STATEMENT OF

STEVEN G. CHALK

DEPUTY ASSISTANT SECRETARY FOR RENEWABLE ENERGY

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

U.S. DEPARTMENT OF ENERGY

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

JUNE 7, 2011

Chairman Bingaman, Ranking Member Murkowski and Members of the Committee, thank you for the opportunity to discuss the Department of Energy's (DOE's) efforts to research, develop and deploy the next generation of alternative fuels and electric vehicles. I will also briefly discuss some areas of S. 937, the American Alternative Fuels Act of 2011, sponsored by Senator Barrasso. However, the Administration is still reviewing the bill and we do not have a position on the bill at this time.

Alternative Fuels

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 emissions[1]. After housing, transportation is the second biggest monthly expense for most American families[2]. As the President said on March 30, "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 increase the fuel economy of our cars and trucks and increase the use of nonpetroleum fuels. Both biofuels – including algae-based fuel – and electric vehicles are critical components of the President's strategy to lessen our dependence on foreign oil.

Home-grown biomass can provide a cost-effective alternative to oil imports while creating business opportunities and jobs in the U.S. Increased use of biofuels also contributes to national and economic security by insulating our economy from damaging fluctuations in international petroleum prices. And biomass use contributes to national environmental goals, helping reduce both smog and greenhouse gas emissions.

Within DOE, programs in the Office of Energy Efficiency and Renewable Energy (EERE), the Office of Science, the Advanced Research Projects Agency-Energy (ARPA-E) and the Loan Guarantee Program have all made investments in next-generation biofuels science and technology. DOE also works closely with the US Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the Department of Defense (DOD), the Department of Transportation's Federal Aviation Administration (DOT/FAA) and other Departments and agencies to accelerate U.S. use of biomass resources.

The Nation has ambitious goals for biomass energy through the Renewable Fuels Standards (RFS) established through the Energy Independence and Security Act of 2007 (Pub. L. No. 110-140). The RFS required the annual use of 9 billion gallons of biofuels in 2008 and expands the mandate to 36 billion gallons annually in 2022 (of which no more than 15 billion gallons can be conventional biofuels, and no less than 21 billion must be from advanced biofuels).

The Navy has set a goal for renewable fuels to comprise 50 percent of its transportation fuel consumption by 2020. We are working closely with DOD to accelerate the deployment of pioneer plants that can support this ambitious goal.

[1] http://www1.eere.energy.gov/vehiclesandfuels/pdfs/vehicles_fs.pdf
[2] http://www.bls.gov/news.release/cesan.nr0.htm

As we take steps to break down barriers to greater use of today's biofuels, DOE is also making investments in next-generation biofuels technologies. The American Reinvestment and Recovery Act of 2009 (the Recovery Act) accelerated investment in innovative biorefineries, providing funding for an additional 18 RD&D projects, in addition to the 11 projects previously funded in 2007 and 2008. Through these projects, DOE is helping scientists and entrepreneurs explore technologies for converting biomass products such as algae into fuel. To help accelerate the development of these technologies, President Obama announced a goal of breaking ground on four commercial-scale cellulosic or advanced biofuels plants over the next two years. To help meet this goal, the FY 2012 budget includes funding for a reverse auction in which cellulosic and advanced biofuels project sponsors would compete for additional support.

With support for such plants, advanced conversion technologies could play a significant role in a commercial biofuels market within a few years. DOE is supporting two main pathways to convert biomass into biofuels in a cost-effective manner: (1) thermo-chemical conversion, based on pyrolysis or gasification, and (2) biochemical conversion using enzymes, fermentation, and other mechanisms, including algae. Over the longer term, research advances showing promise in the laboratory could greatly increase the productivity and reduce the cost of biochemical processes using engineered yeast, bacteria, and other organisms.

ARPA-E is also undertaking a novel alternative storage approach in its Electrofuels program. ARPA-E is seeking ways to make liquid transportation fuels - without using petroleum or biomass - by using novel microorganisms to harness chemical or electrical energy to convert carbon dioxide into liquid fuels. This fuel can serve as a form of energy storage, ready to be used in vehicles, machines, or other pieces of equipment. The objective of this program is to develop a new paradigm for the production of liquid fuels that could overcome the challenges associated with current technologies.

Electric Vehicles

Few technologies hold greater promise for reducing our dependence on oil than electric vehicles (EVs). In his 2011 State of the Union address, the President set a goal to have the United States become the first country with a million EVs 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.

Department of Energy 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 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

[3] http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf

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. That is why the Administration supports new efforts to help develop electric vehicle manufacturing and adoption in the United States through improved consumer incentives, investments in R&D to advance innovative technologies, and a competitive program to encourage communities that invest in electric vehicle infrastructure and regulatory streamlining.

ARPA-E's Batteries for Electrical Energy Storage in Transportation (BEEST) program seeks to develop a new generation of ultra-high energy density, low-cost battery technologies for long electric range plug-in hybrid vehicles and EVs. Improving the energy density of batteries will increase the range of electric vehicles, which the Department understands is of critical concern to consumers. If successful, new battery technologies developed under this program will help move electrified light-duty vehicles toward the ranges, performance, lifetime, and cost that will help shift transportation energy sources from oil to electricity drawn from the domestically powered U.S. grid. ARPA-E's objective is to fund high-risk, high reward research efforts that will promote U.S. leadership in this emerging EV battery market.

Loan and Loan Guarantee Program

The Department of Energy's loan and loan guarantee programs are another key component to winning the clean energy future. As a representative of the Office of Energy Efficiency and Renewable Energy, I can only speak generally to the activities of the Loan Programs Office, which is a separate office within DOE.

In the two years since this Administration took office, the Loan Programs Office has helped drive significant investment in our energy economy. Since March 2009, the Department has issued conditional commitments for loans or loan guarantees to 29 projects, 16 of which have reached financial close – with more to follow soon.

DOE has provided (or conditionally committed to provide) over $30 billion in financing to these 29 projects, which have total project costs of nearly $48 billion. The projects are spread across the country, and reflect an array of clean energy and automotive technologies, such as wind, solar, geothermal, transmission, battery storage, and nuclear. These projects include the world's largest wind-farm; two of the world's largest concentrated solar power facilities; the first nuclear power plant to begin construction in the United States in the last three decades; and the world's first flywheel energy storage plant.

Project sponsors estimate these 29 projects will create or save over 61,000 jobs, including construction and operating jobs.[4] Cumulatively, they will generate over 25 million MWh of clean energy each year – enough to power over two million households, or nearly all the

[4] Breakdown by program is as follows (based on Sponsor estimates): **1703:** 5,210 construction, 1,340 permanent**;** **1705**: 12,900 construction, 3,470 permanent; **ATVM**: 5,700 created, 33,000 saved.

households in Maryland.[5] And they will avoid nearly 17 million tons of CO2 annually – more than is produced by all of the approximately three million registered vehicles in Oregon.[6]

Under the Section 1703 program, DOE has offered conditional commitments for four projects so far, including one nuclear power, one front end nuclear, and two energy efficiency projects, which amount to just over $10.6 billion in total government supported financing, including capitalized interest. Under 1705, DOE has issued conditional commitments to 21 projects representing approximately just under $11.8 billion in financing, including capitalized interest. In addition, a significant number of projects are sufficiently far along in the due diligence process that we have issued a working draft term sheet and are in active negotiations with the applicants. LPO estimates that these projects, if they ultimately reach financial close, will utilize all of our remaining credit subsidy appropriations.

To date, DOE has committed and closed five ATVM loans, totaling over $8.3 billion, which will support advanced vehicle projects in eight states. We anticipate making a number of significant additional ATVM loan commitments in the coming months.

It is important to remember that the loan programs are not grant programs; loans provided or guaranteed by the Department must be repaid. We review projects on a competitive basis, and we do not fund every eligible project. We ensure that the loans we support meet our statutory requirement of having a "reasonable prospect of repayment." Every project that receives financing first goes through a rigorous financial, legal and technical review process – similar to, and in some ways more comprehensive than, what a private sector lender would conduct – before a single dollar of taxpayer money is put to work. This due diligence and underwriting process takes thousands of man-hours to complete for each transaction, particularly as the projects in questions are large, complex, and require the coordination of multiple parties. The Department is committed to processing transaction as expeditiously and transparently as possible, while ensuring that taxpayer resources are prudently deployed and properly safeguarded.

GENERAL COMMENTS ON S. 937 THE AMERICAN ALTERNATIVE FUELS ACT OF 2011

The American Alternative Fuels Act of 2011 seeks to promote and understand the use of alternatives to conventional petroleum fuels. The bill seeks to provide additional incentives for algae-based fuels, examine the emissions impacts of electric vehicles, expand contract authority for the Department of Defense to purchase alternative fuels, and implement reforms to Department of Energy's Loan Programs. As I mentioned previously, these provisions fall under the jurisdiction of multiple federal agencies, including the Department of Energy, Department of Defense, and the Environmental Protection Agency.

---

[5] Sources: EIA 2005 Residential Energy Consumption Survey, Table US8; U.S. Census Bureau, American FactFinder, 2010.

[6] Sources: U.S. Environmental Protection Agency, Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle; U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2008, Table MV-1 (December 2009).

As the Department of Energy continues to review sections of the legislation impacting the Department, various DOE programs are continuing to advance the primary goal of the legislation – to reduce our oil dependence.

For instance, DOE believes that algae based fuels may be an attractive piece of a long term strategy for biomass production. Algal biofuels have the potential to meet a portion of the renewable fuels mandate. Some advantages algal biofuels may have over other biomass feedstocks include higher per-acre oil productivity, use of non-arable land, water input flexibility, mitigation of greenhouse gas emissions and the production of high grade fuels and valuable coproducts.

As such, DOE is pursuing the development of algae-based biofuels through funding from the Office of Biomass Programs. DOE continues to support the technical development of algal fuels through focused R&D. Through the efforts of several consortia, drawing upon private sector, academia, and industry stakeholders, scientists and engineers are making advances in mitigating the remaining economic and technical barriers to achieving the full potential of algal biofuels. Currently, research on algae includes developing suitable algal strains and cultivation parameters, harvesting and extracting oils from algal biomass and techno-economic analysis of different algal biofuels processes. However, because the Renewable Fuel Standard program is administered by the Environmental Protection Agency, DOE cannot speak to any possible implementation challenges associated with using the Renewable Fuel Standard to create incentives for algal biofuel production.

Summary

The President recently set a goal of reducing petroleum imports by one third by 2025. Together with increased fuel economy in vehicles, acceleration of electric vehicle deployments, and expanded production and use of biofuels this goal is well within reach. The Department of Energy welcomes the opportunity to continue working with the Committee to advance our energy goals. I would be happy to answer any questions the Committee may have.