



BATTERY-ELECTRIC AND PLUG-IN HYBRID VEHICLES

THE DEFINITIVE ASSESSMENT OF THE BUSINESS OPPORTUNITY, 2010 TO 2030



Battery-electric vehicles flourished in the early 1900s, but as gasoline vehicles became affordable, reliable, and easy to start—and as gasoline-refueling infrastructure evolved—the electric vehicle could not compete. Limitations centered on the battery's energy-storage capacity, recharge time, and life. Many attempts to return battery-electric technology to Main Street applications have been tried over the last few decades, but none have reached commercially interesting volumes. How will the newest generation of battery-electric vehicles fare?



The prospect of a viable battery-electric vehicle is enormously appealing. Battery-electric vehicles assure compliance with acceptable emissions standards and offer freedom from dependency on geopolitically sensitive fuels. Today, virtually every vehicle manufacturer is developing and/or offering battery-electric vehicles. Plug-in hybrids and extended-range electric vehicles alleviate the impact of battery limitations while still providing the benefits of grid-based power for a significant proportion of every-day excursions. Can vehicles that rely on batteries alone be commercially viable?

"New" chemistries promise greater energy density, cycle life, and reduced recharge time. Battery-swapping networks are being proposed, and government subsidies are encouraging purchasers, technology developers, and electric-power producers and distributors alike to move the technology and the needed infrastructure towards commercial viability. Are these developments enough?

Before investors, policy makers, and others can feel truly comfortable and aggressively pursue battery technology for Main Street, questions must be answered:

- Will unintended or unexpected consequences once again derail the battery-electric vehicle?
- Is the plug-in hybrid a transition technology or a legitimate end in its own right?
- Is there enough electric power available when and where needed to charge a fleet of battery-electric vehicles?
- Is battery technology going to be adequate to meet the expectations of the consumer?
- What is the government's role in addressing these issues?



This study, undertaken by IHS Global Insight and its sister company IHS CERA, will address the significant issues that could once again knock the battery-electric vehicle off Main Street. This work is an essential input to business planners seeking to further the evolution of the electric vehicle, as well as investors seeking opportunities for viable returns from investments in this heretofore "bridesmaid" technology.

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IHS Global Insight's intensive study will provide vehicle, component, and electric-power business and technology planners and investors a thorough and objective understanding of:

- The status of electric grid-based light-vehicle powertrains
- Major technical, infrastructure, and other hurdles remaining, and the likelihood of overcoming those hurdles
- Milestones to watch for to determine the direction of the technology
- Expected market evolution for plug-in hybrid and battery-electric vehicles
- Impacts on electric power demand

Hurdles include cost considerations and "charge anxiety"—consumers want to plug in and top off the battery whenever the vehicle is parked, day or night.



Increased battery performance has come with increases in battery cost. A reasonably sized electric-vehicle battery may cost more than the entire powertrain of a small car.



Brownouts exist in parts of Europe, the United States, and elsewhere despite adequate power-generation capacity because of power-distribution system limitations.



Adequate baseload electric-power-generation capacity exists in the United States and Europe to support vast fleets of battery electric vehicles—but only if these fleets are charged at night, when electricity demand is low.

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IHS Global Insight's Automotive and Energy Groups are committed to helping our customers in their planning process and in reaching better and more informed business, policy, and investment decisions. We draw upon the depth and breadth of the 100+ globally distributed staff with multidisciplinary automotive technical, marketing, and product-planning expertise in:

- Market and economic forecasts
- Technology forecasting
- Consumer understanding
- Generational dynamics
- Economic factors
- Demographics
- Energy and other resource forecasts

▶ ABOUT IHS CERA

IHS CERA (Cambridge Energy Research Associates) offers clients an integrated framework to understand energy markets across industries and regions. This knowledge offers new insights and ideas—often well ahead of conventional wisdom—and provides a comprehensive early warning system for decision makers.

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