TABLE OF CONTENTS

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SBD's EV Guide provides insight into the current situation for mass-produced passenger and light commercial EVs, their features, charging infrastructure, as well as environmental impact and policy considerations.

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#208

Electric Vehicles

Overcoming Barriers to EV Adoption

Consumer attitudes (with survey), key drivers, and future solutions

Globally, the EV market has made impressive gains in the last few years, but much of this growth comes with a hidden cost: government-funded incentives.

As EVs become cheaper to produce and the purchase premium continually falls, incentives and price will be less dominant in the consumer purchase decision, but cost is only one of many factors that play an important role in the purchase decision.

Barriers to purchasing include range anxiety, styling, lack of charging infrastructure, and sustainable production of EV components. These concerns are beginning to come to the front of consumers' minds and influence purchase decisions, causing them to continue buying conventional (ICE) vehicles even when price is not a primary driver.

In this report, key outcomes are highlighted from over 3,600 consumers in critical global markets, resulting from SBD's 2021 global EV survey.

COVERAGE	FREQUENCY	PUBLICATION FORMAT	PAGES
NA, CHINA, EUROPE	ANNUALLY, QUARTERLY, ONE TIME	PDF, POWERPOINT, EXCEL, ONLINE	130+

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Key features and benefits

- Explains the traditional market drivers and barriers to EV adoption, using SBD's primary research to provide context and detail around each.
- Assesses the results of the consumer survey in the context of each market driver and barrier to understand if the traditional view of market drivers and barriers are indeed fact or fiction.
- Understand the root causes of key results from the survey, focusing on those that challenge our initial hypotheses and those that have a disproportionate affect on specific markets.
- Explains the best strategies for automakers, governments, and other industries to eliminate barriers to EV adoption and leverage existing drivers.

This research is useful for

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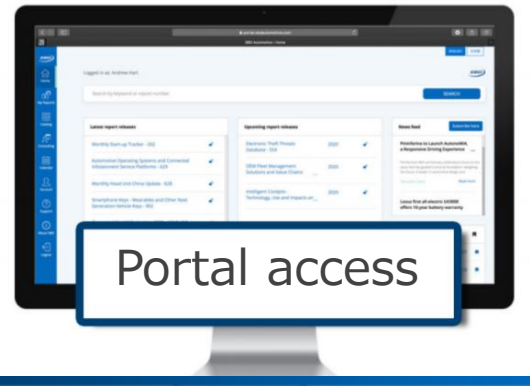

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SBD

April 2021

GEN208-21

OVERCOMING BARRIERS TO EV ADOPTION

Consumer attitudes (with survey), key drivers, and future solutions

Contents Page

Introduction

Introduction to Overcoming the Barriers to EV Adoption

Globally, the EV market has made impressive gains in the last few years, but much of this growth comes with a hidden cost: government-funded incentives.

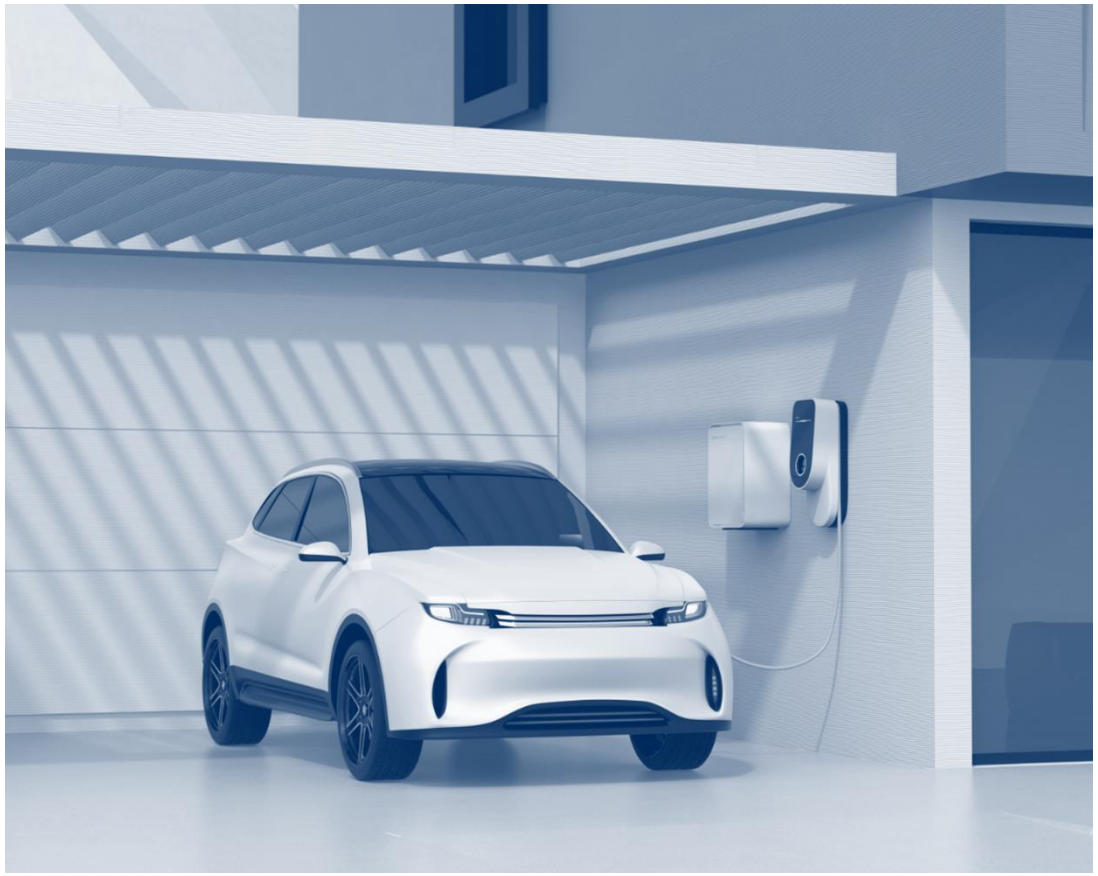
As EVs become cheaper to produce and the purchase premium continually falls, incentives and price will be less dominant in the consumer purchase decision, but cost is only one of many factors that play an important role in the purchase decision.

Barriers to purchasing include range anxiety, styling, lack of charging infrastructure, and sustainable production of EV components. These concerns are beginning to come to the front of consumers' minds and influence purchase decisions, causing them to continue buying conventional (ICE) vehicles even when price is not a primary driver.

In this report, key outcomes are highlighted from over 3,600 consumers in critical global markets, resulting from SBD's 2021 global EV survey.

Various factors involved in the purchase decision are explored, as well as what automakers, dealerships, and governments are currently doing, or should consider, to mitigate these concerns.

By adopting best-practices, the industry can eliminate many of the barriers to adoption, which will create a positive feedback loop where market uptake accelerates, leading to reduced costs/prices, and faster market acceleration.



Aim and structure of this report

The report will provide the reader with insights into today's electric vehicle market from the perspective of the consumer and to identify the driving factors for, and barriers to, switching to electric vehicles.

The main objectives of this report are:

1. Detail the Drivers and Barriers to Adoption

This report will explain the traditional drivers and barriers to EV adoption, using SBD's primary research to provide context and detail around each.

2. Challenge Existing Beliefs with Survey Results

We will then assess the results of the consumer survey in the context of each driver and barrier to understand if the traditional view of drivers and barriers are indeed fact or fiction. We will also examine the consumer survey to understand the willingness to pay for an EV in each market.

3. Identify Causes of Key Results

Understand the root causes of key results from the survey, focusing on those that challenge our initial hypotheses and those that have a disproportionate affect on specific markets.

4. Explain Suggested Solutions

Explain the best strategies for automakers, governments, and other industries to eliminate barriers to EV adoption and leverage existing drivers.

This report is comprised of three sections:

1 Executive Summary

Concise summary of key takeaways from the report

2 Consumer Findings

Reviewing in detail the survey findings for ICE owners and EV owners

3 Barriers in focus

Deep dive into key barriers to EV adoption

Definitions of Terms Used in this Report

Terms	Definition
BEV	Battery Electric Vehicle – Fully electric vehicle without a combustion engine
Charging Station	Charging equipment that acts as an interface between the vehicle and the grid
EV	In this report, synonymous with BEV. In the broader industry, can sometimes refer to both BEV and PHEV.
ICE	Internal Combustion Engine – Often refers to the vehicles that contain internal combustion engines.
PHEV	Plug-in Hybrid Electric Vehicle – Contains both an electric drive system and combustion engine. Can be plugged-in, but not mandatory.
TCO	Total Cost of Ownership – The cost of the vehicle from purchase to second-hand sale

Example slides from the report

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How is this section divided?

The overall consumer findings section is divided into subsections that focus on each of the main areas around the questionnaire and the main subjects. The subsections are the following:

- **EV consideration & myth busting / validations**: High level overview of EV consideration and validating / busting myths related to consumer barriers and drivers
- **Drivers of EV purchasing**: What are the motivating factors for ICE owners to buy an EV and what were the motivating factors for EV owners to buy their EV
- **Barriers to EV purchasing**: What are the core barriers to purchasing an EV, how do these barriers rank, and how should we prioritize the elimination of these barriers
- **Environmental concerns**: How concerned are consumers about the environment including battery production and disposal from an overall and regional point of view
- **Battery swap**: What is the interest level in a battery swap system among ICE owners and EV owners, and how much does this impact EV consideration

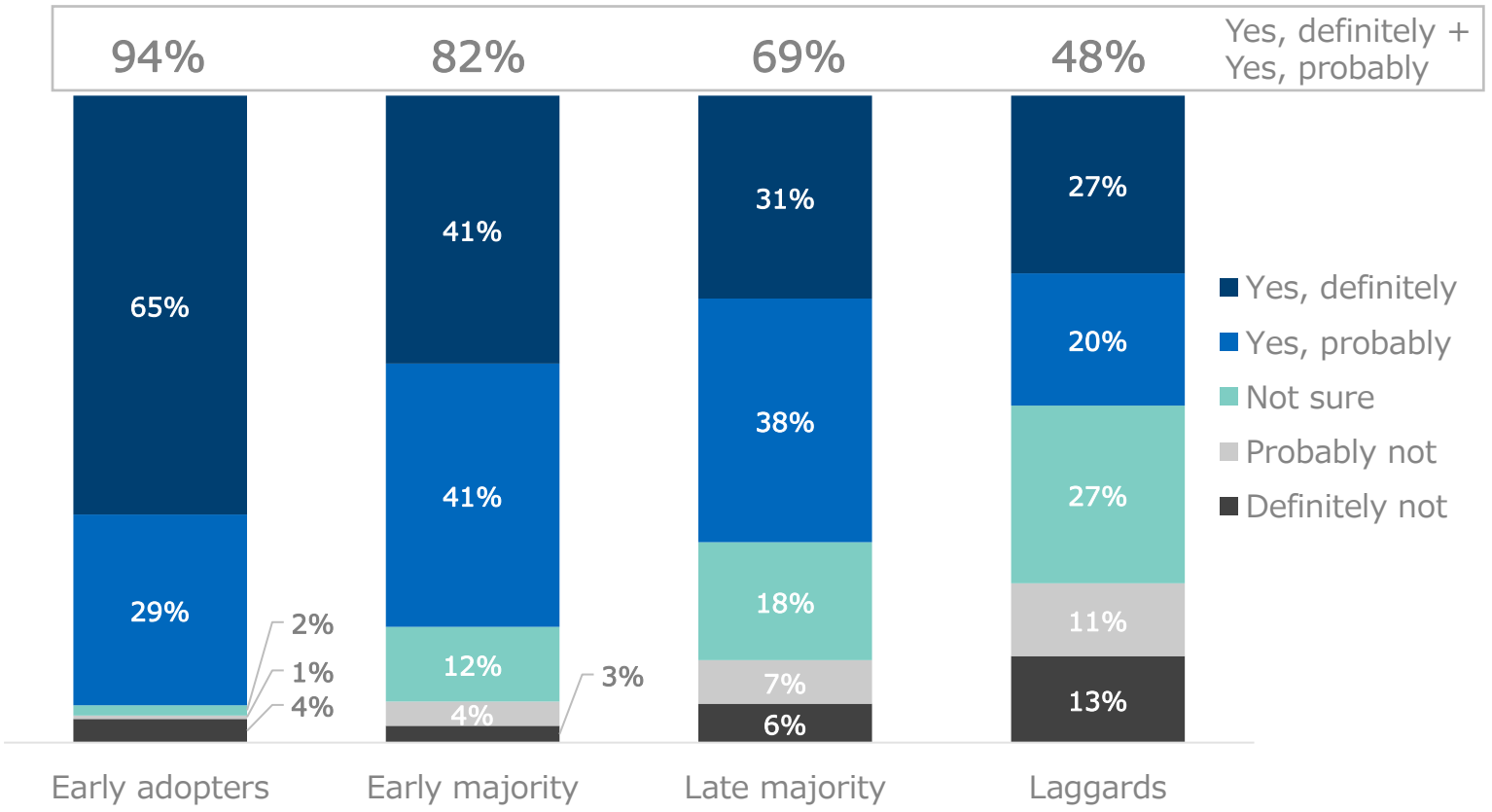
Click below to go to one of the subsections

- EV consideration
- Drivers of EV purchasing
- Barriers to EV purchasing
- Environmental concerns
- Battery swap

"Only early adopters want EVs" – FALSE

While nearly all early adopters will consider buying an EV, most of the early majority and large proportions of the late majority will consider an EV. The laggards still show interest, but much less so, in line with expectations from this profile of consumers.

Global EV purchase consideration by Innovation segmentation



Sample: all surveyed: Early adopters 190; Early majority 3,449, Late majority 2,456; Laggards 142

The innovation segmentation was first proposed by Hurt, Joseph & Cook (1977). This segmentation is used as a proxy for individual company segmentations as many will have an element of this, and facilitates another dimension of profiling of the customer base.

It is unsurprising that 94% of early adopters are considering an EV. But the fact that **more than half of the 'late majority' segment are considering purchasing a BEV** shows that the market is ready for mass adoption of these new powertrain vehicles.

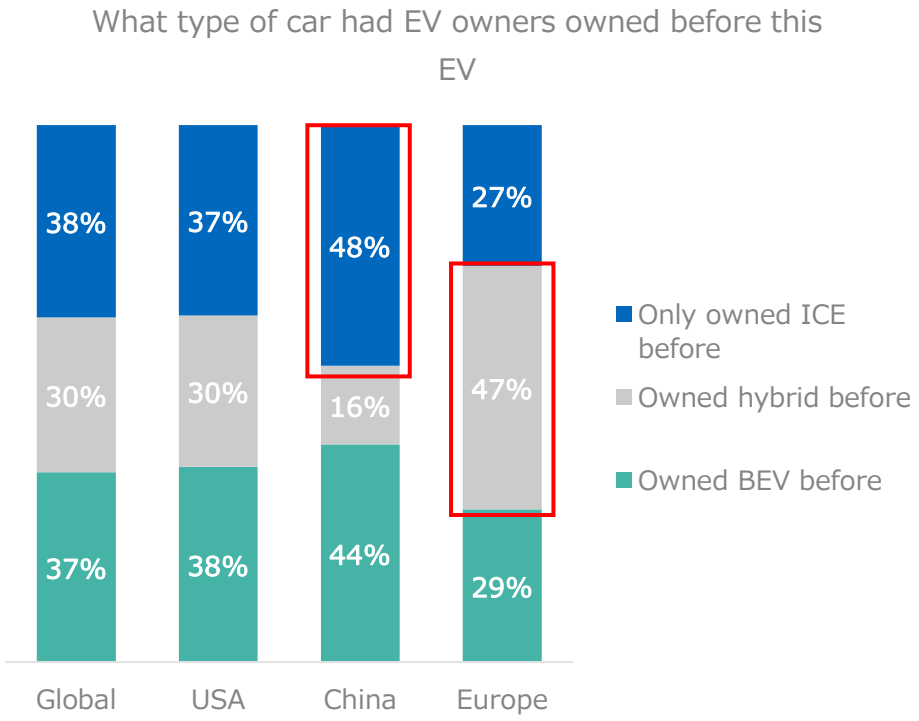
Normally the laggard segment would not show nearly as high interest in adopting a new product, but the fact that **48% of laggards are considering BEVs** shows the motivation and consumer imperative there is for EVs.

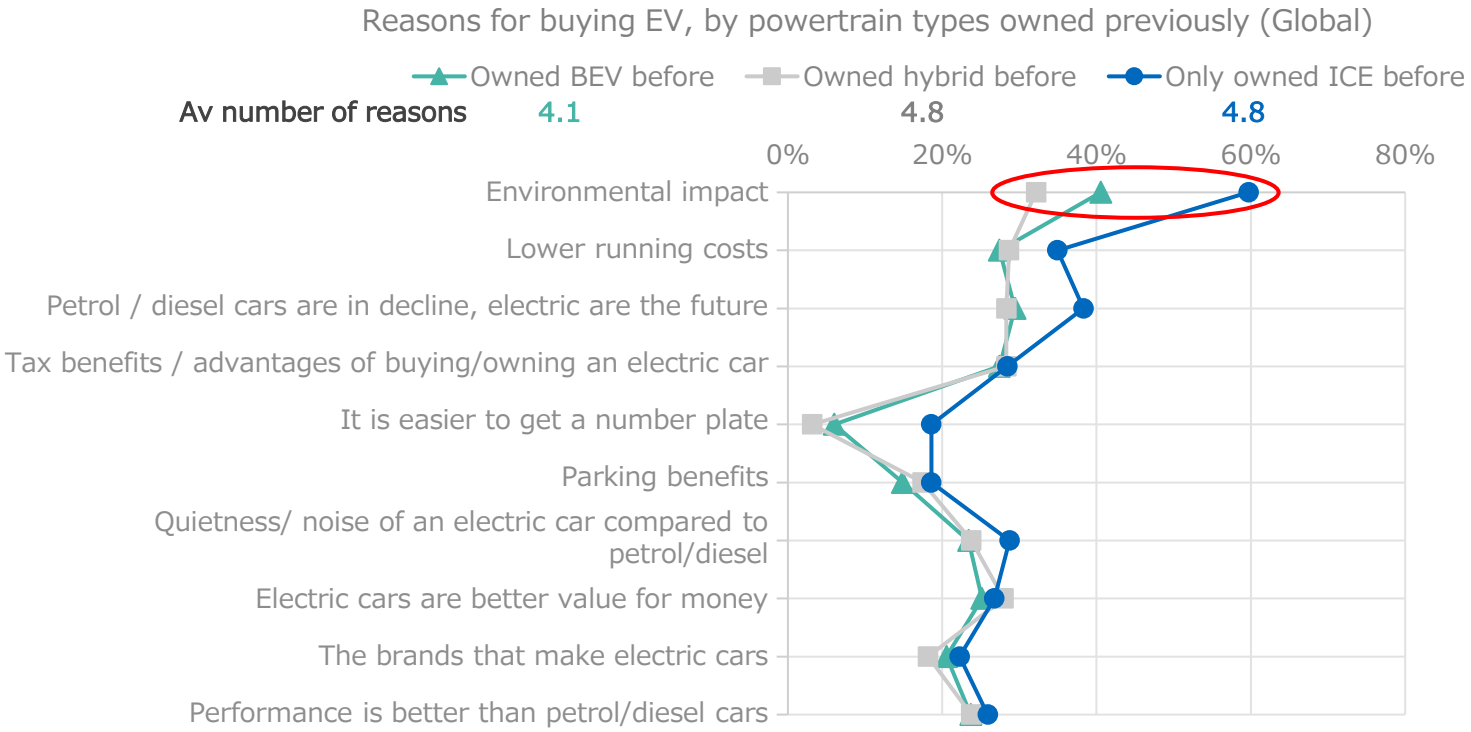
The journey to EV ownership varies across regions

Hybrids are definitely a 'gate-way product' in Europe, while Chinese incentivisation schemes support ICE consumers taking the jump straight into EVs. US consumers closely mirror the global average, with just under a third transitioning to hybrids before going fully electric.

At a global level, the survey respondents were equally split between those who have owned EVs, hybrids, and no alternative powertrain (i.e. only owned ICE vehicles before). This trend is matched in the USA, while in China nearly half of EV owners have never owned an alternative powertrain before, highlighting the push to EVs in China. While in Europe nearly half of EV owners have owned a hybrid before, showing how hybrids are acting as a stepping stone for EVs in Europe.

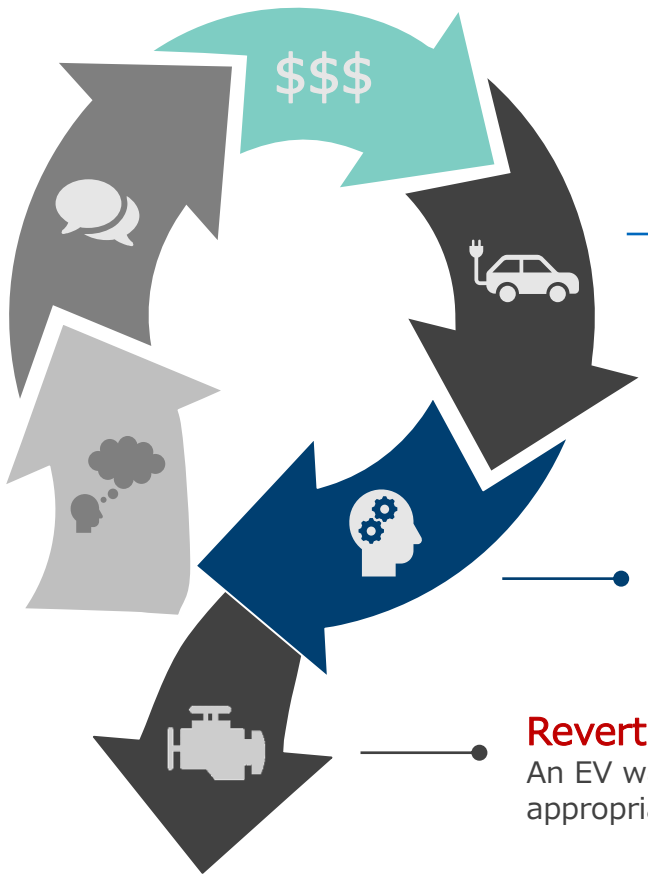
Previous EV and Hybrid owners have largely similar reasons for buying their current EV, while those coming directly out of ICE vehicles state more reasons, dominated by the environmental impact of EVs.





Sample: EV owners Global 517; USA 105: China 108: Europe 304

Overcoming Barriers Throughout the EV Customer Journey



Justify
Accept the price premium and purchase vehicle

Learn
Visit dealer and get price quote.

Experience
Live the EV lifestyle

Consider
Can an EV fit my lifestyle?

Reflect
Consider the experience, cost, and benefit

Revert to ICE
An EV was not appropriate for me.

This chapter will look at the key barriers that EV considerers, and eventually owners, will face in their customer journey. Overcoming these barriers is critical not only for encouraging the consumer to buy their first EV, but also to bring them back to electric technology for their subsequent vehicles. Each of these stages is defined by a key barrier that we will examine in detail, compare against the consumer survey results, and explain the best practices to overcome these barriers.

Consider – **EV Capabilities** – Can an EV do what I need it to do in my lifestyle?

Learn – **Dealership Experience** – Did the dealer support my decision to buy an EV? Did they help me understand the pros/cons and my options for charging?

Justify – **Price Premium** – Most EVs create some level of sticker shock. Was I able to justify the higher price based on the benefit that I expect to receive?

Experience – **Charging Infrastructure** – Throughout the ownership period, what was my experience with the charging infrastructure?

Reflect – **Lifecycle Costs** – At the end of my ownership period, did the total cost savings make up for any charging inconveniences or initial price premium? Would I buy one again?

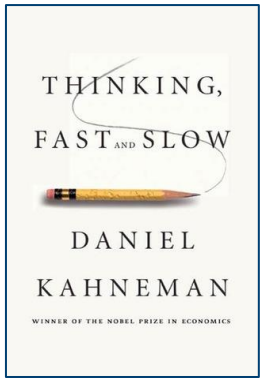
Consumers rely on emotion as well as logic in decision making

The overwhelming information required to make an informed EV purchase decision pushes consumers into a System 1 mindset 'allowing' them to revert to an ICE choice, rather than make the effort to calculate the benefits of owning an EV. To remove irrational barriers, the purchase decision must be simpler.

For many years **the automotive industry has pushed the consumer to buy on emotion** rather than logical facts, spending billions of dollars building brands and linking the purchase to be an emotionally charged one.

The result is that **consumers have been classically trained** to rely on their System 1 decision process in order to finalise a decision. **Consumers buy the vehicle they *want*.** The System 2 decision process is only utilized for a small number of functional critical factors that consumers need.

The reason for so few critical decision factors is due to the **paradox of choice**. An overwhelming range of options that consumers can use to aid their decision making. Studies show that this leads to **decision paralysis** (or the paradox of choice as penned by Barry Schwartz) a behavior al tension that consumers actively try to avoid, and thereby rely on their more emotional decision factors like Brand.



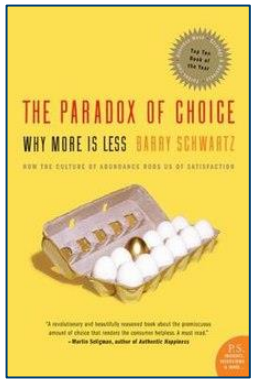
Daniel Kahneman posits that consumers have two modes of thinking –

"System 1" is fast, instinctive and emotional; "System 2" is slower, more deliberative, and more logical.

The theory discusses many facets covering the importance of 'framing' choices through people's tendency to replace a difficult question with one which is easy to answer.

Purchasing a phone

System 1	System 2
iPhone	Android
"I want it"	*"It's faster"*
	"It's cheaper"
	"It's more advanced"

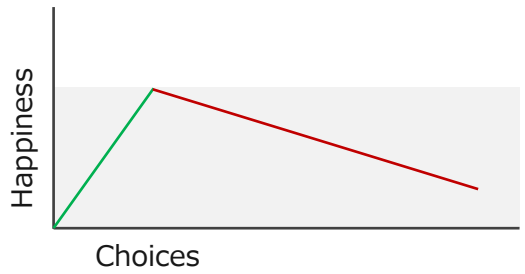


Barry Schwartz posits that:

The core premise is that consumers have too many choices, too little time to do what is really important. Focusing back on what they *want* is a solution to the problem of too much choice.

Schwartz maintains that it is precisely so that we can focus on our own wants that all of these choices emerged in the first place.

Decision paralysis



Dealer Interviews (1/5)

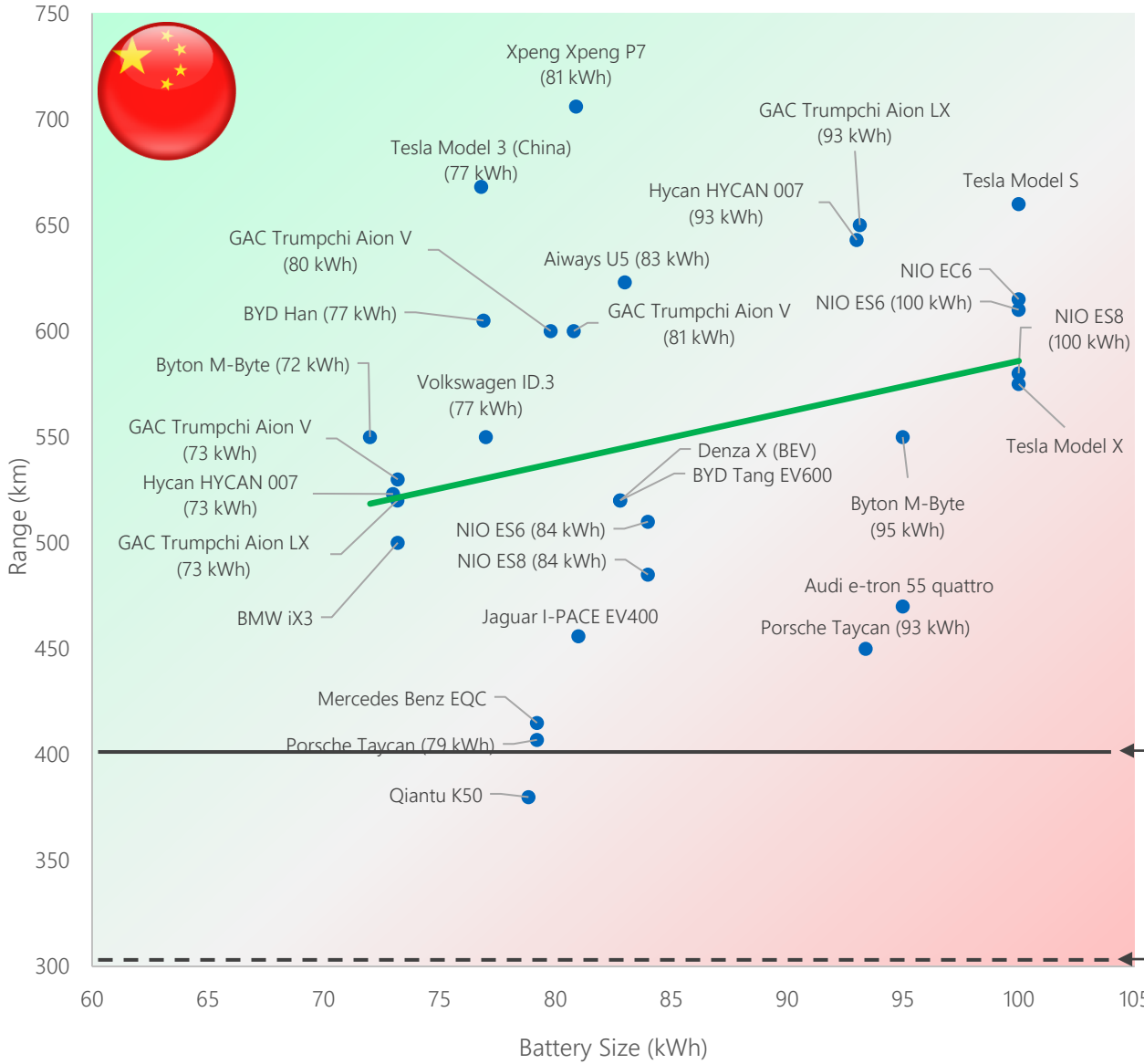
Overview: The interviewee sees EV marketing as a very complex topic that requires in-depth knowledge on how to market EVs correctly. There are several reasons that people consider buying EVs in Germany including cost, more environmentally friendly with interest in charging EVs with solar energy, noise reduction, fun to drive, and better torque performance. However, the biggest reason is the €9,000 incentive for purchasing a BEV in Germany. Customers most frequently asked questions related to EV charging time or driving range.

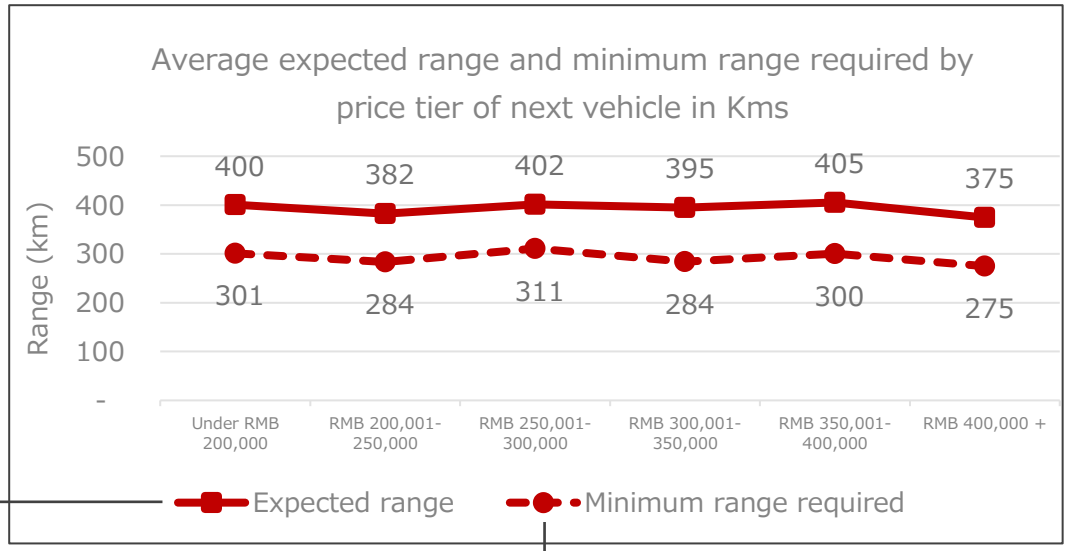
Key Insights from the Dealer

Question	*Answer*
What is the main reason for customers to buy an electric vehicle?	*The main reason consumers are buying EVs in Germany is the €9,000 incentive the government is currently offering. For business customers, the main reason is the reduced tax on business vehicles even though many of them don't even use the electric engine (PHEV).*
Is there special training for selling EVs?	*Yes, but the training was not very helpful. There is some knowledge and experience that could be better gained from owning or driving an EV, for example, public charging.*
When a customer visits you. Are they still unsure what they should buy (EV or an ICE)?	*Some customers are confident in buying an EV, but they have incorrect expectations with EV capabilities, resulting in the salesperson recommending an ICE in the end.*
Are there requirements from the automaker to sell a certain amount of EVs ?	*No, I can sell what I want.*
What are the most frequently asked questions about EVs?	*1. How fast does it charge?* *2. What is the range?*

SBD Insight:
The major reason for customers buying EVs is the incentives (purchase subsidies and tax reduction) which demonstrates the effect of EV price premium on EV sales. The major concerns for EVs are still charging performance and driving range as these are the most frequently asked questions. It is interesting that although automakers are trying to sell more EVs or transferring their focus from ICE to EV, they did not encourage dealers to lead customers to purchase EVs. From the SBD point of view, the interviewee is not an expert in EVs and would suggest dealerships to provide salespeople more opportunities to use EVs during work and in their free time to gain more knowledge and experience. Training that allows salespeople to test EVs in the real-world environment is important for them to become more familiar with the technology, benefits and obstacles.

Nearly all Chinese EVs exceed the respondents' expected range





The average expected range in China is around 390 kms across all price points, with 56% of consumers having an expected range over 400 kms. China is fairly consistent with the US when comparing expected range and minimum required range. Additionally, China and US consumers express similar concerns over range with 40% believing EV range will not meet their needs. Despite consumer concerns, most vehicles sold in China vastly exceed the expected range, with the average EV sold offering a range between 520 and 580 kms, which is the highest among all the regions.

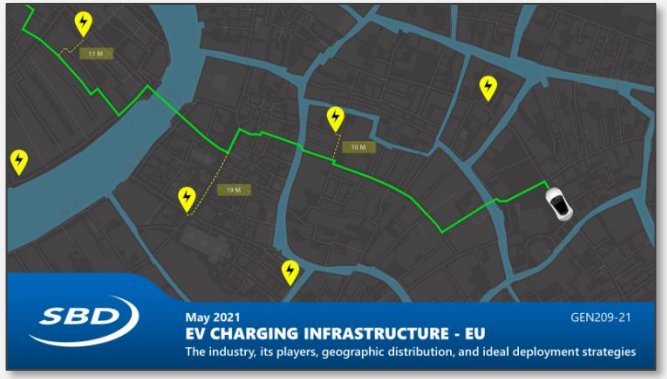
Why do automakers develop their own charging network?

Many automakers are developing their own branded, and sometimes exclusive charging infrastructure, following in the footsteps of Tesla's trailblazing Supercharger network. While exclusive charging networks can be very welcome for that brand's customers, they do not help the EV industry as a whole. Cooperation and collaboration is a necessary part of transforming the EV market into a self-sustaining, natural market, and exclusive networks do not support this. From the automaker's perspective, it's a direct way to support their customers, yet profitability and market benefit would be enhanced if the network were not exclusive. Branded, non-exclusive networks appear to be gaining in popularity too. Automakers see this as a way to support scenarios that are at least partially unique to their customers. For instance, the Jeep trailhead network is not expected to be exclusive, meaning that competitor's customers (for instance Rivian) could use the charger, possibly elevating the brand image for the customer and potentially leading to customer conquest while still providing some revenue to the automaker for the charging service. White-labeled mobility networks such as the one offered by Digital Charging Solutions, allows automakers to provide their customers with a branded roaming network, associated smartphone app, and an RFID card for a relatively low investment since no actual infrastructure is owned by the automaker. Many automakers see this as a simple solution to the currently complex charging network. Third party roaming platforms such as Shell Newmotion will challenge automakers' offers perhaps with broader roaming contracts and better pricing.

If you'd like to learn more about the charging infrastructure industry or optimized deployment of charging stations, consider SBD's new **Charging Infrastructure Report.**

This report helps the reader understand the EV Charging industry in the EU, the distribution of charging stations, and how demand can be met, with a focus on –

- General technology trends and business trends of EV charging eco-system (CPOs, eMSPs, government bodies, and private industry).
- Overview of the EV charging sector value chain, profiles and roles of the main actors involved in the roll out and/or operation of EV charging network in the EU, from primary research and interviews with key industry players and public entities.
- Analysis of the EU's charging network distribution, demographic correlation, and suggested methods for optimizing.
- Review of technical characteristics of the major existing networks deployed in the EU, including investment and cost dynamics for the charge point operator.
- Analysis of key business models underpinning EV charging network deployment and operation, including information on general capital and operational cost structures.



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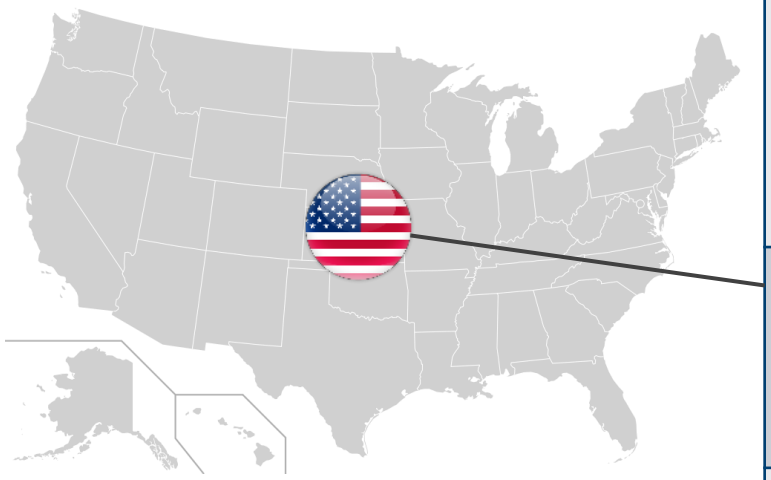
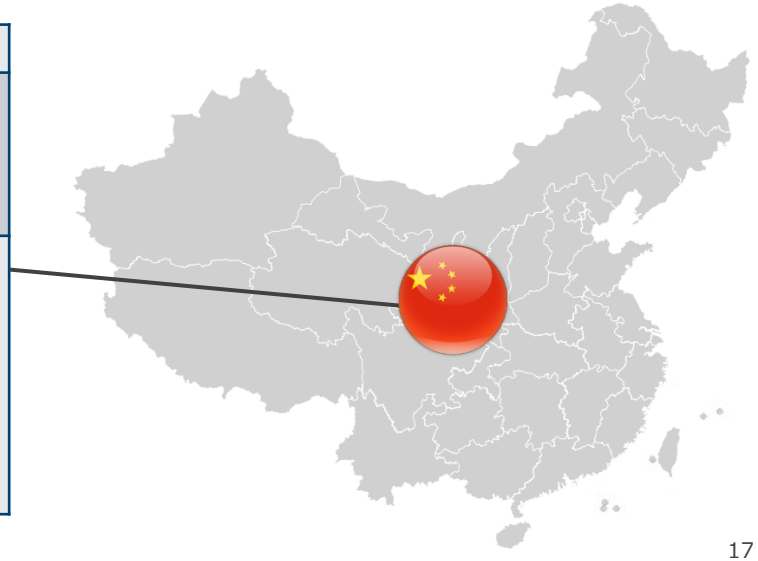
Incentive Structure in USA and China



Tax Benefits	**Fuel Cell Motor Vehicle Tax Credit**: A tax credit of up to $8,000 is available for the purchase of qualified light-duty fuel cell vehicles, depending on the vehicle's fuel economy. Tax credits are also available for medium- and heavy-duty fuel cell vehicles; credit amounts are based on vehicle weight. **Qualified Plug-In Electric Vehicle (PEV) Tax Credit**: $2,500 - $7,500 tax credit for qualified PEV, based on each vehicle's traction battery capacity and the gross vehicle weight rating **Qualified Two-Wheeled Plug-In Electric Drive Motor Vehicle Tax Credit**: 10% of the cost up to $2,500 credit for qualified two-wheeled plug-in EV
Local Incentives	Local Incentive differs in each State, an example of California is shown here: 1. High Occupancy Vehicle (HOV) and High Occupancy Toll (HOT) Lane Exemption • Get a Clean Air Vehicle sticker then use HOV lanes regardless of the number of occupants in the vehicle. • Reduced rates or exemptions from toll charges for HOT lanes. 2. The Electric Vehicle Supply Equipment (EVSE) Loan and Rebate Program • Small businesses in California can get incentives to help with the design, development, purchase, and installation of EVSE.
Purchase Subsidies	Purchase subsidies differs in each State, an example of California is shown here: California alone offers 117 different incentives, by far the most of any US state. Incentives include up to $7,000 in rebates towards the purchase of an EV, up to $15,000 towards the purchase of a fleet electric vehicle, and loans of up to 50% for the design, development, purchase and installation of Electric Vehicle Supply Equipment.

Tax Benefits	Purchase tax exemption for EVs until 2022
Local Incentives	• Charging fee reductions • Exemption from License plate lottery pool • Home charger subsidies • Rental subsidies • Toll reductions
Purchase Subsidies	National subsidy for private car purchase from 2010, with gradually decreasing upper limit per vehicle • 2010-2016: CNY 60,000 • 2017: CNY 44,000 • 2018: CNY 50,000 • 2019: CNY 25,000 • 2020: CNY 22,500 • 2021: CNY 18,000 • 2022: CNY 12,600



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