

**Testimony of Joan L. Pellegrino, President
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ON BIOMASS ENERGY RESEARCH, DEVELOPMENT & DEMONSTRATION**

**Department of Energy Fiscal Year 2010 Budget Appropriation
Submitted to the Senate Committee on Appropriations
Subcommittee on Energy and Water Development**

May 15, 2009

SUMMARY

This testimony pertains to fiscal year 2010 (FY10) appropriations for biomass energy research, development, and demonstration (RD&D) conducted by the **Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE), Biomass Program (OBP)**. This RD&D is funded by the Energy and Water Development Bill, under Energy Supply and Conservation, Energy Efficiency and Renewable Energy. BERA recommends a total appropriation of **\$400 million in FY10 for Biomass and Biorefinery Systems R&D**. This is an increase of ~\$75 million over the U.S. Department of Energy request for FY10 for this programmatic area. **Substantial investments in new technology and demonstrations will be needed to meet the RFS goals for advanced biofuels.** Specific lines items for the DOE biomass RD&D budget are below (also see Table 1):

- **\$40,000,000** for **Feedstock Infrastructure** development (regional partnerships, harvesting and storage technology, exploration of new feedstocks)
- **\$60,000,000** for **Biochemical Conversion Platform Technology** (emphasis on cost-effective pretreatment technologies and fermentation organisms – both are large contributors to high cost of biofuels production from cellulosic materials)
- **\$60,000,000** for **Thermochemical Conversion Platform Technology** (conversion of plants, oil crops, energy crops, wood and forest resources to oils, long chain hydrocarbons, or other fuels/intermediates)
- **\$200,000,000** for **Utilization of Platform Outputs: Integrated Biorefinery Technologies demonstrations**. Technology demonstrations reduce technical and economic risk and accelerate the potential for private investment.
- **\$40,000,000** for **Utilization of Platform Outputs: Bioproducts** (chemicals and materials)

BACKGROUND

On behalf of BERA's members, we would like to thank you, Mr. Chairman, for the opportunity to present the recommendations of BERA's Board of Directors for the high-priority programs that we strongly urge be continued or started. BERA is a non-profit association based in the Washington, DC area. It was founded in 1982 by researchers and private organizations conducting biomass research. Our objectives are to promote education and research on the economic production of energy and fuels from biomass, and to serve as a source of information on biomass RD&D policies and programs. BERA does not solicit or accept Federal funding.

Table 1. FY 2010 Biomass/Biorefinery Systems R&D, Energy Supply & Conservation, DOE/EERE Biomass Program (Million Dollars)		
Program Area	Description of RD&D	Total
Feedstock Infrastructure	<ul style="list-style-type: none"> - Regional feedstock partnerships - Joint development of storage and harvesting technology - Plants species amenable to thermochemical (e.g., high lignin) and biochemical (e.g., more easily processed lignin) processes 	\$40.0
Biochemical Conversion Platform R&D	<ul style="list-style-type: none"> - Next generation biofuels/processes using a range of feedstocks - Technologies to reduce costs of pretreatment - Advanced biological routes that combine biological methods with pretreatment to reduce enzyme costs dramatically - Seed funding for revolutionary new concepts, including small businesses and inventors 	\$60.0
Thermochemical Conversion Platform R&D	<ul style="list-style-type: none"> - Next generation biofuels and processes that can use a range of feedstocks (pyrolysis, gasification, routes) - Technologies to reduce costs of pretreatment - Seed funding for revolutionary new concepts, including small businesses and inventors 	\$60.0
Platform Outputs: Integrated Biorefineries	<ul style="list-style-type: none"> - Direct funding (cost-shared) of biochemical and thermochemical conversion technologies - Public awareness and outreach programs - National center for infrastructure issues - Underwriting of loan guarantees 	\$200.0
Platform Outputs: Bioproducts	<ul style="list-style-type: none"> - Co-production of chemicals and materials from biochemical and thermochemical output streams as alternatives to petroleum-derived chemicals 	\$40.0
TOTAL		\$400.0

There is a growing urgency to diversify our energy supply, develop technologies to utilize indigenous and renewable resources, reduce U.S. reliance on imported oil, and mitigate the impacts of energy on climate and the environment. The benefits will be many – support for economic growth, new American jobs, enhanced environmental quality, and fewer energy-related contributions to climate change. Economic growth is fueled and sustained in large part by the availability of reliable, cost-effective energy supplies. The import of oil and other fuels into the United States is growing steadily, despite increased volatility in supply and prices, especially petroleum and natural gas. This creates an economic burden on industry and consumers alike, and adversely impacts our quality of life. A diversified, sustainable energy supply is critical to meeting our energy challenges and maintaining a healthy economy with a competitive edge in global markets. Biomass can diversify U.S. energy supply in several ways, and biofuels is only one avenue:

- Biomass is the single renewable resource with the ability to **directly replace liquid transportation fuels.**
- Biomass can be used as a feedstock to **supplement the production of chemicals, plastics, and materials now produced from crude oil.**
- Gasification of biomass produces a syngas that can be utilized to **supplement the natural gas supply, generate electricity, or produce fuels and chemicals.**

While biomass will not solve all our energy challenges, it can certainly contribute to the diversity of our supply, and do so in a sustainable way, while minimizing impacts to the environment or climate. The Energy Independence and Security Act (EISA) of 2007 mandates increased use of alternative fuels, with a substantial portion to come from cellulosic biomass. To meet the ambitious EISA goals will require aggressive support for RD&D to move technology forward and reduce technical and economic risk.

OVERALL BERA RECOMMENDATIONS FOR US DOE/EERE BIOMASS RD&D

- 1. MAKE INVESTMENTS TO ACCELERATE DEVELOPMENT OF NEXT GENERATION BIOFUELS/PROCESSES. [Platforms Research and Development - Biochemical and Thermochemical Platform R&D]** Balance funding so more is allocated toward **next generation biofuels and processes** that include both biochemical and thermochemical routes, including pyrolysis, gasification, and others, and hybrid routes; emphasize processes that can use a range of biomass types. Include **advanced biological routes** that better integrate simplified combined biological methods with pretreatment to **reduce enzyme costs dramatically** as enzymes followed by pretreatment are the major cost items that are susceptible to change.
- 2. MAKE INVESTMENTS TO BRING DOWN THE COST OF BIOMASS PRETREATMENT. [Platforms Research and Development - Biochemical and Thermochemical Platform R&D]** Invest substantial funds to bring down the capital and operating costs of **pretreatment** of cellulosic biomass. This is very important and deserves emphasis as **pretreatment is a major factor in the cost of production** and also influences the cost of the rest of process. It remains a major hurdle for commercialization of new processes and achieving economic viability of operating biofuels facilities. Developing pretreatment processes that integrate better with the entire process are a critical aspect.
- 3. UNDERWRITE AN UNPRECEDENTED NUMBER OF LOAN GUARANTEES AND DIRECTLY FUND A WIDE RANGE OF DEMONSTRATIONS. [Utilization of Platform Outputs: Integrated Biorefineries]** **These actions will raise confidence in private investment during uncertain economic times – facilities need to be put in the ground now to make a difference in the mid and long term.** Technology demonstrations reduce technical and economic risk and accelerate the potential for private investment. A major concern is that DOE has not approved and disbursed a single loan guarantee under the innovative technology program established by EAct 2005. However, DOE Secretary Steven Chu indicates he is committed to reform to speed up the loan guarantee process. We suggest that DOE provide ~50% of capital for first plants with the rest being private funds to compensate for the risk of first projects while assuring enough private capital is on the line for proper due diligence. **This level of guarantee is vital – introducing any new fuel in**

today's petroleum-heavy market is extremely challenging. The capital costs for petroleum processing are paid off, making it a cash producer, while a biofuels facility must cover not only cash costs but make a high return on capital to compensate for first time risk. This is a heavy lift for first-of-a-kind technology.

4. **SET ASIDE FUNDING FOR DEMONSTRATION OF REVOLUTIONARY, BUT UNPROVEN NEW CONCEPTS. [Platforms Research and Development - Biochemical and Thermochemical Platform R&D]** Seed funding is needed for revolutionary new ideas that show great promise. We must appeal to the great American sense of innovation and invention to bring ideas to the table that will help solve our energy crises. Small, entrepreneurial inventors and businesses should be part of this equation. This is an important, but riskier proposition, and will take longer to allow for successive funding of ideas and demonstrations.
5. **INVEST MORE FUNDS IN DEVELOPMENT OF COST-EFFECTIVE NEW BIOPRODUCTS. [Utilization of Platform Outputs: Integrated Biorefineries]** Some chemicals could be produced from biomass, reducing our dependence on oil-derived chemicals and materials that go into a myriad of consumer goods from paint to food to drugs to plastics. Positive economic returns (and improved margins for integrated biorefineries) could be achieved by production of value-added co-products, whether the facility is based on thermochemical or biochemical technology. Current funding for this area is extremely limited. The challenge is that large plants are needed for economies of scale, thereby favoring biofuels. Chemicals can improve returns in a fuels biorefinery and provide scale advantages, but financing construction of projects involving more than one product is risky.
6. **INVEST IN STUDY OF NEW NON-FOOD, NON-COMMODITY BIOMASS. [Feedstocks Infrastructure]** This includes algae, selected perennial grasses, wood, and waste (of any kind, industrial, construction, food processing, etc); include an understanding of the viability of these resources (yields, production issues, chemistry, etc) for producing a **wide range of fuels (analogues for gasoline, diesel, jet fuel, marine fuel, etc)**. This should include developing plants species that are more amenable to thermochemical (e.g., high lignin) and biochemical (e.g., low lignin, more easily processed lignin) processing.
7. **INVEST SIGNIFICANT RESOURCES ON OUTREACH TO INCREASE PUBLIC AWARENESS. [Utilization of Platform Outputs]** The importance of public opinion cannot be overstated. Increasing awareness and understanding of biofuels and their impacts on our energy situation is critical. This includes understanding the positive environmental impacts, and dispelling of misperceptions – we need to get the truth out there, good and bad – and enable consumers to make good choices. Funding should include incentives to States to get the word out and educate the public – and make this information available where people fuel up – at local filling stations and grocery stores, etc.
8. **JOINTLY FUND (WITH USDA, DOT, EPA) A NATIONAL CENTER TO ADDRESS INFRASTRUCTURE ISSUES. [Utilization of Platform Outputs]** A national center for centralized information and technology exchange is needed, covering all areas of infrastructure from storage and transport of feedstocks to blending, storage and distribution of fuels to consumers. This center would incorporate a public-private partnership model to encourage investment in infrastructure. Infrastructure has not received much attention, but could severely impede reaching EISA RFS goals.