News

Hybrids: The Solution for Today's Evolving Automotive Landscape

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While standing in line at a rental car agency, I heard three of the four people in front of me decline an upgrade to an electric vehicle. As a battery electric vehicle (BEV) owner, I happily took the upgrade when it was offered, having already gained extensive experience with BEV charging. What felt like a challenge for the other renters had become second nature for me.

This moment was telling. Despite recent improvements in charging infrastructure, barriers to global EV adoption remain, especially when it comes to consumer comfort and confidence.

So, what did those three drivers end up choosing? Two of them opted for hybrids, vehicles they viewed as a safe, familiar middle ground, with no concerns about charging, range, or performance. Once seen as exotic, hybrids have earned mainstream trust, and for good reason, there’s a lot to like about them.

Hybrid vehicle performance and range

From the driver’s perspective, hybrid vehicles are nearly indistinguishable from traditional internal combustion engine (ICE) cars. Aside from a dashboard display showing hybrid system performance, most drivers won’t notice the seamless switch between electric and gasoline power; it’s that smooth.

Hybrids also deliver impressive range and performance, with many mid-sized models consistently achieving up to 50 miles per gallon (mpg). For renters, this means fewer stops at the gas station and lower charges when refueling the vehicle for return. A key contributor to this efficiency is regenerative braking, which recovers energy during braking that would otherwise be shed as heat. This recovered energy is used to support acceleration, boosting fuel efficiency, and delivering the responsive performance that drivers have come to expect from modern vehicles.

Hybrid vehicle batteries

If hybrid vehicle range wasn’t enough to win you over, the cost of batteries may do the trick. Thanks to increased manufacturing capacity, hybrid vehicle batteries are becoming less expensive. This is helping to drive down the overall cost of both BEVs and hybrids.

As vehicle costs decrease and battery performance improves, the distinction between BEVs and hybrids is starting to blur. Plug-in Hybrid Electric Vehicles (PHEVs), for example, have enough battery capacity to run purely as EVs for significant distances when charged from an external source. PHEVs offer drivers a chance to experience the smooth, quiet power of electric driving with the familiarity of a traditional internal combustion engine, and the cost is becoming low enough to facilitate widespread adoption.

Extended range vehicles

Extended Range Electric Vehicles (EREVs), which combine batteries with an internal combustion engine, use the ICE purely as a generator to charge the battery, rather than as a direct power source. This unique configuration eliminates the need for a transmission, delivering the driving experience of a BEV along with the cost and weight savings needed for long-range travel. The engine operates within a limited RPM range and can be tuned for optimal efficiency, providing a blend of smoothness, performance and versatility.

EREV hybrids enable automakers to expand into regions where charging infrastructure is still limited. A prime example is BYD, a major automotive OEM based in China that has rapidly become the world’s largest manufacturer of BEVs.

As BYD looks to grow its global presence, the challenge of deploying vehicles in areas with limited charging infrastructure has become paramount. To overcome this, the company offers a full lineup of EREVs capable of running on gasoline when charging is unavailable. This approach has allowed BYD to rapidly expand into markets across the Southern Hemisphere, accelerating the global adoption of both BEVs and hybrid vehicles.

Taking hybrid designs to the next level

In recent years, innovative use cases for hybrid technology have been developed, enhancing vehicle functionality and range. All-wheel drive designs in some cars

incorporate conventional ICE transmission to power the front wheels, while the rear wheels are driven by an independent electric motor. Under normal conditions, only the front wheels provide propulsion, but when additional traction is required, the electric motor instantly delivers controlled power to the rear wheels. This hybrid design improves vehicle performance and simplifies both the electric and ICE systems. It’s also easy to retrofit into existing vehicles.

The electric motor’s ability to deliver maximum torque at 0 RPM is especially valuable when traction is limited or unpredictable, making hybrid systems well-suited for off-road applications. Jeep’s 4xe and Ford’s Powerboost F-150 perform exceptionally well when rock crawling, where the precisely controlled and instantly available torque of the electric motor can maximize traction and control at low speeds, even in highly precarious situations. Their electric motors are unaffected by horizontal or vertical orientation and can be sealed to protect the vehicle from wet and dusty environments.

Manufacturing advantage

Hybrid vehicles deliver unmatched benefits to vehicle owners while also providing advantages to manufacturers. The transition to electric vehicles has been swift, and with it came a steep learning curve for OEMs traditionally rooted in ICE vehicle manufacturing.

Hybrid vehicles offer established automakers a way to benefit from their current infrastructure and knowledge of ICE technology, while gaining expertise in BEV design. The first hybrid vehicle most Americans encountered was the Toyota Prius, first sold in the year 2000. Toyota, long known for its reliable, efficient and durable vehicles, manufactures internal combustion engines that are the product of decades of research in combustion technology, metallurgy and precision machining. This knowledge represents a valuable asset for Toyota, and like any business, they aim to leverage this asset as much as possible to achieve business success.

The development of the Prius hybrid was a bold move in the late ’90s and early 2000s, but it proved to be a smart one. It allowed Toyota to capitalize on its core competency, ICE technology, while learning about electric drivetrains and broadening its consumer appeal with an affordable and efficient product offering.

What’s next for hybrid vehicles

Where will hybrids go next? The short answer is everywhere. Their versatility, efficiency and broad appeal to both automakers and consumers position them for continued growth in nearly every global market.

While hybrids can’t match the energy efficiency or mechanical simplicity of battery electric vehicles, they offer an excellent solution for today’s evolving automotive landscape, bridging the gap between legacy ICE systems and the electric future.

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