**STATEMENT OF**

**DR. HENRY KELLY**

**ACTING ASSISTANT SECRETARY FOR ENERGY EFFICIENCY**

**OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY**

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**UNITED STATES SENATE**

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Chairman Boxer, Ranking Member Inhofe and Members of the Committee, thank you for the opportunity to discuss the Department of Energy's biofuels program and its efforts to increase the use of domestic renewable fuels, including cellulosic and other advanced biofuels.

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 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 increase the fuel economy of our cars and trucks and increase the use of nonpetroleum fuels. Biofuels are a key part of the solution. Home-grown biomass can provide a cost-effective alternative to oil imports while creating business opportunities and jobs in the U.S. – including rural areas. Increased use of biomass fuels 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 The Department of Energy (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 technologies. 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.

Our strategy for expanding the market for ethanol in the near term has several parts. First, to move toward meeting existing statutory requirements, we have worked with EPA to increase the amount of ethanol that can be sold in gasoline blends. Second, we are working to ensure that fuel dispensers and cars can use 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.

My focus today will be on EERE's programs. Our work includes programs that will increase use of today's biomass fuel as well as research, development, and demonstration programs that will allow us to use a variety of different biomass feedstocks and produce a variety of fuels and other products. We are making rapid progress. 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[3]. But there's 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

[1] http://www1.eere.energy.gov/vehiclesandfuels/pdfs/vehicles_fs.pdf
[2] http://www.bls.gov/news.release/cesan.nr0.htm
[3] http://www1.eere.energy.gov/biomass/pdfs/biomass_mypp_november2010.pdf

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

DOE is also working with auto manufacturers to assess the viability of making new vehicles compatible with 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 new vehicle sales are also E85-compatible and domestic manufacturers have pledged to increase this fraction to 50 percent by model year 2012 (18-20 percent of total sales, including a few non-domestic models).[4] DOE estimates that the incremental cost of manufacturing vehicles to be E85-compatible is in the range of $50-$100/vehicle.

Moving E15 and higher blends also requires work to ensure that fuel pumps and underground fuel storage tanks are equipped to handle these fuels. DOE is working with pump manufacturers to accelerate production of new 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).[5] In addition, DOE is working with states, which are able to use State Energy Program funds or funding from the American Recovery and Reinvestment Act of 2009, 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. This work focuses on technologies that can convert a variety of feedstocks – such as corn stover, wood waste, and other cellulosic materials – into a variety of fuels. We are also exploring ways of converting corn and cellulose to cost-competitive, drop-in substitutes for gasoline, diesel, and jet fuel. Drop in fuels would remove many of the barriers to the commercial adoption of biomass fuels since they would be compatible with existing vehicles and fuel delivery systems. There is substantial demand in the aviation industry for drop-in fuels, and we are supporting the FAA and commercial aviation sector with development of jet biofuels as participants in the Commercial Aviation Alternative Fuels Initiative (CAAFI).

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[4] 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.

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

DOE is supporting research on two main pathways: (1) thermo-chemical conversion, based on pyrolysis or gasification, and (2) biochemical conversion using enzymes, fermentation, and other mechanisms. 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 it to a standardized format. Algae may be an attractive long term strategy for biomass production. Several projects were supported by DOE using Recovery Act funds.

Many of the research projects are rapidly leading to technologies that can be deployed at a commercial scale. 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 to explore technologies for converting a variety of feedstocks into ethanol and drop-in fuels. Collectively, these projects are anticipated to contribute at least 100 million gallons of advanced biofuels by 2014.[6]

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). In addition, EISA carved out specific requirements for "other advanced biofuels" and biomass-based biodiesel.

The Navy has set a goal of 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.

The FY 2012 budget backs these goals with proposals for a well balanced research program and a reverse auction in which cellulosic and advanced biofuels project sponsors would compete for additional support.

Thank you again for the opportunity to discuss these issues, and I welcome any questions Committee Members may have.

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