July **2018**

IPSOS VIEWS

The Future of Mobility

Electrification

John Kiser, Jack Chiu and Peter Otto

GAME CHANGERS

Introduction

Although the electric vehicle (EV) has been around for over 100 years, early solutions were not very popular or very practical and had limited capabilities. The need for EVs was minimal until the late 20th century when gas shortages and environmental concerns came to the fore. By this time transportation emissions regulations were issued which created a renewed interest in EVs, and a need for original equipment manufacturers (OEMs) to comply to produce vehicles that met the new restrictions being imposed.

A key turning point for EVs was the launch of the Toyota Prius. Released in Japan in 1997, the Prius became the world's first mass-produced hybrid electric vehicle. In 2000, the Prius was released worldwide and became an instant success. The rise of gasoline prices plus the growing concern about carbon emissions pollution has helped make the Prius the best-selling hybrid worldwide during the past decade. However, while most associate EVs with the Prius, the drawback with the vehicle has been that is seen as not being fun to drive. Essentially, to get the improved mileage per gallon (MPG) there was a sacrifice in driving performance and styling.

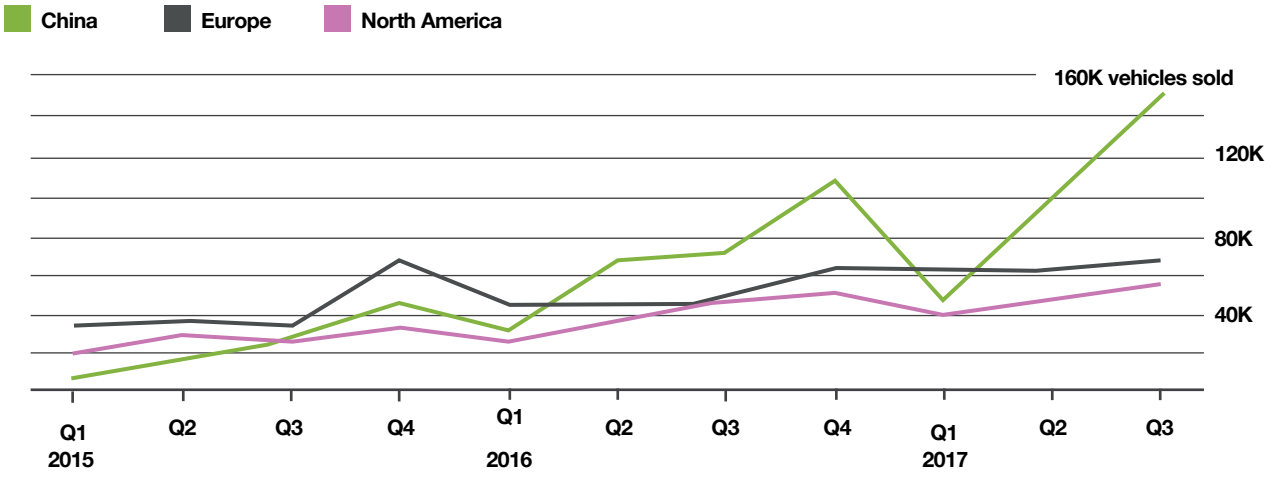
Not until the announcement of Tesla Motors in 2006 did we hear about an all-electric luxury sports car that would have a completely different driving experience, along with a 200-mile range on a single charge. With Tesla's announcement and the buzz the new automotive brand was generating, along with the continued pressure from emission regulations, large OEMs announced plans for their electric strategies. In late 2010, the Chevy Volt and Nissan LEAF were released to the US market. Both vehicles quickly became the leader in US sales in their respective categories; the Nissan LEAF an all-electric or battery electric vehicle, and the Chevy Volt, the first commercially available plug-in hybrid vehicle. By the end of 2017, they were more than 40 all electric and plug-in EVs available in the US from more than 20 automotive brands. As we look to the future, each major OEM is making major commitments to electrification and by the early 2020s we will see a significant increase in all electric and plug-in models and affordable electric models. This will include much more variety of body styles, name plates and diverse options that will meet the consumer's desires.

Beyond the product development focus from OEMs, we have seen an increase in infrastructure support with a growing network of charging stations being installed globally. In addition, we have seen government support through incentives, subsidies and regulations to encourage the adoption of EVs. An example of how impactful this support is can now be seen in China. In the congested cities of Beijing and Shanghai, it is difficult to obtain a new registered license plate which permits driving of a gasoline vehicle about only 50% of the time, while license plates for EVs are more easily available and allow more flexibility in when you are permitted to drive (see figure 1).

Figure 1

Driven by China

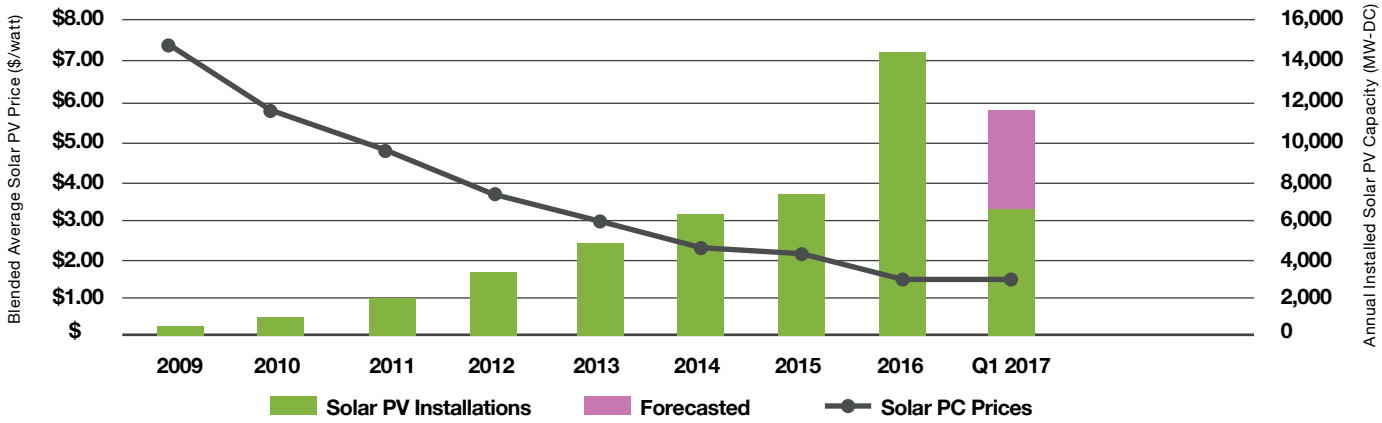
Chinese demand for EVs is soaring



Another global trend supporting the adoption on EVs is the growth of the renewable energy sector over the past decade. While the cost and concerns of fossil fuels rise, the adoption and cost of renewable energy such as solar power is seeing exponential growth (see figure 2). Increasing availability of cleaner, cheaper energy to power vehicles, along with lower maintenance costs of less complicated electric powertrains, decrease the total cost of ownership of EVs significantly compared to traditional gasoline-powered vehicles.

Figure 2

Growth in renewable energy



The barriers to adoption of EVs are shrinking, from decreased cost of ownership, through advances in technology, and product developments from automakers. Along with disruptive business models like Uber and multi-level government support, we are seeing growth in EVs globally.

The key mobility trends

'Disruptive driving' (driverless cars and connectivity), 'electrification' (battery EVs) and 'shared mobility' (car sharing and ride hailing) are the three key trends which will converge and reshape the entire automobile and mobility landscape. But how will consumers react towards all these concepts of future mobility?

In this paper, we are focusing on electrification. This includes battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV) and hybrid electric vehicles (HEV). Through our research, we can understand consumers' willingness to accept this innovative technology and identify potential barriers to overcome and broaden adoption.

Ipsos has interviewed more than 130,000 car owners from nine countries to find out more about:

- concerns around traditional combustion engines
- familiarity of different electric powertrain vehicles
- purchase consideration of different electric powertrain vehicles
- benefits of owning and driving EVs
- barriers to owning and driving EVs
- who is most interested in EVs
- who is most the trusted partner to offer EVs and mobility services

To measure the future success of new technologies and business models, we will need to connect the key trends. We have already covered 'disruptive driving' (driverless cars and connectivity) in *The Future of Mobility: On the road to driverless cars.* These trends are connected and could evolve into a single solution. These include the following examples:

- Privately-owned passenger cars equipped with advanced drive assist systems (ASAS) features which could make our lives easier.
- Battery-powered self-driving micro buses, which will pick up passengers individually after they have requested it using an app.
- Transportation as a Service (TaaS) like Uber and Lyft but without drivers, where a self-driving fleet of EVs are readily available for personal use freeing users from the burden of vehicle ownership.

All these new trends and exciting EV model launches will increase their familiarity and their preferences and expectations from their automobiles over the coming years.

"Charging availability will be a big concern in the future… and what do you do with the time while you wait?"

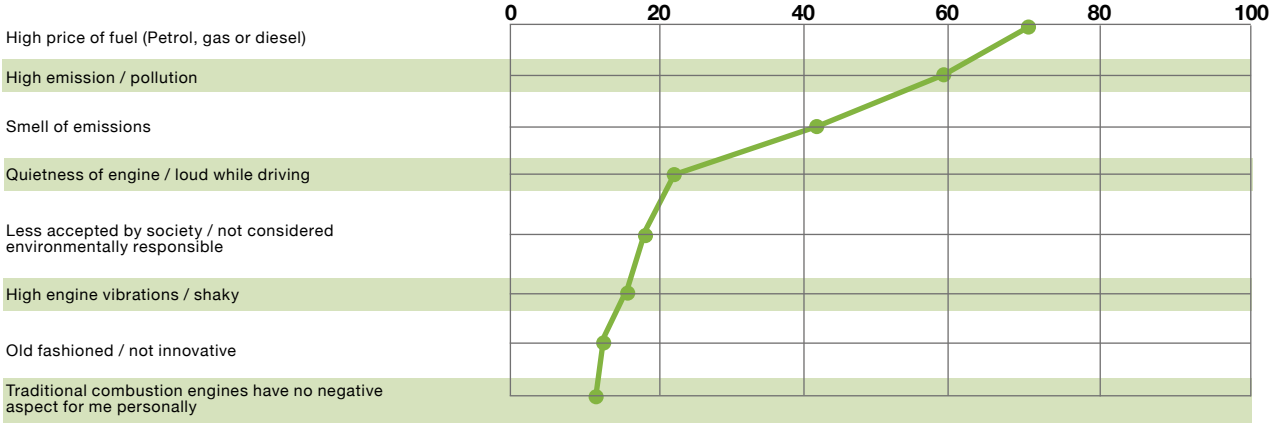
Current behaviour

As part of our survey we evaluated what potential concerns consumers would have with traditional combustion engines, as well as their driving habits.

We learned that most consumers do have a perceived issue with **high fuel prices** along with the **pollution issues associated** with the **traditional combustion engine's carbon emissions.** This was fairly consistent across the countries we sampled, as illustrated in figure 3.

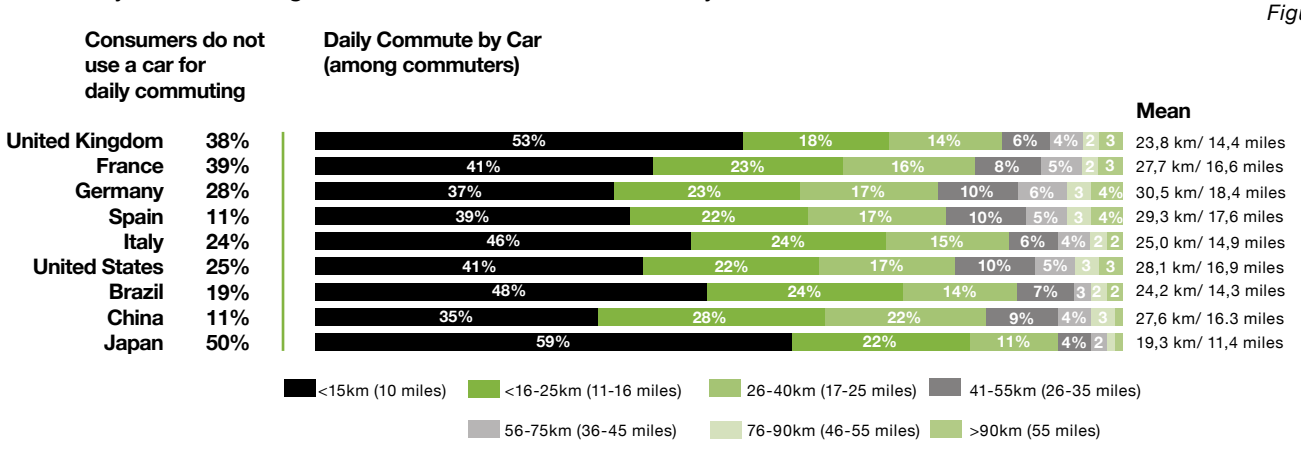
Figure 3

Percentage of consumers with concerns



We also see the daily commute for most consumers is less than 40 kilometres or 25 miles. As shown in figure 4, this is easily within the range of most current BEV offered today.

Figure 4



The daily commute for consumers is just one factor of the vehicles they choose. They also desire flexibility from their vehicle with commuting, weekend trips and even annual holidays contributing to their vehicle of choice. In addition, depending upon the occasion, the vehicle may require space for other riders and/or carry luggage or groceries. Vehicles need to be flexible to handle different types of occasions as well as length of trips. A key insight is that until there are mainstream BEVs available that can handle the variety of consumer needs, such as longer ranges and alternative body styles, we won't see broad adoption. However, we know these highly competitive options are coming and they are coming quickly!

Current consideration of alternative fuel powertrains is low across most countries, with increased interest in developing markets such as Brazil and China (see figure 5). As referenced earlier, we know there is an increase in BEV sales in China, and this is strongly based on the infrastucture and incentive support in that country.

Figure 5

Interest in alternative fuel powertrains by country

Top box %, 5pt scale

	Hybrid Vehicle (HEV)	Plug-in Hybrid Vehicle (PHEV)	Pure Electric Vehicle (BEV)
United Kingdom	6%	4%	4%
France	6%	3%	4%
Germany	5%	3%	4%
Spain	8%	5%	5%
Italy	8%	5%	5%
United States	13%	7%	13%
Brazil	12%	10%	16%
China	10%	12%	19%
Japan	12%	3%	2%

High

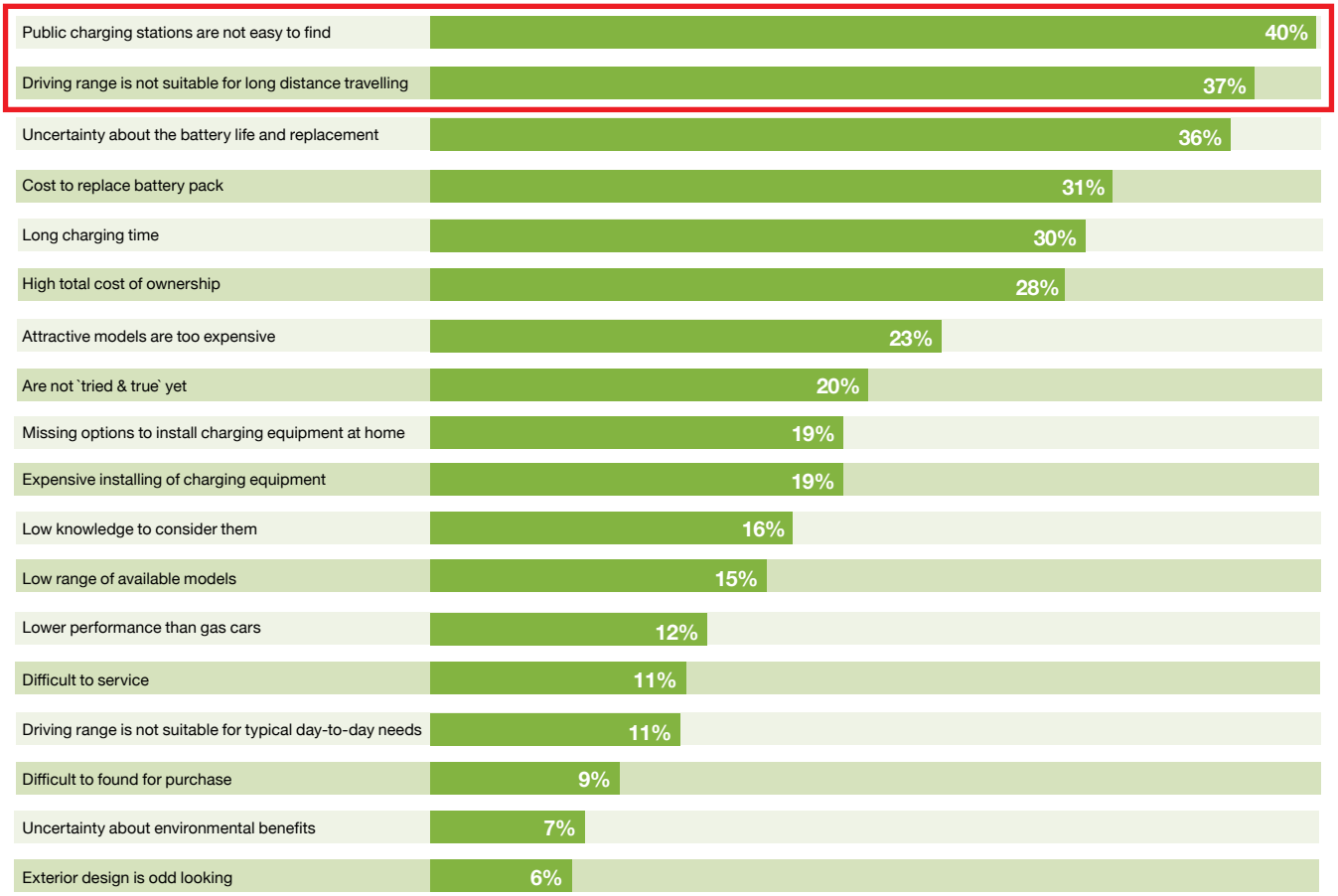
Low

Top barriers to Electrification

In total, key barriers for adoption are the perceived lack of public charging stations and the limited driving range for long distance travel (figure 6). Consumer and auto industry education will be key to increasing awareness of improvements in public charging stations and other charging solutions to ensure consumers are aware of their options.

Figure 6

Barriers to adopting EVs

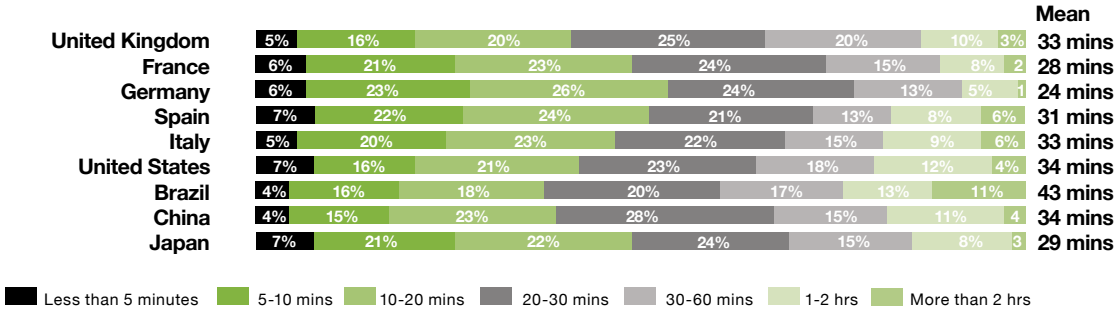


Most consumers are unfamiliar with the BEVs and their benefits. Education of the benefits beyond helping the environment will be key, as consumers desire to help but will also need information to understand the long-term cost of owning and operating a battery electric vehicle. There is a still a lot of uncertainty despite BEVs having been around for a while now.

Consumers will also wrestle with a change in their lifestyle in moving to a BEV. People will no longer go to the gas station to fill up their tank once a week but instead charge their vehicle on a daily basis. This can easily be done by charging at home, but would require getting a charger installed there assuming they have a location where they can park and charge their vehicle. If not, they would need to charge at public charging stations, but not all public charging stations are fast charging. As a result, users will need to ensure to park and charge their vehicle while at work or during a long shopping trip. However, if consumers can access and find a fast charging station they would expect to charge their vehicle in roughly 45 minutes (figure 7).

Figure 7

Time consumers expect to charge their vehicle



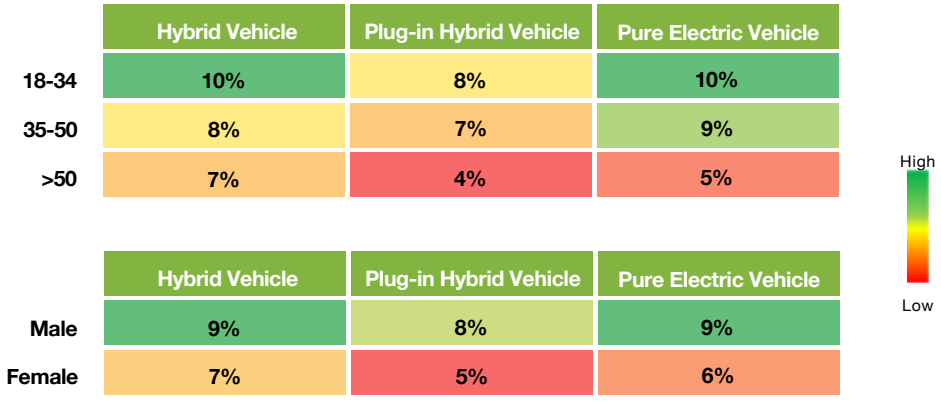
If this is the case, then it will be important to have places for consumers to visit such as restaurants, coffee shops, a park or general shopping while they wait for their vehicle to be charged. Key insight is that consumers won't wait in their vehicles for this duration, OEMs can work with charging venues to ensure there is something for the consumer to do while they get charged up.

Who is interested in electrification?

In total, males and younger consumers are the most interested in battery electric technology (figure 8). This is not uncommon with new technology until it moves beyond early adopters, more consumers are familiar with the technology and it becomes more mainstream.

Figure 8

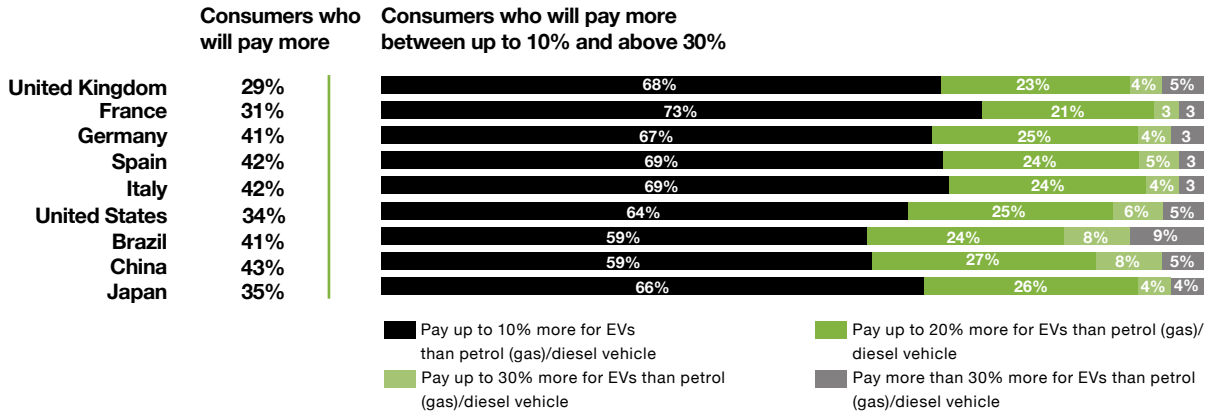
Interest in alternative fuel powertrains by age and gender



About a third of consumers across the world would pay a premium for BEV and that price premium is limited to roughly 10% higher than traditional gas/diesel vehicles (figure 9).

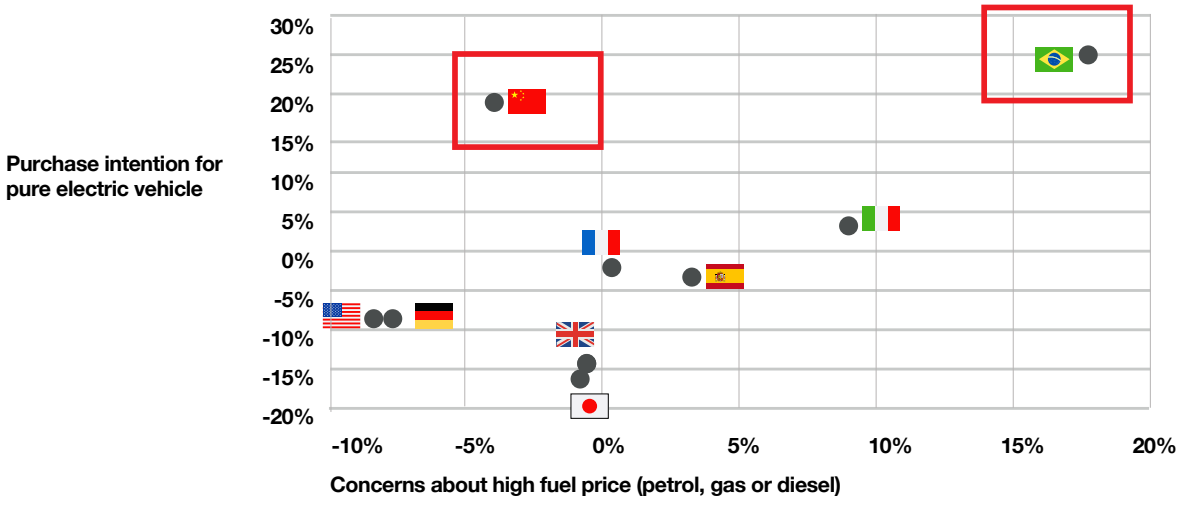
A key insight is that most consumers are not willing to pay a premium simply for improved technology; they desire the improvements and expect it to be on par with what they always have paid for a vehicle. The industry needs to do a better job of educating and illustrating the value associated with BEVs by understanding the total cost of ownership and the positive impact on their lives versus the sticker price.

Figure 9



In the immediate future, we know that fuel prices can drive increased interest (figure 10). Brazil in particular is more interested as a result of their concern of increasing fuel prices. As this happens, there is an opportunity for OEMs to push their alternative fuel vehicles as consumers will respond to this to seek other more efficient fuel solutions.

Figure 10

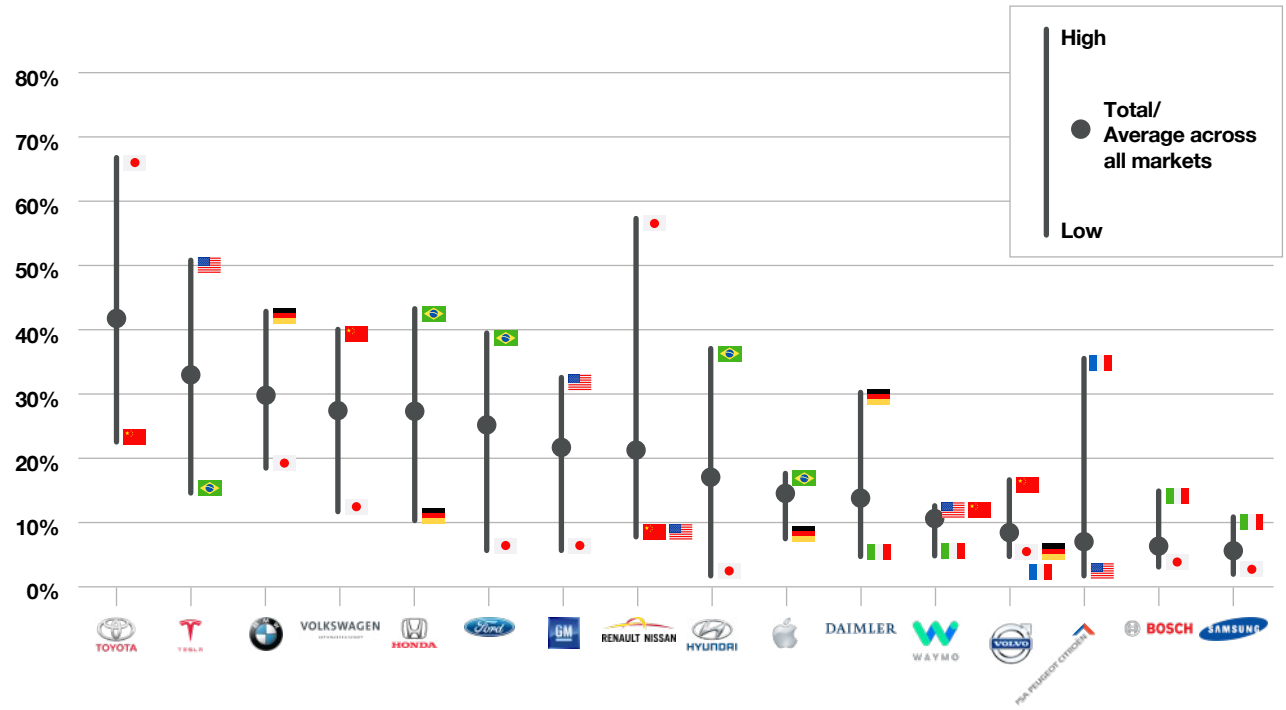


Who is expected to offer the electrified solutions?

There are many new automotive players coming into the market, led by Tesla. Recently there has been significant increased interest from other sectors including utilities and technology companies in future mobility providers. We know current OEMs have an advantage based on brand value, historical expertise and established infrastructure to build and distribute the new vehicles. However, should BEVs be sold through traditional dealerships? Doesn't the model that Tesla has deployed have a competitive advantage as their showrooms are just about BEV and not a mix of different powertrains such as traditional gasoline or diesel, HEV, PHEV and BEV? This gets confusing for consumers and salespeople in the traditional dealerships. Nevertheless, we do expect the largest OEMs to be selling BEVs over the next five years, including Toyota, BMW and VW, as well as Tesla. Only a small proportion of those interviewed expect Apple or Waymo/Google to offer an electric solution (figure 11).

Providers of Battery Electric Vehicles in the next five years

Figure 11

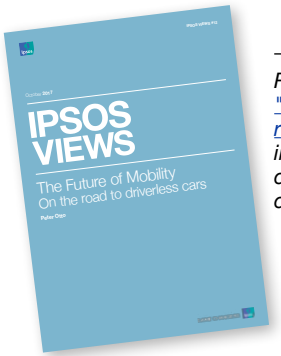


Conclusion

We are seeing strong momentum in the attention and investment by many key OEMs into electrification of vehicles. As a result, consumer acceptance will grow across many different powertrains such as HEV, PHEV and even BEV. OEMs will need to pay attention to the consumers' needs in each market and ensure they are building vehicles that meet and exceed those needs. This includes the desires of functionality and value alternative body styles such as CUVs and SUVs and ensure the pricing is on par with traditional internal combustion engine (ICE) models.

We will continue to track on a quarterly basis how the interest grows in alternative powertrains across alternative body styles. It will be interesting to monitor consumer acceptance and track trends in this new market with new vehicle launches, development of the charging availability and government/legislative support. We anticipate the convergence of self-driving functions and increased familiarity along the added flexibility of ride sharing options will help accelerate the acceptance and adoption of the new powertrains.

We know significant change is coming. The question is: how fast will consumers and businesses adopt the new way? We expect the change will come faster than most think as investment in electrification is significant and focused. We anticipate BEVs will be more than a niche market by 2020. This is especially true as we consider the convergence of autonomous, electrification and ride hailing/car sharing. It is exciting to be part of the mobility community and this revolutionary time in the industry as we proceed into the 21st century! A total understanding of the consumer will be key to success in this new era.



Read the first paper in the series "The Future of Mobility: On the road to driverless cars", which investigates the key trends, disruptive and fully automated driving.

Method: In wave 2 Ipsos interviewed more than 130,000 car owners across nine countries, in the Americans (USA, Brazil), in Europe (France, Germany, UK, Italy and Spain) as well in Asia (China and Japan). Interviews were conducted online in June 2017 and analyzed in September and October in 2017. All results are weighted by net population and size of car parks.

This paper is the second in a series of three on future mobility.

For more information on this survey, please contact FutureMobility@ipsos.com

IPSOS VIEWS | The Future of Mobility Electrification

John Kiser is Senior Vice President, USA

Jack Chiu is Managing Director, Ipsos China Auto

Peter Otto is Chief Client Director, Automotive, Ipsos Global Partnering

The Ipsos Views white papers are produced by the **Ipsos Knowledge Centre.**

www.ipsos.com
@Ipsos

GAME CHANGERS

<< Game Changers >> is the **Ipsos** signature.

At **Ipsos** we are passionately curious about people, markets, brands and society. We make our changing world easier and faster to navigate and inspire clients to make smarter decisions. We deliver with security, simplicity, speed and substance. We are Game Changers.