

My Plug-in Hybrid Experience

By Dave Kuzara

First, the basics:

For anyone considering if and when to switch to an electric car, one option is buying a plug-in hybrid instead of a full electric vehicle (EV). Plug-in hybrids (called Plug-in Hybrid Electric Vehicles or PHEVs) have both a gas engine and an electric motor like standard hybrid cars. But they have larger battery packs than hybrids which allow them to travel a certain range on electric power only. When the battery gets low, they automatically (and imperceptibly) switch to running on the gas engine. In addition to a gas fill-up port, they also have an electric recharging port. Most can be recharged from either a standard 110V electric outlet or from an electric charging station for a faster recharge.

The main advantage of a PHEV over a gas-only car is that, if you travel less than the electric-only range between recharges, you're using only electricity – the same as if you owned an EV – and reducing your carbon footprint. The main advantage of a PHEV over an EV is that, if you travel more than the electric-only range between recharges, the car switches seamlessly to using gas, so there's no range anxiety or searching for a recharging station. PHEVs, however, typically have only 25 to 35 miles of all-electric range, while EVs have an electric range of 100 to 300 miles. Also, PHEVs do need to be plugged into an outlet or recharger when not being used, like an EV, to maintain their charge state. Finally, PHEVs tend to cost more to purchase than an equivalent gas-only or hybrid car but less than an equivalent EV. (They do qualify for state rebates and federal tax deductions, however, just like an EV – which mitigates some of the price premium.)

Whether a PHEV makes sense for you depends completely on your driving patterns. If you routinely drive more than the electric-only range between recharges, you'll still be using a lot of gas and won't be reducing your carbon footprint by much. If you don't mind finding and using recharge stations for longer trips (or if you have a second gas-only car to use for long trips) then you'd probably be better off buying an EV (if you can afford it) to maximize your carbon footprint reduction. If, however, you have a short commute to work, or just tend to drive a small distance each day, then buying a PHEV could make sense for you. You can get the advantages of an EV with a lower purchase price, no range anxiety, and still have a significant reduction in carbon footprint.

Now, for my personal experience:

I bought a Toyota Prius Prime PHEV in July of 2019 which has a 25 mile electric-only range. I was commuting 12 miles each way to work so, theoretically, I could go back and forth to work on electricity only. In practice, however, running the heater or air conditioner somewhat reduces the electric-only range. But my company had free recharging stations that I could plug into. This was great since, not only could I do all my driving on electricity, but I was getting half of it

for free. Whenever I got home, I would plug my car into a standard 110V outlet using the Toyota-supplied cable. The car takes ~8 hours to fully recharge using 110V which means it always fully recharges overnight. It's also possible to recharge the car in ~3.5 hours using a level 2 recharger which can be installed in a home on a 220V circuit. I didn't often drive my car multiple times a day, so I opted not to pay to have this type of recharger installed. I found it very easy to get into the habit of plugging in the recharge cable whenever I parked the car at home. In 2020 the pandemic hit, and I started working exclusively from home. This meant that I no longer had access to a free recharger – but I no longer had a daily commute, either. At the end of 2021 I retired, which meant I did a bit more driving around town. In July of 2022, we bought a new Kia Sorento PHEV for my wife, Anne. This car has a 32 mile electric-only range. She also has been charging it from a standard 110V outlet in the garage. Anne is retired but works 3 to 5 days a week as a substitute teacher in Lowell, the next town over.

In July, we started keeping detailed records for both cars of how much gas we used, what we paid for it, and how far we had driven. I put this data into a spreadsheet and was able to figure out how many miles we drove on gas vs. electricity for each car. For the Prius, I calculated that we drove 32% of the time on electricity, resulting in a net savings of 40 gallons of gas or 790 pounds of CO₂. For the Sorento, we drove 36% of the time on electricity, resulting in a net savings of 43 gallons of gas or 842 pounds of CO₂. We subscribe to a community solar provider so most of our electricity comes from a solar farm – making the gas savings a true reduction in carbon output. The percentages are fairly low because we took 3 long distance trips over the summer where the car ran solely on gas – 2 trips in the Prius and 1 in the Sorento. When I look at the month of September, during which we didn't take any long trips, I see that we drove the Prius 65% of its miles on electricity. Due to the high cost of electricity in the Northeast (I'm currently paying 33¢/kWhr), we don't save much money by driving on electricity. At a gas cost of \$4.00/gallon (our average over the last 6 months) the Prius costs 8.0¢/mile on gas and 9.7¢/mile on electricity. The Sorento (which is bigger and gets 31 miles/gal versus 50 miles/gal for the Prius) costs 12.9¢/mile on gas and 9.7¢/mile on electricity. In other parts of the country, where the average electricity price is 13¢/kWhr, the savings for driving on electricity would be much greater.

In conclusion, Anne and I have had a great experience with our PHEVs. When we're not taking long trips, we fill up at the gas station about once a month, which means we don't feel anxious when gas prices rise. Plugging and unplugging the recharging cord becomes routine after a while and doesn't feel like a burden. My next car will probably be an EV but, at this moment, the nationwide charging infrastructure does not seem robust enough for worry-free long distance driving. So, the PHEV option allows us to reduce our transportation carbon footprint without significantly changing our driving habits – a win for everyone.