



Consumer Federation of America

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Will They or Won't They?

Consumer Adoption of High Fuel Economy Vehicles, 1999-2012, and the Role of the 2025 Standards in Speeding Diffusion of Advanced Technology

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I appreciate the opportunity to present the consumer view of the willingness of consumers to adopt advanced fuel economy technologies. This topic is the target of a great deal of rhetoric these days, but precious little empirical analysis. In my remarks today I will briefly describe the basic factors that define the terrain of innovation adoption in the fuel economy space and explain why the new vehicle emission and fuel economy standards for 2025 are ideally-suited to promote adoption, given this terrain. Then I will present data from the past decade on two important examples of recent consumer adoption behavior – hybrid vehicles and high-performance, 4-cylinder engines.

IT TAKES TWO TO TANGO, SUPPLY OF AND DEMAND FOR ADVANCED TECHNOLOGY

I tend to emphasize the supply-side of the innovation diffusion process because consumers get too much blame when markets perform poorly. In fact, it is innovation and entrepreneurship that drives markets and, as noted above, forward looking public policy that can stimulate these supply-side behaviors. Nevertheless, there are demand-side issues that must be considered and the demand-side is doing its part. The data make a compelling case for my conclusion that there is a strong likelihood of substantial consumer adoption of advanced fuel economy technologies as the automakers incorporate them into new vehicles in their effort to reach the 2025 goal of 54.5 miles per gallon goal.

Innovation adoption is a process that unfolds through stages that takes time (Slide 1). It starts slowly, but once it reaches a critical threshold, it can accelerate rapidly as two market processes interact. The supply-side produces more options that better fit consumer needs and consumers become more comfortable with the new technology because an increasing number of their friends, neighbors and acquaintances have adopted it, and there is information and experience for late adopters and laggards to draw on.

The long term approach and steady rise of fuel economy in the 2025 standards are critically important steps toward recognizing and facilitating the developmental nature of innovation adoption.

Consumers cannot adopt advanced technologies unless they are available in the marketplace. At the same time, automakers hesitate to put new technologies into vehicles unless they are convinced consumers will buy them. Economists call this a coordination problem; real people understand it as a chicken-and-egg problem. Automakers seek to understand consumers with marketing research and they seek to influence consumers with advertising.

Government can help to reduce that problem by adopting standards that lower the supply-side risk of incorporating new technologies into new vehicles and also have the benefit of reducing the cost of the technologies that are selected by the automakers. The clean cars program provided this function for hybrids in the past decade. The 54.5 standard can play this role for a broad range of technologies in the next decade and a half.

The ability of the auto market to achieve the recently adopted goal of 54.5 miles per gallon (MPG) by 2025 does not depend on the extensive adoption of any single technology. There are a large number of different technologies and combinations of technologies that can meet the goal. From the point of view of the regulatory analysis of innovation adoption, particularly in light of the multiple ways in which the target level of mileage can be met, the important question is whether the absolute market size will be large enough and grow quickly enough to support economically viable entry and sustained production of the advanced technology products. The minimum efficient scale is what matters, not the relative level of penetration.

One of the most important and positive characteristics of the standard is that it is technology neutral and pro-competitive. Auto makers are free to meet the standards as they please, which will trigger vigorous competition between them and keep the costs down.

In the current auto market the analysis of minimum efficient scale is global, not national. Automobiles are a fungible commodity and large markets exist around the globe. It is very difficult, if not impossible, for auto makers to be world leaders serving only a single national market. They must seek to serve multiple markets with global platforms. **The 2025 standards promote this goal because they set U.S. targets at a level that are consistent with the levels set by national authorities in other major auto markets.**

The automobile is a multi-attribute product. Fuel economy is just one of many factors that influence consumer purchase decisions and many of the technologies that affect fuel economy are invisible to the consumer. Consumers care a great deal about the body type, model and make of the vehicles they drive. The better advanced fuel economy technology fits into the consumer multi-attribute preference (rather than seeking to change it), the faster adoption will go.

One of the strengths of the new standards is that they are attribute-based, which means vehicles of different sizes must meet different standards. There is no need to push consumers to change their attribute preferences to meet the standards. Different segments and different technologies exhibit different levels of penetration, which is normal and expected.

ADOPTION OF HIGH FUEL ECONOMY TECHNOLOGIES, 1999-2012

Hybrids

Although the auto is a multi-attribute commodity, there is compelling evidence that

consumers now place fuel economy high up on the list of attributes they desire. **Surveys of consumers indicate that fuel economy has become a major vehicle attribute and support for standards programs is quite high.**

More importantly, the experience of the past decade reviewed below suggests that these attitudes are reflected in consumer behaviors (Slide 2). There was a rapid uptake of hybrids beginning about six years after its introduction. The recession clearly interrupted the growth of sales. However, sales have begun to grow more closely to their pre-recession trajectory.

There is also a strong correlation between models offered and sales (Slide 3). The growth of models was not interrupted by the recession, reflecting the fact that the auto industry functions on a multi-year design cycle. The growth in models available reflects and is driven by two other important developments, the offering of models across a broader range of body types by a broader range of manufacturers (Slide 4). Consumers can now find hybrids for all of the major body types from most of the large manufacturers.

The combination of expanding options and growing penetration pushed hybrids into the region of early adopters (measured by the share of new cars and SUVs) just before the recession. This year, sales will substantially exceed pre-recession levels. The hybrid share of total new car and SUV sales stands at 5%, well into the early adopter range.

4-Cylinder Engines

The second technology that provides important insight into consumer willingness to change their behavior is the dramatic increase in the purchase of four cylinder engines. As shown in Slide 5, over the period in which hybrid sales were expanding rapidly (post-2004). The sale of vehicles with 4-cylinder engines increased by over 1 million units per year.

The 4-cylinder engines were becoming more advanced, as measured by the increase in horsepower. There is a strong correlation between horsepower and sales (see Slide 6). **The market was doing its job to fill consumer needs with more fuel efficient vehicles.**

Combining hybrids and four cylinder engines, the share of new cars and SUVs accounted for by these higher fuel economy vehicles has increased from half of all units to three quarters. **This provides a strong experiential base for the introduction of new fuel savings technologies, many of which will not be as visible to consumers as the choice of power type or the number of cylinders.**

Plug-in Electric Vehicles (EVs)

Plug-in electric vehicles are much earlier in the innovation cycle and it is interesting to compare EVs to hybrids at the same level of sales (about 50,000 units). As Slide 7 shows, the EVs have more models, makes and body styles available than hybrids at an equal level of sales. These differences can be interpreted in two ways. On the one hand, one might expect that experience in the hybrid market has accelerated the path for automakers to move into EVs. On the other hand, the lower level of sales at higher numbers of models, makes and body types could be interpreted as reflecting the greater challenge for plug-ins to penetrate the market.

PROJECTIONS

Making projections in the early years of an adoption cycle is challenging because we cannot be sure of where we are on the adoption curve. Since the number of models available in the market is an important factor in adoption, it is interesting to note that J.D. Power projects a very rapid growth in the number of models for hybrids and plug-ins combined, which compares well to a simple innovation adoption curve projection of models in the market over the next decade, as Slide 8 shows. **Thus, there is a good chance that the growth of models will be sufficient to power a great deal of adoption.**

Indeed, if we look past the recession, we can project large numbers of hybrids and EVs (Slide 9). Notwithstanding the uncertainty of adoption predictions, industry analysts predict a rapid uptake, which would be consistent with moving into the heart of the adoption curve (Slide 10).

Thus, it is safe to conclude that the evidence on consumer behavior supports the conclusion that advanced technologies will find markets that are substantially larger than necessary to sustain the production of vehicles that incorporate fuel saving technology. The only questions are: who will the leading producers be and perhaps, how many? It is to the credit of the automakers that they recognize the need to build globally competitive platforms and supported the 2025 standards because of the important role that standards can play in speeding the diffusion of advanced technology.

Consumer behavior and attitudes suggest that by smoothing the way for automakers to put more fuel efficient technology into vehicles, the 2025 standard will move the market to substantially higher levels of fuel economy than would have been realized without the standard. Over the past ten years, our analysis has demonstrated the numerous market barriers and imperfections that have led the auto market to fall short of the economically optimal level of fuel economy. With the new standards in place, it is time to focus on the analysis of the dynamic processes that the long-term standard can trigger in the marketplace.

Sources for Slides

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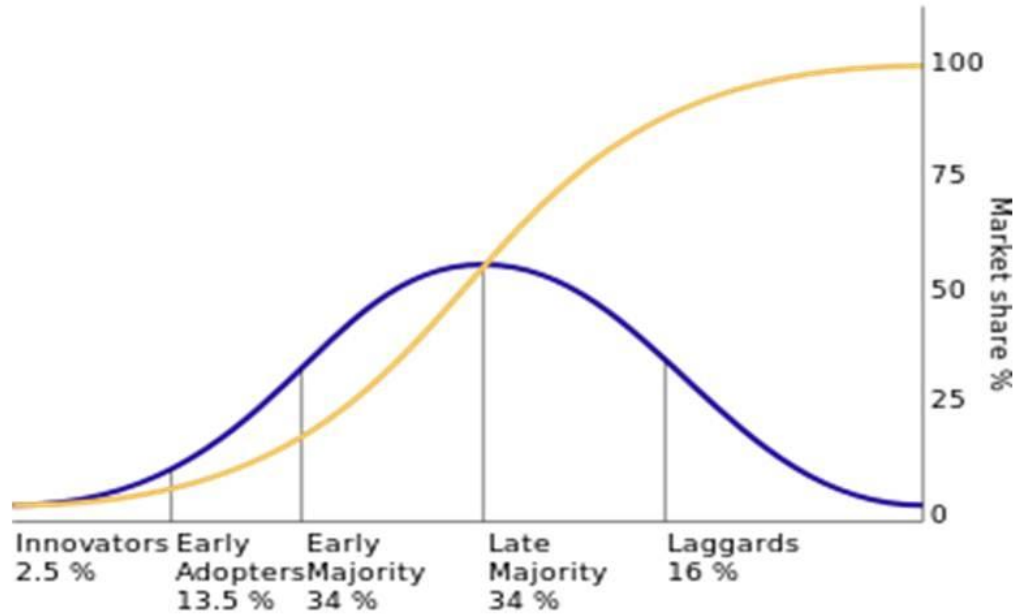
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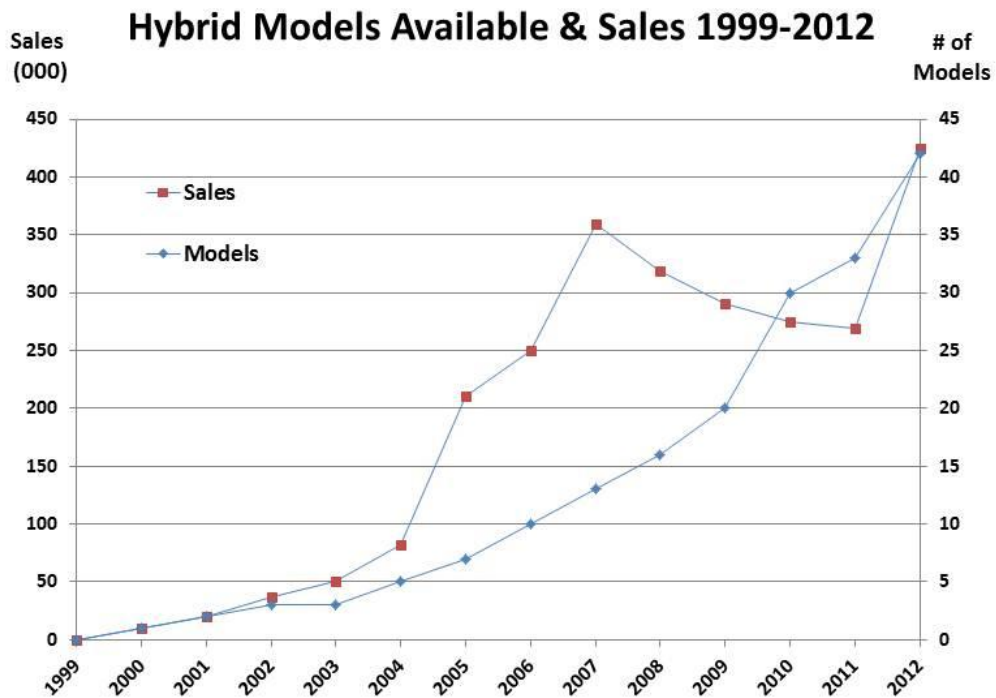
The Boston Consulting Group, The Comeback of the Electric Car? How Real, How Soon, and What Must Happen Next?, June 2011, Exhibit 5, from the “steady pace Scenario.”

Slide 1

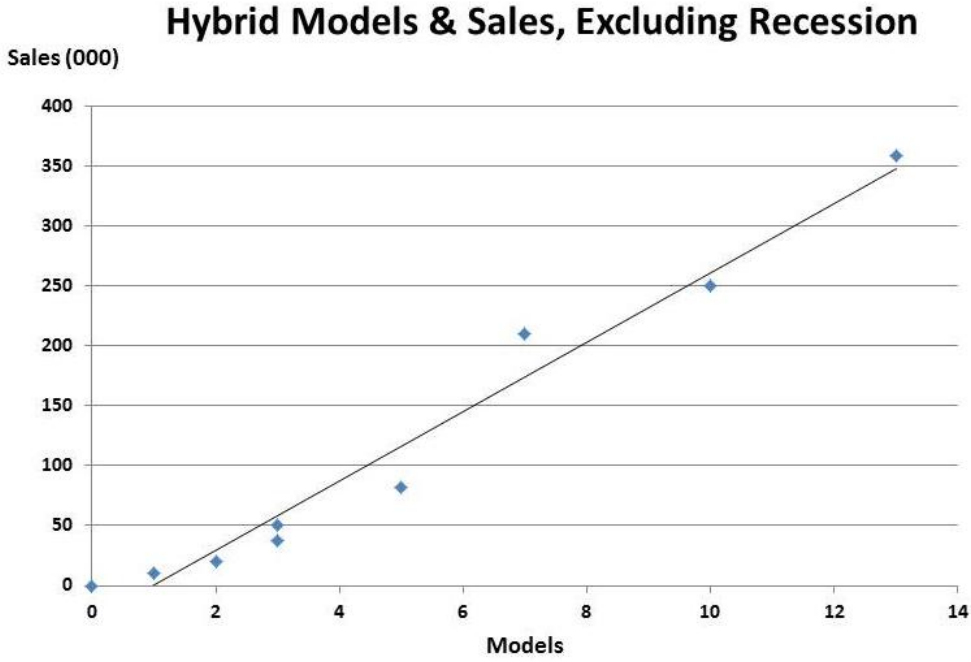
The Classic Innovation Diffusion Framework



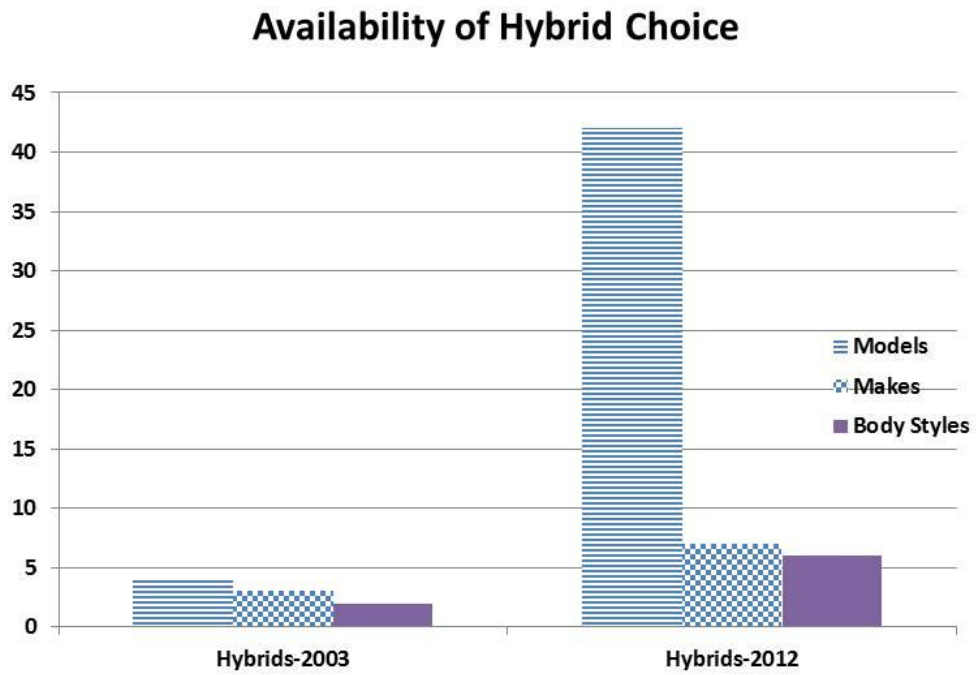
Slide 2



Slide 3

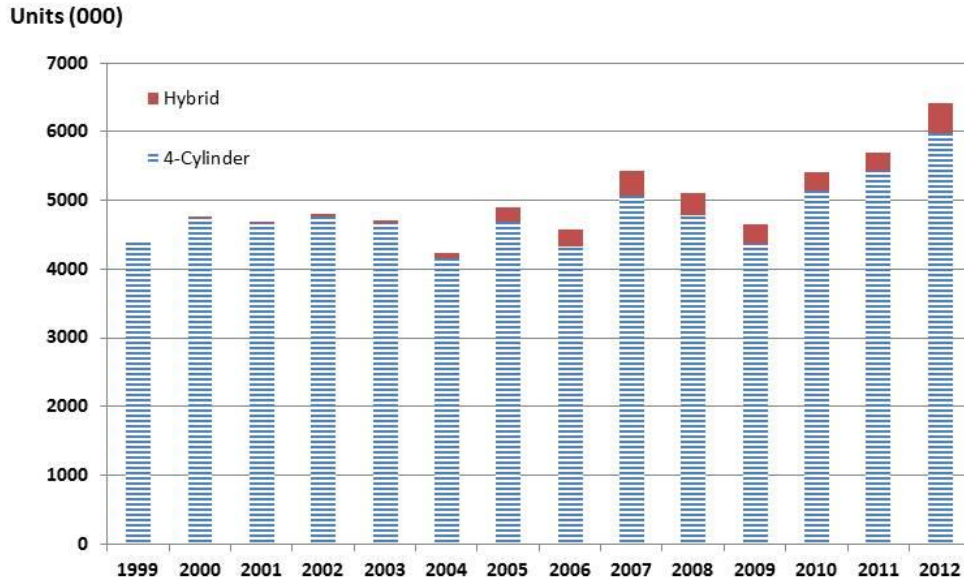


Slide 4



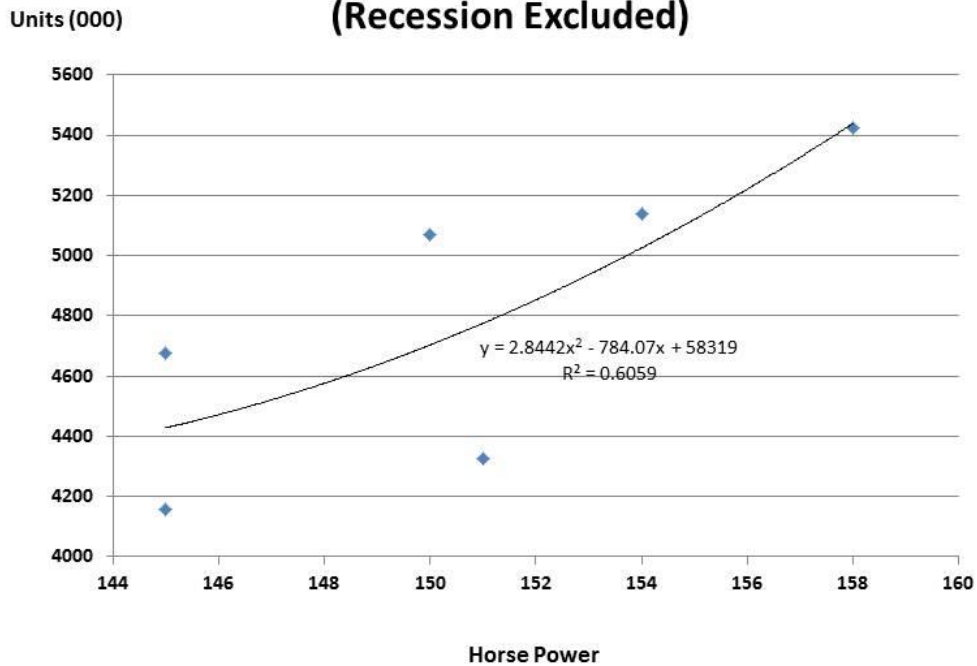
Slide 5

4-Cylinder and Hybrid Sales



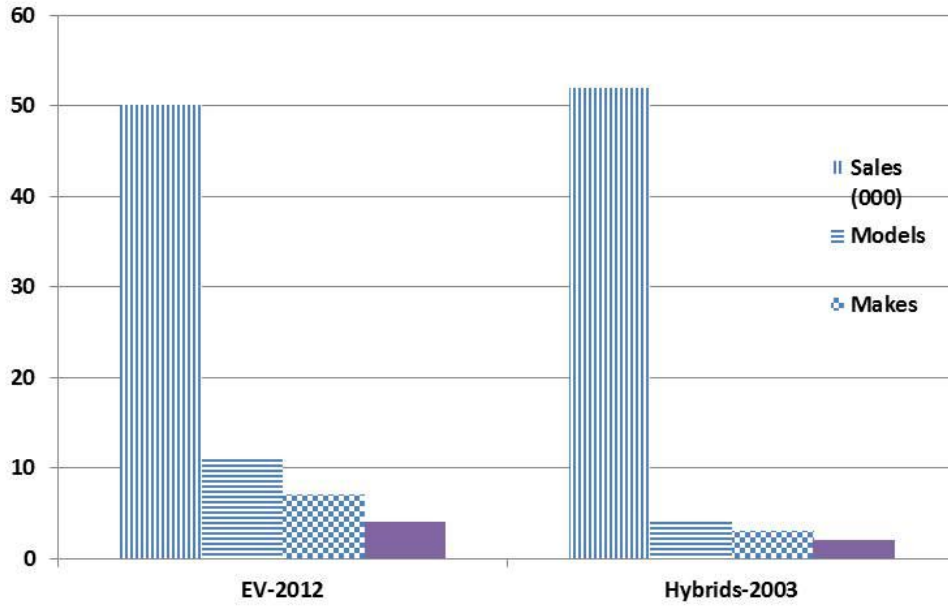
Slide 6

4-Cylinder Horse Power and Sales (Recession Excluded)



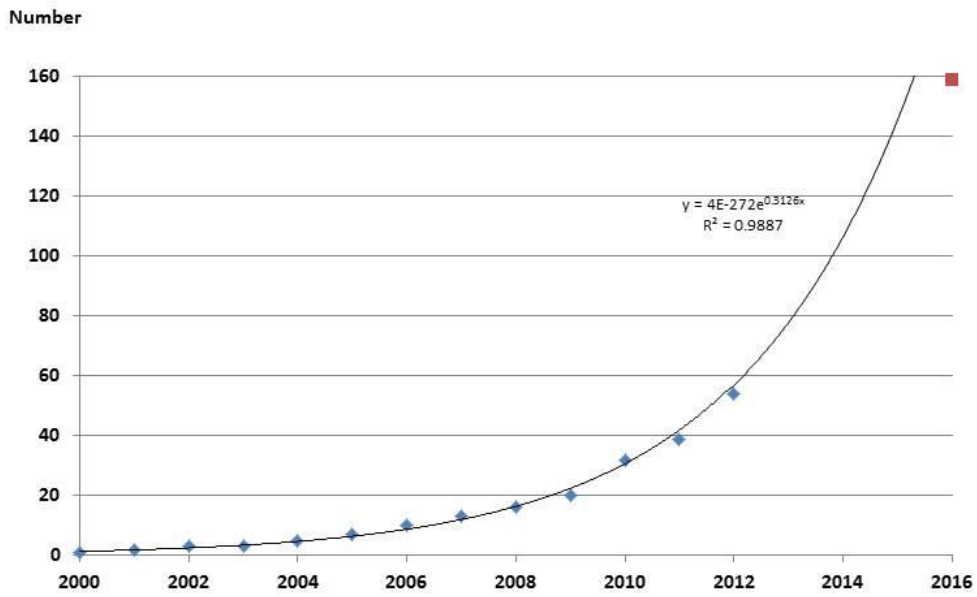
Slide 7

Early Development - Plug-ins v. Hybrids



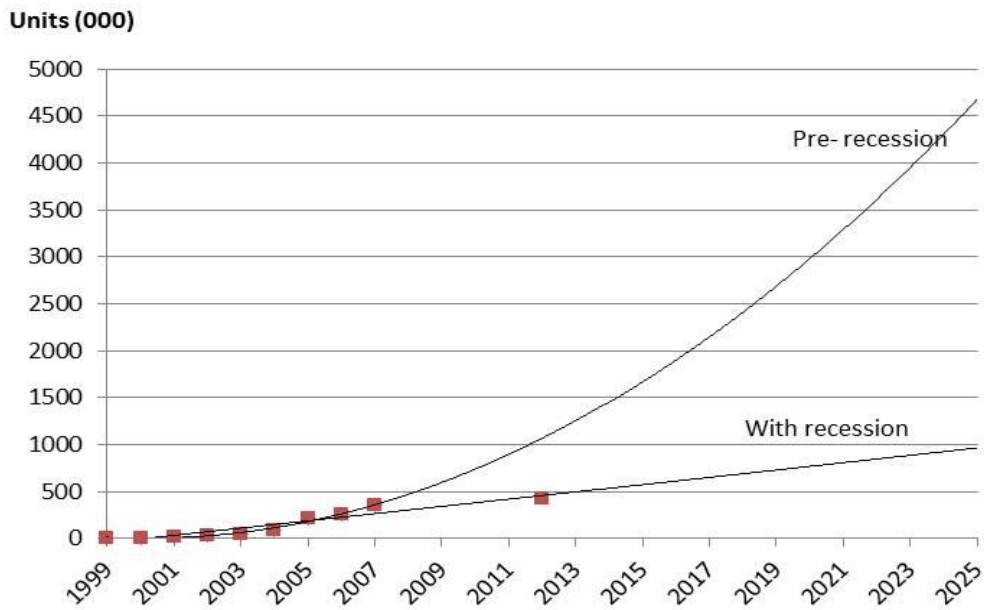
Slide 8

EV Models Offered, History + JD Power Projection



Slide 9

Projection of Hybrid Sales to 2025



Slide 10

INDUSTRY PROJECTIONS OF ELECTRIC VEHICLES SALES

