

Plug-In Hybrids

As vehicle manufacturers have begun to invest massive resources into the hybrid area electrical drive components have emerged as the major new vehicle power train for vehicles. At the same time different technical approaches and technologies are being offered by different manufacturers which reflects the competitive nature of the auto industry.

One technical variation of the hybrid has emerged called the "plug-in hybrid" or Plug-in Hybrid Electric Vehicle (PHEV). This type of hybrid has a larger battery, is recharged principally by plugging the vehicle into the electrical grid, and can travel in an all-electric mode for up to 70 kilometres before the on-board engine activates to power the vehicle.

Major announcements have been made by auto manufacturers that will start to bring this technology into the consumer market in the 2010 – 2012 period. As well, plug-in technology is now being tested in other vehicle platforms such as commercial vans like the Dodge Sprinter (pdf) and school buses.

In March 2008 the California Air Resources Board decided to change its zero emission mandate rules. The new rules will have a major impact on accelerating the introduction of plug-in hybrids in the market. CARB ruled that automakers will only need to produce 7,500 zero-emissions vehicles by 2014 but will compensate for the reduction in ZEV requirements by being required to sell 58,000 plug-in hybrids in the same period.

Plug-in Performance

Google, the web company, established a demonstration project which compares the actual performance of plug-in vs. non-plug-in models. The RechargeIT project findings show a significant improvement in MPG performance of the plug-in hybrids.

Toyota

Toyota has announced that it will be releasing a fleet of Prius plug-in vehicles for fleet demonstration in 2010. This particular design would travel about 15 Km on a single recharge. Toyota has not announced any production plans for a plug-in Prius.

General Motors

GM has made a major commitment to a new technology platform called E-Flex. This platform allows for a high level of vehicle design flexibility and is being used first in the new hybrid concept Chevrolet Volt. This vehicle is the first of a new generation of plug-in hybrids.

Hybrids, such as the Chevrolet Malibu, are parallel hybrids, meaning they have a small electric motor that moves the car when it is going slowly, but when the vehicle speeds up a gasoline motor activates sending power via a transmission to the wheels. The Volt is different. Its design could better be described as an all-electric vehicle with an on-board small engine generator. The engine is not mechanically connected to the wheels and only operates when the battery needs to be regenerated. GM estimates that the vehicle's range on a single charge will be about 70 Km. Due to the vehicle having a conventional fuel tank the driving range is not constrained by the battery capacity.

Watch a video of the Volt.

A key part of this vehicle is the battery pack. The Volt will use lithium-ion technology vs. current hybrids which use nickel-metal hydride, which carry much less energy per unit weight. A123 Systems is the company supplying the new batteries to GM.

Ford

In July 2007 Ford and Southern California Edison announced a demonstration partnership which has resulted in 20 Ford Escape plug-in hybrids operating in southern California. This vehicle uses a large battery with a conventional gasoline engine. In March 2008 Ford announced that it was extending its demonstration program to the US North East states to evaluate the technology under different operating conditions. Ford has not announced any production plans for the product.

Watch a video of the Ford Escape Plug-in Hybrid on the streets of LA.

Watch an interview with Ford's Chief Engineer talking about this vehicle.

Ford has also pushed the technological boundaries releasing its showcase Edge model fuel cell hybrid electric plug-in that uses hydrogen to provide power when the lithium ion battery can no longer do so.

A video of the Ford Edge fuel cell hybrid electric plug-in.

Daimler Benz

Daimler recently showcased a concept plug-in hybrid of its Smart Car. This vehicle is already very fuel efficient and a plug-in feature would easily allow this vehicle to achieve 100 MPG in typical driving cycles. Daimler has not announced any plans to bring this vehicle configuration to the market.

Volvo

Volvo, which has not announced any plans to enter the conventional hybrid market, has released video of its ReCharge plug-in concept vehicle which is similar in technical concept to the Chevrolet Volt. Information from Sweden indicates that Volvo is working with SAAB to place ten demonstration plug-in hybrids on the road in 2009. No further plans have yet been announced regarding production of this vehicle.

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