

Toyota Prius Conversion to Plug-In Hybrid Electric Vehicle (PHEV) Technology



Environmental Impact

A Hymotion plug-in charged from grid electricity of the average national blend results in a 70% or greater reduction in CO₂ emissions compared to a traditional gas-powered vehicle.

If the L5 battery is charged from electricity generated entirely by coal-fired power plants, there is still a net CO₂ emissions reduction of at least 50%.

As our national blend of electricity generation progresses towards greener generation sources, such as solar and wind, the environmental benefits of Hymotion plug-in hybrids will continue to grow.

The L5 battery is also environmentally friendly and recyclable, containing no heavy metals or toxic chemicals.



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Petroleum reduction

Hymotion plug-in hybrid vehicles reduce oil consumption by up to 70% over conventional, gas powered vehicles.

Upgrading to a Hymotion plug-in hybrid will result in a significant reduction in petroleum consumption on an individual vehicle basis.

With widespread adoption, Hymotion plug-in hybrids present the potential to reduce national oil consumption while using today's existing infrastructure – the grid.

The Set America Free coalition, an advocacy group focused on energy independence and GHG reduction points out that "if all cars on the road are hybrids and half are plug-in hybrid vehicles, U.S. oil imports would drop by 8 million barrels per day."



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National Security

Widespread adoption of Hymotion plug-in hybrid technology can help reduce our dependence on foreign oil.

Hymotion plug-in hybrids enable us to reduce our consumption of foreign-sourced petroleum and allow us to rely more on electricity generated at home using our current infrastructure.

Plug-in hybrid technology can also help us take advantage of off-peak electricity generation by charging vehicles overnight when electricity demand is low.

Moving towards a more electric vehicle platform allows us to work towards vehicle-to-grid technologies and a more redundant and fault tolerant grid.



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Hymotion FAQ's

- Regular gas powered cars are driven entirely by a gasoline engine.
- Hybrid electric vehicles (HEVs) have a gasoline engine that is assisted by a battery-powered electric motor. The battery in a hybrid is charged by recapturing energy from braking and deceleration.
- Hymotion™ plug-in hybrids (PHEVs) have a gasoline engine and an electric motor that runs off a high capacity A123Systems Nanophosphate™ battery that is charged from an external source. When the A123Systems battery is fully depleted, a Hymotion plug-in then behaves like a regular hybrid until you charge it again. PHEVs use more electric power generated from the battery and therefore much less gasoline for the same driving pattern.



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How is a Hymotion plug-in hybrid different than a regular hybrid?

Hybrid electric vehicles (HEVs) have a gasoline engine that is assisted by a battery-powered electric motor. The battery in a hybrid is charged by recapturing energy from braking and deceleration.

In a Hymotion plug-in hybrid (PHEV) our L5 PCM battery is added to the HEV system. The L5 PCM is charged only from an external source – by plugging in. The L5 PCM supplements the electrical storage capability of the original HEV battery.

After converting your hybrid into a Hymotion PHEV, when you plug in your car, you are charging only the newly installed L5 PCM. The L5 PCM drains while you drive, assisting the gas engine, often times replacing engine use entirely.

Hymotion plug-in hybrids use more electric power from the L5 PCM for driving and therefore consume less gasoline. After the L5 PCM is fully depleted, the Hymotion PHEV behaves like the original factory HEV until you charge the L5 PCM again by plugging it in.



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What is the driving range on a single charge once a hybrid has been converted with your L5?

Under typical driving and road conditions the L5 PCM will provide electrical driving assistance for 30-40 miles from a single charge. Over those 30 – 40 miles you may see fuel economy of up to 100 mpg in either the city or on the highway, depending greatly on your driving style, terrain and road conditions.

What happens after that 30 – 40 miles when the L5 needs recharging? Can I get stranded?

Once the L5 PCM's electrical energy is depleted, your car reverts to its original hybrid mode of operation using the vehicle's factory battery and engine to drive the car. When you get a chance you can recharge the L5 PCM.



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How is a Hymotion plug-in hybrid different than a regular hybrid?

How long will it take for me to recharge my car?

The L5 PCM will take approximately 5 hours to recharge on a standard 120V household outlet.

What is the cost to recharge my car if the batteries are fully depleted?

This will depend upon your local electricity pricing and delivery charges and whether or not you have variable metering. On average across the U.S., the L5 PCM will cost about \$0.50 for a full charge. For example, if in your area, the cost per kilowatt hour is \$0.10, then it will cost around \$0.50 to fully charge the ~ 5 kWh pack.

Does the L5 take regenerative charge?

No. The L5 PCM is charged only by plugging in to an outlet. The L5 PCM is not charged by braking, going downhill, or by the gasoline engine.

Can I charge the L5 with other options besides 120V?

The L5 PCM is designed to be charged from a 120V outlet only. Charging by other means may be unsafe and may void the [warranty](#) on the L5.



Hydrogen Fuel Cell Project

- Cogeneration
- 1.4 MW power
- Decrease GHG's by 3800 tons annually



Representative Installations

