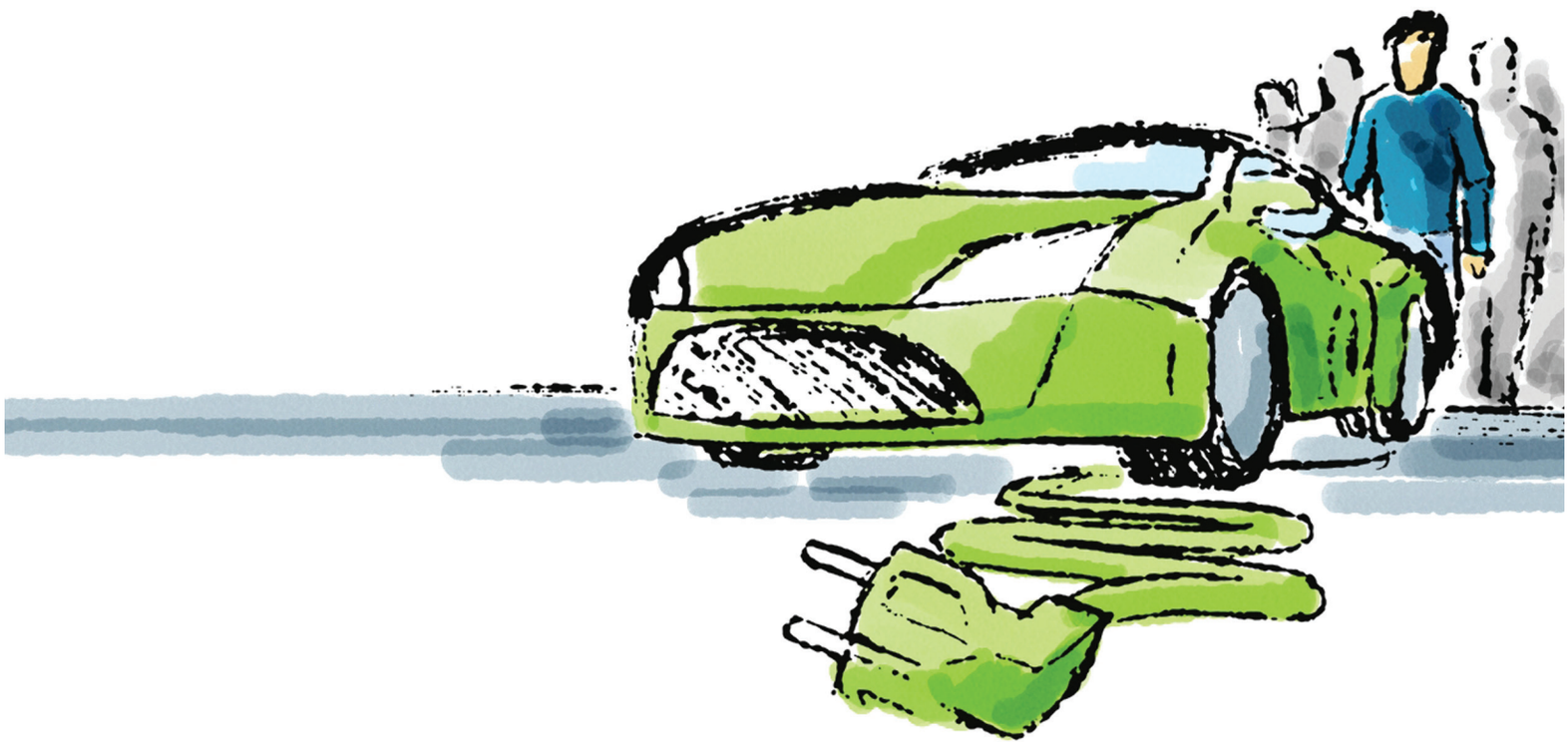
McKinsey&Company

Automotive & Assembly

Profiling Japan's early EV adopters

A survey of the attitudes and behaviors of early electric vehicle buyers in Japan



Profiling Japan's early EV adopters

Philipp Radtke, Axel Krieger, Sergei Kirov, Atsushi Maekawa, Akitake Kato, Naomi Yamakawa and David Henderson

Will EVs short circuit in Japan or become an electrified success? McKinsey's study of early buyers reveals some surprising insights.

Japan makes an almost perfect test-bed for understanding how consumers relate to electric vehicles. The country is home to many hybrid-electric vehicle (HEV) and electric vehicle (EV) innovations, the government actively supports and incentivizes EV use, and consumers are environmentally aware and knowledgeable about alternative transportation options. It ranked first in McKinsey & Company's EV Index (EVI) for January 2012, which measures readiness in terms of both EV supply and demand. What's more, Japan's concentrated population means travel distances are often short and charging infrastructure needs are not overwhelming.

To learn what motivates early EV adopters in Japan, McKinsey & Company conducted a comprehensive initiative. The study included an online survey of more than a thousand people who had purchased new cars in the past two years, in-depth EV owner interviews as well as focus group conversations. The goal was to understand the early experiences of actual EV users, as well as consumer reasons for not buying EVs and to explore ways to improve their uptake (See sidebar for additional information).

Who's buying EVs

One of a number of surprising results we found among the people who bought EVs was that nearly half were in a way "hardwired" to do so, while consumers who rejected them tended to be far more skeptical about their practicality.

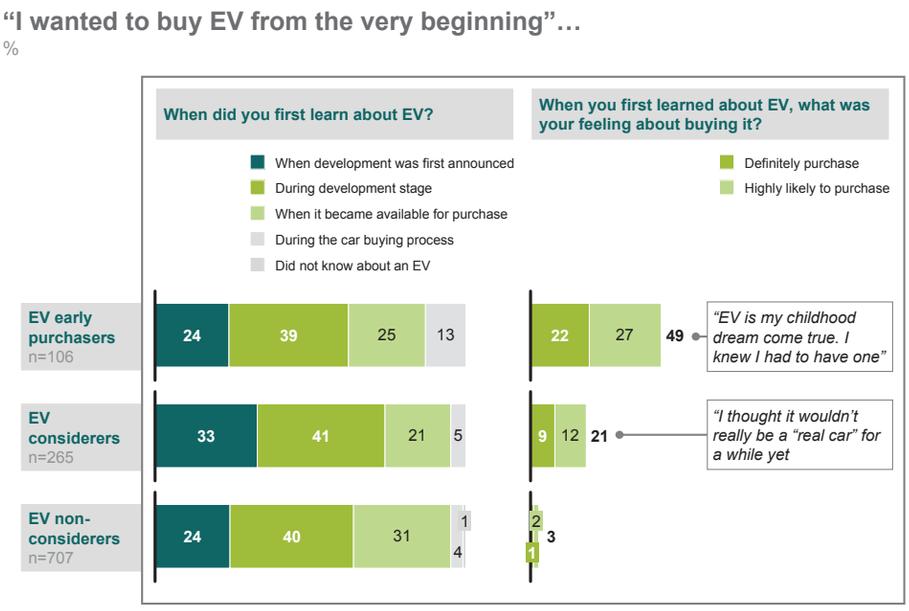
Why?

For many buyers, owning an EV had been a long-term aspiration—they were interested in owning one even before vehicle specifications and prices were announced. A representative comment from an EV owner illustrates the fascination EVs hold for many: *"An EV is my childhood dream come true. I knew I had to have one."*
EV considerers, on the other hand, tended to view the vehicles in a more skeptical light. One summed up the difference in feeling from purchasers by saying, *"I knew it was being developed, but thought it wouldn't be a 'real car' for a while, yet."*

One buyer said, "EV is my childhood dream come true. I knew I had to have one."

In the course of our research, we asked consumers when they first learned about EVs, and the answers were nearly identical across all segments – those who purchased an EV, shoppers who considered purchasing one (but didn't), and those who were not interested in them (Exhibit 1).

Exhibit 1



SOURCE: Electric Vehicle owner survey (April 2012)

Significant numbers of each segment said they first learned about EVs while they were being developed. Another sizeable group heard about them when they actually went on sale, and about the same number found out during the initial announcement for development. In fact, about 13 percent of the people who actually bought EVs became aware of them during the car-buying process—the highest percentage among purchasers, considerers and non-considerers. This appears to indicate an element of impulse buying among some customers, which was borne out in our later analysis.

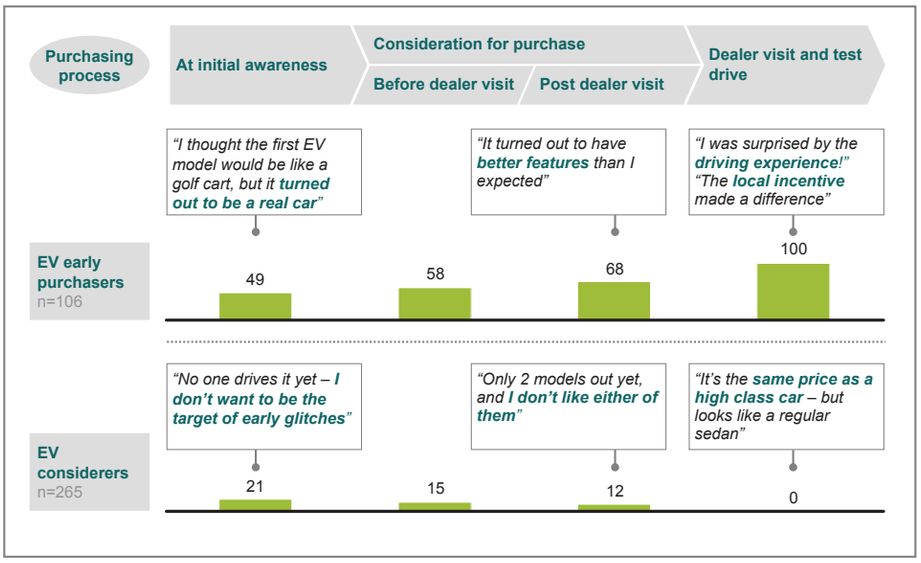
We also tracked EV purchase intent as customers journeyed through the "purchasing funnel," which enabled us to test the level of interest consumers had in buying an EV at each stage of the car-buying process (Exhibit 2).

The funnel migration of EV purchasers was unique in that the more they learned about EVs the more likely they were to buy them. For example, as these shoppers moved from awareness to consideration, their numbers actually grew (normally they decline). One comment that captured the segment's perspective: *"I thought the first EV models would be like a golf cart, but it turned out to be a real car!"* Likewise, the number of EV purchase intenders increased significantly after a dealer visit and test drive. *"I was surprised by the driving experience!"* and, *"The local incentive made a difference,"* were typical comments during this stage.

The reactions of EV considerers (who ultimately did not buy) stood in stark contrast to those of purchasers. For example, a typical comment in moving from awareness to consideration was, *"No one drives one yet—I don't want to be the target of early glitches."* And in moving from

Exhibit 2

…"I fell more and more for EV during the purchasing process"…
%; Intent to purchase ("will buy" or "may buy")



SOURCE: Electric Vehicle owner survey (April 2012)

consideration to the dealer visit/test drive, considerers said, *"It's the same price as a high-class car—but looks like a regular sedan."* As a consequence, considerers followed the traditional funnel profile of fewer potential buyers as they worked through the process.

This fundamental distinction between EV buyers and considerers effectively answers the question why some consumers buy EVs while others don't. More important, it stakes out perhaps the greatest challenge facing this nascent industry. Buyers today tend to be relatively rare individuals with an affinity for new and green technologies, while considerers who ultimately reject EVs exhibit the attitudes and dispositions of the mainstream car-buying public: They are more practical, ranking price and design high among their purchasing decision factors.

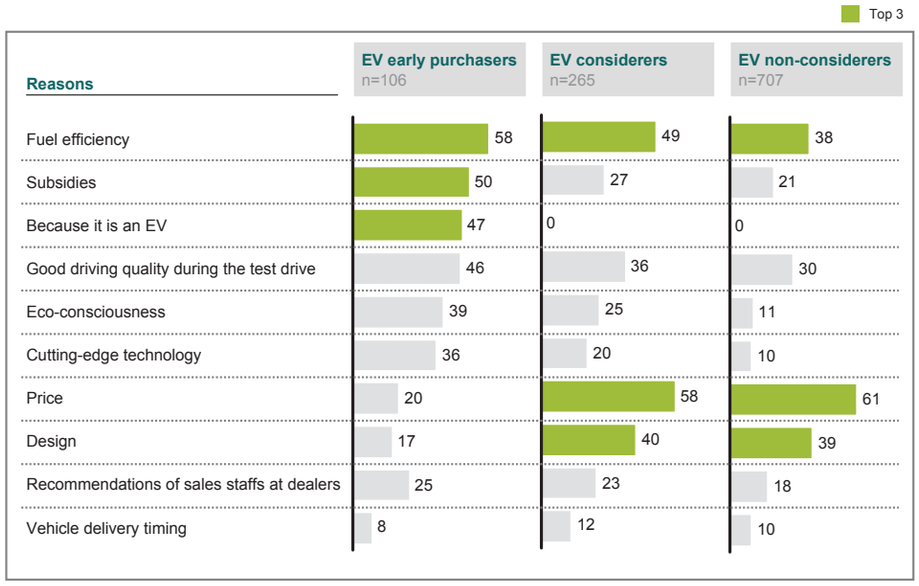
At first glance EV considerers seem likely to evolve into potential purchasers. But that's not the case.

Regarding the purchasing decision itself, well over half of EV buyers named fuel efficiency as a reason for getting an electric vehicle, while half mentioned available subsidies (Exhibit 3). Interestingly, and adding support to our contention that many EV buyers are in a sense hardwired to do so, nearly half said they bought one *"just because it is an EV."* Among considerers/non-considerers, top reasons for buying the non-EVs they ultimately purchased were price, fuel efficiency and design. Significantly, few EV buyers mentioned price or design as considerations.

Exhibit 3

"I bought EV, just because it is EV!"

%; Reasons for selecting to buy last vehicle; Multiple answers



SOURCE: Electric Vehicle owner survey (April 2012)

In segmenting early EV purchasers in Japan, we see the strong presence of "Green Tech Savvies," who are people who love cars and new technologies and who are also environmentally conscious. Green Tech Savvies tend to have high incomes, live in their own houses and own more than two cars. They also have science or technology backgrounds, higher levels of education and larger families with kids at home. They are socially active and love cars and driving. They (and early EV adopters in general) avidly gather information about cars through various sources, are willing to buy new technology and tend to drive only shorter distances. They aspire to contribute to protecting the global environment, often have solar panels on their houses and strive to live sustainable lives.

Voices we heard among early purchasers during our qualitative research phase paint a clear profile of Green Tech Savvy consumers:

"I want to own new technology. I bought an EV just because it is an EV."

"Once I read the blueprint sheets for the EV, I knew the EV was going to work."

"EV is the new edge in cars—I know it will have bugs, but I am willing to be the human pillar for the technology evolution."

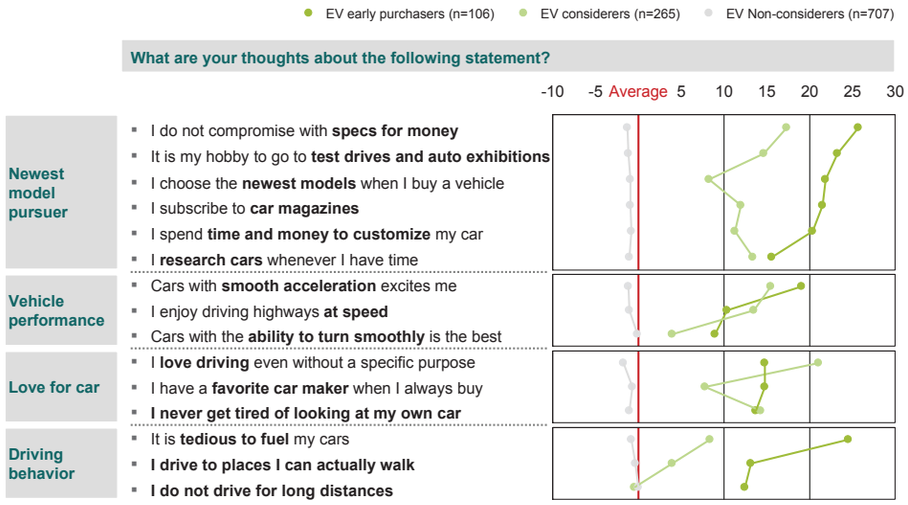
"I used to own a sports car when I was younger."

"I talk with other EV owners I met on Twitter—they are usually even more responsive than the car manufacturers when I ask a question."

Exhibit 4

For EV early adopter, electric car is a perfect mix of cool new automotive technology, fulfilling driving experience and "gadget-like uniqueness"

%; People who answered "strongly agree" and "agree"; n=1,300



SOURCE: Electric Vehicle owner survey (April 2012)

Overall, early buyers see the electric car as a perfect mix of leading-edge automotive technology, fulfilling driving experience and "gadget-like uniqueness" (Exhibit 4). Our research shows they love new models and spend time and money to keep up with the latest trends. They also enjoy driving and value outstanding vehicle performance. These car buyers are true technophiles in the sense that they are excited about embracing and owning new technology in general. What's more, they are often more self-assured in the use of new technology than either considerers or non-considerers.

EV buyers aspire to live a more ecological lifestyle. However, while generally "eco-friendly" and conscientious about the planet, they continue to see themselves as consumers, not ecological footprint minimizers. When split by gender, another surprise was that compared to men, the women who are early EV purchasers tend to be more pragmatic, more excited about buying new models, and significantly more eco-conscious (Exhibit 5). Regarding the last point, compared to men, in responding to the statement *"I don't mind sacrificing comfort for the sake of the global environment,"* more females agreed. Women also dislike refueling their cars with gasoline far more than men.

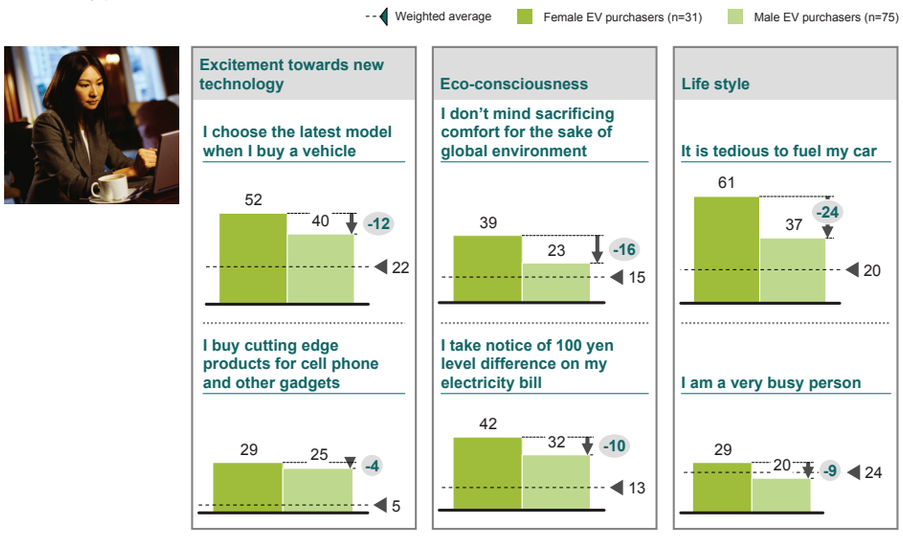
Current Japanese EV buyers are clearly a special group, which we estimate to be no larger than one percent of the total car-buying population. The next question is, are there ways to expand the EV's appeal so that it attracts a larger pool of purchasers?

While at first glance considerers might seem likely to evolve into potential purchasers, that's not the case: They typically have very strong reasons for not buying EVs (Exhibit 6). The top three are

Exhibit 5

Female EV early purchasers are more pragmatic, excited with new models and highly eco-conscious

%; EV early purchasers; n=106

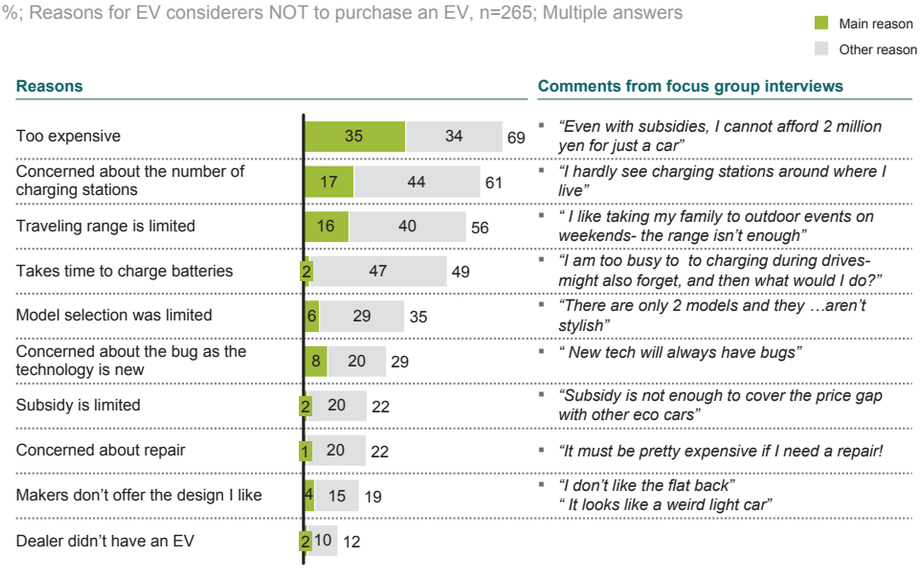


SOURCE: Electric Vehicle owner survey (April 2012)

Exhibit 6

Considerers are not potential purchasers – They have a very strong rational why they do not want to buy…

%; Reasons for EV considerers NOT to purchase an EV, n=265; Multiple answers

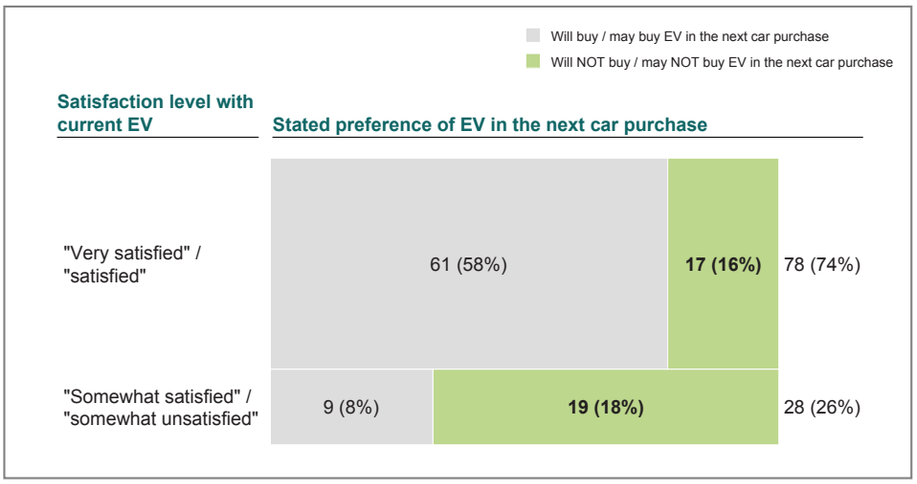


SOURCE: Electric Vehicle owner survey (April 2012)

Exhibit 7

One third of current EV users say they may not buy EV in their next purchase. Is this a RISK or a HINT?

Number of EV early purchasers (% of overall sample, n=106)



SOURCE: Electric Vehicle owner survey (April 2012)

price, concerns about the number of available charging stations, and limited travel range. On price, for example, a representative quote from our focus group interviews asserted that, *"Even with subsidies, I cannot afford two million yen for just a car."* On charging opportunities they said, "I hardly see charging stations around where I live," and regarding travel range, *"I like taking my family to the outdoors even on weekends—the range isn't enough."*

What's more, the changes needed to resolve these issues will likely take time. For instance, a majority said they wanted to be able to charge their EV batteries completely in less than five minutes, while nearly half wanted a driving range that exceeds 300 kilometers (km) on one full charge. Given current EV capabilities in these areas, achieving these targets could take years.

The impact of impulse buyers

Overall, early EV purchasers tend to be significantly happier with their new EVs compared to their previous internal combustion engine (ICE) vehicles. Nearly two-thirds said they were satisfied or very satisfied with their EVs, but just over half said the same about their previous ICE cars.

However, nearly a third of EV purchasers said they might not buy an EV for their next car purchase (Exhibit 7). Our research shows that many of these potentially less loyal owners don't share the attitudes of other EV buyers. In particular, of those in this group far fewer subscribe to car magazines, express the same willingness to sacrifice comfort for the sake of the global environment, are car lovers or understand new technology. As a consequence, they are not attached to their EVs with the same level of intensity as other purchasers. What's more, owners who express uncertainty about the dealer's capability to service their vehicles

Behind the numbers

To determine what early EV buyers liked and disliked about their purchases, we employed a two-step approach. First, in a qualitative research phase, we identified 20 private EV owners in the Kanto area (greater Tokyo) and engaged in two-hour interview sessions with each of them. We met them in their homes and drove with them in their EVs. Doing so enabled us to understand their daily life at home, attitudes towards eco-life, habits and hobbies, and in detail how they came to buy an EV. While driving together with the owners, we also heard from them, face-to-face, about the kinds of activities they did with their cars, the types of information sources they referenced, as well as the frustrations and pleasant surprises they experienced while driving their EV.

During this phase, we also conducted six rounds of focus group interviews with recent car buyers who had either considered an EV or not considered at all, and asked their impressions and reasons for not buying EV. During the interviews we leveraged projective techniques to help participants express themselves. Additionally, we interviewed multiple business EV drivers one-on-one (e.g. taxi drivers and traveling salespersons with EVs) to understand the "pain points" of those who were driving EVs but were less enthusiastic about them than other buyers.

Based on insights from the qualitative phase, we conducted a second phase of the study, an online survey of 1,300 respondents who had purchased a car in the last 24 months in Japan (106 early EV purchasers, 265 EV considerers, 222 plug-in hybrid electric vehicle considerers and 707 EV non-considerers). The survey covered their attitudes, lifestyles, recent car purchase process and perceptions of EVs. It also included a detailed assessment of how they felt about EVs and specific features.

are usually less willing to repurchase. These impulse buyers clearly do not fit the profile of the happy EV purchaser, and could via word-of-mouth effectively "poison the well" for the rest of the undecided population.

Less loyal EV buyers are usually fairly practical car buyers who sought to purchase a second car when they bought an EV. They are nearly three times more likely to be housewives and to have lower incomes than the loyal buyers. Because they are often less well informed about the product, these buyers are also unprepared for some of the daily realities of living with an EV compared to repurchasers. For example, nearly twice as many complain about having no charging receptacles at their apartments, and were over two-and-a-half times more likely to be surprised to see their electric bills increase due to EV charging.

So why did potentially less loyal purchasers buy EVs in the first place? Our analysis suggests that many were "seduced" by a combination of low energy costs per kilometer, attractive subsidies and a high-quality test drive. In fact, their strong response to the test more than anything else persuaded them to make an impulse purchase of an EV. These customers exhibited far less willingness to buy an EV up to that point, but following the test drive changed their minds. Later, faced with the reality of living day-to-day with a uniquely new and different mobility technology they were not really prepared to handle, their initial enthusiasm wore

off. Although this segment indicates the power of a "good product" and impact of a direct sales approach, without proper retention and education programs it can potentially be very dangerous, and a source of negative feedback in the market.

Just how big is the EV "pie" in the short term?

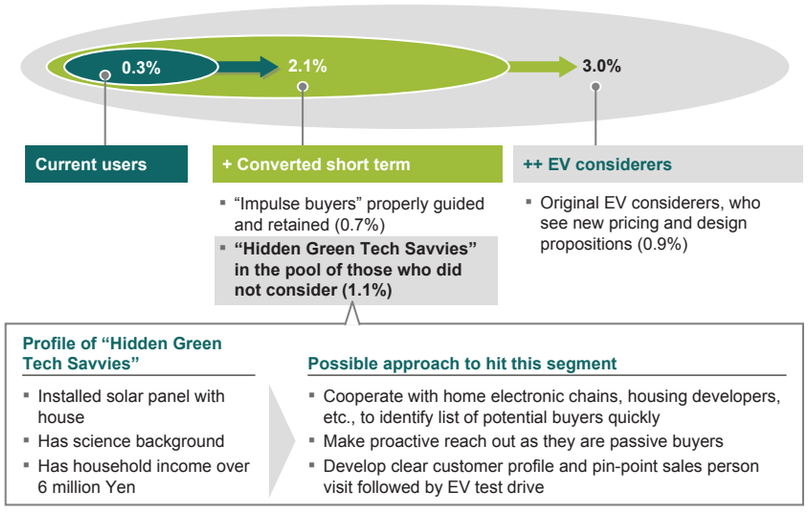
In sizing Japan's future market for EVs, we believe EVs could achieve a 3 percent market share in Japan in the near term, as EV prices and selection improve - 10-fold increase over today (Exhibit 8). Including current users, a number of Japanese consumers are ready to buy EVs now, and more will join them as prices come down and performance improves. To achieve these numbers, however, the industry and supporting infrastructure need to continue to make progress in a number of areas.

Making the case to non-considerers. We believe that enough Green Tech Savvies remain hidden among EV non-considerers to generate an additional 1.1 percent of total EV market share. Because these are passive potential buyers, OEMs and their dealers need to reach out to them proactively. We suggest a targeted strategy focused on developing clear customer profiles and pinpoint salesperson visits followed by EV test-drives. Automakers can also consider partnering with home electronics retail chains or housing and apartment developers, for example, to identify a list of potential buyers. Joining with homebuilders to make sure they

EVs could achieve a 3 percent market share in Japan as EV prices and selection improve.

Exhibit 8

We estimate that there is at least 2.1% of people in the market today, ready to purchase EV already now, and additional 0.9% adding when better price and design are available



SOURCE: McKinsey analysis

install EV charging receptacles in new projects, for example, can help pave the way for future adoption.

In addition, persuading governments to promote EVs (e.g. through providing more opportunities for test-drive experiences, etc.) will provide the incentives needed to maintain current EV conversion levels and attract new considerers.

Luring considerers with pricing, performance. The battery is the biggest reason EVs carry high price tags, but a 2010 McKinsey analysis shows that with more volume, battery costs will drop significantly. We estimate that with EV volumes of around 5 percent of new cars sold, early 2010 battery costs of USD 23,000 would drop to roughly USD 4,600. The ability of battery supplies to achieve mass production scale effects will be the biggest drivers of this decline.

Here as well, supporting ongoing government incentives and putting more consumers behind the wheel of an EV for a test drive can help stoke the market.

The market should also benefit from the impending arrival of new EV models, which should amplify the impact of expected price reductions on price- and design-conscious considerers. We estimate that an additional 0.9% of share can be added as new models are released and prices decline, bringing the potential EV market share to 3%. As one 40-year-old male said, *"I love cars... have owned sports cars, SUVs and foreign cars in the past. EV is a interesting concept, but the two models out on the market are just not cool."* Another concern is the newness of the technology. Said a man in his 30s, *"Although the driving experience was much, MUCH better than I originally expected, I will wait to see if there are no bugs. First generations things always do."*

□ □ □

Japan's experience to date with EVs provides a number of learnings that OEMs and governments in other countries can use to their advantage. A major need involves educating consumers both to promote the EV's advantages and to manage customer expectations about their purchases. This investment can boost interest among considerers and increase the number of repurchasers by providing a real-world view of life with an electric vehicle.

Automotive & Assembly
August 2012
Layout by New Media Australia

www.mckinsey.com