



Powering The Road Ahead



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The Future is Electric

BY MIKE BLOUNT

The Need To Know

Glossary Terms

PEV: A plug-in electric vehicle refers to any vehicle that has a battery on board that can be plugged in to an electrical outlet.

ICE: An internal combustion engine is the engine that powers most of the vehicles on the road today. An ICE produces tailpipe emissions that affect air quality.

Hybrids: These vehicles have an internal combustion engine and an electric motor and battery for increased gas mileage and decreased tailpipe emissions.

PHEV: A plug-in hybrid electric vehicle has some all-electric range and gets superior gas mileage and reduced tailpipe emissions when compared to a standard hybrid vehicle. It can also be plugged in to charge the battery for increased efficiency.

EV or BEV: An electric battery vehicle is a fully electric vehicle without an internal combustion engine. It produces zero tailpipe emissions.

EVSE: The electric vehicle supply equipment is the charge connector for a PEV.

Imagine a future where your car is not dependent on the gas pump. Imagine paying a fraction of your current fueling costs. Now, imagine you don't have to wait.

Plug-in electric vehicles are a great alternative to the fossil-fuel dependent cars on the road today. They offer consumers relief from record-high gas prices, they are easy to use and best of all they are environmentally-friendly. As a forward-thinking company, SMUD is committed to helping its customers make greener, cleaner and cost-effective energy choices. One of SMUD's new programs is providing resources for customers who are considering purchasing PEVs.

Electric vehicles, which have actually been around longer than their gasoline-fueled counterparts, were more successful in the automobile market until about 1920. But after Charles Kettering of General Motors developed the self starter for gasoline vehicles —

which is an electric motor, ironically — sales began to decline for electric vehicles because other technology improved.

PEVs of today are so efficient, that all-electric vehicles can go upward of 100 miles on a single charge, while hybrids like the Chevrolet Volt can go over 40 miles. The average American drives 29 miles per day, according to the U.S. Department of Transportation, so a PEV would not have to stop to fuel up. In fact, 85 percent of PEV owners use their PEV as their primary car, driving an average of 802 electric miles per month, according to the Center for Sustainable Energy California.

Drivers can save anywhere between 75 to 80 percent on fuel costs when using electricity over gas.

The savings can also be significant. According to estimates from goelectricdrive.com — the website of the Electric Drive Transportation Association (EDTA) — PEV drivers can save anywhere between 75 to 80 percent on fuel costs when using electricity over gas. Because the engine is powered by electricity, PEV owners no longer have to worry about oil changes, antifreeze, muffler replacements or tune-ups. Maintenance, according to the website olino.org, will cost about one-third what it costs to maintain a standard combustion engine over the lifetime of the vehicle. In addition, SMUD offers special rates for PEV owners if they elect to install a “time-of-use” meter, which encourages charging during off-peak hours.

And since the future is green, electric vehicles are eco-friendly. They use less gas and produce less pollutants and noxious carbon emissions. According to the Center for Sustainable Energy California, current electric vehicles in the state save approximately 350,000 gallons of petroleum every month. And less gas use equals healthier air. According to goelectricdrive.com, if a PHEV saves up to 300 gallons of petroleum each year, that reduces carbon emissions by 38 percent. PEVs release almost no air pollutants when they are operating.

Today, electric vehicles are poised to make a comeback because technology has improved their usability, durability and affordability; and, manufacturers are producing and selling the once lease-only vehicles.



PHOTO BY RYAN DONAHUE



PHOTO COURTESY OF SMUD

A Cleaner Cruise

PEV gives Sacramento driver a great feeling

BY CORRIE PELC

Sacramento resident Cathi Misquitta loves her 2011 Chevrolet Volt.

“I feel great driving it,” she adds. “And, on ‘Spare the Air’ days when I know I’m not burning any fuel, I don’t feel all that bad driving to work.”

About 14 months ago, Misquitta decided to purchase the Volt, which is a plug-in electric vehicle (PEV), meaning it has a battery on-board that can be plugged in and charged through an electrical outlet. However, the Volt also has an on-board gasoline generator, so if the battery runs out, the generator will kick in and provide electricity to the motor for an extended driving range for hundreds of miles.

Prior to purchasing the Volt, Misquitta drove a Toyota Highlander for her almost 90 mile round-trip commute to work each day, costing her about \$60 in gas a week. Now, she says she can get back and forth to work using mostly her battery — and she only needs to fill it with gas every six to seven weeks.

Misquitta likes the fact the Volt has a gas back-up, so she is not limited in her driving range. “We take the car to Lake Tahoe and the Bay Area and other places for longer

distances, and so I’m averaging 150 miles per gallon,” she says.

When she’s home, Misquitta says it’s easy to charge her Volt. Using the 240-volt rapid charger she had installed in her garage, she can charge the car’s battery from empty to full in about four hours. And when she’s on the road, she can charge it through any 120-volt outlet she finds in about eight hours.

“We take the car to Lake Tahoe and the Bay Area and other places for longer distances, and so I’m averaging 150 miles per gallon.”

— CATHI MISQUITTA, PEV OWNER

Misquitta says her Volt drives like any other car — but some of its features make it even better and easier to use. For instance, she likes how the Volt’s dashboard shows the number of miles she has left on the battery

while she’s driving. “It will show me when I’m coasting or braking that I’m regenerating power, and I like that because it means I can go a little bit longer on the battery,” she explains.

Misquitta also likes that the car will actually tell her if the way she’s driving is helping to preserve the battery’s life or hindering it. She says there’s an indicator that will tell the driver, for example, if they had not accelerated so fast, they would have used less power. “There’s more indicators on the display that will actually teach you how to drive the car as efficiently as possible, which I think is a really nice feature,” she adds.

But the best part of the Volt for Misquitta has stayed the same since she purchased it: to do her part to help the environment. “I know that fossil fuels are a finite resource — what are we going to do when we run out?” she says. “If we don’t invest in this technology now, what’s going to happen when the shortage of fossil fuels becomes more of a crisis? I’ve got kids and I want to do what I can to make this world just as comfortable for them as it has been for me.”

Rethink Your Ride

PEVs are so easy to use. Here are the top five reasons why you should rethink your ride.

1. Plug in, don’t pump:

No more inconvenient trips to the gas station — just plug in every night at home and never worry about going to the gas station again.

2. Electricity is cheaper than gasoline:

Drive an EV 40 miles in a day and pay only 8.8 cents for a kilowatt hour of electricity. That’s like paying 60 cents per gallon versus a gasoline-powered vehicle at \$4 a gallon.

3. Breathe Easier:

PEVs release almost no air pollutants while driving. Some PEVs have no internal combustion engine, while others like hybrids have an ICE and a battery. The reduced reliance on an ICE and gas means less tailpipe emissions and cleaner air.

4. Shhhh: Electric vehicles are quiet, offering a more peaceful ride.

5. Use those U.S. resources: Plug in and use U.S. resources to produce your fuel, not foreign oil.

Go Go Gadget Vehicle

BY MIKE BLOUNT

Fun features offer more value to PEV owner

The future is now. At least, it is according to Rose Leidolph of Citrus Heights when she's driving her Nissan Leaf plug-in electric vehicle. Before, Leidolph says she was driving a Nissan Altima and spending a small fortune to keep it going. With her new PEV, she saves hundreds of dollars by doing most of her driving with it.

"Financially, it just makes sense and where I used to spend around \$300 to \$400 per month on gas and maintenance, now I'm spending around \$10 after I had a [time-of-use] meter installed that charges during off-peak hours," Leidolph says.

"I really love my car. It saves me a lot of money, it's environmentally-friendly and it's just really neat."

— ROSE LEIDOLPH, PEV OWNER

But what gets her really excited is the cutting-edge technology that comes packed into her new electric vehicle. Leidolph says she was amazed at how well the car drove and how all of the features are integrated seamlessly into the easy-to-use interface.

"It's very responsive and it's all tied in to a big computer," says Leidolph.

The computer helps keep track of her driving habits and updates her frequently on her driving range and power consumption. It even lets her know where the nearest

charging stations are located. These things, she says, are extremely helpful for her as a PEV owner. There are also two modes: power and eco mode. The first one is for acceleration and the second one is for conserving battery power. Leidolph says she enjoys the level of control she gets to have as a driver.

"The first time I went to drive it in power mode, it just took off," Leidolph says recalling her surprise. "It accelerated so much faster than my first car... It really is fast."

While the ability to take off in a hurry is nice, Leidolph says she also enjoys some of the lesser-known features of her car — things that aren't immediately noticeable like the solar panel on her rear spoiler. The panel charges a 12-volt battery during the day that is responsible for turning on the interior lights and car radio.

She also gushes about the seat and steering wheel warmer she quickly got used to after purchasing the car in January. But possibly her favorite feature, she concludes, is her GPS and car radio that syncs with her cell phone via Bluetooth. She had no problems learning how to use it and she uses it almost on a daily basis.

While she admits that buying a new vehicle can cause major anxiety, Leidolph says there's absolutely no buyer's remorse. She's pleased she's doing her part to help the environment and after doing the math, she found out her car will pay for itself in just a few years.

"I really love my car," Leidolph says. "It saves me a lot of money, it's environmentally-friendly and it's just really neat."



PHOTOS BY NANA DONAHUE



Electric Fun

BY MIKE BLOUNT

Electric vehicles make going green cool. If you're looking to cruise down the highway in style, look no further than the Tesla Model S — a fully-electric sedan crafted with both luxury and saving the environment in mind. The Model S should satisfy your need for speed as it can go from 0 to 60 miles per hour in roughly 4.4 seconds. For the technology geek, it comes stocked with features like a high-definition camera for moving in reverse, xenon headlamps, turn-by-turn navigation and automatic keyless entry. Best of all, it has the longest range available on the PEV market. Equipped with an 85 kilowatt hour battery, the Model S has an average range of 265 miles. You can plan one epic road trip from Sacramento to San Francisco and back on a single charge! It's practically begging you to take it out for a joy ride.

Getting A Smoother Ride

PEV allows commuter to drive to work for a week without using gasoline

BY SUKHI BRAR

Fernando Aceves has always wanted to own a green vehicle, but for years it was not in the cards for him. He first heard about electric vehicles in the early '90s, but he decided against purchasing one due to a number of factors including high cost, small size and the questionable reliability of the vehicles available at the time because they were so new.

When Aceves and his wife started to build their family in 2005, they realized they needed to replace Aceves' full-sized truck with a more family-friendly sedan. They decided to take their first plunge into the world of green vehicles — but purchased a hybrid instead of an electric vehicle.

"We felt that the technology back then was well in place for a hybrid, we wanted to have the support of the manufacturer and dealer, and we wanted to try it out to see if it would fit our lifestyle," says Aceves.

Though Aceves started with the hybrid, he still had his eye on an electric vehicle that could charge by being plugged into the wall at home. Aceves kept up with the development of electric vehicle technology and waited to hear about any issues with the cars. He finally decided that 2012 was the year he was going to purchase a PEV and bought a Chevrolet Volt.

"I like the Volt better than my other cars. It's a great car, great ride. It is able to average 202 miles per gallon. This is way above and beyond what any hybrid can give," explains Aceves.

Aceves' daily round trip commute is 32 miles. Considering his Volt can travel up to 44 miles without using a drop of gasoline, he can commute to work for the entire week without using any gas.



PHOTO BY ANNE STOKES

"I have not filled up gas in over three months. I'm not polluting and I'm saving money. My house has become my filling station. I plug it in at night and it is ready to go in the morning," says Aceves. "I don't need to stop by the gas station anymore. If I do, it is just to grab a snack or something. This car is where the future of personal transportation is headed."

"I have not filled up gas in over three months. I'm not polluting and I'm saving money... This car is where the future of transportation is headed."

— FERNANDO ACEVES, PEV OWNER

Best of all, Aceves says, the car is fun to drive.

"It has amazing acceleration. It just takes off with no grunting and no lag. As soon as you press the pedal, you get immediate torque — even more than a regular car," he says.

Aceves loves the car so much he uses every opportunity to encourage family and friends to purchase a PEV like his. He even has people coming up to him who ask him about the car when he is out around town and he encourages them to get one.

"People don't know exactly how it works and how easy and comfortable it is," Aceves says. "I tell them about how I have zero issues, zero maintenance and a smooth ride."

Why Buy Now?

BY MIKE BLOUNT

PEVs are more affordable, safer and come with more features than ever.

Now is the time to buy with federal tax credits of up to \$7,500 and up to \$2,500 in rebates available through the California Clean Vehicle Rebate Project. These rebates can help offset the cost of a PEV and are designed to reward consumers for producing lower emissions and decreasing their use of petroleum-based fuels.

Safety first. The Nissan Leaf recently earned five stars from the National Highway Transportation Safety Administration.

PEVs offer the total package. The Chevrolet Volt was recently awarded "Car of the Year" by *Motor Trend* and *Automotive Magazine*.

It's the way of the future. The Obama administration recently invested \$2.4 billion in research and development as part of its goal to have 1 million electric vehicles on the road by the end of 2015.

Traditional Gas-powered Vehicle

Many Americans drive around 40 miles each day. If your car gets 25 miles per gallon, that means you're buying 584 gallons of gas every year. You're probably paying around \$4 per gallon for gas – that adds up to \$2,336 spent on gas every year!



25
miles per gallon

584
gallons per year

\$2,336
spent on gas every year

\$4.00
per gallon

How much does it
cost to fill up your car?

Plug-in Electric Vehicle

If you own a PEV and charge your car every night, you're consuming 3,960 kilowatt hours (kWh) of electricity each year. SMUD charges as low as 8.8 cents per kWh. That adds up to only \$348 dollars a year to keep your PEV running. That's like paying 60 cents for a gallon of gas!

30
charges per month

11
kWh per charge

8.8¢
per kWh

\$348
spent on electricity
per year



Myth Buster: Demystifying PEVs

Jeff Paull
PHOTO BY PRISCILLA GARCIA

Plenty of myths exist about PEVs: They are only capable of driving short distances and they cost as much as you would spend in gas through your energy bill. If you're trying to sort through all the information on PEVs, Jeff Paull can help. As an energy specialist at SMUD, Paull helps customers by answering any questions they may have about their new purchase when signing up for an electric vehicle rate. He also helps with high electric bills by conducting energy audits and works with people purchasing solar panels.

Won't a PEV just drive up your electric bill? How much does it really save you in the long run?

If you get 80 miles per charge out of a Nissan Leaf, and it uses 22 kilowatts hours per charge and drives 1,000 miles per month, then it would add \$24 a month to an electric bill on SMUD's EV rate. How much do you currently spend on gas? Let's say you get 25 miles per gallon. You would spend \$140 in gas to drive that same 1,000 miles. So, you are saving \$100 per month by not buying gas.

How long does the battery in a PEV last? Could you drive on a long road trip?

This is a question only necessary for people that have to rely on a single car household. People should take advantage of PEVs by just doing 90 percent of their driving with the PEV, so they can benefit from the savings

and advantages of PEVs. Save the long trips for their gas vehicle or rent a car. Also, if you purchase a plug-in hybrid such as a Volt or Prius, there are no range limitations.

PEVs are fairly new technology versus combustion engines. How safe is the technology?

I wouldn't say that this is a new technology. Did you know that electric cars took off before gas? My grandfather had a 1904 Pope Waverly PEV. Gas cars were hard to get and did not take off until 1908 with the Ford Model T. And

"... How many people can fill up their gas vehicle from an endless, cheap filling station in their garage?"

— JEFF PAULL, SMUD ENERGY SPECIALIST

still, many favored PEVs because they did not require a dangerous hand crank to start or require messy gas filling. It wasn't until 1912 when electric starters for gas engines were used and gas infrastructure was readily available.

What happens if you run out of power?

[The] same thing that happens if you don't fill up your gas car with enough gas. Plug-in hybrids such as the Volt

and Prius can easily be recharged off a simple 110 volt electrical outlet. No additional charging station is necessary.

Can you recharge a PEV anywhere?

The benefit of a little planning is inexpensive fuel. People want to think of PEV fuel like they do fuel for a gas vehicle and want charging stations everywhere. Instead of trying to make electric cars the same in every way to gas cars, people should embrace the differences. The truth is, how many people can fill up their gas vehicle from an endless, cheap filling station in their garage? And, if you could fill up in your own garage for 60 cents per gallon, wouldn't you try to fill up at home all the time? Wouldn't it be nice to simply plug in before walking into your own home? Does avoiding gas stations sound nice?



From An Electrician's Point Of View ...

Phil Haupt and his wife Becky own Phil Haupt Electric. The company has been doing commercial and residential electrical service work for 28 years, including installing electric vehicle supply equipment (EVSE) in homes for electric vehicles.

Can you install a charging station yourself or do you need a professional to do it?

I would not recommend [self-installation]. Charging stations may require a certified electrician to install them or your warranty could become limited. Besides that, it's high voltage. It's not like wiring speaker cables for your surround sound system. It is a lethal voltage and there's a big difference between the two.

Do you need any permits or certification before you can install a charging station?

An EVSE permit is required from the city to install an [EVSE] and the electrician would pull the permit at the request of the homeowner. You would need to make

"As Chevy Volt owners ourselves, we love our car."

— PHIL HAUPT, CO-OWNER OF PHIL HAUPT ELECTRIC

sure the electrician is already familiar with installing electric charging stations. They need to be mounted at a certain height.

[Electricians] doing the work would need to be familiar with the National Electrical Code.

Will you have to change anything with my current electrical setup before installing a charging station?

If your current electrical service is unable to support the additional load, then you would need to upgrade your electrical panel. That doesn't happen very often. Out of the 100 residential installations of electric charging stations we've done, we've never encountered it. You would mostly run into that [situation] in older residential neighborhoods.

Do you receive any credits or rebates from SMUD for installing a charging station?

SMUD will give you special rates if you install an additional meter called a "time-of-use" meter. It encourages you to charge at night, during off-peak hours.

Are you seeing an increase in people purchasing PEVs and installing charging stations in their homes?

As Chevy Volt owners ourselves, we love our car. With the way we drive, we're averaging 215 miles per gallon after 8,000 miles of driving. If you're interested in purchasing an electric vehicle, you should definitely look into it. We're installing commercial charging stations regularly all across Northern California.

Where to go to get more information...

In addition to saving you money on fueling costs, PEVs have a positive impact on the environment by curtailing dependence on oil and cutting down on carbon emissions released into the atmosphere. SMUD remains committed to providing customers like you information to help you decide if a PEV is right for you.

SMUD Electric Vehicle Energy Rates

To find more information on PEVs and SMUD electric vehicle energy rates, visit smud.org/pev.



General Information on Electric Vehicles

For additional information on clean emissions and the benefits of purchasing a PEV, visit goelectricdrive.com.



Compare various plug-in vehicle models and pricing at greencar.com.



Clean Transportation Campaigns

For information on California's Clean Cars Campaign, visit calcleancars.org.



CALSTART is an organization dedicated to expanding and supporting clean transportation. Find out more about them at calstart.org.



Clean Energy Transportation Technology

To read more about the technology a plug-in electric vehicle's battery is based on, visit energycs.com.



Compare alternative fuels and vehicles at afdc.energy.gov.



Electric Charging Stations

Find locations of public charging stations for your PEV, plan trips, share photos and stay connected, visit recargo.com.



Federal and State Tax Rebates and Incentives

Find out how to qualify for tax incentives and rebates for purchasing a plug-in electric vehicle at fuelconomy.gov/feg/taxevb.shtml.



For information on California tax rebates and incentives, visit pluginamerica.com.



Environmental Preservation

For information on the California Environmental Protection Agency Air Resource Board, visit arb.ca.gov.



Find out about preserving the air quality in Sacramento at airquality.org.

