e9a-a9d3-3a18e150	0	0	0	0	0	0	0	0	0	0	0	0		
25	2025-08-01 00:00:53.976	2024-10-01	user	vehicle	updated	09978423-3427-4672-86a2-722cfc52d9e	0	0	0	0	0	0	0	0	0	0	0	0		
26	2025-08-01 00:00:54.085	2024-10-01	user	vehicle	updated	0485c-17-6684-4054-8846-57-7c831496c	0	0	0	0	0	0	0	0	0	0	0	0		
27	2025-08-01 00:01:213.203	2024-10-01	user	vehicle	updated	a7533c1c-9c-463-959-0	0	0	0	0	0	0	0	0	0	0	0	0		
28	2025-08-01 00:01:31.717	2024-10-01	user	vehicle	updated	39e315c2-7cea-42a9-90c	0	0	0	0	0	0	0	0	0	0	0	0		
29	2025-08-01 00:01:46.427	2024-10-01	user	vehicle	updated	3623a2d-882-4c-06-a7d	0	0	0	0	0	0	0	0	0	0	0	0		
30	2025-08-01 00:01:49.633	2024-10-01	user	vehicle	updated	009699e-6ed-4599-935a-06196551f	0	0	0	0	0	0	0	0	0	0	0	0		
31	2025-08-01 00:11.982	2024-10-01	user	vehicle	updated	3a8b2548-2151-47a8-8958-2051b7b10	0	0	0	0	0	0	0	0	0	0	0	0		
32	2025-08-01 00:20.270	2024-10-01	user	vehicle	updated	14cc7cc9-35a4-43b4-ba8-99157a63797	0	0	0	0	0	0	0	0	0	0	0	0		

Modbus Interface



# Next steps

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- We test how different features of the fleet affect and change the optimization model and the economic potential as its outcome
- We assume that a heuristic trading strategy is more successful in dealing with dynamics from fleet specific behaviors and technology and specific local context compared to complex standard optimization
- Based on this, we seek to draw implications for a more fine-grained understanding in regard to the energy economic fundamentals of pooling electric vehicles



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# Agenda

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- The role of business models and how companies are moving beyond two iconic business models
- Research project 1: Efficiency of the EV sales process at car dealerships
- Research project 2: Specifics of large e-mobility fleets and electric power and energy reserve trading
- **Wrap-up**



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# Wrap-up

Learning	Why important	Topics
<p><i>#1: Business models provide a useful perspective of analysis for understanding dynamics at the convergence of the energy and automotive industry</i></p>	<p>A business model perspective helps to focus on interesting variance in company offerings, especially value propositions towards customers</p> <p>By considering and exploring this variance, business model research can develop precise prescriptions to improve whole business models or single aspects</p> <p>Given the impact of business models on social acceptance and diffusion, this potentially provides meaningful support for the diffusion of e-mobility</p>	Classification of business models, acceptance studies of bms and bm elements, dynamics among business models (e.g. complementarity and competition of bms)
<p><i>#2: The delivery configuration is an important element of business model research</i></p>	<p>Some value propositions are especially sensitive to efficient delivery, e.g. novel value propositions or value propositions that require detailed explanation</p>	Challenges and opportunities for an efficient design of the EV sales process at car dealerships and beyond
<p><i>#3: Monetization is an important element of business model research</i></p>	<p>Providing resources and capabilities to create and deliver value propositions is expensive, a detailed understanding of financial viability is a critical element for bm performance</p>	considering regulatory, technical and behavioral contingencies, field studies





Thank you ☺  
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