EIA-DOE Vehicle Choice and Markets Technical Workshop

Meeting Summary

The Department of Energy (DOE) and Energy Information Administration (EIA) held a workshop on January 25th, 2013 in Detroit, MI with marketing and automotive industry experts to discuss and better understand consumer acceptance of hybrid, plug-in hybrid, and battery electric vehicles. The workshop focused on recent survey analyses, market representation, state of the art modeling, and comparisons of projected model results. This event provided a rare and insightful opportunity to compare and contrast our understanding and representation of vehicle markets and vehicle choice modeling with our nation's automotive leaders to assure that EIA's future projections and policy analyses that examine the potential impacts of electric powertrain vehicles under varying assumptions are consistent with the understanding and expectations of industry experts.

Invited speakers provided details on modeling approaches and techniques; consumer, demographic, and market segmentation; model calibration and validation; and consumer awareness and attitudes toward advanced technology vehicles. Presentations were followed with industry expert commentary and group discussions. While consensus was reached on several factors that are critically important to the adoption of electric powertrain vehicles, there was a broad spectrum of potential issues identified that are also relevant to eventual market success. Due to a lack of consumer familiarity with electric powertrain vehicles, especially battery electric vehicles, it was generally agreed that there is still a lot we do not know about how consumer acceptance and preference for electric powertrain vehicles will evolve over time. In addition, market influences beyond consumer behavior (such as future policies, advances in competing technologies, and the cost and availability of competing alternative fuels) will have deterministic effects on vehicle technology development and the products made available to the market.

The bottom line from this discussion was that consumers overall are applying a choice framework that appears consistent with a rational, risk-averse model. However, notable niche market opportunities (on the scale of the Prius sales model) also coexist within the distribution of consumer EV acceptance. It remains unknown how many more niche markets could be developed, the specific marketing approaches this would require, or their relative size in terms of EV sales. Beyond niche markets, this discussion indicated that truly large-scale EV market penetration will likely continue to be

hampered by cost, with less significant hurdles also present due to unfamiliar technology, infrastructure limitations, and performance issues with EVs to date. Regulatory policy and market changes would influence these outcomes, but speculative scenarios were not the focus of the discussion on this occasion.

Although scenarios were not discussed, participants indicated that market success of electric powertrain vehicles would be critical to meeting future minimum corporate average fuel economy requirements indicating the need for further study to better understand consumer perceptions of electric powertrain vehicles to identify vehicle attributes and infrastructure issues that will needed to be addressed to enable successful market acceptance.

Summary of the key findings:

1. Multiple modeling techniques are being employed to examine potential market penetration of electric powertrain vehicles. Generally speaking, theses models are producing similar overall penetration results with differences being identified in consumer segmentation, demographic representation, regional representation, and assumptions regarding potential improvement in electric powertrain cost and performance.

2. Currently, most models used to project future market share of electric powertrain vehicles are based on nested multinomial logit structures with coefficients derived from revealed and/or stated preference data for specific vehicle attributes. Studies testing the connection between stated and revealed preference data have shown that consumers overstate their willingness to pay for efficiency and environmentally friendly products.

3. Market heterogeneity is a very important consideration. There are currently over 1,000 make and model choices in the new light-duty vehicle market that caters to a very diverse consumer base with a wide variety of transportation needs that harbors strong perceptions and biases about available choices. In addition, consumer perception of and preference for vehicle attributes like safety, quality, styling, and reliability are very important but difficult to measure and quantify. New and unfamiliar technologies, like plug-in electric vehicles, have additional awareness and perception issues that limit market consideration and are not well understood.

4. The value of fuel economy savings to consumers is widely varied across market segments. Technology early adopters are generally price insensitive and purchase decisions are not influenced by regulation and pricing incentives. Mass market consumers are innately risk adverse and are much less willing to pay increased vehicle costs for uncertain future payback in fuel savings but do appear to act as rational

consumers. As conventional technology vehicles improve fuel economy, consumers will become less sensitive to additional fuel savings that could be gained from non-conventional advanced technology vehicles.

5. Recent surveys indicate that early adopter interest in electric powertrain vehicles is decreasing with negative headlines while the other mass market group interest is consistent with previous surveys. In a recent pricing surveys, the consumer-preferred price for a plug-in electric vehicle (PEV) has been falling with each year of the survey and suggests PEVs are still overpriced relative to willingness to pay. Currently, the vast majority of electric powertrain vehicles are being purchased by households with income greater than $100,000.

6. The observed sales of EV models such as the Prius demonstrates some level of niche market potential within the broader consumer preference set. Marketing strategy will likely be critical to the development of further niche markets. It is unknown precisely how such opportunities will be developed, on what time frame or to what specific scale in terms of model sales. For the near term, this element could be a major factor in providing a limited scale build-out opportunity for both vehicle technology and infrastructure for charging, maintenance etc. In addition, these niche market impacts could have a positive effect on some of the non-cost elements of consumer uncertainty for the broader market—provided that the EVs perform well and have minimal negative events for their owners.

7. Consumer awareness and understanding of electric powertrain vehicles is limited, but consumers can identify certain PEV attributes as potential deal breakers. Anxiety over limited driving range and fear of getting stranded due to limited infrastructure and long recharge times will keep some consumers out of the market. Proliferation of electric powertrain vehicles with very diverse all electric capabilities, plug-in requirements, and industry labels confuses consumer understanding of product offerings. Addressing these issues will significantly expand market potential as indicated in a survey of localized consumer attitudes that were significantly improved after infrastructure development and education efforts were put in place.

8. Lastly, participants proposed that environmental, fuel price, or technological events could occur, leading to paradigm shift in consumer preference for electric powertrain and alternative fuel vehicles.