



Article published on February 28th 2012 | [Business](#)

Over the last decade, hybrid vehicles have become more and more popular among car buyers. A hybrid vehicle is a vehicle that uses two or more distinct power sources to move the vehicle. The term most commonly refers to hybrid electric vehicles (HEVs), which combine an internal combustion engine and one or more electric motors. When the term hybrid vehicle is used, it most often refers to a Hybrid electric vehicle. These encompass such vehicles as the Lexus RX 400h and 450h and others. A petroleum-electric hybrid most commonly uses internal combustion engines (generally gasoline or Diesel engines, powered by a variety of fuels) and electric batteries to power the vehicle. There are many types of petroleum-electric hybrid drive-trains which offer varying advantages and disadvantages.

The hybrid vehicle typically achieves greater fuel economy and lower emissions than conventional internal combustion engine vehicles (ICEVs), resulting in fewer emissions being generated. These savings are primarily achieved by three elements of a typical hybrid design. The first element is involves the fact that hybrid vehicles rely on both the engine and the electric motors for peak power needs, resulting in a smaller engine sized more for average usage rather than peak power usage. A smaller engine can have less internal losses and lower weight. Second, these vehicles have significant battery storage capacity to store and reuse recaptured energy, especially in stop-and-go traffic, which is represented by the city driving cycle. And third, hybrid vehicles recapture significant amounts of energy during braking that are normally wasted as heat; this regenerative braking reduces vehicle speed by converting some of its kinetic energy into electricity, depending upon the power rating of the motor/generator.

The Lexus RX is a crossover sport utility vehicle (SUV) sold since 1998 by Lexus, the luxury division of the Japanese automobile manufacturer Toyota. Three generations of the Lexus RX have been produced to date, the first being compact in size, and the latter two classified as mid-size. In the Lexus model lineup, the RX sits below the company's other SUVs, the GX and LX, but remains the brand's only crossover model. In mid-2009 Lexus put the Lexus RX 450h on sale. This hybrid vehicle is equipped with a 3.5-liter 2GR-FXE V6 engine, now running on the Atkinson cycle, which produces 245 hp (183 kW); by incorporating a more powerful inverter and electric motors, total horsepower reaches 295 horsepower (220 kW). Two additional systems are added to the RX 450h's Lexus Hybrid Drive powertrain, an exhaust-heat recovery system to reduce engine warm-up periods (optimizing engine start-stop times), and a water-cooled Exhaust Gas Recirculation (EGR) system to reduce engine pumping losses.

This hybrid luxury vehicle also includes a new ECO mode that helps the driver improve fuel economy by controlling air conditioning and throttle inputs, while a driver selectable EV drive mode allows for electric-only propulsion at low speeds. Visually, the RX 450h receives a unique grille with modified front fascia, blue-tinted headlamps and tail lamps, hybrid badging, different wheels, and optional LED headlamps. In the US market, the RX 450h went on sale in early June 2009.

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Article Keywords:

hybrid vehicle,hybrid luxury vehicle,SUV

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