

Paying at the Pump and EV Adoption Collide



Special report by Zpryme's Electric Vehicle Insights - July 2011

2011 has been touted as “the year of the plug-in electric vehicle”. With domestic fuel prices up 30 percent since last year, drivers are feeling pain at the pumps.¹ Automakers have heard the cries of American wallets and have delivered a fleet of plug-in electric vehicles (PEVs). The Nissan Leaf and Chevy Volt are the first in a new generation of PEVs. The Leaf, a full PEV, runs entirely on a battery powered by the electric grid.² The Volt is a plug-in hybrid electric vehicle (PHEV) that runs on a grid powered battery but also has a conventional engine fueled by gasoline.³ The Volt can travel between 20-50 miles on a single charge while the Leaf can travel over 100 miles. Regardless of a driver's selection, the charging costs of both vehicles are less per mile than gasoline or diesel⁴ – approximately three cents per mile for EVs versus 12 cents per mile for conventional engines.⁵

With the price of gasoline flirting with \$5 per gallon this summer, making the switch to a PEV will result in considerable savings at the pump for consumers. However, saving consumers money is not the only factor driving the PEV market. Energy security also plays a significant role, as oil is a finite resource.⁶ The Electrification Coalition, an electric vehicle advocacy group, estimates that if, by 2040, 75 percent of all miles driven in the United States are powered by electricity, oil consumption by light-duty vehicles will drop from nearly nine million barrels a day to two million.⁷ Transitioning to a predominately electric vehicle fleet is critical for achieving energy independence.

The rise of the electric vehicle (EV) is not just causing a jolt among American drivers and automakers; President Obama stepped forward in support of EVs as well. His Administration hopes to achieve a goal of

one million electric cars on the road by 2015. To that end, the Obama Administration has established incentive programs through the American Recovery and Reinvestment Act to encourage drivers to purchase electric vehicles. There is currently a \$7,500 tax credit available for the purchase of an EV. Further, the Administration has allocated \$2.4 billion to the development of the electric car industry.⁸ More than \$100 million will be used to finance EV battery research and to build thousands of charging stations across the country.⁹ ¹⁰ The Department of Energy and the National Renewable Energy Labs are partnering with Google to ensure that these targets are met. In addition to the Administration's initiatives, several members of the House have drafted legislation with more ambitious goals. The Electric Vehicle Deployment Act will increase the federal purchase incentive to \$9,500 for 500,000 customers and will provide \$3 billion to the development of EV charging infrastructure.¹¹

In spite of support from the public and private sectors, forecasters indicate that it may take up to 10 years before PEVs account for even a tenth of the vehicles on the road.¹² A recent Gallup Poll found that 57 percent of Americans would not buy a *limited range* all-electric vehicle – even if the price of gasoline continues to rise – indicating that high gas prices are not the only factor influencing consumer demand for PEVs.¹³ Weighing more heavily on the minds of drivers are the immediate costs and not the long-term benefits of all-electric vehicles. Potential buyers are concerned about the lack of fueling stations available on the road and the limited battery range of current model PEVs. Further, they have expressed “sticker shock” at the additional \$10,000 needed to purchase an electric vehicle. However, if these roadblocks were removed, would rising gasoline prices sway consumer preference for all-electric vehicles?

State and federal governments, utilities, and automakers are working to develop a fleet of electric vehicles and supporting infrastructure that meet your driving needs at minimal cost. The following analysis of

¹ http://www.lvrj.com/special_sections/rising-gas-prices-cause-growth-in-hybrid-car-sales-122574324.html?ref=324

² Accenture, Plug-in electric vehicles: changing perceptions, hedging bets, May 2011

³ Ibid.

⁴ Ibid.

⁵ <http://avt.inel.gov/pdf/fsev/costs.pdf>

⁶ <http://www.cbsnews.com/stories/2011/06/20/earlyshow/main20072501.shtml>

⁷ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

⁸ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

⁹ <http://www.cbsnews.com/stories/2011/06/20/earlyshow/main20072501.shtml>

¹⁰ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

¹¹ <http://electric-vehicles-cars-bikes.blogspot.com/2011/05/increase-proposed-to-9500-electric-car.html>

¹² Accenture, Plug-in electric vehicles: changing perceptions, hedging bets, May 2011

¹³ <http://www.digitaltrends.com/lifestyle/despite-high-gas-prices-americans-still-dont-want-electric-cars/>

price trends at the pump and savings gained from operating a PEV indicates that consumers will welcome the electric fleet with open arms.

GAS PRICES AND CONSUMER PREFERENCE

As of June 2011, the national price of gasoline averages \$3.70 per gallon. Retail gasoline prices are up \$1 per gallon since last year and 90 cents per gallon since just January.¹⁴ Why are gas prices going up? Political instability in the Middle East and lost crude oil supply from war-torn Libya are primarily to blame.¹⁵ Oil production has fallen by more than 50 percent, while demand has remained relatively constant. As a result, prices at the pump are on the rise and are not expected to plateau until over the \$5 per gallon mark.

American drivers are impacted by high gas prices on a daily basis. In a recent Associated Press poll, 71 percent of respondents said they have experienced “some hardship” from prices at the pump – 41 percent ratcheted it up to “serious hardship”.¹⁷ How are American consumers responding? Zpryme reported in the study, *The New Energy Consumer*, that high gas prices are forcing consumers to make fuel economy a top priority for their next car purchase.^{18,19} A recent Kelly Blue Book Intelligence survey found that 80 percent of drivers say their next vehicle purchase will be affected if gas prices reach \$4 per gallon; 95 percent say it will be affected if prices hit \$5 per gallon.²⁰ With prices rapidly approaching the \$4 mark (and in some cases already there), American drivers will be faced with the decision of what to bring home as the next primary or secondary vehicle. Although purchasing a more fuel-efficient vehicle will cut down on

¹⁴ <http://www.thecitywire.com/?q=node/16290>

¹⁵ <http://blogs.forbes.com/eco-nomics/2011/05/23/pain-at-the-pump-americans-ready-for-electric-cars/>

¹⁶ http://articles.chicagotribune.com/2011-04-27/business/ct-biz-gas-prices-electric-cars_1_gas-prices-electric-rates-tracker

¹⁷ <http://blogs.forbes.com/eco-nomics/2011/05/23/pain-at-the-pump-americans-ready-for-electric-cars/>

¹⁸ Zpryme, *The New Energy Consumer* (sponsor: Itron), May 2010

¹⁹ <http://pressroom.consumerreports.org/pressroom/2011/05/consumer-reports-survey-car-buyer-want-better-fuel-economy-and-are-willing-to-pay-for-it.html>

²⁰ <http://www.smartplanet.com/blog/smart-takes/high-gas-prices-a-boon-to-electric-vehicles-hybrids/14728>

fuel costs, the price of oil is highly volatile and sharp fluctuations can offset savings. Electricity rates, however, are more stable – eliminating gasoline as a fuel source and switching to an all-electric vehicle will result in considerable and consistent savings.²¹

EV SAVINGS POTENTIAL

Domestic fuel prices are influencing consumer preference for EVs.²² When based solely on the potential for cutting costs at the pump, a recent Accenture report found that the majority of Americans would consider an electric car for their next purchase.²³ But what are the actual savings that we can expect? Although most EVs cost about \$10,000 more up front than comparable gas fueled vehicles, the federal government is offering consumers a \$7,500 tax credit to reduce purchase costs.^{24 25} Federal incentives help to narrow the gap in purchase price between conventional cars and EVs to \$2,500 on average. The additional savings in fuel costs make purchasing an EV even more attractive. Gasoline fueled vehicles get 12 cents' worth of fuel per mile; EVs get 3 cents' worth. Therefore, a PEV can travel four times as far as a gas-fueled vehicle for the same price.²⁶ If gas prices rise to \$5 a gallon as predicted, consumers who drive 12,000 miles a year could save on average \$2,257 by switching to an EV.²⁷ These additional savings close the gap between purchase costs of ICE (internal combustion engine) and EVs in just one year. In subsequent years, owners of EVs will continue to save \$2,257 on average for the lifetime of the car.²⁸

When considering the fuel costs of plugging-in versus pumping, the economics are in favor of the EV. Yet, in spite of the savings, potential

²¹ <http://articles.latimes.com/2011/mar/12/business/la-fi-ev-owners-20110312>

²² http://news.carjunky.com/alternative_fuel_vehicles/record-gas-prices-spark-interest-electric-cars-abc5804.shtml

²³ http://switchboard.nrdc.org/blogs/mbaumhefner/get_it_right_usa_today_-_ameri.html

²⁴ Accenture, *Plug-in electric vehicles: changing perceptions, hedging bets*, May 2011

²⁵ <http://www.cbsnews.com/stories/2011/06/20/earlyshow/main20072501.shtml>

²⁶ http://news.carjunky.com/alternative_fuel_vehicles/record-gas-prices-spark-interest-electric-cars-abc5804.shtml

²⁷ http://articles.chicagotribune.com/2011-04-27/business/ct-biz-gas-prices-electric-cars_1_gas-prices-electric-rates-tracker

²⁸ Ibid.

buyers are still hesitant – they are concerned about the drive-ability of EVs. But drivers can put their concerns to rest. A close inspection of two currently available EV models, the Chevy Volt and Nissan Leaf, reveals that EVs have the ability to meet daily driving needs at minimal cost. The 2011 Chevy Volt is a plug-in hybrid that runs primarily on electricity. The Volt can travel between 20-50 miles on a charge.²⁹ The average American commutes 40 miles or less a day, so most people who drive a Volt won't rely on any gasoline.³⁰ The Volt can meet daily driving needs on \$1 of electricity and is very efficient on gasoline if you need to drive farther.³¹ The Nissan Leaf is the only mainstream pure electric vehicle – it never consumes gasoline. The Leaf can go up to 100 miles on a single charge and costs only \$3 to fill up.³²

EVs like the Volt and Leaf are just the tip of the iceberg; nearly every major car company is coming out with an electric model.³³ Auto industry analysts say that by 2016, consumers will have between 25 to 30 pure electrics and another 25-30 hybrids to choose from. These second generation EVs will offer larger batteries that can go as far as 150 miles on a single charge.³⁴ Scientists at universities such as Stanford and MIT and national laboratories like Argonne and Lawrence Berkeley are developing batteries as rich in energy as gasoline, which could make vehicles like the Volt, with their gasoline powered backup engines, a thing of the past.³⁵

LOOKING FORWARD AND RECOMMENDATIONS

The future of the EV looks promising; as the price of gasoline continues to rise, Americans will vote with their wallets and select vehicles that save

²⁹ <http://www.digitaltrends.com/lifestyle/despite-high-gas-prices-americans-still-dont-want-electric-cars/>

³⁰ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

³¹ http://switchboard.nrdc.org/blogs/mbaumhefner/get_it_right_usa_today_-_ameri.html

³² Ibid.

³³ <http://www.cbsnews.com/stories/2011/06/20/earlyshow/main20072501.shtml>

³⁴ Ibid.

³⁵ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

them money at the pump. Demand for EVs will increase as the price of gasoline continues to climb. Although the Oil Price Information Service predicts a 40-cent drop in gas price over the next month, drivers may not go back to their gas guzzling ways. After 2008 and 2011, Americans are stuck in “worry mode”.³⁶ Zpryme predicts a 36.2 percent annual growth rate of PEVs from 2011-2016.³⁷ By 2016, Zpryme estimates that 730,700 PEVs will be on the road, just shy of President Obama's goal of 1,000,000 vehicles (see figure a).³⁸

Projected U.S. EV/PHEV Annual Unit Sales and Total Stock
(2011 - 2016)

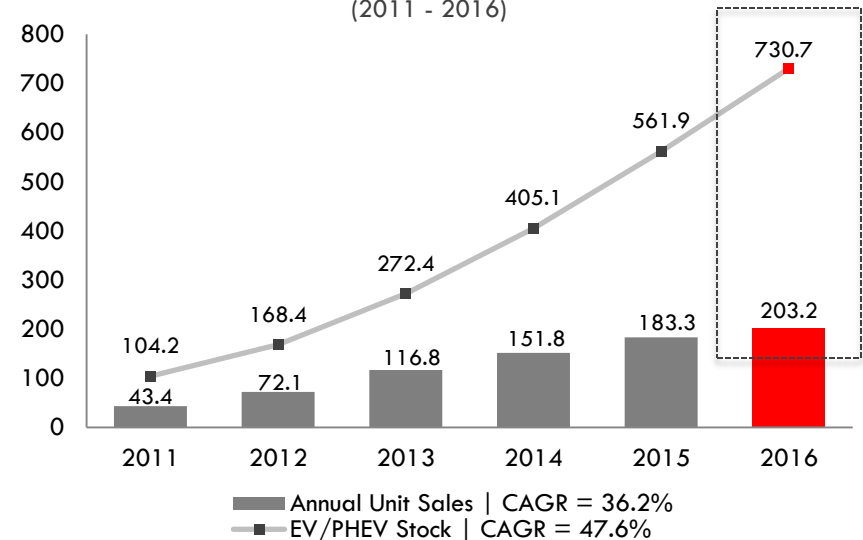


Figure a - Source: Zpryme

With 2016 around the corner, there is much work to be done in the EV market. The road to an all-electric fleet is long and not necessarily a smooth ride. What should we expect to see in the coming years? A report by Accenture, *Plug-in electric vehicles: changing perceptions, hedging bets*, asserts that the development of the PEV market will begin with an understanding of consumer preferences:³⁹

³⁶ <http://blogs.forbes.com/eco-nomics/2011/05/23/pain-at-the-pump-americans-ready-for-electric-cars/>

³⁷ Zpryme, The Electric Vehicle Study (sponsor: Airbiquity), December 2010

³⁸ Ibid.

³⁹ Accenture, *Plug-in electric vehicles: changing perceptions, hedging bets*, May 2011

Convenience matters – Initially expect to see higher demand for PHEVs than full PEVs. Consumers feel that first generation PEV models have insufficient battery range and are too time consuming to charge. Drivers want a battery that is comparable to a tank of gas. In the formative years, the landscape of the auto industry will be a mixed bag; however, as the technology improves, full PEVs will become more dominant.

Incentives matter – Consumers want PEVs to be affordable in both the short and long term. Drivers are in favor of incentives that minimize the upfront costs associated with PEVs. Potential incentive programs could include: waiving car tax on the purchase of a PEV or transforming the existing \$7,500 tax credit for the purchase of a PEV into a point-of-sale rebate, which would give buyers their refund immediately rather than at tax time.^{40 41}

Fuel source matters – Drivers would like to charge their cars quickly – at home and on the road – and at reasonable rates. Drivers would also like their electricity to be green – this is particularly important to young drivers.⁴² Consumers express concern at the lack of infrastructure to support the PEV industry. Their preferences for charging PEVs will challenge utilities and charging network providers.⁴³ Moving forward, service providers will have to consider demand management to avoid stress on the grid. Utilities will view the electric vehicle industry as an opportunity to extend their customer base as charging service providers.⁴⁴ They will become the “Chevron” of the future.

Utilities, city authorities, service providers, and automakers will have to address concerns for convenience, purchase incentives and the fuel

⁴⁰ Ibid.

⁴¹ http://www.nytimes.com/2011/05/10/opinion/10Fletcher.html?_r=1

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

source of electricity.⁴⁵ The rise of the EV will impact investments of automakers, battery manufacturers, charging service providers, electricity retailers, power generators, and network operators as well as the infrastructure they build.⁴⁶ Simply put, there is a wide array of stakeholders in the electric vehicle arena. Coordinating all of these parts and developing the electric car future is no easy task. Private transportation will not transform overnight. Although the long-term vision of a predominantly electric vehicle fleet appears to be feasible, in the short term EVs will share the market with conventional gas powered cars. With time, as gas prices and inflation continue to rise and EV technology progresses, consumer preference will more fervently shift to the electric vehicle. And major automobile manufacturers will be ready. Companies like General Motors, Nissan, and Ford are already eating up the market share and crowding out small business competitors that started the EV craze. Although the road to the electric vehicle began with the simple problem of high gas prices it will end with a highly complex industry that will in due course transform private transportation.

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⁴⁵ Ibid.

⁴⁶ Ibid.

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