USDA AWARDS $12.6 MILLION FOR BIOMASS RESEARCH AND DEVELOPMENT

WASHINGTON, Oct. 6, 2005—Agriculture Secretary Mike Johanns today announced that 11 biomass research, development and demonstration projects were selected to receive $12.6 million for the Biomass Research and Development Initiative, a joint effort of USDA and the Department of Energy (DOE). The total value of the projects is nearly $19 million, including cost sharing of the private-sector partners.

"This cooperative conservation partnership benefits our nation with enhanced energy security, a cleaner environment and revitalized rural economies," said Johanns. "The selected projects support President Bush's goal to enhance renewable energy supplies. The grants will help to develop additional renewable energy resources and expand markets for agricultural products."

The Biomass Research and Development Act of 2000 and the 2002 Farm Bill set the framework for interagency cooperation and joint solicitations.

USDA's Natural Resources Conservation Service and DOE's Office of Energy Efficiency and Renewable Energy coordinated efforts to issue a joint solicitation that is awarding these funds. More than 670 applications, divided into four unique technical topic areas, were submitted in response to the solicitation. The selection process involved multiple reviewers from each agency.

Following is a list of the 11 selected projects and the amount funded.

2005 Biomass Research and Development Initiative Projects

University of Idaho (Moscow, Idaho) – Increasing the Potential for the Utilization of Cellulose from Straw for Biofuel and Bioproduct Production - $693,285

This project seeks to demonstrate the feasibility of using biomass from wheat and barley for biofuel production and to promote the development of future barley and wheat cultivars for fuel production. The project will accomplish this by examining the economic feasibility of the use of reduced lignin grain crops for fermentable sugar production and determining the effect the environment has on lignin biosynthesis in straw. It will also determine what level of lignin decrease can be tolerated by wheat without having a negative impact on crop performance. Since the research uses wheat and barley genotypes adapted to the Pacific Northwest, a successful demonstration of the economic feasibility of ethanol from straw would allow for rapid implementation of the technology in rural communities in this area.

The Samuel Roberts Noble Foundation, Inc. (Ardmore, Okla.) – Development of Low-Lignin Switchgrass for Improved Ethanol Production - $670,166

The reduction of lignin in switchgrass by genetic engineering is likely one of the most effective and economic ways of reducing the costs of producing ethanol. This project seeks to produce low-lignin switchgrass by transgenic down-regulation of the key lignin biosynthetic enzymes: cinnamyl alcohol dehydrogenase (CAD), and caffeic acid *O*-methyltransferase (COMT). It also seeks to reduce the cross-linking of polysaccharides with lignin in switchgrass through the down-regulation of coumarate 3-hydroxylase (C3H), aldehyde deydrogenase (ALDH) and COMTII-like genes in order to modify ferulate and lignin biosynthesis. The transgenic materials that are developed will be tested for their conversion efficiency to ethanol in comparison to untransformed controls. Those transgenic lines identified as increasing the efficiency of ethanol production will then be incorporated into a grass breeding program for the development of elite switchgrass cultivars.

The Tampa Bay Area Ethanol Consortium (Florida) – Implementation of a Scale-Up Pilot Plant Demonstration Facility toward the Commercialization of Florida Biomass Feedstocks for Ethanol Production - $1,920,000

This project will demonstrate how the production, harvest, transportation, storage, handling and conversion of multiple feedstocks compatible with the climate and soil of Florida can be managed to economically produce ethanol. The project will focus on the development of a flexible-feedstock process that will enable the use of a combination of several feedstocks (citrus pulp and peel waste, sweet sorghum, and nonfood, high starch sweet potato) to enable stable-year-round ethanol production. This entails designing and constructing a 2 million gallon per year flex-feed ethanol plant, integrating high power ultrasonics as a pretreatment technology in the plant and validating the technical and economic feasibility of producing, harvesting, storing, handling and converting multiple feedstocks.

University of Montana, College of Technology (Missoula, Mont.) – Biopower Demonstration and Educational Outreach - $990,500

The goal of this project is to create positive awareness of the environmental and economic benefits of bioenergy in the minds of thousands of new stakeholders. In it the University of Montana Collage of Technology and its partners will advance the awareness of bioenergy as a biobased product by researching and applying bioenergy technology in ways that will expand its knowledge and understanding, identifying important stakeholder groups that are key to expanded use of bioenergy and packaging and distributing information about bioenergy and other biobased products to stakeholders in a way that is memorable and actionable. They will institute an education and research program, develop a biomass technical curriculum and design a series of high visibility outreach initiatives. A highly visible mobile educational laboratory will be outfitted with a wood chipper and dryer powered by biomass and several applications that can show audiences how biomass can be used to create bioenergy.

North Carolina State University, Department of Chemical and Biomolecular Engineering (Raleigh, N.C.) – Conversion of BioDiesel Derived Glycerol to Glycidol, Glycerol Carbonate and C-3 Oxygenates by Catalytic and Biocatalytic Pathways - $1,606, 265

Conversion of glycerol, a byproduct of biodiesel production, to other, more chemically-reactive and therefore useful three-carbon (C3) compounds is the focus of this project. Several approaches are being evaluated, including novel chemistries utilizing solid catalysts, the use of supercritical carbon dioxide as a reactant, the evolution of enzymes with improved catalytic activities, and the creation of genetically-engineered bacteria that express new metabolic pathways to generate valuable C3-oxygenates. This multi-pronged effort is expected to generate several new technologies in the laboratory with sufficient promise to justify small pilot scale evaluation.

Iowa State University (Ames, Iowa) – Environmental Enhancement through Corn Stover Utilization - $1,853,996

This project proposes a new system for maintaining soil fertility that employs cornstover or corn fiber for production of nitrogen-rich, biologically active char that both enriches the soil and sequesters carbon from the atmosphere. In this system, corn stover or corn hulls are collected and pre-processed locally to yield fine, porous char and energy rich bio-oil. The bio-oil, which can be thought of as densified biomass, is transported by tanker truck to a central facility for steam reforming to hydrogen followed by some part of it being converted to anhydrous ammonia (the process yields excess hydrogen for other applications). Using existing infrastructure of the agricultural fertilizer industry, anhydrous ammonia is transported back to the distributed preprocessing facilities where it is reacted with carbon dioxide, water, and char which are byproducts from pyrolysis of biomass, to yield ammonia bicarbonate precipitated within the pores of the char. The nitrogen rich char is injected into the soil where it serves three purposes: nitrogen fertilizer, biologically-active soil amendment, and a means for sequestering carbon from the atmosphere.

Oak Ridge National Laboratory (Oak Ridge, Tenn.) – Carbon Fiber from Biomass Lignins - $1,083,770

This project proposes to evaluate the use of biomass lignins, such as ethanol organosolv lignins produced from wood, woody biomass, annual crop materials, and grasses, as carbon fiber feedstocks. It is expected that the techniques used in evaluation of carbon fiber feedstocks from Kraft lignins can be modified to permit evaluation of melting and spinning behavior; presence and removal of contaminants which interfere with fiber production; fiber mechanical properties; carbon fiber production from lignin-based materials; and fabrication of small composites from experimental carbon fibers. The project will evaluate: 1) technologies needed to produce biomass-derived lignins that can be readily converted to industrial-grade carbon fibers; 2) the production and properties of

carbon fibers from biomass lignins, 3) activation of lignin-based carbon fibers, and 4) integration of lignin recovery into production schemes for other biobased products, including ethanol. If the ability to produce carbon fiber from biomass lignins can be demonstrated, lignin may become the most valuable product of a biorefinery. Sales of biomass derived carbon fiber could spur biorefinery deployment and, at the same time, improve energy efficiency, the environment, sustainability, and rural development.

Clarkson University – (Potsdam, N.Y.) – Environmental and Economic Performance of an Integrated, Digester-Cogeneration-Value-Added Process - $805,938

The overall goal of this project is to provide the data and understanding necessary to overcome questions of reliability and to prove the economic and environmental value of Anaerobic Digestion (AD) systems in order to increase their implementation. Tasks being undertaken in the project include: design and install a digester, energy recovery and value-added product system (e.g., micro-cheese); develop a mathematical model to optimize the digester/cogeneration/value-added system; quantify the environmental impact through a detailed lifecycle environmental analysis; and survey farmers to identify their perceptions of AD systems, barriers they face, and economic and education instruments they feel are required to overcome these barriers. The project will generate quantifiable evidence of the technical, environmental, economic and social efficacy of this integrated system. The model developed in this project will be invaluable to the regulatory community to identify incentive structures needed to promote this technology, for the designer to evaluate design and operational parameters and for the farmer to optimize his/her system to adjust for seasonal variations in temperature, changes in manure composition or other farm management practices.

University of Minnesota, Morris (Morris, Minn.) – Biomass Gasification: A Comprehensive Demonstration of a Community-Scale Biomass Energy System - $1,896,493

This project will address the obstacles to establishing community scale biomass systems and develop tools to enable further deployment of biomass gasification systems. Guidelines will be created to promote parallel development of sustainable biomass cropping systems. Six different streams of biomass feedstocks will be demonstrated: corn stover, corn earlage, wheat straw, soybean residue, native grasses, and hybrid poplar. Information obtained from test burns will be used to develop the Biomass Toolbox including Standard Operating Procedures, Best Management Practices, Templates for Contracts and Pricing Structures, and Environmental Permitting Templates. Capstone classes for professionals and World Wide Web monitoring of the biomass system highlight the outreach efforts.

University of Florida (Gainesville, Fla.) – Bioenergy: Optimum Incentives and Sustainability of Non-Industrial Private Forests in the U.S. South - $656,525

The goal of this project is to determine the optimum mix of policy instruments that can bridge current management and sustainable forest management of non-industrial private forests (NIPF) with wood energy as a product in the U.S. South. To accomplish this goal an in-depth assessment of the effect of policy initiatives on forest biomass supply, bioenergy production, employment, profitability and environmental quality will be conducted. The assessment will include a study of non-industrial forest (NIPF) landowners to gauge their willingness to enter into sustained biomass production for bioenergy through land use and forest management decisions; a study of the values households place on wood biomass and bioenergy production; a study of the effects of biomass-related policy instruments on NIPF landowner decisions; a region-wide economic analysis of employment, income, household welfare, and environmental effects of biomass-related policy instruments; and a status paper that combines the knowledge gained in the other parts of the assessment. The assessment will serve as the basis for exploring strategies to promote NIPF sustainability and increase bioenergy usage 10-fold by 2020 in the U.S. South. Theoretically consistent methodologies including contingent valuation, dynamic optimization, and computable general equilibrium will be applied to achieve the proposed tasks. The span of the data collection will cover most eventualities for biomass production, including coastal plain, piedmont, mountain, and bottomlands site types, as well as pine, hardwood, and mixed cover types.

Environmental Resources Trust (Washington, D.C.) – Incentives for Biomass Commercialization: Pioneering Markets for Biomass Using Renewable Energy Certificates, Emission Reduction Credits and Incentive Programs for Ammonia, PM_{10} and $PM_{2.5}$ Reductions - $449,993

The goal of this project is to spur the commercialization of biopower and bioproducts from animal feed operations throughout the country by capturing the economic value of their multiple environmental benefits, including biopower generation, verified emission reductions, emission reduction credits, and renewable energy certificates. This project will demonstrate a model to generate revenue from environmental benefits including the potential to create valuable PM10 emission reduction credits based on achieved ammonia reductions. Project deliverables will include protocols, tools and training materials designed to promote diffusion of advanced biomass technology throughout the United States. It will also develop online or web-enabled tools for quantification, monitoring, reporting and verification.

#