FUEL COSTS: PEV VS. GASOLINE CARS?

CALIFORNIA PLUG-IN ELECTRIC VEHICLE COLLABORATIVE

Driving on electricity is usually much cheaper than using gasoline. Plug-in drivers have the additional benefits of more stable electric prices and the convenience of fueling at home or in the community.

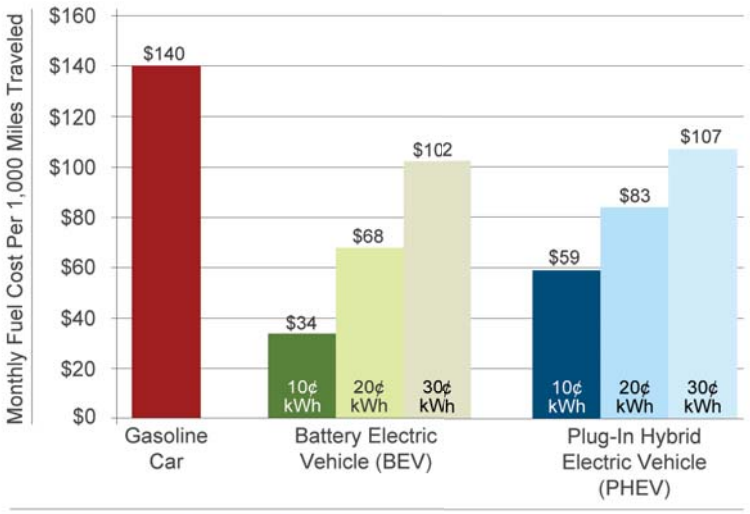
KEY MESSAGES

Driving on Electricity Can Be Cheaper. $0.10 per kilowatt hour (kWh) is the equivalent of driving on gasoline that costs less than $1 per gallon!

- Plug-in Electric Vehicle (PEV) drivers may find residential time-of-use (TOU) rates worth considering. On a TOU rate, household electricity costs/kWh vary according to the time of day electricity is used.

Electricity Prices Are More Stable Than Oil Prices. Electricity is typically generated from diverse, domestic sources, and its price is more stable. Oil prices fluctuate widely, and are highly influenced by world events.

DRIVING ON ELECTRICITY CAN BE CHEAPER

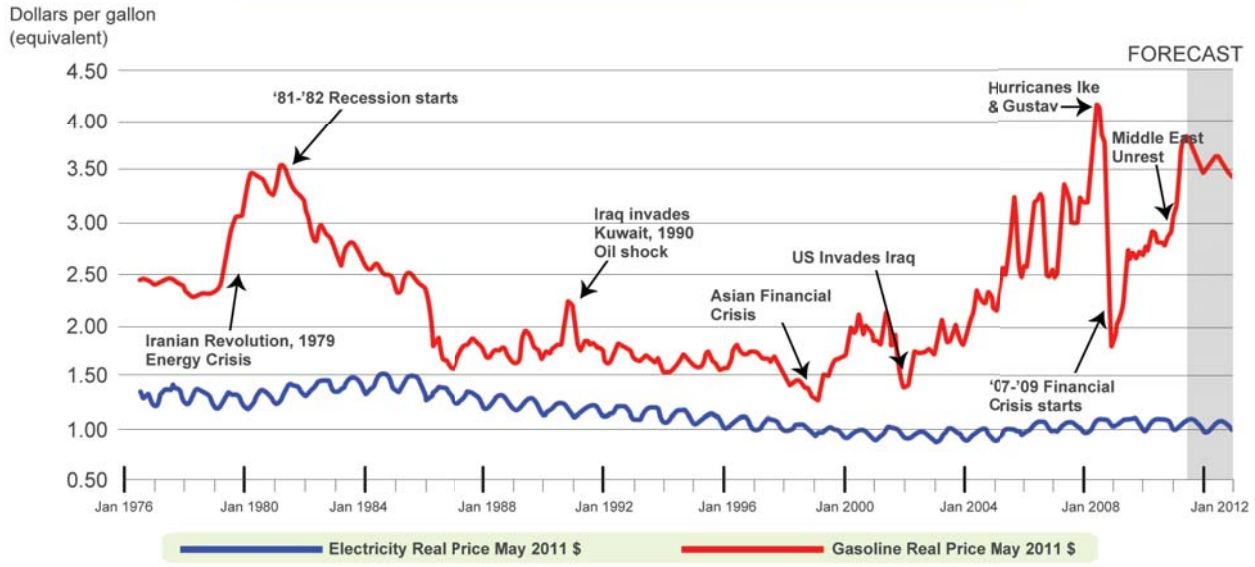


Source: California PEV Collaborative (CG4-1).

Assumptions

Gasoline Passenger Car, Average New Car, California 2010: 26 miles per gallon (MPG).
Battery Electric Vehicle (BEV): Example - 0.34 kWh/mile, fueled only by electricity; vehicle efficiency varies by model.
Plug-in Hybrid Electric Vehicle (PHEV): Example - 0.36 kWh/mile; 35 mile electric range; 37 MPG; vehicle efficiency varies by model. PHEV drives 2/3 miles on electric fuel, 1/3 miles on Premium gasoline fuel.
California Retail Gasoline Prices: $3.635 / gallon Regular; $3.849/ gallon Premium, January 2012. *(See Additional Data and Sources)*

ELECTRICITY PRICES ARE MORE STABLE THAN OIL PRICES

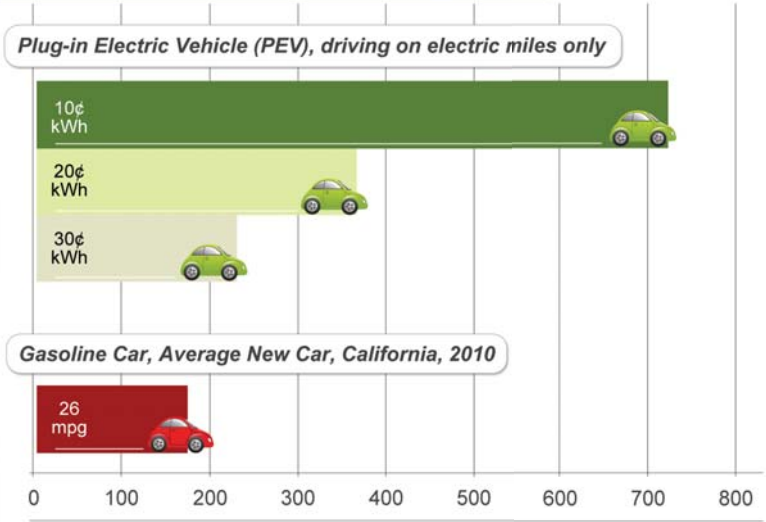


Source: California PEV Collaborative (CG4-2). Data compiled, converted, and presented by the Edison Electric Institute. Source: Energy Information Administration, Short-Term Energy Outlook, May 2011. Note: Based on a plug-in electric vehicle with an efficiency of 3.4 miles per kWh (like the Nissan LEAF™) and an internal combustion engine vehicle with a 30 mpg rating.

FUELING UP ON ELECTRICITY

- **How much it costs to "fill-up" depends on the battery's state of charge and battery size.**
  - For a PEV with an EPA-rated efficiency of 0.34 kWh per mile (similar to a Nissan LEAF™), at $0.10 per kWh it will cost ~ $2.50 - $2.65 to drive 70 - 75 electric miles.
- **Most PEVs can be programmed to charge when electricity rates are lowest.**
- **Utility rates continue to evolve with new metering and rate options for PEV households expected over the next few years.**
- **To keep fuel costs low, contact utilities to learn about choices in electricity rate options. Start thinking about kWh instead of MPG!**

HOW FAR CAN YOU DRIVE ON $25?



Miles Driven:
Plug-in Electric Vehicle, driving on electric miles only vs. Average New California Light-duty Car, 2010

Source: California PEV Collaborative (CG4-3).

Assumptions

Gasoline Passenger Car, Average New Car, California 2010: 26 miles per gallon (MPG).
Plug-in Electric Vehicle (PEV): Examples - Battery Electric Vehicle (BEV) or Plug-in Hybrid Electric Vehicle (PHEV) traveling only on electric miles, with 0.34 kWh/ mile fuel economy; vehicle efficiency varies by model.
California Retail Gasoline Prices: $3.635 / gallon Regular, January 2012.
(See Additional Data and Sources).

ELECTRICITY 101

- California policies regarding electricity rates are designed to encourage conservation and energy efficiency.
- There are more than 50 utilities in California with varied electricity rate structures. In general, residential rates fall into three categories:

Tiered or block rate

The more electricity used, the more likely the household will move into a higher cost tier for the incremental electricity used. These rates are designed to encourage conservation. There is no difference in cost based on time of day.

Flat rate

The same price per kilowatt-hour is charged, regardless of how much is used or when it is used.

Time-of-Use (TOU) rate

This rate rewards customers who use electricity when it is cheapest for utilities to produce – generally, at night (also known as an off-peak rate); however it is coupled with higher daytime on-peak charges. Most drivers can get lower PEV TOU rates.

Source: California PEV Collaborative (CG4-4)

CHOOSING THE RIGHT ELECTRICITY RATE – ASK YOUR UTILITY FOR ADVICE

Rate Options Available to California PEV Drivers

Rate	Definitions and Benefits	Considerations
Tiered Rate	Typical residential rate structure offered by investor-owned utilities and some municipal utilities. In general there is a monthly baseline of kWh at a fixed rate ($/kWh). Anything above the baseline usage has a higher cost per kWh, for each tier. Benefits PEV drivers when (i) current electricity bill is fairly low, or (ii) energy efficiency measures or solar panels are installed at a home.	Adding PEV charging to the household load has the potential to shift a household into a higher tier, with higher costs per kWh, raising the average per kWh cost for household electric usage. Utilities offer Whole House Time-of-Use (TOU) and PEV- only TOU rates that may help drivers alleviate these concerns. Investing in home energy efficiency improvements can help PEV owners keep from moving into a higher-priced tier.
Flat Rate per kWh	Typical residential rate structure offered by some utilities. Benefits PEV drivers if the flat rate is relatively low.	Some utilities may offer discounts for PEV off-peak charging, or a lower off-peak PEV Time-of-Use Rate. PEV drivers may wish to inquire whether there is a lower off-peak rate, and whether there is a cost to the PEV driver to switch to that rate.
Whole House Time-of- Use (TOU) Rate	Single meter and same rate structure for whole house, including PEV. Rates vary by time of day. Benefits PEV drivers when most or all electricity usage is off-peak; i.e., family members are not at home during the day.	Lower off-peak rates at night, when PEV drivers typically charge up, could offer significant benefits. However, day-time costs per kWh for all household electric loads are significantly higher than day-time tiered or flat rates. Factors to consider when evaluating Whole House TOU rates include (i) how much day-time PEV charging will be needed, and (ii) whether family members are home during the day, adding much day-time household electric load.
PEV Time-of-Use (TOU) Rate	Separate rate and meter for PEV charging. Rates vary by time of day. Benefits PEV drivers when most PEV charging is likely to occur at night, when lower off-peak rates are offered. If current electricity usage is in a higher tier, or PEV charging could shift household into a higher tier, this rate structure may benefit PEV drivers.	Lower night-time off-peak PEV electricity rates will benefit PEV drivers, but it is important to determine whether there is a cost to the PEV driver to install a separate meter and/or service, or other equipment needed to take advantage of the low off-peak charging rate. Day-time cost per kWh for PEV charging on a PEV TOU rate is significantly higher than day-time tiered or flat rates.

Source: California PEV Collaborative (CG4-5)

RESOURCES

- Los Angeles Department of Water and Power (LADWP)
  www.ladwp.com/ladwp/cms/ladwp000801.jsp
- Pacific Gas and Electric Company (PG&E)
  www.pge.com/electricvehicles/
- Sacramento Municipal Utility District (SMUD)
  www.smud.org/en/residential/environment/plug-in-electric-vehicles/
- San Diego Gas & Electric (SDG&E)
  www.sdge.com/ev
- Southern California Edison (SCE)
  www.sce.com/info/electric-car/residential/residential.htm

- California Energy Commission
  www.energy.ca.gov/drive/index.html
- California PEV Resource Center
  www.DriveClean.ca.gov/PEV
- Electric Drive Transportation Association (EDTA)
  www.GoElectricDrive.com
- U.S. Department of Energy, Energy Efficiency & Renewable Energy, Alternative Fuels & Advanced Data Center
  www.afdc.energy.gov/afdc/vehicles/electric.html
- U.S. Department of Energy and U.S. Environmental Protection Agency
  www.fueleconomy.gov/
- U.S. Energy Information Administration: Weekly Retail Gasoline and Diesel Prices
  www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_w.htm

ADDITIONAL DATA AND SOURCES

- Formula for equivalency of $0.10 electricity rate to less than $1/gallon gasoline:
  Gasoline car @ 26 mpg x BEV @ 0.34 kWh/mi (example: EPA-rated efficiency for Nissan LEAF ™) x $0.1/kWh = $0.88 /gallon of gasoline equivalency.
- Gasoline Car: 26 Miles per Gallon (MPG) assumption reflects data from the California Air Resources Board regarding the fuel economy of the average new California light-duty passenger car for Model Year 2010; this data is equivalent to the United States E.P.A. trends report (www.epa.gov/otaq/fetrends.htm) for the national fleet.
- Battery Electric Vehicle (BEV) and Plug-in Hybrid Electric Vehicle (PHEV) fuel economy assumptions used in graphs reflect real-world experience for BEVs (similar to a Nissan LEAF™) and PHEVs (similar to a Chevy Volt) as cited in U.S. Department of Energy, Energy Efficiency & Renewable Energy, Alternative Fuels and Advanced Data Center website www.afdc.energy.gov/afdc/vehicles/electric.html, and U.S. Department of Energy and U.S. Environmental Protection Agency, www.fueleconomy.gov
- Driving proportions (electric vs. gasoline miles) used in graphs for a Plug-in Hybrid Electric Vehicle (similar to a Chevy Volt) reflect statements made by General Motors representatives at conferences (e.g., Plug-in 2011, Raleigh, North Carolina, July 2011) and at public hearings before the California Air Resources Board in January, 2012 to consider adoption of the 2012 Amendments to the California Zero Emission Vehicle Regulation.
- California retail gasoline prices: Regular gasoline (Reformulated areas) is $3.635/gallon; Premium gasoline (Reformulated areas) is $3.849/gallon. Plug-in Hybrid Electric Vehicle uses Premium gasoline. Gasoline car uses Regular gasoline. Source: Weekly Retail Gasoline and Diesel Prices, for California, week of 1/2/12, U.S. Energy Information Administration.