Who are the Participants in The EV Project? August, 2013

The EV Project is an infrastructure study in which over 8,000 residential participants have been enrolled. These participants purchased or leased a Nissan Leaf or Chevrolet Volt and have been among the first to explore this new electric drive technology. The EV Project participant has generally been very cooperative and enthusiastic about his/her participation in the study and very supportive in providing feedback and information. The demographics of these innovators and early adopters of electric vehicles (EV) were speculated by many but little was actually published, so demographic information was solicited from the EV Project participants in a recent survey.

Why is this important?

Everett Rogers sought to explain how new technologies can spread through a culture in his book *Diffusion of Innovations.* According to the theory, new technology products must be successful for the innovators and early adopters before it can be accepted by the larger market. Any market consists of the groups identified in Figure 1 which also shows their typical share of that market.

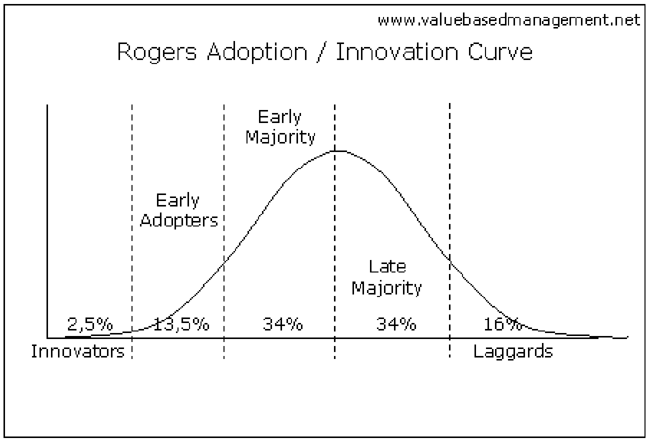

Figure 1. Rogers Adoption/Innovation Curve[1]

The demographics of the innovators and early adopters of electric transportation then are of interest because they are the leaders in bringing this new technology into use.

Participation Requirements

Every study has boundary conditions. The EV Project had boundaries for participation that included time and budget constraints as well as physical geographic limitations.

In exchange for allowing the collection and use of their charging data in the study, The EV Project provided the Blink Electric Vehicle Supply Equipment (EVSE), used to recharge the Plug-in Electric Vehicle (PEV) battery, and credit toward the installation of the EVSE at their residences. The installation credit was constrained by the overall Project budget and costs exceeding this credit were borne by the participant. Single-family homes with their electrical service entrance near the garage would be the least costly installation. Installation costs for multi-unit dwellings and older homes with long electrical conduit runs or insufficient electrical service proved to be a significant barrier for many potential participants. (The residential installation experience and costs will be explored in another report[2] to be posted at www.theevproject.com.)

Because the Nissan Leaf is a battery-only EV, it was essential that the residential installation process be expeditious. At the beginning of The EV Project, there were almost no publicly accessible EVSE units, so the EV driver would have to recharge at home where most of the charging would be expected to occur. The AC Level 1 cordset provided with the Leaf would require up to 20 hours to fully recharge the battery. Multi-unit dwellings and rental property would require approvals of owners or home owners associations or property managers, and these approvals would likely be a lengthy and variable process. The single-family home that was owner occupied proved to be the circumstance with the shortest installation time.

The initial regions of The EV Project, which were based on the Nissan Leaf sales roll-out plan, included areas where innovators and early adopters of EVs could be found. The regions were later expanded to include 16 metropolitan areas in 9 states plus the District of Columbia. Within these regions, the physical study boundary also had to be established.

Because this was an infrastructure study, the charging behavior of the residential participant with the publicly accessible EVSE was a primary interest. Consequently, the residential participant needed to reside within roughly 40 miles from the city center; approximately one-half the Leaf's advertised range. Figure 2 shows the typical boundary for Washington, D.C. region.

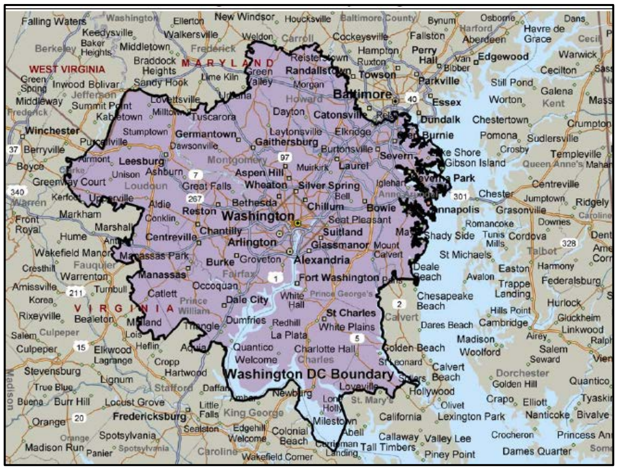

Figure 2. Washington DC Participant Boundary

Based on the above conditions, residential participation in The EV Project consisted of those eligible and willing EV drivers living within 40 miles of the major metropolitan center, and residing in an owner-occupied, single-family residence.

Regional Participation

The local PEV supplier promotions, along with local incentives and local market adoption rates, determined the interest by the public which led consequently to the enrollment figures in The EV Project. The enrollment in the EV Project was complete early in 2013, and the final composition of the participants is identified in Table 1. Because of another Department of Energy (DOE) project in the area, the Chevrolet Volt drivers were not included in The EV Project in the San Francisco region.

Table 1. Regional Participation in The EV Project

	Leaf	Volt
Arizona	376	156
Los Angeles	471	344
San Diego	722	277
San Francisco	1874	-
Oregon	558	136
Wash State	969	177
Tennessee	942	144
Texas	34	288
Wash DC	50	291
Atlanta	176	77
Chicago	34	129
Philadelphia	32	54
Overall	6238	2073

The original completion date of The EV Project was December 2012. It was later extended to December 2013 so some of the participants retired from the Project at the end of the original period. In addition, some other participants have been retired because they sold their vehicles or their vehicles were destroyed in accidents.

Participant Survey

With full enrollment achieved, The EV Project desired to know participant experience and attitudes toward many aspects of their EV usage. A survey was sent to 7,730 EV Project participants and responses were received from 3,236 for a 42% response rate. Among the topics identified were questions on their personal situations such as education and income levels. Information and observations based on the responses received from EV Project participants are included below.

34 of the respondents reported having both a Leaf and a Volt in The EV Project and 13 reported they were no longer participating. Table 2 presents the responses received by region and single vehicle type.

Table 2. Survey Responses by Region

	Leaf Responses	Volt Responses
Arizona	159	74
Los Angeles	133	120
San Diego	244	109
San Francisco	553	-
Oregon	211	74
Wash State	378	83
Tennessee	345	54
Texas	11	119
Wash DC	13	114
Atlanta	74	39
Chicago	15	67
Philadelphia	13	26
Unknown	159	2
Overall	2308	881

EV Driver Gender

Participants were asked “What is the gender of the primary driver of the EV?” 3063 responses were received. Figure 3 provides the responses by region.

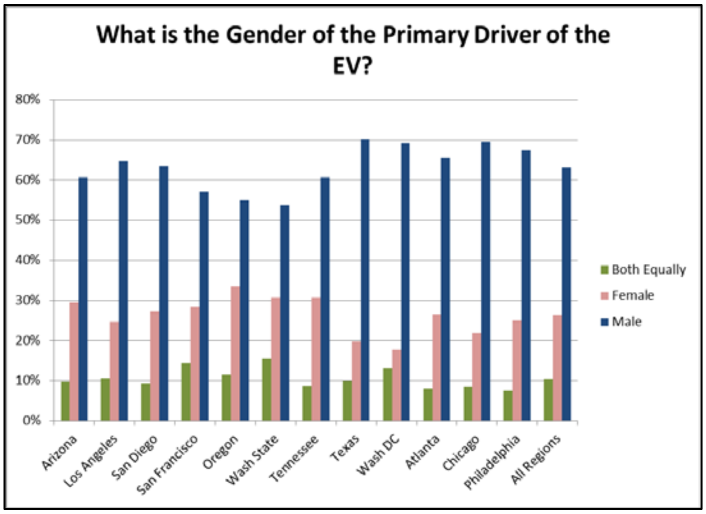

Figure 3. Gender of EV Primary Driver

Overall 63% of the primary EV drivers are male, but this percentage reaches nearer 70% in Texas, Washington, D.C., and Chicago. On the other hand, Oregon presents the highest percentage of female drivers at 34%.

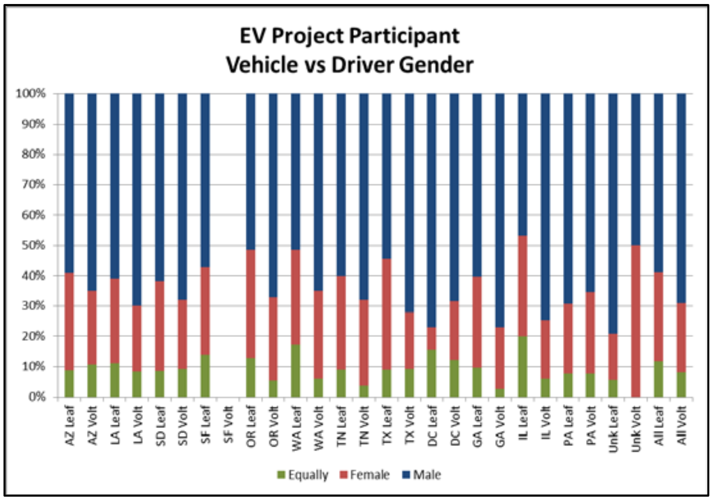

Figure 4. Gender vs. Vehicle Type by Region

Figure 4 compares the gender of the primary driver by Leaf or Volt for the regions. Overall, the Volt driver is more predominantly male than the Leaf with 69% of Volt drivers and 59% of Leaf drivers male.

Participant Age

Participants were asked "What is the age of the primary driver of the EV?" 3065 responses were received. Figure 5 provides the responses by region. The average age in that region is shown above the bars.

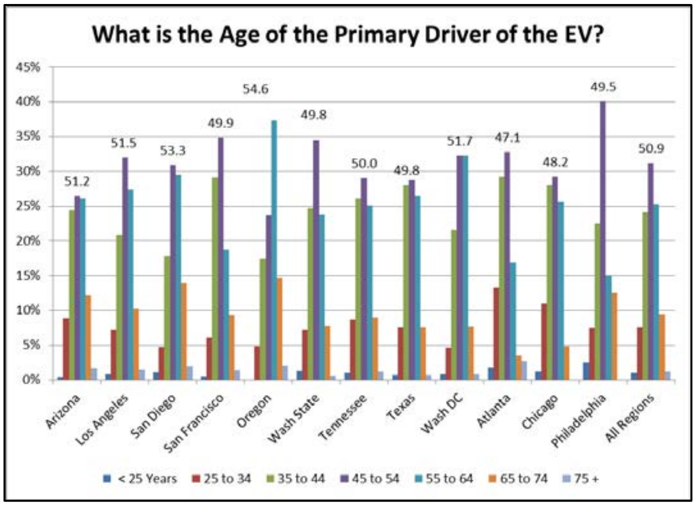

Figure 5. EV Driver Age by Region

The bars for All Regions shows a regular distribution of the age groups, with the mean age being 50.9 years, but the distribution can vary significantly in each region. Oregon and San Diego have slightly older drivers (means of 54.6 and 53.3 years, respectively), whereas Atlanta and Chicago have slightly younger drivers (means of 47.1 and 48.2 years, respectively).

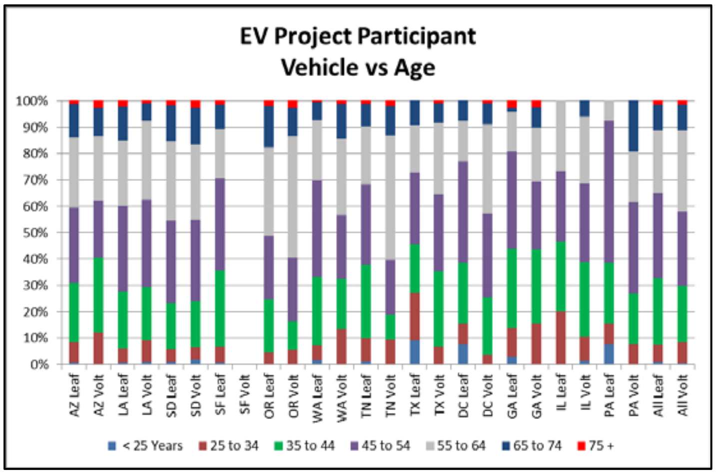

Figure 6. EV Driver Age by Vehicle Type by Region

Figure 6 shows the comparison of driver age by vehicle type for each region. The comparison of the All Leaf and All Volt shows that overall; the average Leaf driver is slightly younger (average age 50.6 years) than the average Volt driver (average 51.6 years). This age difference appears to be most significant in Oregon, Washington State, Tennessee, Washington DC and Philadelphia.

Participant Income

Participants were asked "What is your approximate average household income?” 2813 responses were received. Figure 7 provides the overall response distribution. Figure 8 provides the responses by region.

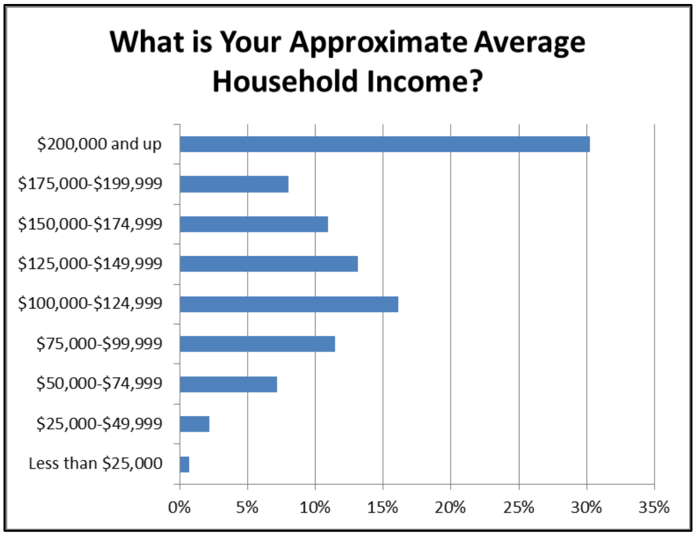

Figure 7. Household Income Distribution

Using the midpoint of each range and a cap at $212,500, the average household income is $148,811.

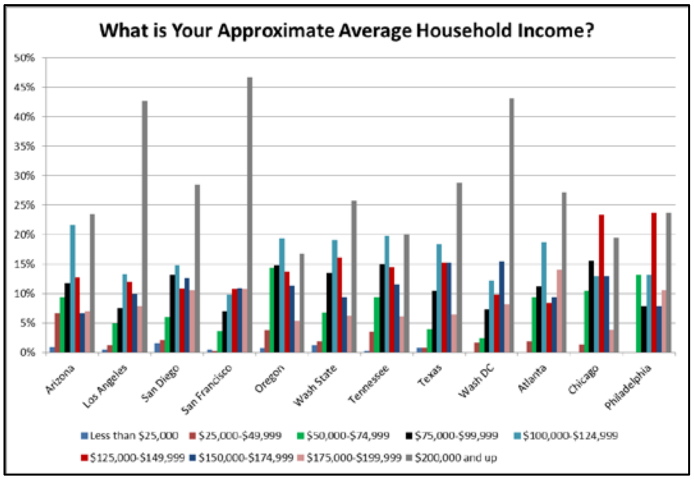

Figure 8. Household Income by Region

San Francisco, Washington DC and Los Angeles showed the highest average household income, which probably reflects actual population demographics.

Figure 9 continues the evaluation by considering the vehicle type obtained by the participant.

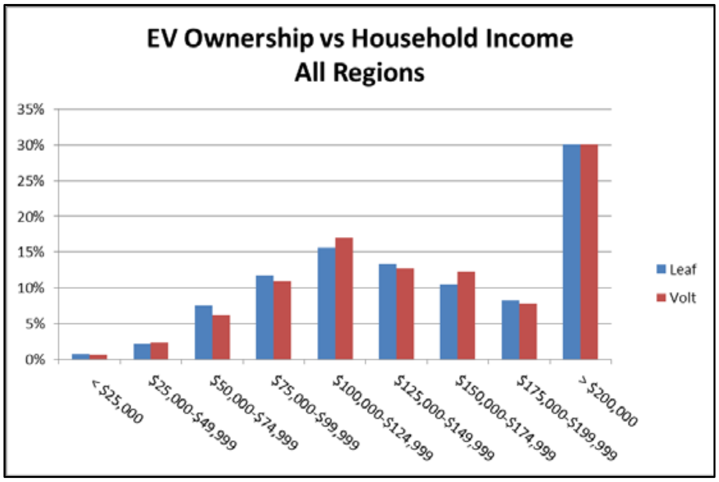

Figure 9. Household Income vs. Vehicle Type

For the combined regions of The EV Project, there is little difference between types of vehicle purchased or leased based upon income.

Participant Education

Participants were asked “What is the highest level of education for the primary EV driver?” 3040 responses were provided. Figure 10 provides the overall response distribution.

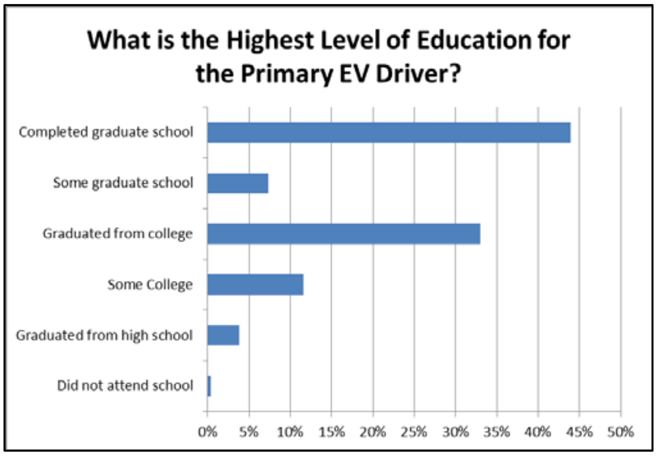

Figure 10. Primary Driver Education

84% of the primary drivers have college degrees with 44% having advanced degrees.

Figure 11 continues the evaluation by considering the education achieved by the participant vs. the type of EV.

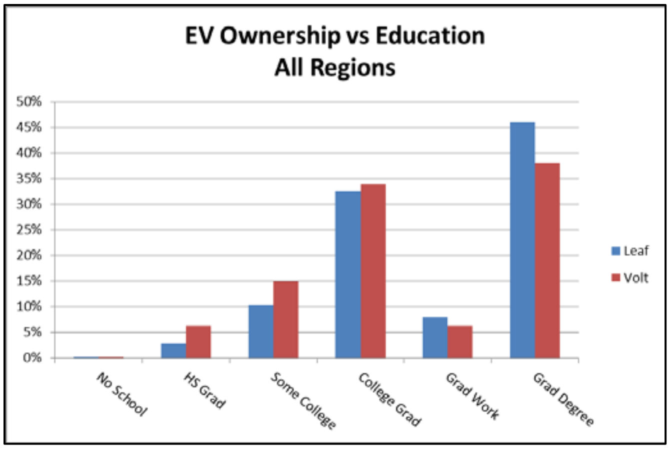

Figure 11. Primary Driver Education vs. Vehicle Type

Leaf drivers are slightly more likely than Volt drivers to have completed some graduate-level work (7% vs. 6%) and noticeably more likely than Volt drivers to have graduate degrees (46% vs. 38%).

Figure 12 provides the same comparison by region.

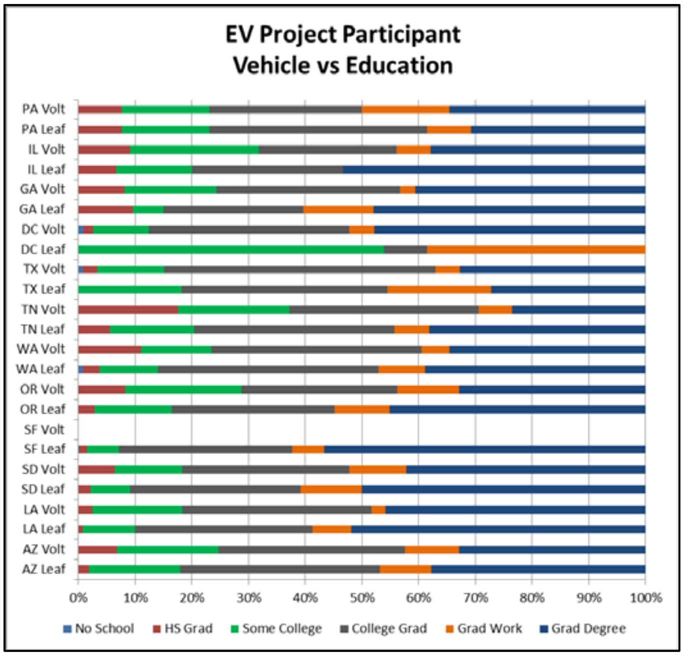

Figure 12. Driver Education by Vehicle Type by Region

How Has this Changed over Time?

At the end of February 2012, there were a total of 4,135 residential participants in The EV Project or about 50% of the final enrollment. These are the "earliest" of the early adopters and innovators because the EVs had been available on the market for only one year at that point. The Nissan Leaf was still being marketed to those who had reserved the vehicle in advance. How do the demographics of this group compare to the final complement?

The survey responses were screened to include only those whose EVSE installation occurred prior to March 2012. A total of 1465 responses then were valid. This represents 35% of the participants at that time.

Primary Driver Gender Comparison

There are 1453 valid survey responses for the "What is the gender of the primary driver of the EV?" question for those enrolled prior to March 2012. The responses are shown in Figure 13.

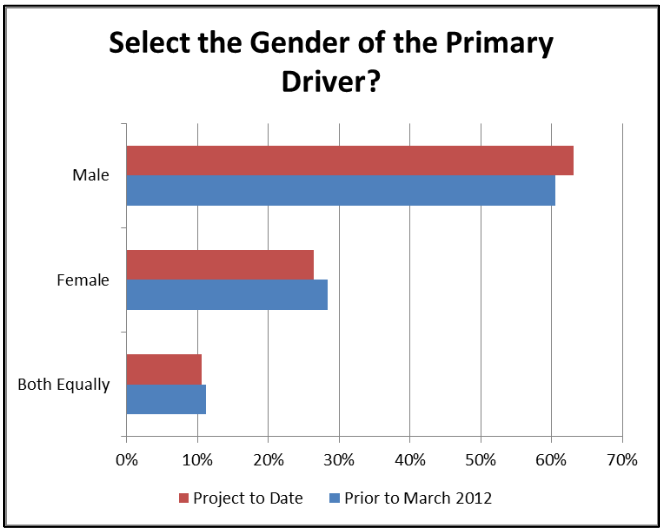

Figure 13. Primary Driver Gender Comparison

As noted above, the PEV driver is predominately male and Figure 13 illustrates that the driver gender has gotten more so since March 2012. However, it is noted that prior to March 2012, 8.2% of the participants were Volt owners which grew to 24.9% by the end of the enrollment. As noted above, more Volt drivers are male than Leaf drivers, which could account for the change noted in Figure 13.

Participant Age Changes

There are 1454 valid survey responses for the "What is the age of the primary driver of the EV?" question for those enrolled prior to March 2012. The responses are shown in Figure 14. An adjustment to the present day responses was conducted because the age of the participant would have been 1 year less if the survey had been taken in March 2012.

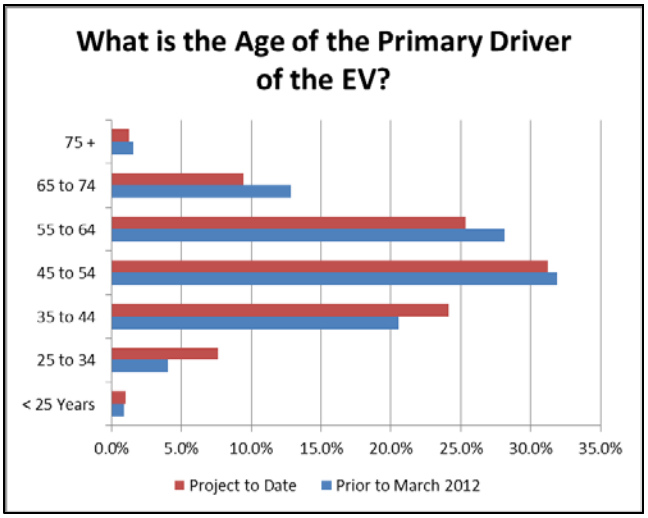

Figure 14. Primary Driver Age Comparison

The age of the primary driver has shifted to be slightly younger than when The EV Project was 50% subscribed.

The average age prior to March 2012 would have been 51.7 years old compared to 50.9 when The EV Project was fully subscribed.

Participant Household Income Changes

There are 1316 valid survey responses for the "What is your approximate average household income?" question for those enrolled prior to March 2012. The responses are shown in Figure 15.

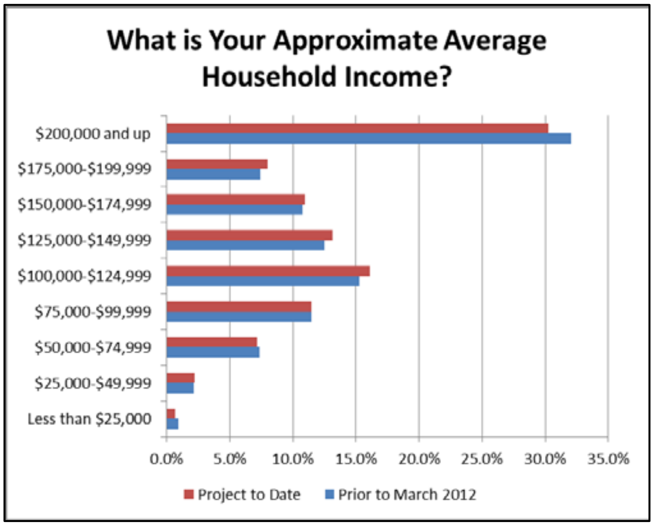

Figure 15. Household Income Comparison

Average income prior to March 2012 was $149,688; slightly higher than the fully subscribed average income of $148,811.

Participant Education Changes

There are 1443 valid survey responses for the "What is the highest level of education for the primary EV driver?" question for those enrolled prior to March 2012. The responses are shown in Figure 18.

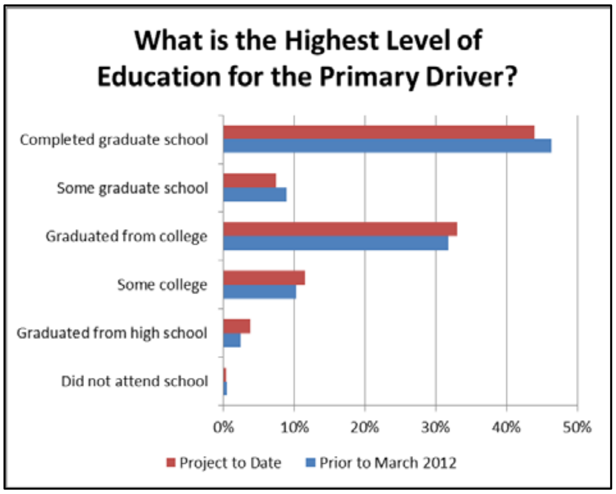

Figure 16. Primary Driver Education Comparison

Prior to March 2012, 87% of all participants had earned a college degree. After full enrollment 84% had achieved this degree.

Observations

Prior to the delivery of PEVs starting late in 2010, it was postulated that the PEV adopter would be more highly educated with higher household income than the majority of vehicle buyers. This has been proven to be the case. In addition, the typical EV driver is a male about 51 years old.

Age, education and household income are related naturally, however, it should be noted that there are many in The EV Project that contrast significantly with the typical participant. Approximately 16% of the participants do not have a college degree, 10% have incomes less than $75,000, and 8.6% are under the age of 34.

Conclusions

Although PEV adoption continues to be very strong in the United States, very little has changed in the demographics of these drivers when comparing the total to the very first year. However, there does appear to be the start of a shift to a younger and less wealthy demographic. Perhaps the adoption trend is moving closer to the early majority noted in Figure 1.

About The EV Project

The EV Project is the largest electric vehicle infrastructure demonstration project in the world; designed and managed by ECOtality North America (ECOtality), with a budget of over $230 million USD, equally funded by the United States (U.S.) Department of Energy (DOE) through the American Recovery and Reinvestment Act and ECOtality and its partners. The EV Project will deploy and study approximately 13,000 AC Level 2 EVSE charging stations for residential and commercial use, as well as 200 dual-port DC Fast Chargers in conjunction with the usage data from 8,000 Nissan LEAF™ and Chevrolet Volts. This project will collect and analyze data, and publish lessons learned on vehicle and EVSE use, and driver behavior. This material is based upon work supported by the DOE under Award Number DE-E0002194.

Company Profile

ECOtality, Inc. (NASDAQ: ECTY), headquartered in San Francisco, California, is a leader in clean electric transportation and storage technologies. Its subsidiary, Electric Transportation Engineering Corporation (eTec) dba ECOtality North America (ECOtality), is a leading installer and provider of charging infrastructure for PEVs. ECOtality has been involved in PEV initiatives since 1989 in North America and is currently working with major automotive manufacturers, utilities, the U.S. DOE, state and municipal governments, and international research institutes to implement and expand the presence of this technology for a greener future.

References

[1]"Acceptance and Diffusion of Innovations", http://www.valuebasedmanagement.net/methods_rogers_innovation_adoption_curve.html, accessed August14, 2013
[2]"Residential Installation Costs and Challenges" – Lessons Learned, www.theevproject.com.

For more information, visit www.theevproject.com

blink™

BLINK™, BLINK LINK™, EV MICRO-CLIMATE™ and the BLINK™ logo are all trademarks of ECOtality, Inc.

ecotality NORTH AMERICA

Electric Transportation Engineering Corporation
dba **ECOtality North America**
430 S. 2nd Avenue
Phoenix, Arizona 85003-2418
(602) 716-9576