

Benefits of Plug-In Electric Vehicles

Plug-in electric vehicles (PEVs) are fun to drive, have little to zero tailpipe emissions and can be powered with clean, affordable, domestic electricity. There are currently over 510,000 clean PEVs on American roads today, with the market ready to expand.¹ Given the top benefits for PEVs as listed below, it's no doubt that consumers want more of these clean vehicles today.

These benefits accrue to all citizens, regardless of who may purchase the car or the type of PEV purchased. PEVs include battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The BEVs are charged by electricity from the local grid, while PHEVs drive on electricity from the local grid first, then on gasoline for longer trips. Plug In America's mission is to promote the accelerated adoption of PEVs across the United States in order to achieve these benefits for all.

For the Driver...

1. **PEVs are fun to drive.** They are smooth and quiet, making for a more pleasant drive with less fatigue on vehicle occupants. The most notable feature of PEVs is their instant torque, delivering immediate acceleration the moment the driver steps on the pedal. Thanks to their low center of gravity, PEVs can offer greater stability and traction in difficult conditions such as snow and high winds.
2. **PEVs are convenient.** There's no trip to the gas station needed, and the battery can be charged overnight and be ready to go first thing in the morning.
3. **PEVs are cheaper to maintain.** Maintenance for PEVs costs much less than for gasoline vehicles. PHEVs require fewer oil changes, while BEVs require none. BEVs also have 10 times fewer moving parts than gasoline vehicles; there's no engine, transmission, spark plugs, valves, fuel tank, tailpipe, distributor, starter, clutch, muffler, or catalytic converter.
4. **PEVs are cheaper to fuel than gas-powered vehicles.** On average, fueling a car with electricity is roughly the same as gas at \$1 per gallon, thanks to a PEV's performance efficiency and the lower cost of electricity.² Electricity prices are also far more stable than gasoline prices, allowing drivers to avoid the risk of future price spikes.



A future PEV driver enjoys a Kia Sol PEV.


For the Policy Maker...

1. **PEVs are more cost-effective than gas-powered vehicles.** more than \$3,500 saved over its lifetime if gas prices fall to a low of \$2.50 per gallon. If gas prices go back up to a more typical

¹ Vehicle count based on HybridCars.com count of U.S. sales of 512,174 plug-in vehicles (BEVs, PHEVs) from December 2010 through the end of September 2016.

² <http://energy.gov/eere/everywhere/ev-everywhere-saving-fuel-and-vehicle-costs>

recent price of \$3.50 per gallon, the average electric vehicle will save its owner nearly \$9,000 over the vehicle's lifetime.³

2. **PEVs are significantly better for the local economy.** PEVs are fueled from electricity from the local grid, which is cheaper for all consumers. Money not spent on gas or on maintenance can be invested back into the local economy.⁴ 
3. **PEVs produce little to zero dangerous tailpipe air pollution, improving air quality and reducing health care costs.** Despite continued improvement, too many people in the U.S. live where the air is unhealthy for them to breathe.⁵ BEVs have no tailpipe and therefore no tailpipe emissions, while PHEVs produce far fewer tailpipe emissions than a standard gasoline-powered vehicle. With more PEVs on the roads, public and private health care costs can be greatly reduced.
4. **PEVs significantly reduce carbon emissions.** PEVs powered by electricity from the local grid currently produce 54 percent less (lifetime) carbon pollution than gasoline cars, which could grow to 71 percent by 2050 as our power supply gets cleaner.⁶ Using renewable energy to charge a PEV reduces the carbon emissions from the PEVs close to zero. PEVs also have the lowest total lifecycle carbon footprints for all light-duty vehicles on the road.⁷
 - The transportation sector in the U.S. is responsible for nearly a third of our nation's carbon pollution, with cars and light-duty trucks accounting for nearly 20% of the carbon emissions. A recent study found that widespread vehicle electrification across the country could reduce greenhouse gas emissions by between 430 million metric tons and 550 million metric tons annually by 2050.⁸
5. **PEVs help achieve national security.** These clean vehicles reduce our dependence on oil and imported fossil fuels as they are fueled by electricity, which can be domestically produced from multiple resources, including renewable resources.
6. **The PEV market is creating good American jobs.** The U.S. is manufacturing PEVs and other advanced technology vehicles and components in at least 20 states, creating thousands of new, good jobs.⁹
7. **With little to zero tailpipe byproduct and no oil leakage on to roadways, PEVs reduce the public and private sector costs spent on mitigating the pollution from roadway runoff.** The polluted



³ The analysis was performed by Environment California in the report, "Drive Clean and Save: Electric Vehicles are a Good Deal for California Consumers and the Environment." However, similar incentives are already in place in dozens of other states across the country, and gas prices are similar in dozens of other states as well, suggesting a similar result in savings for other states. The report is available here: <http://www.environmentcalifornia.org/sites/environment/files/reports/Drive%20Clean%20and%20Save%20June%202016.pdf>

⁴ Roland-Holst, David. 2012. Plug-in Electric Vehicle Deployment in California: An Economic Assessment https://are.berkeley.edu/~dwrh/CERES_Web/Docs/ETC_PEV_RH_Final120920.pdf and Stroo, Hans. 2015. Bills to Advance Electric Vehicles Make Good Economic and Environmental Sense <http://planwashington.org/blog/archive/bills-to-advance-electric-vehicles-make-good-economic-and-environmental-sense/>

⁵ <http://www.lung.org/our-initiatives/healthy-air/sota/key-findings/>

⁶ <https://www.nrdc.org/experts/luke-tonachel/study-electric-vehicles-can-dramatically-reduce-carbon-pollution>

⁷ <http://carboncounter.com/>

⁸ <https://www.nrdc.org/media/2015/150917>

⁹ <http://sierraclub.typepad.com/compass/2012/06/fuel-economy-jobs.html>

runoff from highways is nonpoint source pollution, and can significantly impact local surface and ground water quality as well as aquatic habitat. BEVs are cleaner than gas-powered vehicles and have no oil leakage or drips of pollution from the tailpipe.

8. **PEVs have bipartisan support.** Both Republicans and Democrats have supported PEV policies across the nation.

For Utilities and Grid Operators...¹⁰

1. **Investment in PEVs and the charging infrastructure can result in more off-peak energy sold, and therefore reduced rates for ratepayers.** Additional load from PEVs can make more efficient use of existing utility assets, which – especially through off-peak charging – puts downward pressure on electricity rates.¹¹
2. **PEVs can be a source of potential load control.** Many PEV owners are open to load control programs, such as letting the utility or a third party turn PEV charging on and off as needed, as long as it does not prevent the charge from finishing by a specified time.¹² Going a step farther than load control is pulling energy from idle PEVs at peak load times via “vehicle-to-grid” (V2G).
3. **PEVs can make the integration of renewables easier.** PEV loads are generally during low demand times (and can be moved around with TOU rates and other tools), making it easier to justify the addition of renewable power sources that cannot be ramped.¹³

About Plug In America

Plug In America is the nation’s leading independent consumer voice for accelerating the use of plug-in electric vehicles in the United States to consumers, policymakers, auto manufacturers and others. Formed as a non-profit in 2008, Plug In America provides practical, objective information collected from our coalition of plug-in vehicle drivers, through public outreach and education, policy work and a range of technical advisory services. Our expertise represents the world’s deepest pool of experience of driving and living with plug-in vehicles. The organization conceived National Drive Electric Week and has advanced workplace charging by pioneering ride-and-drive events at such leading corporations as Google, Mattel and Paramount Pictures. We drive electric. You can too.
www.pluginamerica.org

¹⁰ For a comprehensive report on the PEV potential and challenges for utilities, see the Plug In America report for CalETC, “Evaluating Methods to Encourage Plug-in Electric Vehicle Adoption.” October 2016. Available here: <https://pluginamerica.org/wp-content/uploads/2016/11/PEV-Incentive-Review-October-2016.pdf>

¹¹ Available here: <https://pluginamerica.org/wp-content/uploads/2016/11/PEV-Incentive-Review-October-2016.pdf>

¹² Tal, Gil. 2016. Plug-In Electric Vehicle Multi-State Market and Charging Survey
<http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=00000003002007495>

¹³ (INL) Anonymous, Idaho National Laboratory. 2013. How do PEV owners respond to time-of-use rates while charging EV project vehicles
<http://avt.inel.gov/pdf/EVProj/125348-714937.pev-driver.pdf> and (INL) Anonymous, Idaho National Laboratory. 2015 (a). Residential Charging Behavior in Response to Utility Experimental Rates in San Diego
<http://avt.inel.gov/pdf/EVProj/ResChargingBehaviorInResponseToExperimentalRates.pdf>

