STATEMENT OF

MR. PATRICK DAVIS

PROGRAM DIRECTOR, VEHICLE TECHNOLOGIES PROGRAM

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

U.S. DEPARTMENT OF ENERGY

BEFORE THE

COMMITTEE ON ENERGY AND COMMERCE

SUBCOMMITTEE ON ENERGY AND POWER

UNITED STATES HOUSE OF REPRESENTATIVES

MAY 5, 2011

Chairman Whitfield, Ranking Member Rush and Members of the Subcommittee, thank you for the opportunity to discuss the Department of Energy's transportation portfolio – specifically our alternative fuels and vehicles programs.

The transportation sector accounts for approximately two-thirds of the United States' oil consumption and contributes to one-third of the Nation's greenhouse gas (GHG) emissions.[1] After housing, transportation is the second biggest monthly expense for most American families.[2] As the President said in his recent energy speech, "In an economy that relies so heavily on oil, rising prices at the pump affect everybody." Emphasizing that "there are no quick fixes," the President outlined a portfolio of actions which, taken together, could cut U.S. oil imports by a third by 2025. These include programs that would put one million electric vehicles on the road by 2015; increase the fuel economy of our cars and trucks; as well as expand the biofuels market and commercialize new biofuels technologies, including cellulosic and other advanced biofuels.

The Office of Energy Efficiency and Renewable Energy's (EERE's) Vehicle Technologies Program (VTP) develops and promotes energy-efficient, environmentally-friendly transportation technologies that will reduce petroleum consumption and lower GHG emissions while meeting drivers' expectations of vehicle performance. VTP's activities promote energy security, environmental, and economic benefits in both the near- and long-term.

Few technologies hold greater promise for reducing our dependence on oil than electric vehicles. In his 2011 State of the Union address, the President spoke of his goal to have the United States become the first country with a million electric vehicles on the road by 2015. Meeting this goal will help the United States become a leader in the clean energy economy, while capitalizing on the ingenuity of American industry. Manufacturing products needed for the clean energy economy will generate long term economic strength in the U.S., creating jobs across the country while reducing air pollution and greenhouse gas emissions.

EERE investments past, present, and future are critical to achieving this goal. In 2009, the U.S. had only two, relatively small, factories manufacturing advanced vehicle batteries, and produced less than two percent of the world's hybrid vehicle batteries.[3] But over the next few years, thanks to investments from the American Recovery and Reinvestment Act of 2009 (Recovery Act) in battery and electric drive component manufacturing, and electric drive demonstration and infrastructure, the U.S. will be able to produce enough batteries and components to support 500,000 plug-in and electric vehicles per year. High volume manufacturing, coupled with battery technology advances, design optimization, and material cost reductions, could lead to a drop in battery costs of 50 percent by 2013 compared to 2009, which will lower the cost of electric vehicles, making them accessible to more consumers.

Further policies and research are needed to build on the work under the Recovery Act. In order to make electric vehicles even more affordable for American consumers, the President's FY 2012 Budget request would transform the existing $7,500 tax credit for purchasers into a

[1] http://www1.eere.energy.gov/vehiclesandfuels/pdfs/vehicles_fs.pdf
[2] http://www.bls.gov/news.release/cesan.nr0.htm
[3] http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf

credit for the seller or the person financing the sale. The credit would be passed through to consumers giving them the ability to receive the benefit of the credit at the point of sale.[4] Economic incentives for early adopters of cutting edge technologies like electric vehicles are necessary for two reasons. One, although the life-cycle energy costs of owning an electric vehicle are lower than those for a conventional vehicle, the upfront costs may be slightly higher, discouraging cash-strapped consumers from purchasing them. And two, as demand for electric vehicles grow, manufacturers will be able to take advantage of economies of scale to lower their prices.

More broadly, increased investments in R&D will be critical to the deployment of new technology. This year's Budget will significantly broaden R&D investments in technologies like batteries and electric drives – including an over 30 percent increase in support for vehicle technology R&D and a new Energy Innovation Hub within the Office of Science devoted to improving batteries and energy storage for vehicles and beyond. The Batteries and Energy Storage Hub will provide an interdisciplinary, research framework for energy storage research, bringing fundamental and applied research teams together to foster materials discovery and ensure progress towards commercialization of new energy storage technologies. In addition, the FY 2012 request would create competitive programs to encourage communities to invest in electric vehicle infrastructure – an idea based on a bipartisan legislative proposal. Subject to appropriations, these programs within EERE would include funding for battery and electric vehicle R&D and a new $200 million competitive program to help communities become early adopters of electric vehicles through a number of activities, including regulatory streamlining, infrastructure investments, and vehicle fleet conversions. These programs would build on EERE's Clean Cities program, which supports local-level petroleum-reducing practices in the transportation sector. Since its inception in 1993, Clean Cities and its partners have displaced nearly three billion gallons of petroleum.[5]

DOE's work on advanced vehicle technologies will enable continued improvement of the fuel economy of new vehicles. Making our cars and trucks more efficient is one of the easiest, most direct ways to limit our petroleum consumption and save consumers money. To help increase the fuel economy of the vehicle fleet, DOE is investing not only in electric vehicles, but also in higher efficiency combustion engines, vehicle light-weighting, ethanol and biodiesel deployment, fuel cell electric vehicles, battery and electric drive manufacturing, and vehicle electrification deployment and infrastructure development.

The FY 2012 Budget also provides for new areas of activity, including non- and off-highway activities to reduce petroleum use and GHG emissions in rail and off-highway transportation modes; and a Vehicle Miles Traveled Reduction and Legacy Fleet Improvement activity to support the more efficient use of existing light-duty vehicle stock. These new programs are intended to provide new opportunities to reduce oil consumption, increase the Nation's energy security, reduce GHG emissions, and save consumers money.

---

[4] The existing tax credit is for both hybrid- and battery-electric plug-in vehicles with a battery that has a capacity of at least 4 kilowatt hours and is capable of being recharged from an external source. The base credit is $2,500, with an additional $417 per additional kilowatt-hour battery capacity, up to a maximum of $7,500. These credits will begin to be phased out after a manufacturer sells 200,000 qualified vehicles.

[5] http://www1.eere.energy.gov/cleancities/mission.html

DOE's Biomass Program within EERE focuses on the development and transformation of domestic, renewable, and abundant biomass resources into cost-competitive, high performance biofuels, biopower, and bioproducts through targeted planning, research, development and demonstration leveraging public and private partnerships.

Domestically produced biomass can provide a cost-effective alternative to oil imports while creating business opportunities and jobs in the U.S. – especially in rural areas. DOE's efforts to displace petroleum in the transportation sector have been underscored and strengthened by passage of new and ambitious targets for the Environmental Protection Agency's (EPA's) Renewable Fuels Standard (RFS) program across four categories of biofuels: conventional biofuels, biomass-based diesel, cellulosic biofuel, and other advanced biofuels. Increased use of fuels from biomass resources also contributes to national and economic security by insulating our economy from damaging fluctuations in international petroleum prices. Additionally, biomass use for fuels, products, and power creates wealth in rural America and contributes to national environmental goals by displacing petroleum and thereby reducing GHG emissions.

DOE's efforts to remove barriers to expanding the market for biofuels in the near term include—

- First, to move toward meeting existing statutory requirements, we assisted EPA in assessing the impacts of higher ethanol fuel blends on automobile engines and emissions, as part of EPA's their rulemaking activities that considered increasing the amount of ethanol that can be sold in gasoline blends.
- Second, we are working to ensure that existing fuel dispensers can dispense higher ethanol blends.
- Finally, we are engaged in a multi-faceted research strategy that has the potential to commercialize a variety of bio-based fuels derived from several different technological pathways.

DOE not only supports increasing the use of today's biomass fuel, it also undertakes RD&D programs to facilitate use of a variety of different biomass feedstocks and produce a variety of fuels and other products. Domestic biofuels production increased from less than four billion gallons per year in 2005 to nearly 13 billion gallons per year in 2010, a more than threefold increase in production in just five years.[6] Yet there is still much work to be done.

Prior to October 2010, the amount of ethanol that could be blended in gasoline for use in standard vehicle engines without modification was limited to 10 percent ethanol by volume (E10). DOE worked closely with EPA to provide data needed to determine the potential impact of gasoline containing up to 15% ethanol by volume (E15) on compliance with vehicle and engine emission standards established under the Clean Air Act. Using DOE and other test data EPA ultimately determined that E15 may be introduced into commerce for use in model year 2001 and newer passenger vehicles once several conditions are met. This means that EPA has

[6] http://www1.eere.energy.gov/biomass/pdfs/biomass_mypp_november2010.pdf

approved the use of E15 for about 62 percent of the passenger vehicles on the road, vehicles that account for more than 70 percent of the miles driven.

DOE is also working with stakeholders to broaden the market for higher ethanol blends. DOE estimates approximately 3 percent (8 million out of approximately 240 million) of passenger vehicles on the road today are already manufactured to be compatible with blends up to 85 percent ethanol. Roughly 15 percent of total new vehicle sales are also E85-compatible. Domestic manufacturers have pledged to offer half of their vehicle models as flexible fuel vehicles (FFVs, vehicles designed to run on either gasoline or ethanol blends up to E85) by model year 2012, bringing FFV sales to about 20 percent of total sales.[7] DOE estimates that the incremental cost of manufacturing vehicles to be E85-compatible is in the range of $50-$100/vehicle.

DOE is also working with pump manufacturers to accelerate deployment of pumps that can operate with E15 and higher ethanol blends. While pumps capable of dispensing very high ethanol blends such as E85 currently cost 1.6 times as much as conventional pumps (conventional pumps cost $10,000-$15,000, while E85 pumps cost about $20,000-$25,000) DOE analysis suggests that the cost differential could be driven down to a few hundred dollars if the high-blend pumps were manufactured in volume. DOE is working with pump manufacturers to develop and market retrofit kits to upgrade existing pumps to be compatible with E15. DOE currently estimates that modifying fuel pumps to make them compatible with E15 should also be relatively inexpensive ($1,000 or less per pump, depending on several different pump-specific variables).[8] In addition, DOE is working with states, which are able to use State Energy Program funds and funding from the Recovery Act, to upgrade existing fuel pumps to be compatible with higher ethanol blends. DOE will continue to work with USDA, EPA, and other agencies to facilitate these modifications, which will allow more ethanol to enter the market.

DOE is also making investments in next-generation biofuels technologies, primarily through the Biomass Program. This work focuses on technologies that can convert a variety of feedstocks – such as corn stover, wood waste, algae and other materials – into a variety of fuels and products, as well as power. We are supporting research on two main pathways to convert these materials into cost-competitive, drop-in substitutes for gasoline, diesel, and jet fuel: (1) thermochemical conversion, based on pyrolysis or gasification, and (2) biochemical conversion using enzymes, fermentation, and other mechanisms. Advanced research continues to focus on meeting technical targets and reducing costs through these routes. We are also working on cutting the cost of collecting, transporting and storing cellulosic biomass materials by exploring strategies for increasing the density of the materials and converting raw material into a standardized format.

Recovery Act funding accelerated our R&D investment in drop-in substitutes and diversified our overall portfolio of integrated biorefineries in terms of feedstocks and technologies used, regions represented, facility sizes, and types of fuels and products being

[7] See, for example, http://media.gm.com/content/media/us/en/news/news_detail.brand_buick.html/content/Pages/news/us/en/2011/Feb/0221_regalturbo.

[8] Based on discussion with industry and on DOE calculations.

generated. DOE's 29 integrated biorefinery projects aim to validate first-of-a-kind technologies at pilot, demonstration, and commercial scales to reduce risk of further investment. These demonstrations help to overcome key technical and economic barriers for producing advanced biofuels and better enable future scale up and replication of biorefineries by the private sector. Most of these projects are either in construction or will be by the end of 2011. These projects aim to collectively generate at least 170 million gallons of advanced biofuels. The President has also announced a goal to break ground on at least four commercial-scale cellulosic or advanced biorefineries over the next two years. As these and other biorefineries come online throughout the United States, more and more petroleum will be displaced.

In order to help defray the cost of cellulosic biofuel production, the President's FY 2012 Budget proposes funding a technology-neutral reverse auction incentive program. DOE would solicit bids from potential producers of cellulosic ethanol and other advanced biofuels, and those producers submitting the lowest bids would be awarded the production incentives that would allow their production costs to be competitive with conventional fuel production costs. This reverse auction would reduce the perceived risk of investment for these facilities.

Bringing more commercial biorefineries producing advanced biofuels on line will help us meet the nation's ambitious goals for biomass energy through the RFS, support the Navy's goal for renewable fuels to comprise 50 percent of its transportation fuel consumption by 2020; and respond to substantial renewable fuels demand in the commercial aviation industry.

In sum, the Department's transportation portfolio will save consumers money, reduce our dependence on oil, lower our environmental impact, and keep America on the cutting edge of clean energy technologies, enabling us to build a 21st century clean energy economy. Thank you again for the opportunity to discuss these issues, and I welcome any questions you may have.