

April, 2023 | US Consumer Insights

The Role of Battery Technology in EV Purchasing Considerations



Introduction

As more consumers opt for electric vehicles (EVs), the arc of progress for cleaner transportation—while still long—seems to have hit an inflection point. Today we're moving from early adopters leading the charge to the normalization of electric mobility that will eventually expand to mass adoption. And there are many reasons for this shift: adding new and improved EVs and adjacent technologies, more model options and a wider range of price points, and heightened awareness and concern about environmental issues. Whatever the reasons, times are changing. But how much have consumer purchase considerations changed along with them? And how much do consumers know about the battery technology driving the EV transition?

SIS International Research conducted a study on behalf of advanced battery materials supplier Sila to understand current EV consumer behaviors, motivations, and their understanding of the battery technology powering EVs today.

Executive Summary

About the Survey

SIS International Research, a global Market Research & Market Intelligence firm, conducted a nationwide study to understand consumer considerations and perspectives when contemplating an EV purchase. Respondents were EV drivers and consumers residing in all regions of the U.S. with household incomes above \$50,000—the largest percentage earning between \$150,000 - \$200,000 per household, and the largest percentage had purchased or were planning to purchase a vehicle priced at \$55,000 or less.

The study addresses:

- *the driving behavior of EV consumers*
- *barriers to and motivators for an EV purchase*
- *awareness levels of technology's role in battery performance*
- *battery performance metrics that matter most*
- *consumers' willingness to pay for enhanced battery performance*



Moderator's Note: Qualitative focus groups were conducted to capture the voice of the consumer (VOC) and influence the design of the nationwide quantitative research. Focus group discussions revealed that EV consumers are highly-engaged purchasers that actively seek information about EV performance and infrastructure challenges, related environmental concerns, and battery raw materials. Their individual research was foundational to their purchasing considerations.

Key Findings

Range and Charge Anxiety Persists

The survey found that EV performance—specifically range—is a top consideration and concern for consumers. Across all pricing segments, range anxiety and charging infrastructure were highlighted as the primary deterrents to EV ownership, and 81% of respondents cited range and charging infrastructure as the reasons they would not own an EV exclusively. Most also possess ICE (internal combustion engine) vehicles.

81%

of respondents cited range and charging infrastructure as the reasons they would not own an EV exclusively.

Consumers Value Battery Performance Above Other Features

Respondents proved to be tuned into the battery, with significant interest in the performance features, as well as the sustainability of its manufacturing and lifecycle. When asked to rank their top drivers to purchase an EV, Technology (Battery and Features) (**Fig. 3**) was ranked first by respondents. 89% of respondents also strongly agree or agree that EVs with technology to boost battery performance are more valuable. Battery range, battery life, and battery charge time were the top battery features influencing consumers' EV purchase decisions, ranking above luxury features and advanced technology (e.g., autonomous driving capabilities) and acceleration (**Fig. 4**).

89%

of respondents also strongly agree or agree that EVs with technology to boost battery performance are more valuable.

Consumers Are Willing to Pay More For a Better Battery

EV consumers have a strong desire to address their stated anxieties related to range (including loss of range from cold weather and heavy towing) and charging infrastructure challenges (including convenience and trip length). That strong desire results in a high willingness to pay for increased range; 61% of consumers interested in vehicles with a base price over \$80,000 were willing to pay \$13,000 for an extended-range battery today (**Fig. 6**). 75% of respondents have paid or intend to pay for a better battery, and 92% of EV owners who paid for an extended-range battery are still happy with their decision. Respondents tell us their desire for a longer range will remain even as charging infrastructure improves.

75%

of respondents have paid or intend to pay for a better battery.

92%

of EV owners who paid for an extended-range battery are still happy with their decision.

Conclusion

Based on our findings, it is clear that delivering peak performance across EV platforms is paramount to today's performance-focused consumer. EV consumers currently demand and will continue to demand high-range, quick-charge battery systems that address their concerns. As a result, there is an opportunity for auto manufacturers to prioritize performance above other perceived bells and whistles and to elevate messaging about their EV battery technology (including performance, environmental impact, etc.). These differentiators would demonstrate a competitive advantage in the eyes of today's savvy EV consumers.

Survey Structure and Design

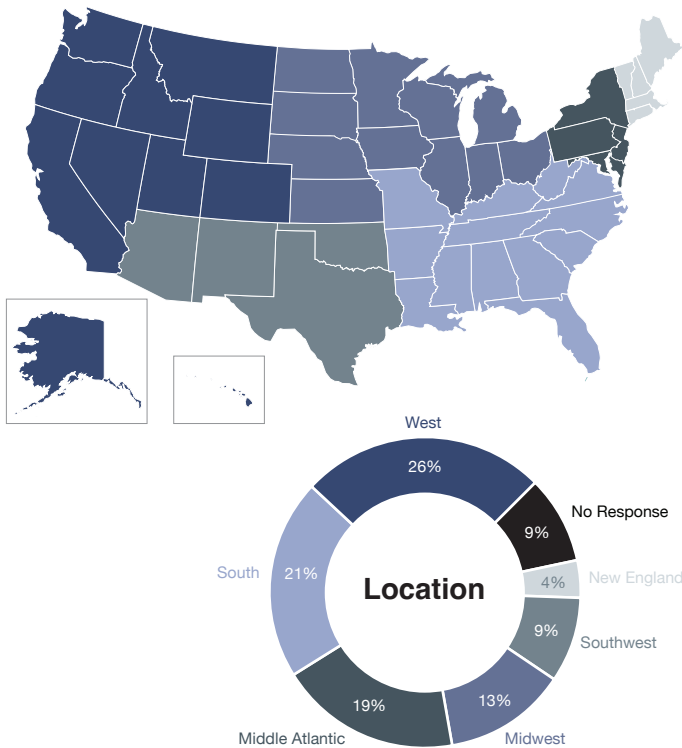
The research consisted of both a qualitative and quantitative survey conducted in the United States with one thousand respondents.

Six moderated focus groups were also performed in New York, Los Angeles, and Chicago to capture the VOC.

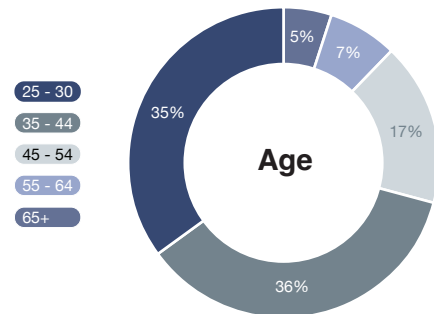
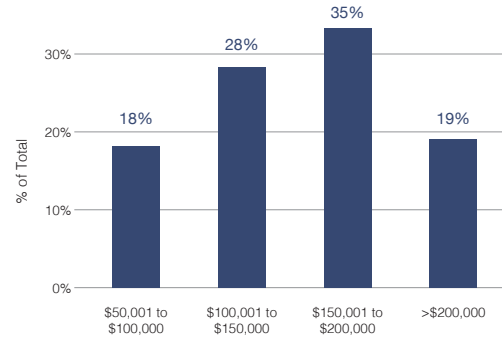
50% of the respondents are current EV owners, and 50% plan to purchase an EV within the next 12 months. We asked respondents about their current EV and ICE vehicles, costs, driving habits, primary charging locations, and barriers to EV purchase.

The core of the pricing data was captured using a Gabor-Granger method to determine willingness to pay for specific features or performance.

Figure 1.
Quantitative Demographics



Household Income



Source: SIS International Research analysis 2023

Survey Findings

Range Anxiety and Charging Infrastructure Are Top Barriers to Purchase

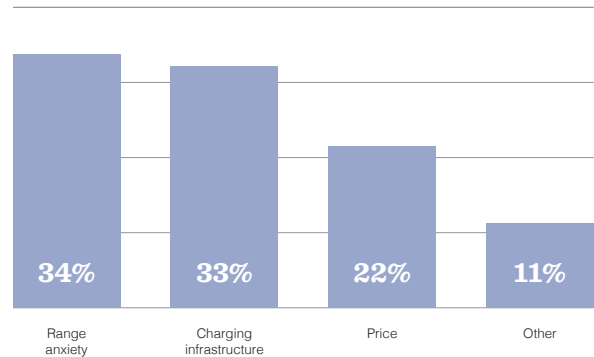
Purchase Influence

Concerns related to electric vehicle range and the availability and convenience of charging stations continue to plague today's EV consumers and significantly influence their purchase decisions. Respondent data across all segments highlights that range anxiety and charging infrastructure (above car price) are the primary deterrents to Consumer's Deterrents to EV Ownership (**Fig. 2**).

Hesitation to Replace ICE Completely

81% of respondents said they do not expect to own EVs exclusively, citing range anxiety and charging infrastructure as the primary reasons. Several respondents noted that they use an EV for daily commutes and short travel but use an ICE SUV or minivan for long road trips and family excursions. Ownership patterns reflect this reluctance to go all-electric - 60% of respondents who already own an EV also own an ICE vehicle. And 79% of those who plan to purchase an EV already own an ICE vehicle, which they don't plan to replace.

Figure 2. Consumer Deterrents to EV Ownership



Source: SIS International Research analysis 2023

The Battery Is Top of Mind for EV Consumers

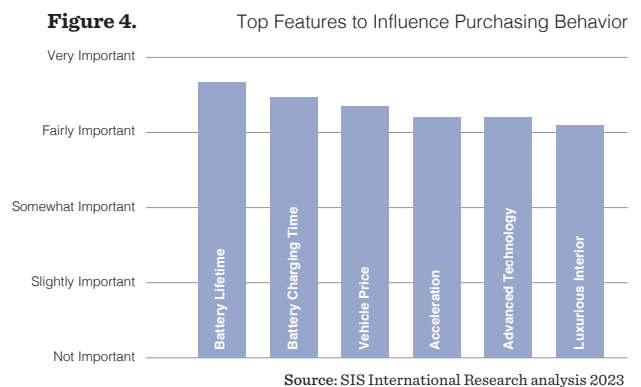
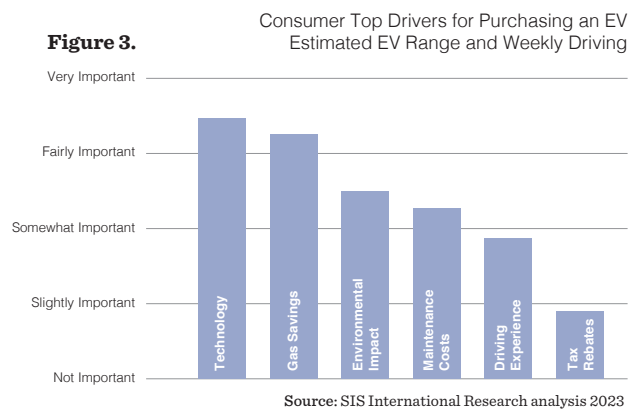
A Driver for Purchase

Through this study, we discovered the emphasis that prospective buyers put on battery technology and how they link it to EV performance. Most respondents are savvy, educated consumers that, before purchasing, do their research to learn more about EV technology. With range anxiety and charging infrastructure as a backdrop to their research, many respondents turned to the battery as an opportunity to address their need for better EV performance.

During our survey, we asked respondents to rank the top three primary drivers to purchase when considering an EV. Respondents ranked Technology (Battery and Features) as their top choice, followed by gas savings and environmental impact (Fig. 3).

Battery Performance Versus Other Features

Consumers are drawn to the battery not out of curiosity about the technology, but because they are interested in the performance that it provides. In fact, consumers ranked battery performance metrics like range, battery life, and battery charging time as the top three features influencing their purchase (Fig. 4). These features were prioritized above cost, advanced technology such as autonomous driving capabilities, and a more luxurious interior.



Consumers rank battery range, battery life, and charge time above other EV features.

Consumers Want More Range for Peace of Mind

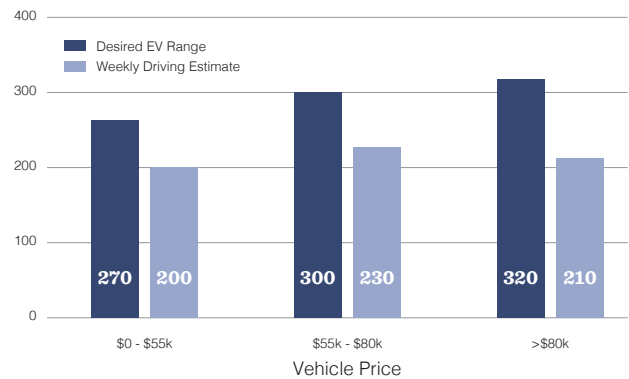
Battery range was ranked as the top feature consumers consider when purchasing an EV. But how much range is needed to mitigate range anxiety?

We asked respondents to share their weekly driving mileage and their expectations for range when shopping for a new vehicle. Consumers across all vehicle price points are expecting their EVs to go farther than they actually drive today.

The average respondent drives or expects to drive 208 miles per week. However, they want a vehicle with an estimated average of 286 miles per charge. EV drivers expect their EVs to go farther than they generally need every week. Coupled with feedback from focus groups, we can infer a correlation between the need for extended range and the distinct range anxiety cited in the study.

EV drivers expect their EVs to go farther than they generally need every week, which correlates to the range anxiety cited in the study.

Figure 5. Estimated EV Range and Weekly Driving



Source: SIS International Research analysis 2023

Long Range Versus Fast Charging

While 87% of respondents said that charge time was very or fairly important to them, the majority of respondents chose range over charge time (and lower cost) when forced to choose. We asked respondents to imagine that they are purchasing a new EV and are offered two models:

First EV model:

- 300-mile range
- 25-min charge time (from 10-80% state of charge)

Second EV model:

- 200-mile range
- 15-min charge time (from 10-80% SOC)
- \$5,000 reduction in cost

With all other things being equal, we asked them which model they would prefer, and the large majority of the respondents chose the longer range, more expensive EV with the slower charging time.

79%

of respondents chose the longer-range, more expensive EV with a slower charging time.

When asked, *“if infrastructure improves and rapid charging becomes increasingly available, would it influence their decision on EV battery range?”* 48% of respondents said it would not affect their decision, and they would still opt for a long-range battery.

Our focus groups also reinforced that range outweighs battery charging time in importance, as most people charge at home or work. Only a small percentage who take long work trips daily consider short charging time necessary because their time translates into money. The rest opt for range, even more so in colder climates like Chicago, New England, and New York.

However, most respondents see shorter charging times as an expected feature of new batteries. Several participants raised concerns about the potential trade-offs of fast charging, like decreased battery life.

48%

of respondents said charging infrastructure and rapid charging would not affect their decision, and they would still opt for a long-range battery.

Environmental Motivators Are Considerable

While battery technology, and the performance that it affords, is most important to consumers, they are also significantly influenced by their concerns about the planet.

86% of respondents cite greenhouse gas emissions/environmental impact as motivators for their switch to electric vehicles. In addition, 69% cite raw materials, like lithium and graphite, and the emissions from mining these materials as environmental motivators. Respondents also consider the human aspect of manufacturing when purchasing an EV and cite local jobs and environmental impact as part of that consideration.

“For me, (source and environmental impact) are very important. Both environmentally and also human. It needs to be safe. I want to know that the materials are not negatively impacting people, wherever they live.”

— **Chicago**, EV Buyer

86%

of respondents cite greenhouse gas emissions/environmental impact as motivators for their switch to electric vehicles.

69%

of respondents cite raw materials, like lithium and graphite, and the emissions from mining these materials as environmental motivators.

Consumers Will Pay More For a Better Battery

Throughout the survey, consumers demonstrated the value they put on key battery performance metrics as a way to alleviate their purchase concerns. We asked respondents if an EV with the technology to boost battery performance (i.e., range, charging time, acceleration) was more valuable than others with “regular batteries.” 89% of respondents agreed or strongly agreed with this statement. And, EV buyers are willing to pay for that extra value. Most respondents have paid or intend to pay for a better battery.

89%

of respondents agree that EVs with technology to boost battery performance are more valuable.

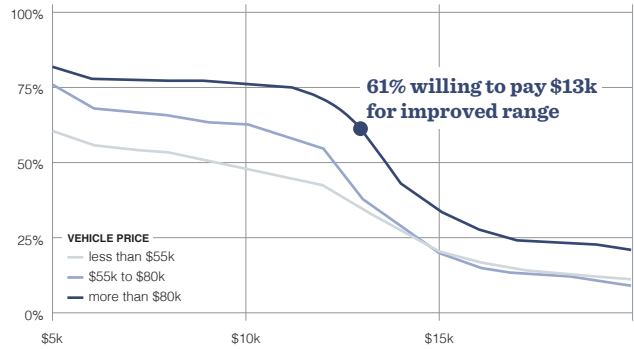
75%

of respondents have paid or intend to pay for a better battery.

One-Time Fee

First, we probed to find the one-time fee that respondents are willing to pay for better battery performance. To increase the range of their desired electric vehicle from 300 to 350 miles, we identified the highest turnover ratio between \$12,000 - \$13,000 (**Fig. 6**). Willingness to pay for increased range does scale with the price of the vehicle: 61% of consumers targeting a vehicle with a sticker price above \$80,000 are willing to pay \$13,000 or more, while 50% of those shopping for a vehicle priced less than \$55,000 are willing to pay \$9,000 or more.

Figure 6. Consumer Willingness to Pay: One-Time Fee for Range increase from 300 to 350 miles



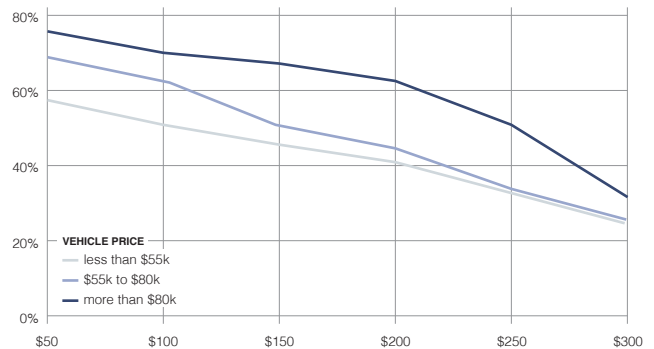
Source: SIS International Research analysis 2023

Subscription Fee Model

In addition to one-time fees, we also tested a monthly subscription service. Consumers are open to subscription models for better battery performance options and are willing to pay up to \$200 - \$250/month—potentially more than they’re willing to pay as a one-time fee (**Fig. 7**).

If we extrapolate the monthly pricing over six years, which we consider a conservative estimate for duration of EV ownership, the result is a \$16,000+ willingness to pay for extended range. If the respondent’s income rises above \$200,000, the willingness to pay increases to \$18,000 - \$20,000.

Figure 7. Consumer Willingness to Pay: Monthly Subscription Fee for Range increase from 300 to 350 miles



Source: SIS International Research analysis 2023

Extended-Range Battery Owners Have No Regrets

During our focus groups, we found that current EV owners prefer extended-range batteries. The quantitative survey also showed that most consumers either have or intend to purchase an extended range battery (Fig. 8). In fact, of the respondents who have paid for an extended-range battery, 92% are still happy with their decision.

The factors that contributed to our respondents' choice and/or preference for extended-range batteries are:

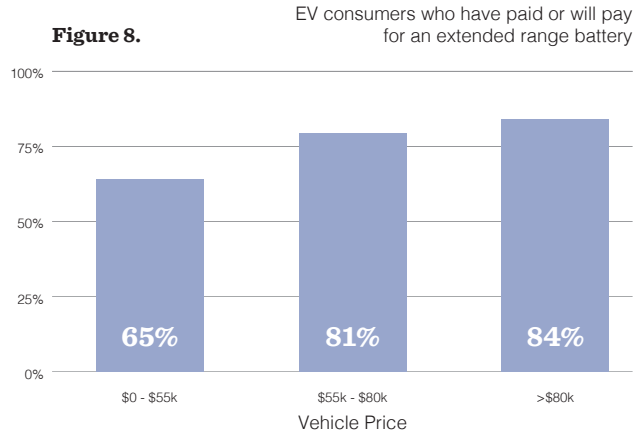
- range anxiety
- battery drain from cold weather
- towing
- long-range trips
- forgetting to charge the vehicle
- desire to be less affected by battery degradation

92%

of EV owners are happy with their purchase of an extended-range battery.

“I have not regretted [buying the extended battery]. If I were going to buy again, I would buy the highest range available.”

— Chicago, EV Buyer



Source: SIS International Research analysis 2023

Sila's Perspective on the Findings

At Sila, we offer an all-in partnership to auto OEMs and their cell partners to ensure our technology meets their electrification needs. This study was commissioned to secure and understand the voice of our customers' customers—today's EV drivers and future buyers—to ensure that we are delivering differentiated battery performance where it matters most. Insights from EV consumers helped to inform, influence, and affirm our focus on performance, enabling batteries with longer ranges and faster charging capabilities.

We were not surprised to discover that battery technology is a top-of-mind consideration with prospective EV buyers. Still, we did find it interesting that battery performance reigned supreme over more visible tech and that consumers are willing to pay more, significantly more, to be able to drive farther and charge faster.

For electric platforms, auto OEMs are racing to develop the next best-in-class tech features such as AI software, autonomous driving capabilities, and in-vehicle entertainment to win over consumers. The approach makes sense as new technology has been a successful customer acquisition strategy to drive differentiation in a competitive ICE market. But today, as the world accelerates its transition to all-electric vehicles, and with the rollout of more EVs across all price points, the industry needs to shift its focus to get the most essential thing right—the battery.

In addition, we are heartened by consumers calling out the importance of mitigating the environmental impacts of EV battery production, including the impacts of mining. Our goal

of delivering the world's highest-performance battery materials to our customers is in service of our mission to power the world's transition to clean energy. So this point spoke to us. Our auto-scale factory in Moses Lake, WA will be powered by clean hydropower, which enables us to deliver high performance with a significantly lower CO₂ footprint than today's legacy graphite batteries. This aligns with consumers' desire for EVs that are better on the road, while also being better for the world.

To win in this new world, the industry must lean into delivering peak performance across all segments of vehicles. Yes, we have been improving battery range since the early days, but we are not where we need to be to properly address consumer expectations and drive greater rates of EV adoption, which is important for global sustainability goals. Every incremental percentage point of performance improvement matters—and those who are determined to be the best will dominate the market.

We've come a long way, but EV consumers are eager to go further.

About SIS

SIS International Research is a global Market Research & Market Intelligence firm providing comprehensive research services and strategic analysis of information. With a global team of diverse industry experts and world-renowned researchers and analysts, SIS leads companies to identify and capitalize on market opportunities, discover their full potential, and navigate the global economy.

A truly global firm, SIS offers multilingual recruitment, client servicing, moderation, and analysis in languages including Spanish, Mandarin, Japanese, French, and German. In its 35 years of experience, SIS has conducted projects in over 120 countries, and has serviced some of the world's largest and most influential companies and organizations, including over 70% of the Fortune 500.

