

Mr. Chairman, Members of the Committee, I appreciate the opportunity to discuss the Department of Energy's Biomass program. I'm especially pleased to testify with the Under Secretary of Agriculture. Our two agencies have been working closely together over the last few years to promote our Nation's biomass resources, which we believe will enhance our energy security, provide for a cleaner environment, and stimulate economic growth in rural communities.

Biomass - agricultural crops, trees, wood wastes, plants, grasses, fibers, animal and other wastes - represents an abundant, domestic and renewable source of energy that has tremendous potential to increase domestic energy supplies. Many think of biomass mainly as a source for liquid fuel products such as ethanol and biodiesel. But biomass can also be converted to a multitude of products we use every day. In fact, there are very few products that are made today from a petroleum base, including paints, inks, adhesives, plastics and other value-added products, that cannot be produced from biomass.

The Department estimates that the total available domestic biomass resource, beyond current uses for food, feed, and forest products, is between 500-600 million dry tons per year. Within the continental U.S., we can literally grow and put to use hundreds of millions of tons of additional plant matter per year on a sustainable basis. These biomass resources represent about 3-5 quadrillion Btus (quads) of delivered energy or as much as 5-6 percent of total U.S. energy consumption. In terms of fuels and power, that translates into 60 billion gallons of fuel ethanol or 160 gigawatts of electricity. This is enough energy to meet 30 percent of U.S. demand for gasoline or service 16 million households with power.

In addition to production of alternative liquid transportation fuels such as ethanol and biodiesel, biomass is a proven option for generating electricity through the direct combustion of wood, municipal solid waste, and other organic materials; co-firing with coal in high efficiency boilers; or combustion of biomass that has been chemically converted into fuel oil. So-called "biopower" in 2002 accounted for about 71 percent of non-hydroelectric renewable electricity generation and about 1.0 percent of total U.S. energy supply. It also accounted for about 9,733 MW in 2002 of installed capacity. This includes about 5,886 MW of wood and wood waste, 3,308 MW of generating capacity from municipal solid waste and landfill gas, and 538 MW of other capacity such as agricultural byproducts, sludge waste, and tires. The majority of electricity production from biomass is used as base load power in the existing electrical distribution system.

The Energy Information Administration (EIA) forecasts that electricity output from biomass (including municipal waste) combustion will increase from 59 billion kWh in 2002 (1.5 percent

of generation) to 112 billion kWh in 2025 (1.9 percent of generation).

More than 200 companies outside the wood products and food industries generate power in the United States from biomass. Where power producers have access to very low cost biomass supplies, the choice to use biomass in the fuel mix enhances their competitiveness in the marketplace. This is particularly true in the near term for power companies choosing to co-fire biomass with coal to save fuel costs and earn emissions credits. An increasing number of power marketers are starting to offer environmentally friendly electricity in response to consumer demand and regulatory requirements.

DOE Biomass Program

The focus of the DOE Biomass and Biorefinery Program today is advanced technologies to transform the Nation's domestic biomass resources into high value chemicals, fuels, and power.

Recognizing the growing importance of biomass technologies, two years ago we integrated several bioenergy activities into one office to allow a clear and consistent set of goals and objectives and increased collaboration with industry. The program worked closely with industry to produce a vision and R&D roadmap that focuses on the most promising long-term opportunities that, with leveraged funding from industry, can realize a goal of establishing the first large-scale biorefinery based on agricultural residues by 2010. A multiyear technical plan in support of this goal provides a comprehensive work breakdown structure with milestones, costs and schedule, so that every project is linked to program goals, objectives and technical barriers.

The Department of Energy's FY 2005 budget request for biomass activities is \$81.3 million. Notably, Congressionally-directed projects accounted for \$41 million of the FY 2004 appropriation, or nearly half of the biomass budget. The need to fund these specific projects has delayed progress toward the program goals and diminished core research capabilities at the National Laboratories.

The current focus of the DOE Biomass program is an integrated approach to the simultaneous production of liquid fuels, power and products in what we call a "biorefinery" that would produce a suite of products much in the manner of an oil refinery. By producing multiple products, a biorefinery could take advantage of the differences in plants and other biomass, and maximize the productivity and value from each of the feedstocks. A biorefinery might produce low volume, high value chemicals and low value, high volume liquid transportation fuel while generating enough electricity and process heat for its operation. The high value products enhance profitability, the high volume fuel helps meet national energy needs, and power production reduces costs. Such a refinery would take advantage of the vast supplies of corn

stover and other lignocellulosic biomass - the "everything else" in biomass beyond the simple sugars, starch and protein that are valuable inputs into our food supply.

The concept of a biorefinery is based on two technology pathway "platforms" that would promote different products. The "sugar platform" uses a biochemical conversion process to ferment sugars extracted from biomass feedstocks. The "thermochemical platform" involves gasifying biomass feedstocks and by-products from the conversion process. We are currently supporting six major biorefinery projects across the country, each involving private sector partners, focused on developing new technologies for integrating production of biomass-derived fuels and products in a biorefinery.

For example, DOE is partnering with chemical industry leaders such as DuPont and Dow Chemical to develop new opportunities for producing both fuels and chemicals from biomass. DuPont and DOE are working with other industrial partners to develop what DuPont calls an "Integrated Corn Biorefinery" - the goal of which is a refinery that can efficiently convert the starch in corn grain to a low-cost sugar as feedstock to make value-added chemicals, while using the remaining lignocellulosic parts of the corn plant to produce ethanol and power. The ethanol would be competitive at first with corn grain ethanol, and possibly with gasoline. If successful, DuPont's process design could be added onto existing corn ethanol facilities to dramatically improve the yield of ethanol and overall profitability of the facility.

In another project, DOE is working with Cargill-Dow (a joint venture of Cargill and Dow Chemical) to develop new biorefineries that use the corn plant (both the grain and the lignocellulosic fraction) to produce polylactic acid (PLA) - a unique and environmentally friendly renewable polymer. Cargill-Dow has constructed its first PLA facility in Blair, Nebraska and it is producing PLA from the starch in corn while the technology focus is to utilize the remaining lignocellulosic components in the corn plant in the PLA production process.

Interagency Cooperation

We recognize that a new bioindustry will also encourage better use of agricultural land and forestry residues, such as woody biomass. Last December President Bush signed the Healthy Forest Restoration Act (HFRA), which was aimed at reducing the threat of wildland fire to communities by thinning forest lands. These efforts will yield large volumes of materials in the form of brush and small-diameter trees that today have little commercial application. Title II of HFRA is intended to help focus research on overcoming barriers hindering the use of biomass, accelerating assistance to community-based enterprises, and encouraging the adoption of

technologies that use biomass and small diameter material.

Woody biomass utilization is an important part of a Memorandum of Understanding signed last year by the Departments of Agriculture, Interior and Energy. We work very closely with the Department of Agriculture in implementing the biomass program. The Biomass Research and Development Act of 2000 required the Secretary of Agriculture and the Secretary of Energy to establish and carry out a Biomass Research and Development Initiative under which competitively awarded grants, contracts, and financial assistance would be provided to eligible entities to carry out research on biobased industrial products. The Act also established the Biomass R&D Board, chaired by Under Secretary Rey and myself, and that also includes the Department of Interior, the Environmental Protection Agency, the National Science Foundation, the Office of Science and Technology Policy, and the Federal Environmental Executive.

The Act also created the Biomass R&D Technical Advisory Committee, an advisory group to the Secretaries of Energy and Agriculture. The Committee includes 30 industrial and other biomass experts that advise the Department (and the Department of Agriculture) on program technical focus. The Committee facilitates partnerships among Federal and State agencies, producers, consumers, the research community, and other interested groups. In October 2002, the Federal Advisory Committee released its "Vision for the Bioenergy and Biobased Products in the United States." The report sets aggressive goals to increase the role of biomass in the US economy by 2020 and beyond.

The 2002 Farm Bill provided direct funding of \$75 million for USDA research, development and demonstration projects under the Biomass Research and Development Act of 2000. USDA's Natural Resources Conservation Service and EERE coordinated efforts to issue a joint solicitation that is providing nearly \$16 million in USDA funding and more than \$7 million from DOE. Nineteen projects (4 DOE and 15 USDA) were selected from more than 400 submitted. This is an unprecedented level of cooperation between our two agencies that we hope to continue in the future.

Conclusion

Mr. Chairman, that completes my prepared statement. I would be happy to answer any questions at this time.