Electric Vehicles: A Force for the Future

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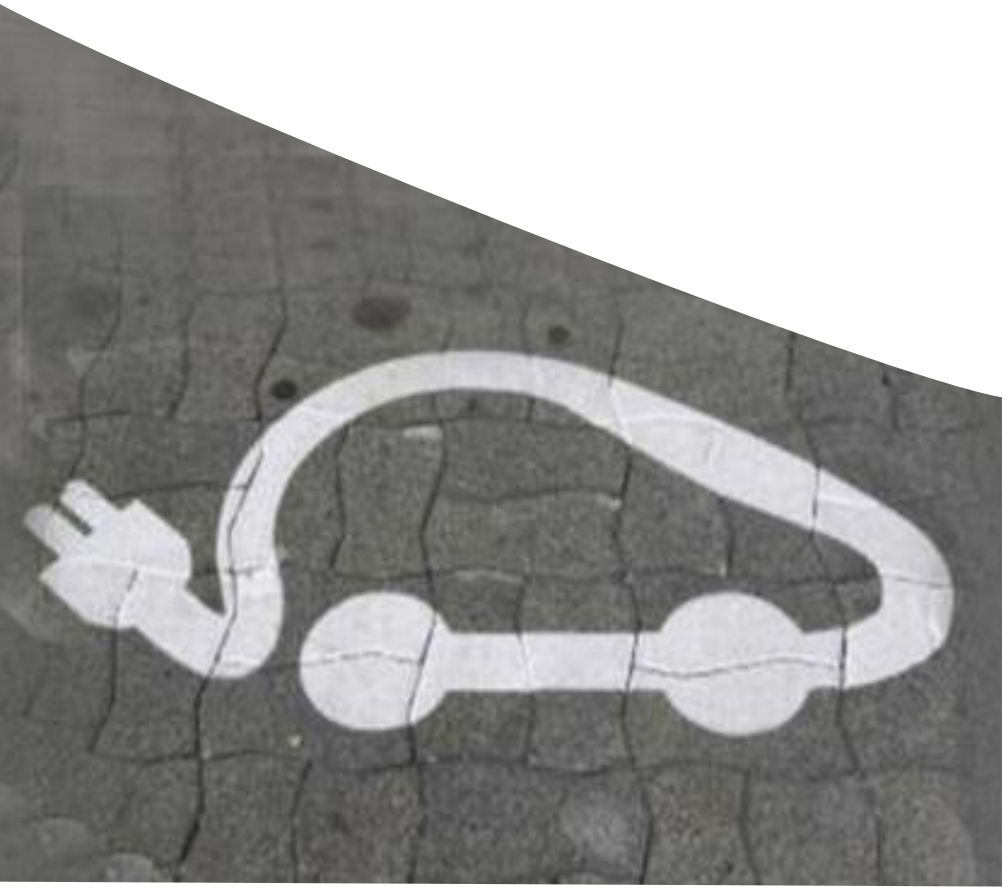
Electric Vehicles (EVs) are a force for the future and collaboration inside and outside the automotive and utility industries will be key to electric vehicle development and integration.

Globally, Capgemini is identifying opportunities and implications for EV grid technology recognizing that by 2030, the plug in electric vehicle market will mature, with about 4.5 – 6 million new EV sales per year in the United States alone. Battery power and energy density may be two-to-four or more times present levels for increased ranges and heavier vehicles—this means longer charging times and/or more rapid special-purpose chargers.

Addressing the Challenges

The emerging EV technologies offer an opportunity for utilities to shape and facilitate new opportunities for grid integration and regulation. Advancing understanding of EV integration market and reliability implications is important as plug in vehicle technology advances, energy stored in the batteries of the vehicles can be used to support ancillary services, demand response programs, and the integration of renewable technologies.



The growth of electric powered vehicles will lead to a fundamental shift in the existing landscape in areas such as design and manufacturing, distribution and after sales service, and energy supply and infrastructure. Governments and other public sector bodies around the world are making significant investments in the development of electric vehicles and introducing various tax credits, incentives and subsidies. Energy companies and other industries have also set their sights on electric vehicles, but most importantly, electric vehicle development is being strongly fueled by consumer demand stemming from economic and environmental factors.

Electric vehicles have the potential to be a market-changing force. However, the continued development of this business will require collaboration both inside and, more importantly, beyond the automotive industry. Parties including vehicle manufacturers, suppliers, dealers, other retailers, consumers, electric utility companies and governments must all be aligned. Capgemini has the supporting tools and methodologies to help bring together these key stakeholders in the emerging electric vehicle business, as well as broad and proven experience in automotive strategy, process, infrastructure and retail. We use proprietary approaches such as our Accelerated Solutions Environment (ASE) to harness high-performance group creativity and collaboration to achieve buy-in and build solutions in record time, particularly relating to emerging technologies and business models.

Changing the Landscape

As these development scenarios play out, the growth of electric vehicles will raise a number of critical questions:

- Will traditional players (vehicle manufacturers, suppliers, energy companies) be able to maintain their dominant positions?
- Will new players be able to design viable products and strategies to gain market share?
- Will new after sales players design and implement new business models?
- Can business – and potentially government – define and develop the standards and infrastructure necessary to provide the power supply for electric vehicles?
- Can companies and governments optimize the management of electrical energy needs?

The answers to these questions will underlie a fundamental shift in the existing landscape in areas such as design and manufacturing, distribution and after sales service, and energy supply and infrastructure.

Traditional and new players will need to consider the potential impact of this emerging market on their business.

Traditional manufacturers will need to define their strategy for positioning the different "clean" vehicle technologies and rethink their design and manufacturing capabilities as well as their supply chain. Automotive suppliers will need to adapt existing products and develop new products to suit electric vehicles, while new suppliers with purpose-built products will enter the market. Traditional car dealers, service providers and spare parts vendors will need to adapt and transform their activities to serve the electric vehicle market. Gasoline and tanker companies will need to manage the transition to a new power source that will reduce the traditional heart of their business. And large utilities will need to take into account the potential impact on the grid, new rate structures and new types of services.

At the same time, new players, including vehicle and battery manufacturers, will need to master the technology development and scalability needed to serve the mass market. Mobility service providers and car rental companies will also need to adapt their business models for this new market. The development of a significant market for electric vehicles will likely give rise to the need for a new network of charging points that could include traditional fuel stations as well as other players with a large number of physical locations. This could include big fast-food operators such as McDonald's or retail chains like Walmart.

Collaboration Is Key to Electric Vehicle Development

Capgemini is actively engaged in analyzing the opportunities and implications of the emerging EV integration concepts. We are identifying products and services that EVs could provide under existing market and reliability structures within various markets. This includes recommendations and analysis of requirements that address, reliability, market products and services, demand response and alternative energy opportunities, technology, communications, security and protocol requirements, issues, constraints, costs and the accountable parties, such as vendors, regulatory, utility staff, and standard setting agencies, performance, operability and observability requirements and recommendation, requirements for utilities to be the integrators of the aforementioned products and services, recommendations appropriate for the utilities to have a consistent view, standards, and how the products and services would play across all of the markets.

We are also providing specific recommendations on market implementation success factors, including: proposed market design and operational requirements recommendations for the operational and market infrastructure development considering vehicle-to-grid (V2G) interoperability, Demand Response (DR) and alternative energy, results of detailed modeling and analysis as appropriate to demonstrate feasibility of recommendations and time lines, recommendations for development of operational and market infrastructure that provided for visibility to the system operator in real time and integration with EMS and DMS systems and pricing algorithms, settlements, physical and cyber security, field safety, vehicle 'plug and play' requirements, and applicable uniform grid codes and standards.

About Capgemini and the Collaborative Business Experience™

Capgemini, one of the world's foremost providers of consulting, technology and outsourcing services, enables its clients to transform and perform through technologies. Capgemini provides its clients with insights and capabilities that boost their freedom to achieve superior results through a unique way of working, the Collaborative Business Experience™. The Group relies on its global delivery model called Rightshore®, which aims to get the right balance of the best talent from multiple locations, working as one team to create and deliver the optimum solution for clients. Present in more than 30 countries, Capgemini reported 2009 global revenues of EUR 8.4 billion and employs 90,000 people worldwide.

With 1.13 billion euros revenue in 2009 and 12,000+ dedicated consultants engaged in Energy, Utilities and Chemicals projects across Europe, North America and Asia Pacific, Capgemini's Energy, Utilities & Chemicals Global Sector serves the business consulting and information technology needs of many of the world's largest players of this industry.

More information about our services, offices and research is available at **www.capgemini.com/smartenergy**

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