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## Which way will automobile electrification go?

Only more time, consumer demand and incentives will tell

BY DAVID BOOTH, NATIONAL POST; CANWEST NEWS SERVICE APRIL 23, 2010



Chief operating officer Toshiyuki Shiga recently announced that Nissan will start selling its zero-emission Leaf electric car.

**Photograph by:** Kazuhiro Nogi, AFP, Getty Images, National Post; Canwest News Service

It's a fair bet the future of the automobile will involve electric motors.

It's almost impossible to pick up a newspaper without some headline proclaiming the demise of the traditional automobile and the rise of a new (automotive) world order. The end of internal combustion is nigh, they all say, though few dare to detail when and how.

The problem is that no one knows the exact form electrification will take.

Will it be the now-familiar hybrid that becomes the dominant technology, or will it be newfangled electric cars such as the upcoming Nissan Leaf? Maybe the winning formula will be a hodgepodge of both, either the range-extended electric characterized by the Chevrolet Volt or the plug-in version of the hybrid Toyota is working on. It's all very confusing.

Forgetting hydrogen-powered cars (for they too are electric vehicles, with hydrogen fuel cells taking the place of rechargeable batteries), electrified vehicles essentially separate into four categories: hybrids, plug-in hybrids, extended-range electrical vehicles and pure electric cars. The Prius would be a prime example of the first, the aftermarket-equipped plug-in Prius an early example of the second, Chevy's much-ballyhooded Volt the third and the eagerly awaited Leaf the first mass-market sample of the last.

Although all will find a place in the motoring world of the future, which will establish enough of a mainstream presence to significantly reduce the automotive world's impact on the environment, and which will be relegated to the sidelines as idealistic but flawed niche players?

All indications point to the fact that standard hybrids may never achieve the universal appeal once promised. Despite 10 years of hype, sales have plateaued and hybrids continue to be bit players in the auto market.

To make significant inroads in cutting our dependence on fossil fuels, any alternative to the ordinary internal-combustion-engine automobile must be as convenient as current products, offer significant fuel savings over existing technology and be cost effective. While current hybrids pass the first test quite easily, they stumble over the latter two.

Yes, a Prius gets significantly better gas mileage than a Chevy Silverado, but is it, in everyday real-world use, superior to a diesel-powered Volkswagen Jetta?

Perusing Transport Canada's official ratings would indicate that, yes, the hybrid would have superior fuel economy. But, every Prius I have tested has averaged about six litres per 100 kilometres both in the city and in highway use. The city figure is slightly better than what I achieved during a recent drive of the Jetta TDI, but the highway figure is almost identical. And while diesel technology is more expensive than traditional power plants, the complexity of hybrids -- a hefty battery pack, two motors (internal combustion and electric) and a complicated transmission -- makes them more expensive to produce.

If my first experience with a plug-in hybrid is any indication, it would seem to have a bright future. Fuel savings were significant compared with an equivalent conventional hybrid (around 35 to 40 per cent), and driving was completely conventional other than the need to plug it in every night. This aftermarket-sourced Prius was certainly not cost-effective, but mass production will perhaps see the cost/benefit ratio tilt so that owners might actually recoup the initial premium they pay to save the environment.

Extended-range electric vehicles (E-REVs) possibly offer even greater fuel savings since a car such as the Volt, being entirely electrically powered until the battery depletes after approximately 64 km, will use no gasoline in a typical daily drive (even plug-in hybrids use a little gasoline in urban driving). Gasoline consumption will depend on how often and how far one drives beyond the car's electrical limit. There should not be any need to acclimatize to new driving techniques as all indications are that E-REVs will also be as convenient to drive as a current automobile. Like the plug-in hybrid, the success of the Volt will depend on its cost. Current indicators see a \$40,000 US price tag, a limitation to widespread adoption.

Of course, like the pure EV, the Volt's affordability depends on future government subsidies.

Electric cars certainly win the prize for reducing gasoline consumption. And, at existing prices, the cost of motoring electrically is cheaper than depending on fossil fuels. But they suffer pitifully in the convenience department as a result of their anxiety-inducing range. Dramatic strides are sure to be made in the future lowering of that anxiety, but it is doubtful a pure electric car will ever be as convenient as a conventional automobile.

And, although no price has yet been established for Canada, the Leaf has been priced at \$32,870 south of the border, with the U.S. government kicking in a \$7,500 income tax credit. (California throws in another \$5,000.) Carlos Tavares, head of Nissan North America's operations, candidly admits it will take three to five years worth of subsidies at that level to generate the momentum required to see an infrastructure built to handle EVs.

The reason North Americans have so bought into the car culture is freedom -- the ability to go where they want when they want.

Electric vehicle proponents would like us to voluntarily limit that freedom. Sacrifice is a hard sell, and basing programs on the presumption of sacrifice is just bad policy. Why some automakers and politicians think significant numbers of consumers will voluntarily sacrifice the convenience of motoring they've come to expect continues to elude me. While EVs can eliminate the need for gasoline, they are too inconvenient for the average North American consumer.

Plug-ins can't eliminate our dependence on fossil fuel, but they can cut consumption dramatically, all without significant compromise. The crux of this issue comes down to which technology is most likely to appeal to the broadest number of consumers -- a car that can reduce fuel consumption by perhaps 50 per cent with little sacrifice or one that promises independence from fossil fuels but requires significant changes in lifestyle?

Assuming the price/performance equation can be balanced, plug-in hybrids and E-REVs would seem to best be poised to displace ordinary gas-powered vehicles in the near future. They offer the best balance of maximizing benefits while minimizing infrastructure change and the recalibration of our driving habits. Plain hybrids simply don't offer enough fuel savings to warrant their technological and monetary investment and EVs are too compromised for widespread adoption.

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