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ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

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MEMORANDUM

May 6, 2018

To: **Subcommittee on Environment Democratic Members and Staff**

Fr: **Committee on Energy and Commerce Democratic Staff**

Re: **Hearing on "Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years Ahead"**

On **Tuesday, May 8, 2018, at 10:15 a.m. in room 2322 of the Rayburn House Office Building**, the Subcommittee on Environment will hold an oversight hearing titled, "Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years Ahead."

I. BACKGROUND

Transportation fuels and passenger vehicles have diversified over the past few decades. While gasoline blended with ten percent ethanol (E10) remains the most common fuel, vehicles using diesel fuel, higher ethanol blends, compressed natural gas, and electricity are also available. Automobile companies also plan to introduce additional vehicle models powered by fuel cells and hybrid gasoline-electric technology, as well as fully electric vehicles (EVs). EVs provide significant benefits for the environment and consumers by improving air quality and reducing carbon dioxide emissions as well as fuel costs.

This hearing will explore potential mid- to long-term directions for electric and conventional vehicles under current federal policy, and projected supply and demand factors that influence consumer choice and vehicle purchases. Hearing testimony could also touch on current and future mobility needs, environmental and public health benefits of EVs, and incentive programs to minimize barriers to adoption for EVs. For background information on recent Committee activity on transportation fuels and vehicles issues, please see the Democratic memos covering the recent hearings in the 115th Congress, as well as related hearings during the 114th Congress.

II. ELECTRIC VEHICLES AND CHARGING INFRASTRUCTURE

There are two general categories of EVs: all-electric vehicles (AEVs) and plug-in hybrid electric vehicles (PHEVs). AEVs have an electric battery motor and rely on an external power source to charge the battery. PHEVs use an internal combustion engine (ICE) in addition to an electric motor and operate on stored battery electricity or liquid fuel. Hybrid electric vehicles (HEVs) operate similarly to PHEVs. However, HEV vehicles use liquid fuel and can produce electricity through a generator or the vehicle braking system to charge the battery associated with the electric motor.[1] According to the Department of Energy (DOE), there are currently 23 PHEV and 36 HEV models available for purchase in the United States and approximately 234,000 and 3.3 million on the road, respectively.[2] Global EV markets continue to grow; however, the deployment and accessibility of electric vehicle supply equipment (EVSE) continues to be a notable barrier to EV production and adoption.

Approximately 43,000 charging outlets operated by utilities are available for public use throughout the United States.[3] An estimated 80 percent of EV charging occurs at home, and in the 50 largest cities across the United States, EV recharging costs are lower than the average cost of gasoline. Electricity providers have established plans that support EV ownership and home charging. Public EV charging providers offer a variety of fee structures for EVs, which also includes free charging.[4] According to DOE, EVSE charging infrastructure includes three categories:

- Level 1: Provides charging through a 120 V AC plug and does not require installation of additional charging equipment. Can deliver 2 to 5 miles of range per hour of charging. Most often used in homes, but sometimes used at workplaces.

- Level 2: Provides charging through a 240 V (for residential) or 208 V (for commercial) plug and requires installation of additional charging equipment. Can deliver ten to 20 miles of range per hour of charging. Used in homes, workplaces, and for public charging.

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[1] Department of Energy, Office of Energy Efficiency and Renewable Energy, *Electric Vehicle Basics* (www.energy.gov/eere/electricvehicles/electric-vehicle-basics) (accessed May 2, 2018).

[2] Department of Energy, *The History of the Electric Car* (www.energy.gov/articles/history-electric-car) (accessed May 2, 2018).

[3] Department of Energy, *Electric Vehicle Update: Charging Infrastructure Research* (www.energy.gov/eere/articles/electric-vehicle-update-charging-infrastructure-research) (accessed May 2, 2018).

[4] Union of Concerned Scientists, *Going from Pump to Plug* (2017) (www.ucsusa.org/sites/default/files/attach/2017/11/cv-report-ev-savings.pdf).

- DC Fast Charge: Provides charging through 480 V AC input and requires highly specialized, high-powered equipment as well as special equipment inside the vehicle. (Plug-in hybrid electric vehicles typically do not have fast charging capabilities.) Can deliver 60 to 80 miles of range in 20 minutes of charging. Used most often in public charging stations, especially along heavy traffic corridors.[5]

III. BARRIERS TO ELECTRIC VEHICLE ADOPTION AND CHARGING INFRASTRUCTURE DEPLOYMENT

There are a variety of factors that contribute to EV adoption and the widespread deployment of EV charging infrastructure, including, purchase price, driving range, charge time, installation costs, and policy and regulatory limitations. On average, EVs tend to be more expensive than ICE vehicles due to the cost of batteries. However, they are cheaper to maintain over time due to minimal maintenance requirements, and in some areas, EVs are cheaper to operate due to electricity costs being lower than the cost of gasoline. As battery technology evolves and prices decline, EV purchase prices have adapted accordingly.[6] Consumers who purchased EVs after December 31, 2009, qualify for the Plug-In Electric Drive Vehicle Credit, which ranges from $2,500 - $7,500 and minimizes the cost of EVs.[7] Installation costs for charging infrastructure varies and depends on the type of charger, location, and regulatory environment. The cost of Level 2 chargers can range from $500 - $6,000 and DC Fast Chargers are approximately $50,000 per installation.[8]

In addition to financial barriers limiting EV adoption, consumers have indicated that expanded range and the availability of accessible charging infrastructure is critical to EV adoption. The distance EVs are able to travel is limited by battery capacity, and charge time currently ranges from 30 minutes to 12 hours. Therefore, adequate charging infrastructure outside of areas with a high concentration of EV sales is necessary for market growth.[9] State and regional regulations have also presented some challenges for expanding EV infrastructure.[10]

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[5] Department of Energy, Office of Energy Efficiency and Renewable Energy, *Vehicle Charging* (www.energy.gov/eere/electricvehicles/vehicle-charging) (accessed May 2, 2018).

[6] *See* Note 2.

[7] Internal Revenue Service, *Plug-In Electric Drive Vehicle Credit (IRC 30D)* (www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d) (accessed May 2, 2018).

[8] Rocky Mountain Institute, *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand* (2017) (www.rmi.org/wp-content/uploads/2017/10/RMI-From-Gas-To-Grid.pdf).

[9] National Renewable Energy Laboratory, *The Barriers to Acceptance of Plug-in Electric Vehicles: 2017 Update* (Nov. 2017) (NREL/TP-5400-70371).

[10] *See* Note 7.

IV. ELECTRIC VEHICLES AND CLIMATE

Electric vehicles have a significant impact on greenhouse gas (GHG) emissions and air quality. Compared to ICE vehicles that run on liquid fuels, EVs produce approximately 50 percent fewer emissions over a vehicle's lifespan.[11] Many cities throughout the country have developed public-private partnerships to promote Smart City initiatives that incorporate EVs and the deployment of EVSE infrastructure.[12] For EVs to achieve greater emission reductions, more renewable generation sources will have to be incorporated into the power system. Studies have shown that EVs powered by an electric grid with more renewable sources, will produce more than a 60 percent reduction in emissions compared to conventional vehicles.[13]

V. WITNESSES

The following witnesses have been invited to testify:

Genevieve Cullen
President
Electric Drive Transportation Association

David Reichmuth
Senior Engineer, Clean Vehicles Program
Union of Concerned Scientists

Mitch Bainwol
President and CEO
Alliance of Automobile Manufacturers

Geisha Williams
President and CEO
Pacific Gas and Electric Company
On behalf of the Edison Electric Institute

Dylan K. Remley
Senior Vice President, Terminal Operations
Global Partners LP

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[11] Union of Concerned Scientist, *Cleaner Cars from Cradle to Grave* (2015).

[12] Edison Electric Institute, *Examples of Smart Communities in Action* (2018); Department of Energy, Partnerships and Tech Roadmaps (www.energy.gov/eere/vehicles/partnerships-and-tech-roadmaps) (accessed May 3, 2018).

[13] *See* Note 11.

Frank Macchiarola
Downstream Director
American Petroleum Institute

Bob Dinneen
President and CEO
Renewable Fuels Association

Megan McKernan
Manager, Automotive Engineering
Automobile Club of Southern California
On behalf of the American Automobile Association