EVOLUTION OF MOBILITY: THE PATH TO ELECTRIC VEHICLE ADOPTION

AUGUST 2019
About the EV Study

Consumers
Online survey among a mix of EV owners, EV considerers, and EV non-considerers
2,503 Consumers – Fielded

Dealers
Online survey among single or group Franchise dealers
308 Dealers

Fielded January – March 2019

Research Objectives

1. Explore the gap between consumers and dealers’ barriers and expectations with current EV realities in the US

2. Understand EV shoppers’ dealership experiences during their purchase journey

3. Examine key support areas dealers need to advance EV adoption
Consumers Believe EVs are Coming, But that Hasn’t Increased Their Interest in Buying One

EV as the Vehicle Trend in the Next Five Years
(% More on the Road)

Q1-Q2 2016
70%

Q1-Q2 2018
70%

Electrical Vehicle Consideration

Q. Where do you think the trend is going for the following type of vehicles in the next 5 years?

Source: KBB.com Brand Watch, 2013-2018
Source: KBB.com Consumer Sentiment Survey, Jan-Jun 2018
Tesla Leads the Pack in EV Brand Awareness

**EV Brand Awareness (Aided)**

**Considerers^**  
(n=1,001)

- Tesla: 81%
- Toyota: 52%
- Chevrolet: 47%
- Nissan: 42%
- Honda: 39%
- Ford: 39%
- BMW: 35%
- Smart: 32%
- Hyundai: 22%
- Kia: 20%
- Mercedes-Benz: 18%
- Volkswagen: 18%
- Fiat: 12%
- Porsche: 9%
- Mitsubishi: 8%
- Jaguar: 8%

Source: 2019 Cox Automotive EV Study  
^Model under 1% unaided awareness not shown

Q55. What brands of all-electric vehicles are you aware of?  
Q56. Which of the following brands make an all-electric vehicle?
Without Tesla, EV Market Share is Stagnant, Yet Almost 100 Electrified Models are Coming Soon
CLEAN UP MISCONCEPTIONS ON THE COST AND RANGE
There Are Very Clear Barriers to Adoption Among Non-Considerers

70% Cost

83% Charging/Battery

Source: 2019 Cox Automotive EV Study
Perceived Initial Cost is Higher than ICE Vehicles

EVs Cost MORE than Gas-Powered Vehicles

Q38. Do you think that the price for an all-electric vehicle on average is about the same, less or more than the price for a gas-powered vehicle?

Considerers:
- Somewhat More: 77%
- Much More: 87%

Non-Considerers:
- Somewhat More: 77%
- Much More: 87%

Source: 2019 Cox Automotive EV Study
Affordability Is Within Reach as the Price Gap Closes

Example

Average Transaction Prices
Nissan

ATP Change
(2012 vs. 2019)
Nissan Leaf: -2.5%
Nissan Maxima: 7.5%
Nissan Sentra: 3.1%

Source: KBB.com Insights
ATP does not include OEM and Federal/State Tax Credits
Majority Perceive Cost of Ownership to Be Less for EVs

- **98%** Considerers
  - Take Ownership Cost Into Account When Initially Considering the Cost of an EV

- **65%** Considerers
  - Think It Costs Less to Charge an EV than Fuel a Gas Vehicle

- **54%** Considerers
  - Think It Costs Less to Maintain an EV than a Gas Vehicle

Q39. Considering the cost of charging an all-electric vehicle versus the cost of gas for a gas-powered vehicle, do you think the cost of driving an all-electric vehicle is about the same, more, or less than the cost of driving a gas-powered vehicle?

Q14. What are your expectations about the costs of service and maintenance for an all-electric vehicle versus a gas-powered vehicle?

Q40. [Did/Will] you take the cost of driving an all-electric vehicle versus a gas-powered vehicle over time into account when considering the initial cost of purchasing/leasing an all-electric vehicle?

Source: 2019 Cox Automotive EV Study

Department of Energy
In Actuality, 5-Year Cost-to-Operate Savings is Positive for EV Consumers

Average 5-Year Total Cost-to-Operate Savings

58%
EV vs. ICE

Average Fuel Savings
60%

Average Service Cost Savings
25%

*5-Year Cost to Operate includes Expenses such as Fuel, Insurance, Financing, State Fees (License, Registration, State Sales Tax, and Federal Tax Credits), Maintenance, and Repairs

Average includes calculations of EVs and their comparable ICE vehicles. Depreciation is excluded from Cost to Operate calculations. Vehicles in the analyses are: Kia Soul EV vs. Kia Soul ICE, Chevy Bolt vs. Chevy Sonic, Nissan Leaf vs. Nissan Sentra, Hyundai Ioniq EV vs. Hyundai Elantra GT, and Kia Niro EV vs. Kia Sportage.

Source: KBB.com 5 Year Cost to Own
Q53. How long do you perceive that a typical all-electric vehicle battery lasts before it must be replaced?

**Consumer Expected EV Battery Life**

- **Owners**
  - Average: 7.2 years
  - 5 years/65k miles or less: [Bar]
  - 8 years/100k miles+: [Bar]

- **Considerers**
  - Average: 6.9 years
  - 5 years/65k miles or less: [Bar]
  - 8 years/100k miles+: [Bar]

Source: 2019 Cox Automotive EV Study
Warranty Programs and Declining Battery Pack Pricing Provide Assurance Over Battery Replacement Cost Concerns

Federal regulations mandate OEMs offer a minimum of 8-Year/100K miles warranty on batteries.

Lifetime coverage on batteries is offered on the Hyundai Kona.

Average Battery Pack Price Decrease

- **77%** \(\downarrow\) from 2010-2016
- **45%** \(\downarrow\) additional decrease by 2021

Q31. What are the main reasons you are not considering purchasing/leasing an all-electric vehicle?
Q33. What reasons, if any, might prevent you from purchasing/leasing another all-electric vehicle in the future?

Source: 2019 Cox Automotive EV Study
More Than Half of Owners Bought Extended Warranty for Their EV Batteries

52% of EV Owners Purchased Extended Warranty for Battery

Q15. Did the dealership or showroom staff discuss any of the following with you regarding an electric vehicle?
Q16. Did you purchase any of the following for your electric vehicle?

<table>
<thead>
<tr>
<th>Warranty for Vehicle</th>
<th>Warranty for Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxury Dealer</td>
<td>Non-Luxury Dealer</td>
</tr>
<tr>
<td>35%</td>
<td>29%</td>
</tr>
<tr>
<td>44%*</td>
<td>18%</td>
</tr>
</tbody>
</table>

* Statistically significant difference at 95% level

Source: 2019 Cox Automotive EV Study
Considerers Desire Mileage Range Comparable to ICE

Battery Range Among Considerers

<table>
<thead>
<tr>
<th>Min Acceptable</th>
<th>Estimated</th>
<th>Desired</th>
</tr>
</thead>
<tbody>
<tr>
<td>184 miles</td>
<td>240 miles</td>
<td>300 miles</td>
</tr>
</tbody>
</table>

Range for ICE: 300-400 miles

Q45. How often do each of the following problems/issues happen with your all-electric vehicle?
Q35. What is the approximate number of miles you estimate an all-electric vehicle can be driven before the battery is fully depleted and needs to be charged?

What is the minimum acceptable number of miles you could drive between battery charges for an all-electric vehicle? And, what is your desired number of miles you could reasonably drive between battery charges for an all-electric vehicle?

Source: 2019 Cox Auto EV Study; www.solarchargeddriving.com
## Range is Becoming Less of a Concern

<table>
<thead>
<tr>
<th>Year</th>
<th>Make/Model</th>
<th>Mileage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>Audi e-tron</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>Hyundai Kona EV</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>Kia Niro EV</td>
<td>239</td>
</tr>
<tr>
<td></td>
<td>Kia Soul EV</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>Mercedes-Benz EQC</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Mini Electric</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Nissan Leaf (extended range)</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>Polestar 1</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Polestar 2</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>Porsche Taycan</td>
<td>300+</td>
</tr>
<tr>
<td></td>
<td>Tesla Model 3</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>Tesla Model Y</td>
<td>280</td>
</tr>
<tr>
<td>2020</td>
<td>BMW iX3</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Byton M Byte</td>
<td>323</td>
</tr>
<tr>
<td></td>
<td>Mercedes-Benz EQA</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Rivian R1T</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Tesla Roadster</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>Polestar 3</td>
<td>275</td>
</tr>
<tr>
<td></td>
<td>Volvo XC40</td>
<td>250</td>
</tr>
<tr>
<td>2021</td>
<td>BMW i4</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>BMW iNEXT</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Genesis Electric Sedan</td>
<td>310</td>
</tr>
<tr>
<td>2022</td>
<td>Tesla Pickup</td>
<td>500</td>
</tr>
</tbody>
</table>

Source: Automotive News, Oct 1, 2018 "Nearly 100 electrified models slated to arrive through 2022; OEM websites; PluginCars.com; myev.com; electrek.co
RANGE IS FINE… INFRASTRUCTURE IS PRIORITY
There Is a Clear Need for More Charging Stations

Too Few Charging Stations

68% Home area

63% Work area

Source: 2019 Cox Automotive EV Study

Q50. What is your perception of the number of electric vehicle charging stations around the area where you live? Around the area you work?
Implementing Future Battery Charging Services Can Enhance the Current Infrastructure

Interest in Future Battery Charging Services

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Owners</th>
<th>Considerers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile battery charging service that comes to your location</td>
<td>77%</td>
<td>83%</td>
</tr>
<tr>
<td>Robotic charging station where a robot locates your vehicle, plugs it in and charges it (No human interaction)</td>
<td>74%</td>
<td>76%</td>
</tr>
</tbody>
</table>

Source: 2019 Cox Automotive EV Study

Q52a. How interested would you be in using each of the following services for your electric vehicle?

* Statistically significant difference at 95% level.
DEALERS HAVE MANY BARRIERS TO OVERCOME
Dealers Aren’t Really Selling Many EVs Today…

Average Number of Vehicles Sold per Month

<table>
<thead>
<tr>
<th>Type</th>
<th>BEV</th>
<th>PHEV</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>5</td>
<td>5</td>
<td>131</td>
</tr>
</tbody>
</table>

Dealers Say EVs Represent Only…

- **5%** Of total average **new vehicles** sold per month
- **9%** Of total average **CPO vehicles** sold per month
- **4%** Of total average **used non-CPO vehicles** sold per month

…and in reality it’s even lower

**Q1.** During an average month, how many of each type of vehicle does your dealership sell to consumers in each of the following sales categories?

**Source:** 2019 Cox Automotive EV Study
...And Dealers Aren't Convinced that Will Change

Only 9% of dealers feel their OEM is exerting high pressure to hit EV sales targets.

Expect EV Sales to Increase in the Next 1-2 Years

- Total Dealers: 46%
- Luxury Dealers: 64% *
- Non-Luxury Dealers: 41%

Q14. What level of pressure, if any, is your EV OEM imposing on your dealership regarding hitting sales targets of electric vehicles?
Q5a. How do you expect sales of the following types of electric vehicles to trend in the next 12-24 months? - Battery electric vehicles (BEV)
Q5b. How do you expect sales of the following types of electric vehicles to trend in the next 12-24 months? - Plug-in hybrid electric vehicles (PHEV)

Source: 2019 Cox Automotive EV Study
* Significant difference at 95% confidence level
Dealers’ Lack of Urgency Can Be Attributed, in Part, to the Perception of Lower Profits for EVs

Dealer Perception of EV Service & Sales

- See Lower ROI from EV Sales
- Do Not See Lower ROI from EV Sales

54%
See lower ROI for sales of EVs compared to gas

Q31. Compared to gas vehicles, does your dealership...
Q32. In which of the following ways is servicing electric vehicles different than servicing gas vehicles

Dealers with Service Department

- More likely to always sell gas: 49% *
- Agree EVs hurt gas sales: 24% *
- See lower ROI for sales of EVs compared to gas: 54%

Source: 2019 Cox Automotive EV Study
* Significant difference at 95% confidence level
Dealers Encounter Similar Barriers as Consumers

Barriers to EV Purchase

- Cost: 79% (Dealers), 70% (Consumers)
- Charging/Battery: 79% (Dealers), 83% (Consumers)

Source: 2019 Cox Automotive EV Study
EVs Are Just More Complicated to Sell with Additional Internal Barriers

Top Internal Sales Barriers for Dealers

- Lack of inventory (availability/models): 55%
- Not enough charging stations: 50%
- Lack of OEM support: 33%
- Poor EV sales training: 32%

Q10.1 What are the key internal barriers that prevent your dealership from selling more electric vehicles (BEVs/PHEVs)?

Source: 2019 Cox Automotive EV Study
THE RIGHT ALIGNMENT IS KEY
Alignment = Win-Win

F&I Opportunity with Extended Warranty on EV Battery

Expand vehicle segment and features for increased EV adoption

More OEM support generate more sales for both parties

Source: 2019 Cox Automotive EV Study
MORE OEM SUPPORT GENERATES MORE EV SALES FOR DEALERS AND OEM
Dealers Are Underestimating Their Influence. OEMs Can Help Fill the Influence Gap.

Dealer/Salesperson has Strong Influence on EV Purchase Decision

- Dealers: 64%
- Owners: 74%

EV Considerer Expectations vs. Dealer Delivery

- Detailed cost comparison vs gas: 58% (Expectations) vs. 41% (Delivery)
- Show how to operate EV: 58% (Expectations) vs. 41% (Delivery)
- Show how to take care of EV: 62% (Expectations) vs. 38% (Delivery)
- Provide map of charging stations in area: 48% (Expectations) vs. 35% (Delivery)
- Arrange charging station to be installed at home: 46% (Expectations) vs. 28% (Delivery)

Q21. How much influence do you think the dealership experience has on your customers' final decision to purchase/lease an electric vehicle?
Q6 Consumer. How much influence did the dealer/showroom have on your final decision to purchasing/leasing an all-electric vehicle?
Q9 Consumer. What expectations (do/did) you have of the dealership/showroom and staff when you shopped for an electric vehicle?

Source: 2019 Cox Automotive EV Study
...But Dealers Aren’t Experiencing Enough OEM Support

66% of Dealers Are Receiving Some to No OEM Sales and Marketing Support

Among dealers receiving any support, only 32% consider it very helpful

Q14. What level of pressure, if any, is your EV OEM imposing on your dealership regarding hitting sales targets of electric vehicles?
Q15. What level of marketing and sales support (e.g., programs, promotions, incentives) is your EV OEM providing to help you sell/lease more electric vehicles?
Q17. How helpful is the marketing and sales support provided by your OEM in selling more electric vehicles? / Base Dealers receiving any OEM support

Source: 2019 Cox Automotive EV Study
Even Among Dealers Who Feel Well-Prepared for Future EV Demand, Most Are in Need of OEM Support in Several Areas

**Are Extremely/Very Prepared**

- 44% among those dealers...

**Consumer Education Offered**

- Short/long term benefits: 55%
- Tax credits & rebates: 55%
- Differences PHEV & EV: 54%
- How to operate: 51%
- How to take care of EV: 41%
- Cost comparison to gas: 37%

**Charging Support Offered**

- Install charging stations at dealer: 62%
- Recommend charging locator apps: 38%
- Charging station map: 33%
- Arrange charging station install at customer home: 29%

**Training Offered**

- Train salespeople with EV knowledge & expertise: 64%
- Mechanic training: 50%

**Marketing & Variety Offered**

- Display Evs prominently: 50%
- Have variety to choose from: 36%
- Have Evs with wide variety of options: 34%
- Website showcases Evs and benefits of owning: 32%

Q8. With that in mind, how prepared do you think your dealership is if there is a future increase in sales of electric vehicles?

Q9. What methods is your dealership currently implementing to prepare for the increase in sales of electric vehicles?

Source: 2019 Cox Automotive EV Study
There’s Payoff with the Right Alignment…
Dealers Receiving Quality OEM Support Enjoy Higher EV Sales

High Support Dealers Sell
88% More EVs than Lower Support

Q21. How much influence do you think the dealership experience has on your customers’ final decision to purchase/lease an electric vehicle?
Q8. With that in mind, how prepared do you think your dealership is if there is a future increase in sales of electric vehicles?
Q1. During an average month, how many of each type of vehicle does your dealership sell to consumers in each of the following sales categories?
Q2a/b How, if at all, did [new/used] vehicle sales change in 2018 versus 2017, for each of the following vehicle types?

Source: 2019 Cox Automotive EV Study
Cost & Battery remain the biggest consumer and dealer barriers to EV adoption.

Public charging infrastructure is critical to further EV proliferation.

Dealers do not feel a sense of urgency to sell EV due to lack of inventory levels, perceived profits, and OEM support.

Dealers need more education, marketing and sales support from automakers to ensure preparedness to sell and service EVs.
Methodology: Consumer Survey

An online survey was conducted via a representative online panel from January 16 – February 4, 2019.

US Representative General Population Sample
Age 18-72 & not employed in sensitive industries
Vehicle decision maker

EV Owners (n=502)
- Own/drive a Battery Electric Vehicle (BEV)
- Purchased/leased BEV from dealer or website
- Visited a dealer showroom as part of BEV research

EV Considerers (n=1,001)
- Aware of BEVs but do not own/drive
- Plan to purchase/lease vehicle in the N12M
- Would consider a BEV in the N2Y
- Would consider purchasing from a dealer or online

EV Non-considerers (n=1,000)
- Do not own/drive BEV
- Plan to purchase/lease vehicle in the N12M
- Would NOT consider a BEV in the N2Y
- Would consider purchasing from a dealer or online

Oversampling was conducted to increase the overall base sizes of these groups to:

n=103 Generation Z (age 18-22)
n=305 Luxury Automobile Owners
n=105 Generation Z (age 18-22)
n=305 Luxury Automobile Owners
n=105 Generation Z (age 18-22)
Methodology: Dealer Survey

An online survey was conducted using a qualified Cox Automotive list from March 8 - March 18, 2019. Cox Automotive was identified as the sponsor of the research.

308 US Dealers

- Single or group Franchise dealership
- Sell 5+ new and/or used vehicles a month
- Sell new or used BEVs or PHEVs
- Involved in vehicle sales operations decisions or strategy and business operations decisions