

Hybrids

Design and photos by Bix Bigler, WestPub, Inc.

By Tom Graves

Toyota started exporting the mass-produced subcompacts it became known for in the late 1960s, and in America, they stood out like rolling jokes. Amidst the monuments of domestic chrome and steel prowess, they really were laughable, with miniaturized everything, no luxury features to speak of, and minimal back

seat legroom, if there was a back seat.

Owners braced themselves for some ribbing and even joined in with self-effacing humor, shortening the Toyota logos to "Toy."

Then the energy crises of the mid-1970s arrived with gas shortages, lines, and odd/even fill-up days, and car buyers made fuel efficiency a high priority, not a footnote. The subcompact became the fastest growing segment of the U.S. automobile market.

Fast-forward to the 21st century, where \$3 per gallon gas looks like a base price, not a ceiling. Once again, Toyota and its compatriot Honda are ahead of the pack, leading the fuel efficiency market with the first hybrid



2006 Toyota Highlander

Price: \$33,030-\$39,290

Seats: 5

Engine: 3.3-liter DOHC 24-valve V6-cylinder

Mileage: City/highway
33/28 (uses premium fuel)

Horsepower: gas engine: 268 hp,
electric motor: 167 hp

Transmission: electronically controlled variable
transmission (ECVT)

Info online: www.toyota.com

The Race For Higher Mileage Is On



2006 Honda Insight

Price: \$19,330 base
Seats: 2
Engine: 1.0 liter, In-line 3-cylinder
Mileage: City/highway
60/66 (uses regular unleaded)
Horsepower: 67-73 hp @ 5700 RPMs
Transmission: 5-speed manual or Continuously
Variable Transmission (CVT)
Info online: www.honda.com

gasoline/electric-powered vehicles, sipping gasoline at rates of 65 miles per gallon (mpg) or more.

At the 2005 California International Auto Show in Anaheim, Calif., hybrids moved from a laboratory oddity on the sidelines to one of the center attractions. Not all carmakers offer hybrids yet, but domestics like Ford and General Motors are joining the ranks with Honda and Toyota, and widening the field SUV hybrids that offer fuel economy in a larger format.

The Mileage Race

The original hybrids like the Honda Insight and the Toyota Prius made gas mileage the primary goal, and early boasts spoke of production cars getting up to 80 mpg. That goal has yet to be made on a line-production car, but the 2006 Prius rates 60 mpg in city driving and 51 on the highway.

That's right. Because the gasoline engine in a hybrid shuts off at red lights and sometimes stays off at low speeds, many hybrids achieve better mileage in the city than they do on the highway, when the gas engine usually runs continuously, except of course, in gridlock traffic.

One exception is the mileage race winner for 2006. The two-seater Honda Insight rates 60 mpg in the city and 66 mpg on the highway.

The Size Race

American automakers now are using hybrid technology in Sports Utility Vehicles such as the Ford Escape and the Mercury Mariner. The mileage gains were not as dramatic as in the compact cars, but the vehicles kept their gutsy size and roominess.

The Ford Escape sips gas at 36 miles to the gallon in city mileage, which can't beat the Prius for thriftiness, but it sure beats the mileage found in the standard SUVs on the market. Rather than reinvent the hybrid wheel, the Ford Escape uses technology licensed by Toyota.

The 2006 Mercury Mariner hybrid is billed as "the first full-hybrid premium compact SUV," and for a hybrid, it's a cushy ride, with plenty of legroom, satin-aluminum accents and woodgrain finishes. The Mariner rates 33 mpg in the city and 29 on the highway.

The American push for full-size hybrids has led to some marginal mileage increases, such as with the 2006 Chevrolet Silverado hybrid pickup, which goes all-electric when under 15 miles per hour, but gains about 3 mpg over the standard gas-powered Silverado. Even so, the Silverado hybrid uses three standard car

batteries located under the back seat of its crew cab, which are far less expensive to replace than the Nickel-Metal Hydride (Ni-MH) batteries that most hybrids use.

General Motors plans a 2007 Chevrolet Tahoe hybrid that the driver can manually switch from hybrid mode for more economy to standard mode for more power. Chevrolet representatives at the International Auto Show said the model should be available this year.

Among American car makers, it's easy to see that Ford is taking the hybrid lead, with GM's Chevrolet nameplate close behind, and so far, no hybrid is in sight from Chrysler/Daimler, at least for 2006. Japanese automaker Nissan plans a hybrid 2007 Ultima.

It seems some manufacturers are waiting to see whether hybrids are the next big thing or a passing trend in the quest for fuel efficiency.

Mild Hybrid or Full Hybrid?

Current hybrids fall into two categories that are easy to distinguish. Both use electric power to recharge the battery, supplement horsepower and apply "regenerative braking" for battery charging. Both typically have gas engines that can shut

down during full stops. But a full hybrid can run solely on electric power at lower speeds, while the mild hybrid cannot.

The mileage figures usually tell you which kind of hybrid it is. The full hybrid gets better

city mileage than highway. The mild hybrid, like a gas-powered car, typically gets better highway mileage than city mileage.

If the hybrid version of a model gets only 10 to 15 percent better mileage than its gas-powered counterpart, it's probably a mild hybrid.

Parallel Paths

In half a decade of hybrid production, auto manufacturers worldwide are showing that hybrids are a practical way to push

2006 Ford Escape

Price: \$26,900 to \$31,000
Seats: 5
Engine: 2.3-liter DOHC 16-valve 4-cylinder
Mileage: City/highway 36/31
Horsepower: 155 hp combined gas/electric
Transmission: electronically controlled variable transmission (ECVT)
Info online: www.fordvehicles.com/escapehybrid

How Do Hybrid Cars Work?

Hybrids use a gasoline engine to provide torque to the wheels and also to generate electricity for a battery or series of batteries. At low speeds, the gasoline engine may shut off while electric motors power the car.

During "regenerative" braking, the motor switches roles to become a generator, recharging the battery with energy that most cars lose as friction and heat. During acceleration, both the internal combustion engine and the electric motor provide power, reducing fuel requirements.

The owner never has to recharge the battery externally because the gasoline engine and the brakes power the motor that doubles as a generator.

Because the gasoline engine is used less, wear and tear on it is decreased. Most power train warranties for hybrids include the battery, often for five to eight years or 100,000 miles. Some maintenance and repair costs should be lower for hybrids, but battery replacement is steep. The Nickel-Metal Hydride (Ni-MH) battery in a Ford Escape Hybrid costs about \$1,200.

2006 Mercury Mariner

Price: \$29,225 base
Seats: 5
Engine: 2.3-liter DOHC 16-valve 4-cylinder
Mileage: City/highway 33/29
Horsepower: 155 hp combined gas/electric
Transmission: electronically controlled variable transmission (ECVT)
Info online: www.mercuryvehicles.com/hybrid

the envelope on gas mileage, and the boasted-about 80 mpg goal is realistic within a few years.

But most manufacturers realize that hybrids are not a panacea

for all car buyers, especially those who want low emissions to match their high mileage.

The gas-powered 2006 Ford Focus has a 2.0-liter engine that classifies it as a Partial Zero Emission vehicle (PZEV), making it cleaner and greener than some of the hybrids. For comparison purposes, a PZEV Focus has to drive 6,700 miles to produce the same tailpipe emissions as a 5.4 hp lawnmower used for one hour, and gets 26 mpg in the city and 34 mpg on the highway.

Volkswagen is squeezing mileage out of its smaller diesel engines. Its 1.9 liter, 5-speed manual New Beetle rates 44 mpg in the city and 58 mpg on the highway.

Car buyers have more than one way to get high mileage. But hybrid technology appears to be a growing trend as more manufacturers get onboard.

Whether hybrids match claims of lower maintenance in the long run has yet to be seen, and car buyers demand that cars hold their value longer. The hybrid models have a way of winning people over. As attested by waiting lists to buy the Toyota Prius, demand is on the rise for the electric cars that never need to be plugged in.

2006 Toyota Prius

Price: \$21,725 base
Seats: 4
Engine: 1.5-liter 16-valve 4-cylinder
Mileage: City/highway/combined 60/51/55
Horsepower: 110 hp
Transmission: electronically controlled variable transmission (ECVT)
Info online: www.toyota.com

2006 Honda Accord

Price: \$30,140 to \$32,140
Seats: 5
Engine: 3.0-liter 24-valve V6
Mileage: City/highway 29/37
Horsepower: 253 hp combined gas/electric
Transmission: 5-speed automatic
Info online: www.honda.com

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