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Written Testimony of Megan McKernan
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Before the U.S. House of Representatives Energy and Commerce Committee, Subcommittee on Environment

May 8, 2018

On behalf of AAA, I would like to thank you for the opportunity to express our views on consumer attitudes related to electric vehicles (EVs). As a vocal consumer advocate, AAA has invested significant resources into understanding and evaluating vehicle ownership trends, fuels, automated vehicle technologies and electric vehicles. This effort includes fostering relationships with automakers, surveying consumer attitudes and purchase intentions, conducting cutting-edge research, and testing of the latest automotive technologies.

One of the key investments we have made in this area is the Automobile Club of Southern California's Automotive Research Center (ARC), which is located in Los Angeles. The ARC has a premier vehicle emission test laboratory featuring state-of-the-art facilities and equipment operated by a team of highly qualified engineers and technicians, who I have had the privilege to lead over the last five years.

With over 100 years of experience, AAA is a trusted, independent authority in the automotive industry. AAA experts serve on Society of Automotive Engineers (SAE) committees responsible for setting automotive standards and participate in the Automotive Information Sharing and Analysis

Center (Auto-ISAC) working group responsible for vehicle cybersecurity guidelines. Most importantly, AAA serves 58 million members and is a leading traffic safety advocate.

AAA commends the Subcommittee on its thoughtful and deliberative approach to studying the policy implications of EVs becoming more prevalent on the nation's roads. The internal combustion engine – running on liquid fuels – is likely to remain the most dominant propulsion technology for consumers in the coming decades. However, the pace of battery EVs and plug-in hybrid vehicles being introduced into the national fleet is likely to accelerate, especially as technology trends ramp up due to changing consumer preferences and the adoption of connected and autonomous vehicles. Moreover, as charging infrastructure expands throughout the country and ownership costs lower, more and more consumers are deciding to switchover to vehicles that use electricity as their primary fuel source. Today's hearing comes at an optimal time given how quickly transportation technology is evolving and electric vehicles growing visibility among all road users. In 2017, electrified vehicles accounted for 3.3% of U.S. vehicle sales. This is up from 2015 and 2016.

AAA is actively working to help make sense of all of this innovation for our members and consumers, providing useful advice on technology adoption trends for both consumers and policymakers.

Background

American drivers have a growing appetite for EVs. According to a new AAA survey, 20 percent of Americans (50 million) are likely to go electric for their next vehicle purchase – a jump of 5 percentage points from just a year ago. With lower-than-average ownership costs, increased driving

ranges and the latest advanced safety features, more consumers than ever are interested in EVs. Moreover, concern for the environment is still a top reason 80 percent of Americans who are considering an EV may make the leap next time they are in the market for a new vehicle.

These trends are in line with global movement toward EVs in the industry, where China – for example – saw 2017 sales figures for EVs reach four times those found in the U.S. market. In the last two years, several countries and major automotive markets poised for growth, including China, India, Japan and South Korea, have set ambitious goals for EV proliferation throughout their respective national fleets. In Europe EVs represented approximately 5% of vehicle sales. Additionally, some policymakers around the globe have started efforts to ban consumers from purchasing diesel and gasoline-powered vehicles in the future decades, or offer increasingly enticing incentive plans aimed at luring consumers away from the internal combustion engine. Automakers are taking note of these trends and are aligning their own investment and research timelines to match the new contours of the evolving automotive industry. It is estimated that automakers will invest more than $90 billion in vehicle electrification to remain competitive in the global EV market.

Green Car Guide

As potential EV buyers look at all of the vehicle options on the market, including electric vehicles and alternative fuel vehicles, AAA has undertaken independent, rigorous test-track evaluations of plug-in hybrids, hybrid and fuel-efficient, gas-powered vehicles to help consumers understand current models. Since 2010, the annual AAA Green Car Guide has become a trusted source of information for buyers who are looking to maximize the value of their purchase.

The rigorous research and evaluations are conducted by the Automobile Club of Southern California's Automotive Research Center (ARC), which rates and ranks new vehicles and publishes the annual AAA Green Car Guide. To be eligible for AAA Green Car Guide evaluations, which are conducted by AAA's ARC engineers and technicians who have more than 75 years of combined automotive experience, vehicles must be a hybrid or plug-in hybrid, battery electric, compressed natural gas (CNG), hydrogen, other alternative fuel vehicle or have category-leading fuel economy set by the U.S. Environmental Protection Agency (EPA). All vehicles are evaluated in 13 different categories in real-world and test track evaluations that include acceleration, handling, ride comfort and other important factors. The driving tests were performed at the Auto Club Speedway in Fontana, California and on southern California roads. Testing procedures were developed using the Society of Automotive Engineers (SAE) standards and custom procedure employed by the ARC to provide useful information to members and consumers.

Vehicles are rated on the criteria that matter most to car buyers, including ride quality, safety and performance. In 2018, we evaluated 74 vehicles and we awarded top vehicles, based on our findings, AAA's Top Green Vehicle Awards in several categories, including best midsize car and best value for $30,000 - $50,000. The guide also provides a listing of top cars for teens. A complete list of the award recipients is available in the report, and available online for consumers.

Additionally, to support EV drivers, AAA tracks charging station availability via the AAA Mobile app and TripTik Travel Planner as a service that provides useful data drivers need to plan trips. AAA has also piloted mobile EV charging in several markets, and while usage of this service is very low,

the learning will help prepare us for the future when EVs make up a larger percentage on the vehicles on the road.

EV Consumer Survey

As the domestic EV market heats up, Americans are greeted with more choices than ever when purchasing a vehicle. To better understand changing consumer preferences, AAA conducted a telephone omnibus survey in March 2018 with over 1,000 adults 18 years of age or older to gauge consumer attitudes toward electric vehicles. A similar study in 2017 provided insight into how consumers' thinking has evolved toward the technology.

To understand consumer attitudes toward electric vehicles, AAA pursued three lines of inquiry for its 2018 survey. First, we sought to investigate how many Americans are interested in buying an electric or hybrid vehicle. Next, we wanted to uncover the motivations for Americans to purchase an electric vehicle. Additionally, we thought it would be critical to understand what prevents Americans from purchasing an electric vehicle and how convenient it is to charge an electric vehicle, which can be a crucial consideration for American EV buyers.

Our findings from the 2018 survey revealed the following:

- Two-in-ten (20%) Americans say they are likely to buy an electric vehicle the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017's survey results.

- Consumers who are likely to buy an electric vehicle would do so out of concern for the environment (80%), lower long-term ownership costs (67%), cutting edge technology (54%) and access to the car pool lane (35%).
- Reliability and fuel economy/range are the most important criteria for consumers when choosing which hybrid or electric vehicle to buy.
- Nine-in-ten (92%) Americans who are likely to buy an electric or hybrid vehicle, consider reliability important, followed by fuel economy or how far the vehicle can go on one charge (87%).
- Other considerations include crash rating (77%), cost (71%), vehicle performance (69%) advanced safety technology such as automatic emergency braking and lane keeping assistance (60%).
- Six-in-ten Americans (63%) who are unlikely (or unsure) to purchase an electric vehicle are concerned there are not enough places to charge. This, however, is down from 69 percent in 2017.
- Compared to last year, drivers are less concerned about traditional EV purchase barriers, including charging availability and battery life:
    - Running out of charge while driving (58% in 2018 versus 68% in 2017) and higher cost to repair or replace the battery (49% in 2018 versus 55% in 2017).
    - Baby Boomers (66%) and Generation X (64%) are more likely than Millennials (48%) to be concerned about running out of charge while driving.

Consumer expectation regarding the amount of time they would be willing to wait to charge their vehicle while on the road may not align with reality. Seven-in-ten Americans (68%) feel that a

charging time of no more than 30 minutes is reasonable, when in fact, if a higher voltage charger is available, it can take several hours to charge a fully depleted battery. A standard 120-volt outlet available in most homes will recharge most electric vehicles overnight, especially for those EVs with a smaller battery.

Conclusion

Today, electric vehicles are gaining mainstream appeal. Perhaps fueling American's desire for electric vehicles, AAA's survey found that "range anxiety" is beginning to ease. More charging options will reduce consumer anxiety and position EVs as a viable transportation option for a variety of trips, including longer journeys that may require fueling options as convenient as filling up at the corner gas station. Moreover, while range is important to most (87 percent) electric and hybrid vehicle shoppers, it is not the only consideration. Reliability is king with nine-in-ten (92 percent) of those likely to by an electric or hybrid vehicle stating it is important when evaluating which car to buy. The AAA Green Car Guide is a valuable resource for members as well as for all consumers who are looking for the right electric vehicle or alternative fuel vehicle for their next purchase. That is why the Automobile Club of Southern California's Automotive Research Center has taken great pride in publishing the guide over the last decade.

Our survey findings illustrate that overall technological advancements in new vehicles are helping to push drivers into EVs, as advancements in fuel technologies are viewed as one of the options among the many that drivers want in their next vehicle.

More Americans than ever before are considering EVs when they purchase a new vehicle. As demand for EVs heats up, automakers are taking note – especially as the global market grows and governments around the world take action to put their citizens behind the wheel of an EV. Over the coming years, automakers will make EVs a higher priority in their research and development efforts, and the next generation of EVs will feature the most advanced technology our nation's roads have ever seen. It is likely that EVs will form the platform upon which autonomous vehicles are deployed. Additional research, investment and deployment of next generation EVs will be needed to address consumer concerns that enhance the total capabilities of the vehicle.

With electric vehicles serving as the platform for delivering more advanced technologies for consumers, infrastructure improvements and system upgrades will need to incorporate electric vehicle charging, intelligent transportation and connected vehicle technologies to ensure networks are built and maintained to support all levels of multi-modal connectivity that will benefit all users and improve safety.

As noted earlier, AAA is celebrating over 100 years as an association tracking all the developments and advancement of the automobile from its very beginning. As a researcher, it is exciting to be part of the automotive transformation that will ultimately lead to more fuel efficient and safer cars for all drivers. Our surveys show that Americans' interest in electric vehicles is growing, and will likely increase over time. Concerns associated with range anxiety, reliability and ownership costs are being replaced with consumer confidence in electric vehicles. Our Green Car Guide provides options for consumers that are poised to replace or purchase their first electric or alternative fuel vehicle.

AAA is committed to doing its part to provide accurate information to help consumers on all things automotive. Through our continued vehicle research and consumer surveys to our work in traffic safety, we will look for our opportunities to make the nation's roads, vehicles and drivers safer.

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To better understand changing consumer preferences, AAA conducted a survey to gauge consumer attitudes toward electric vehicles. Findings from the 2018 survey revealed the following:

- Two-in-ten (20%) Americans say they are likely to buy an electric vehicle the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017's survey results.
- Consumers who are likely to buy an electric vehicle would do so out of concern for the environment (80%), lower long-term ownership costs (67%), cutting edge technology (54%) and access to the car pool lane (35%).
- Nine-in-ten (92%) Americans who are likely to buy an electric or hybrid vehicle, consider reliability important, followed by fuel economy or how far the vehicle can go on one charge (87%).
- Compared to last year, drivers are less concerned about traditional EV purchase barriers, including charging availability and battery life:
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FACT SHEET

CONSUMER ATTITUDES ELECTRIC VEHICLES

Automotive Engineering

BACKGROUND

Thanks to their compatibility with autonomous vehicle technologies and energy efficiency, electric vehicles are emerging as the centerpiece of the future. In 2018, a new AAA survey has found an increased interest in electric vehicles, with 20 percent of Americans (50 million people) saying they are likely to buy one for their next car, up from 15 percent in 2017. Concern for the environment remains the top reason for purchase (80 percent), followed by lower long-term costs (67 percent), cutting edge technology (54 percent) and access to car pool lane (35 percent).

As popularity for electric vehicles grows, automakers will expand the electric vehicle portfolio even more, offering consumers a wide variety of choices. This combined with rising gas prices, easing of range anxiety and the lower long-term costs of ownership leads AAA to believe the future for electric vehicles is fertile and will continue to grow.

To understand consumer attitudes toward electric vehicles, AAA pursued three lines of inquiry:

1. How many Americans are interested in buying an electric or hybrid vehicle?
2. What is motivating Americans to purchase an electric vehicle?
3. What prevents Americans from purchasing an electric vehicle?
4. How convenient is charging an electric vehicle?

KEY FINDINGS

Electric Vehicle Appetite:

- Two-in-ten (20%) Americans say they ***are likely to buy an electric vehicle*** the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017.
- Americans who are likely to buy an electric vehicle would do so out of ***concern for the environment*** (80%), ***lower long-term costs*** (67%), ***cutting edge technology*** (54%) and ***access to the car pool lane*** (35%).
  - Women (90%) are more likely to buy an electric vehicle out of concern for the environment over men (68%).

- Three in 10 adults (31%) say they are ***likely to buy a hybrid vehicle*** the next time they are in the market for a new or used vehicle. This level of interest is unchanged form 2017.
- Reliability and fuel economy/range are the most important criteria for consumers when choosing which hybrid or electric vehicle to buy.
  - Nine-in-ten (92%) Americans who are likely to buy an electric or hybrid vehicle, ***consider reliability important***, followed by fuel economy or how far the vehicle can go on one charge (87%).
  - Other considerations include crash rating (77%), cost (71%), vehicle performance (69%) advanced safety technology such as automatic emergency braking and lane keeping assistance (60%).

Range Anxiety:

- Six-in-ten Americans (63%) who are unlikely (or unsure) to purchase an electric vehicle are concerned there are ***not enough places to charge***. This, however, is down from 69 percent in 2017.
- Drivers are less concerned this year over last regarding the following purchase barriers:
  - ***Running out of charge while driving*** (58% versus 68%) and ***higher cost to repair or replace the battery*** (49% versus 55%).
  - Baby Boomers (66%) and Generation X (64%) are more likely than Millennials (48%) to be concerned about running out of charge while driving.

Charging Expectations:

- Consumer expectation regarding the amount of time they would be willing to wait to charge their vehicle while on the road may not align with reality. Seven-in-ten Americans (68%) feel that ***a charging time of no more than 30 minutes is reasonable***, when in fact, if a Level 2 charger is available, it can take several hours to charge a fully depleted battery. If a normal 120 volt outlet is all that is available, an overnight charge may be required to get you back on the road.
  - Women (44%) are more likely than men (33%) to feel that charging time of no more than 15 minutes would be reasonable.

AAA Green Car Guide

The Automobile Club of Southern California's Automotive Research Center rates and ranks electric, hybrid, compressed natural gas-powered (CNG), diesels and high fuel economy gasoline-powered vehicles for the annual AAA Green Car Guide. Vehicles are rated on the criteria that are most important to car buyers, including ride quality, safety and performance. Visit AAA.com/greencar to learn more information.

In 2018, the following vehicles earned AAA's Top Green Vehicle Award:

CATEGORY	VEHICLE
Overall	Tesla Model X 75D
Subcompact Car	Chevrolet Bolt EV Premier
Compact Car	Nissan Leaf SL
Midsize Car	BMW 530e i-Performance
Large Car	Tesla Model S 75
Pickup	Ford F-150 4X4 XLT Sport
SUV/Minivan	Tesla Model X 75D
Best Under $30K	Kia Niro LX
Best $30K - $50K	Chevrolet Bolt EV Premier
Best Over $50K	Tesla Model X 75D

METHODOLOGY

A telephone omnibus survey was conducted March 8-11, 2018. A total of 1,003 interviews were completed among adults, 18 years of age or older.

A dual-frame approach was used that combined landline and cell phone interviews to ensure that adults who only or primarily communicate via cell phones are included and properly represented. Survey responses are weighted by six variables (age, gender, geographic region, race/ethnicity, education, and landline vs. cell phone only) to ensure reliable and accurate representation of the total continental US population, 18 years of age and older.

Generation groups defined as: Millennials (20-37 years old), Generation X (38-53 years old) and Baby Boomers (54-72 years old).

The margin of error for the study is 4% at the 95% confidence level. Smaller subgroups will have larger error margins.