

WHAT IF LEXUS BUILT A PRIUS?



Entry-lux dedicated hybrid

Thus defined, it's the world's first, though the fourth Lexus hybrid to date
 We drive the Lexus HS 250h from Little Rock to Lake Hamilton, Arkansas

Lexus is no stranger to the hybrid market. For one thing, they're first cousins to the über-hybrid, the Toyota Prius. For another, they've consistently added hybrids to their lineup: the RX 400h in 2005, the GS 450h in 2006, the LS 600h and LS 600hL in 2007 ... and now their mildly-lux version of the mainstream hybrid sedan: the alpha-numeric-alpha HS 250h. Despite being their fourth hybrid, Lexus bills this as their first "dedicated luxury hybrid."

An Atkinson-cycle engine is used for high efficiency and compatibility with hybrid operation. This twin-cam powerplant uses four valves per cylinder and Variable Valve Timing with Intelligence (VVT-i) on the intake side. The engine is undersquare, with an 88.5-mm bore diameter and 96 mm stroke and has a relatively high compression ratio of 12.5:1. Peak output is 147 hp; in combination with the hybrid drive motor, the HS produces 187 hp total. It meets California SULEV and federal Tier 2 Bin 3 emission standards, 70 percent lower than conventional vehicles; it also has a new system that reduces evaporative emissions to near zero.

An electronically-controlled continuous-

ly variable transmission (CVT) and motor speed-reduction planetary gear unit provide high power output in a small package. The HS 250h uses a shift-by-wire system to eliminate shift cables, saving space and weight while allowing design freedom in placement of the shift lever.

An electric transmission oil pump eliminates another source of what's called parasitic energy. Electronic operation invokes the oil pump only when needed, and since the oil also flows over the drive motor, overall efficiency of the motor and transmission are improved.

At the vehicle's media introduction in Little Rock, Lexus VP of Sales and Dealer Development Brian Smith explained that the HS 250h targets fuel efficiency and other eco-goals not just through the hybrid drive system, but also through glass, lighting, aerodynamics and many more engineering details, including an interior and trunk made of 30% "ecological" materials. Even the factory is especially "green," featuring natural materials, careful climate control, and air locks to ironically ensure that this "natural" environment is carefully isolated from the one outside.

A car as tech-based as this will surely

Welcome to Markham Street, downtown Little Rock.

The cabin of the Lexus HS 250h takes an evolutionary leap, combining some of the newer and less conventional positions and controls of a high-tech hybrid with familiar luxury and style. Not quite knob, not quite joystick, the console interface controller feels a bit like a loose tooth at first (resist the impulse to wiggle it with your tongue).

have a healthy share of electronics, and the HS 250h boasts fully three driver displays: the instrument panel, of course, plus MID interface and heads-up information. Controls displayed thereupon include dash, stalk, foot and steering-wheel inputs, for driving, entertainment, information and other purposes.

Safety features include a strong-but-light structure and 10 airbags, plus again a full complement of electronics, including lane and distance features that either comfortingly or disturbingly mean "the car is watching you," as Smith says.

With economy a longstanding byword in the hybrid market, it might seem natural that the luxury market would be slow in adopting the technology. However, Smith points out that 60% of entry-luxury buyers surveyed indicate they would have at least considered a hybrid model. Additionally, 54 percent of current hybrid buyers have a household income of \$100,000 or more, and 16 percent of cur-

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rent hybrid owners also have a luxury vehicle. Put it all together, and the luxury hybrid market niche becomes glaringly apparent. And signs of its growth abound.

Gut reactions to last year's soaring fuel prices aside, hybrid buyers are known as early adopters or forward thinkers, who not only like their vehicle to be a social statement, but want to be "closer to tomorrow, today." To reach this demographic, Lexus is expanding its presence on Facebook and other social media, with a "Power of H" campaign.

The Lexus entry-luxury sedan segment includes the ES, IS and now the HS. Lexus hopes to sell 100,000 HS sedans in the first year. They've sold 170,000 hybrids so far and intend to keep introducing a new luxury hybrid model each year.

Charles Hubbard, Senior Product Education Administrator for the University of Toyota with Lexus, reaffirms that the HS falls between the ES and IS models (with the GS and LS at the upper end).

Hubbard draws attention to the twin air intakes on the car's face—the upper for hybrid cooling and the lower for gasoline engine cooling. Such single-grille makes as Audi or the Chrysler 300C aside, most vehicles have intakes above and below the bumper area, but usually not with such purpose. This dedicated approach, as with all the details on the HS, provides focused function that adds to overall ener-

gy efficiency. While introducing the car's front-end design, Hubbard mentions that the daylight running lights (DRLs) can be turned on and off, and that in fact a great many details and features of this car can be customized and/or automated.

As Smith had already pointed out the three separate display systems of the car, Hubbard stated that the interior has a human-machine interface comprising three zones: the three displays, all in the upper/visual area, operations at hand level, including steering wheel switches, instrument panel controls and such, and of course the foot-operated pedals.

The driver can select among three drive modes: Power, Normal and Eco. Each switch position changes the rate of throttle opening for a given throttle-pedal angle. Normal mode has an essentially linear throttle action that gives naturally progressive power. In Eco mode, throttle actuation is reduced to emphasize fuel economy; it's worth noting that the Eco mode alters operation of such things as air conditioning, so this option may not always be ideal in an Arizona summer. Power mode can be selected for a more responsive feel. As with the Prius (see May/June issue), a new driver-selectable EV mode can allow the vehicle to be driven short distances using only the electric motors. On our drive from downtown Little Rock, on a combination of city streets, interstates, two-lane

highways and the local roads around Hot Springs, we were able to dabble in each, though it would take more long-term time to appreciate the relatively subtle user experiences.

Aerodynamics of the HS 250h body design were considered from the outset, though while a low-drag form and compact package were givens, the Lexus team sought a decent level of attractiveness and spaciousness. Their work yielded a 0.27 coefficient of drag (Cd). Interestingly, the new Prius has a Cd of 0.25, despite its more pronounced slippery-prioritized shape. (When the new Honda Insight and highly updated Prius were introduced recently, the similarity of their shapes was noted by many, but generally explained as the necessary outcome of maximized wind-tunnel time. Nonetheless, the Cd of the HS 250h has managed to come very close to the others, but with a more conventional shape. But fuel mileage is noticeably less than that of the Prius, for a handful of reasons; whether that was a reason to forego another 0.02 Cd or might have been a reason to try even harder for it, that's apparently a design, i.e. engineering/styling, tradeoff.)

Over the years, changes to body structural requirements for safety have made it difficult to keep A-pillars slender, affecting

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the driver's field of vision. But HS 250h designers were able to create a relatively slim A-pillar structure that improves visibility without degrading structural integrity. A somewhat taller profile and more forward A-pillar allow a higher seating position for both front and rear passengers, providing improved passenger vision and easier ingress/egress, while also creating a better location for the batteries. The battery components, including high-voltage battery pack, auxiliary battery and battery-connected devices, were carefully packaged to take advantage of this layout, resulting in a spacious cabin and surprisingly large trunk space, capacious enough for four golf bags.

Double-wishbone rear suspension balances performance and comfort. Its compact design uses low-mount coil springs that also help improve cargo space. As in the front suspension, rebound springs are used to aid both handling and ride, and all mountings and bushings are optimized for ride, handling and low noise.

An optional Pre-Collision System (PCS) with Dynamic Radar Cruise Control and Driver Monitor uses millimeter-wave radar to measure and maintain a pre-set distance from a vehicle ahead. A computer measuring speed, steering angle and yaw-rate inputs helps to determine whether a collision is highly possible. PCS alerts the driver with audible and visual warnings, preemptively retracts front seat belts and pre-initializes Brake Assist so that increased braking will be applied the instant the driver depresses the pedal.

Lexus has developed another new system for the HS 250h called Lane Keep Assist (LKA) that is designed to help drivers stay within their chosen lane. LKA combines lane-departure warning (LDW), which smoothly increases steering torque

a small amount, with the detection of lane markers by an on-board camera. LKA is intended for use basically on well-marked roads. Hubbard points out that these features are *not* an auto-pilot; PCS assists the driver who *does* apply the brakes, and LKA *does help* to steer you back into your lane, but only if you have your hands on the wheel.

The HS 250h with available navigation comes with a rear-view camera and adds an available Wide-view Front Monitor to see in the traditionally blind areas around the front of the vehicle. The front camera has a maximum 190-degree lateral and 83-degree vertical field of view, so the driver can see as close as about 23.5 inches in front of the car (up to 7 mph). We found it takes a bit to get oriented to the multiple views, though full-time use probably makes it more intuitive.

The list of available electronics and features for the HS is extensive. It's the first Lexus to offer the all-new telematics system: Lexus Enform™ with Safety Connect™, available by subscription. Safety Connect, the cornerstone of the services, available on both the non-navigation and nav-equipped HS 250h, offers four features: Automatic Collision Notification, Stolen Vehicle Location, Emergency Assistance Button (SOS), and enhanced Roadside Assistance, which adds GPS data to the already-included warranty-based Lexus roadside service.

Lexus Enform includes all the Safety Connect features and adds Destination Assist and eDestination. Destination Assist agents are available via on-board cellular to help drivers find a specific address, a business by name, or a type of business (e.g. gas station, movie theater, even Zagat-rated restaurants), then send the coordinates to the nav system. With

eDestination, drivers can go online at Lexus.com to save and sort destinations in up to 20 folders holding as many as 10 destinations each—all personalized by the driver. This information—up to 200 at a time—is sent by the owner to his or her vehicle, for download into the navigation system. Online, drivers can create personalized location names and list notes about their saved locations. This is reminiscent of some of the handiest iPhone apps, but integrated onboard and linked to your nav system and vehicle display.

Launching with Lexus Enform is Lexus Insider, a free opt-in service available without subscription on the nav-equipped HS. This offers in-vehicle audio casts with useful vehicle tips and event information, and info on other owner benefits. Those who opt into this service can elect whether or not to receive notification of new messages at vehicle startup. One-year trial subscriptions of Enform and Safety Connect are included.

As with our Toyota Prius test drive up Mt. Lemmon a couple of months prior, our drive in the HS 250h was noteworthy for not being noteworthy, in the sense that—despite a technical tour de force underlying it all—for practical purposes, this is simply a nicely outfitted sedan that operates much like any car. We gave it a good spin, from Little Rock to Lake Hamilton (near Hot Springs, Arkansas, Bill Clinton's boyhood home), including city streets, Interstate highways, beautiful two-lane roads, downtown/tourist-town traffic, and some briefly winding roads around the lake. The fact that you're saving fuel and reducing your carbon footprint are just the icing on the cake.

The HS 250h should be at dealers by mid-August. Pricing had not been announced by press time. ■

