

**U.S. Department of Energy  
Energy Efficiency and Renewable Energy  
Office of the Biomass Program  
And  
U.S. Department of Agriculture**

**RESEARCH AND DEVELOPMENT ACTIVITIES  
BY  
ROADMAP CATEGORY**

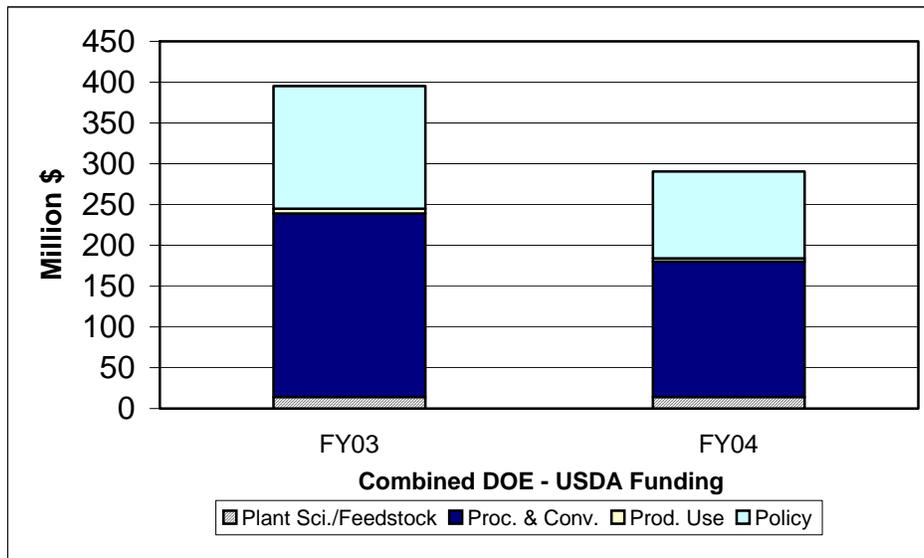
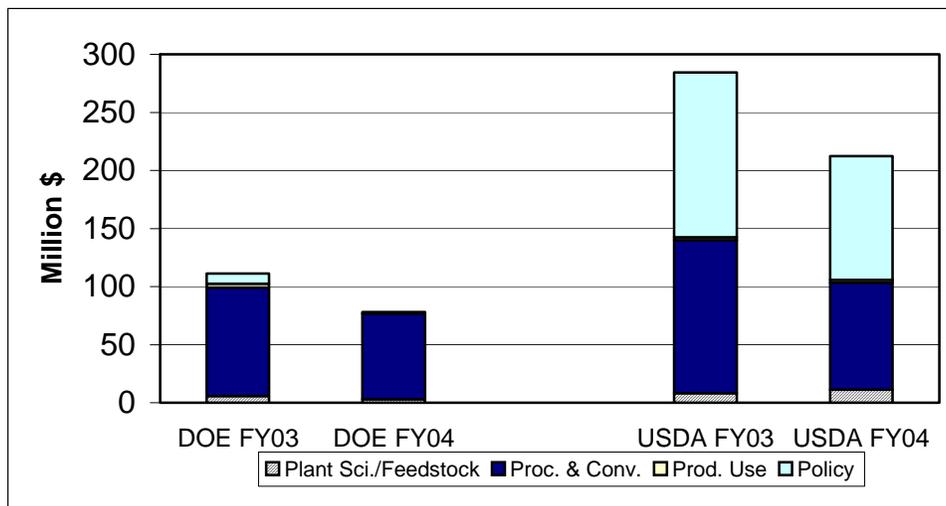
**Prepared for:**

**Biomass Technical Advisory Committee  
and the  
Interagency Biomass Research and Development Board**

**Updated:  
April 18, 2003**

## DOE and USDA Funding by Roadmap Category

Roadmap Category	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Plant Sciences and Feedstock Production	\$5,803,206	\$8,363,000	\$14,166,206	\$3,000,000	\$11,224,000	\$14,224,000
Processing and Conversion	\$93,359,369	\$131,779,000	\$225,138,369	\$73,658,000	\$92,200,000	\$165,858,000
Product Uses and Distribution	\$3,487,000	\$2,288,000	\$5,775,000	\$1,500,000	\$2,369,000	\$3,869,000
Public Policy Measures to Support Biomass Development <sup>1,2</sup>	\$8,479,691	\$141,981,800	\$150,461,491	\$0	\$106,511,700	\$106,511,700
Other <sup>3</sup>	\$20,638,336	\$500,000	\$21,138,336	\$0	\$500,000	\$500,000
<b>Total</b>	<b>\$131,767,602</b>	<b>\$284,911,800</b>	<b>\$416,679,402</b>	<b>\$78,158,000</b>	<b>\$212,804,700</b>	<b>\$290,962,700</b>



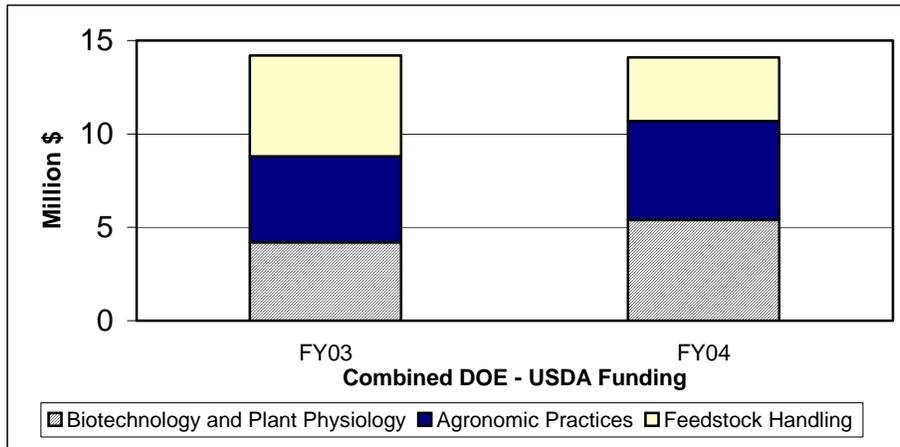
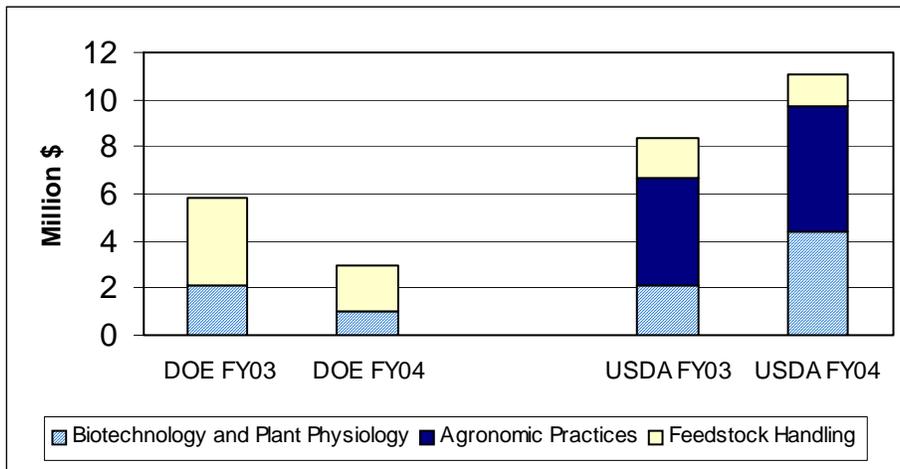
<sup>1</sup> Includes DOE Planning and Analysis Activities and State and Regional Funding

<sup>2</sup> Includes USDA Rural Development Undistributed Subcategory moved from Processing and Conversion

<sup>3</sup> Includes Earmark and Solicitation Reserves

## Funding in Plant Sciences and Feedstock Production Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Biotechnology and Plant Physiology	\$2,107,799	\$2,078,000	\$4,185,799	\$1,000,000	\$4,446,000	\$5,446,000
Agronomic Practices	\$0	\$4,596,000	\$4,596,000	\$0	\$5,346,000	\$5,346,000
Feedstock Handling	\$3,695,407	\$1,689,000	\$5,384,407	\$2,000,000	\$1,432,000	\$3,432,000
<b>Total</b>	<b>\$5,803,206</b>	<b>\$8,363,000</b>	<b>\$14,166,206</b>	<b>\$3,000,000</b>	<b>\$11,224,000</b>	<b>\$14,224,000</b>



## **KEY RESEARCH PROJECTS/FOCUS AREAS IN PLANT SCIENCES AND FEEDSTOCK PRODUCTION ROADMAP CATEGORY**

### **DOE - Biotechnology and Plant Physiology**

Enhancement of Bio-Based Products from Sorghum Grain, with Optimized Production, B-8

### **USDA - Biotechnology and Plant Physiology**

Improve Biomass Yield and Quality, A-4

Improvement of Technical Understanding Biochemistry and Development of Biological Pathways and Genomic Data of Woody Biomass, A-23

### **USDA - Agronomic Practices**

Develop Management Practices, Systems, and Sustainable Systems for Energy Crops and Identify New Energy Crops, A-5

Expanding Canola Production in Five Regions across the U.S. and for Trees as Energy Crops, A-18

Optimizes Silvicultural Practices and looks at Ecological Management Practices and Impacts for Woody Crops, A-23

### **DOE - Feedstock Handling**

Agricultural Engineering Systems and Sustainability, B-10

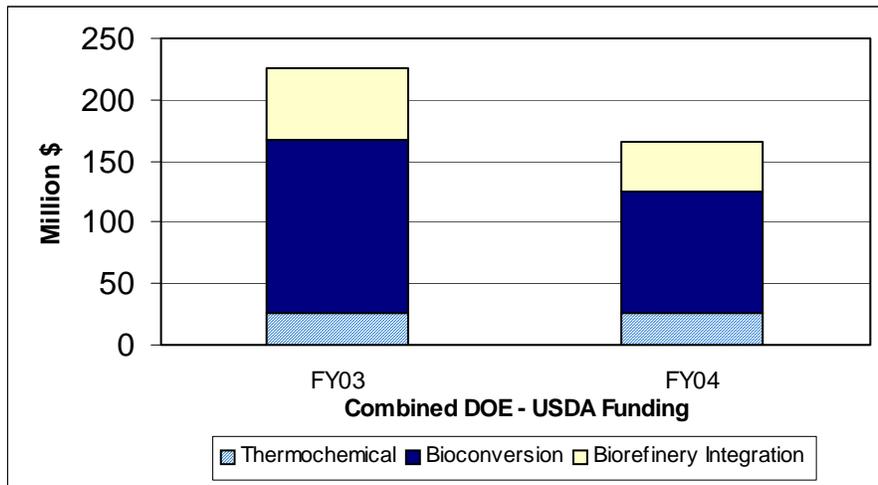
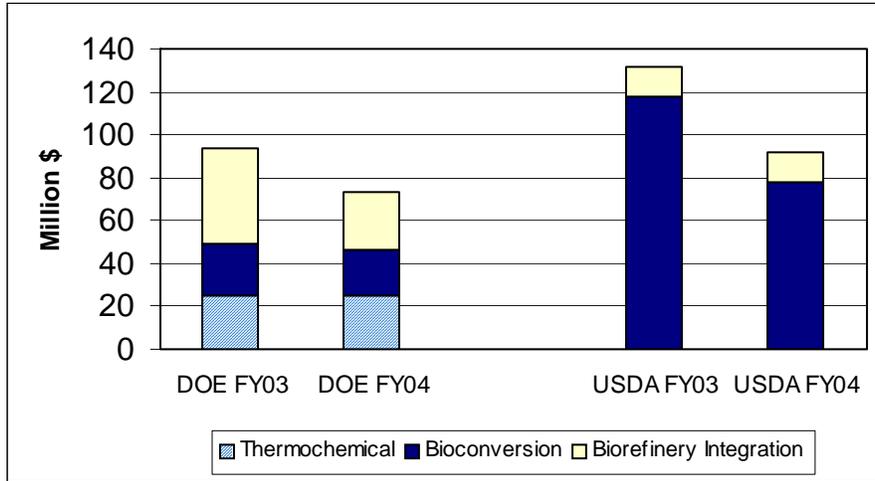
### **USDA - Feedstock Handling**

Develop Herbaceous Biomass Harvesting and Handling Systems, A-6

Explore Feedstock Handling of Woody Crop Systems, A-24

## Funding in Processing and Conversion Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Thermochemical Conversion Pathways	\$25,338,425	\$200,000	\$25,538,425	\$25,304,000	\$200,000	\$25,504,000
Bioconversion	\$23,529,294	\$117,670,000	\$141,199,294	\$21,104,000	\$78,000,000	\$99,104,000
Biorefinery Integration	\$44,491,650	\$13,909,000	\$58,400,650	\$27,250,000	\$14,000,000	\$41,250,000
<b>Total</b>	<b>\$93,359,369</b>	<b>\$131,779,000</b>	<b>\$225,138,369</b>	<b>\$73,658,000</b>	<b>\$92,200,000</b>	<b>\$165,858,000</b>



## **KEY RESEARCH PROJECTS/FOCUS AREAS IN PROCESSING AND CONVERSION ROADMAP CATEGORY**

### **DOE - Thermochemical Conversion Pathways**

Demonstration of Black Liquor Gasification at Big Island, B-16  
Gasification Program Technology Support and Project Management, B-18  
SynGas Platform Advanced Biomass R&D: Syngas Production, B-19  
R&D Activities at PNNL, Including Technical Support, Wet Gasification, and Liquid Fuels Gasification and Pyrolysis, B-20  
Capital Equipment, B-22  
Biomass Gasification Facility in Birmingham, AL (Earmark), B-22  
Analytical Studies and Program Integration at NREL Related to Syngas Platform, B-23  
High Pressure Combinational Catalysis Unit, B-23

### **USDA - Thermochemical Conversion Pathways**

Explores Environmental and Economic Benefits of Woody Biomass Gasification, A-24

### **DOE - Bioconversion**

Sugar Platform Integration, B-26  
Sugar Platform Advanced Biomass R&D Products from Sugars: Fermentation Platform, B-27  
Sugar Platform Advanced Biomass R&D: Cellulase Enzymes, B-28  
Sugar Platform Advanced Biomass R&D: Pretreatment, B-29  
PHAs in Plants (Biomass Biorefinery for Production of Polymers and Fuel), B-30

### **USDA - Bioconversion**

Improve Conversion of Feedstocks into Biofuels and Bioproducts, A-9  
Non-Food Characterization/Process/Product Research and Improved Utilization of Wood and Wood Fiber, A-15  
Develop More Effective Bioconversion of Woody Biomass, A-24  
Value-Added Agricultural Product Market Development Grant Program, A-34

### **DOE - Biorefinery Integration**

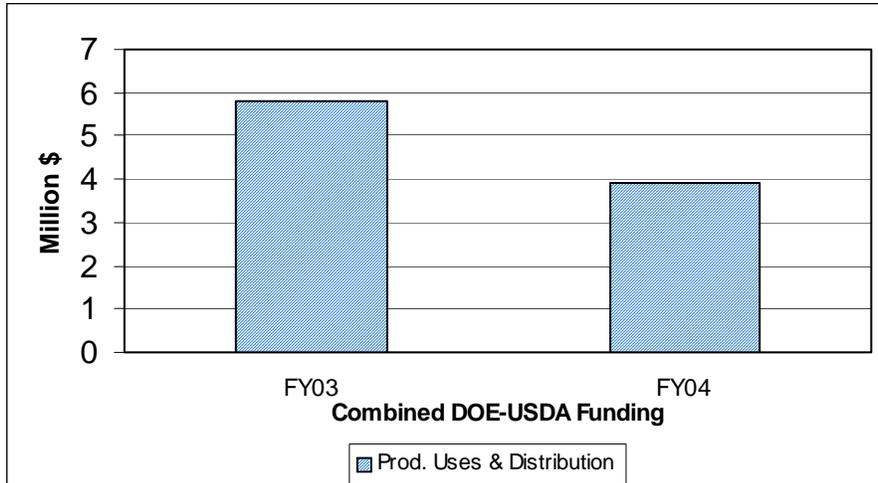
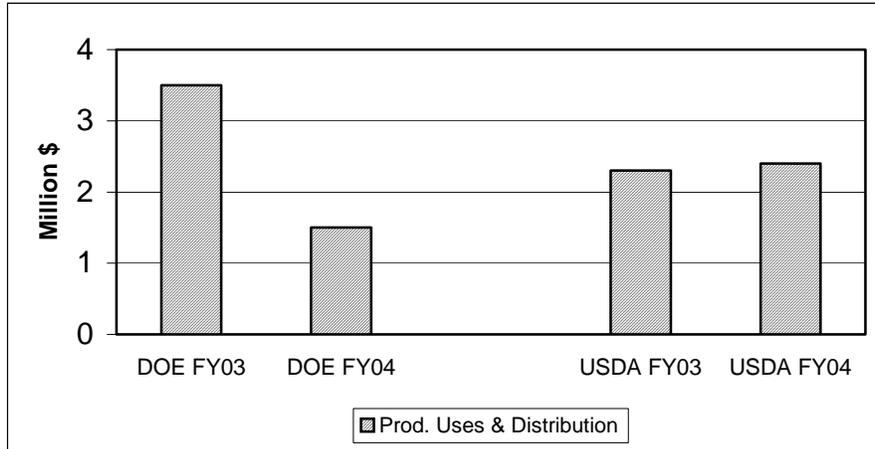
Collaboration with USFS Forests Products Laboratory on Gasifier Demonstration, B-31  
GovWorks/Department of the Interior (Obligated to the Six Projects), B-32  
A Second Generation Dry Mill Biorefinery\*, B-32  
A New Biorefinery Platform Intermediate\*, B-32  
Making Industrial Bio-Refining Happen\*, B-33  
Integrated Corn-Based Bio Refinery (ICBR) Project\*, B-33  
Advanced Biorefining of Distiller's Grain and Corn Stover Blends: Pre-Commercialization of a Biomass-Derived Process Technology\*, B-34  
Separation of Corn Fiber and Conversion to Fuels and Chemicals, Phase II: Pilot-scale Operation\*, B-34  
Mixed Waste Biorefinery Using Thermal Depolymerization in Colorado (Earmark), B-35  
Combined Heat and Power Green Institution in Minnesota (Earmark), B-35  
Iowa Switchgrass at Agreed to Levels, B-36  
Iroquois Bioenergy Cooperative (Earmark), -37  
Michigan Biotech Institute (Earmark), B-37  
Mississippi Ethanol (Earmark), B-37  
New FY03 Solicitation with USDA, -38  
\*Funding data for the integrated biorefinery projects is the sum of FY02 and FY03

### **USDA - Biorefinery Integration**

Biorefinery Solicitation with DOE, A-27

## Funding in Product Uses and Distribution Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
End-Products and Distribution Systems	\$3,487,000	\$2,228,000	\$5,775,000	\$1,500,000	\$2,369,000	\$3,869,000
<b>Total</b>	<b>\$3,487,000</b>	<b>\$2,228,000</b>	<b>\$5,775,000</b>	<b>\$1,500,000</b>	<b>\$2,369,000</b>	<b>\$3,869,000</b>



## **KEY RESEARCH PROJECTS/FOCUS AREAS IN PRODUCT USES AND DISTRIBUTION ROADMAP CATEGORY**

### **DOE - End-Products and Distribution Systems**

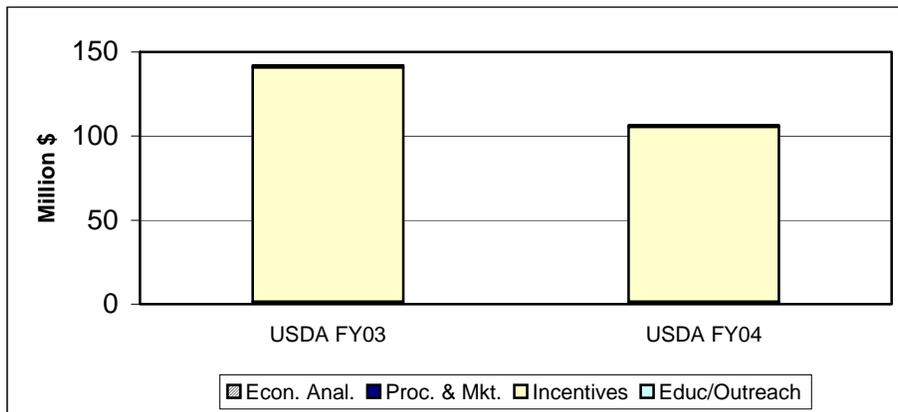
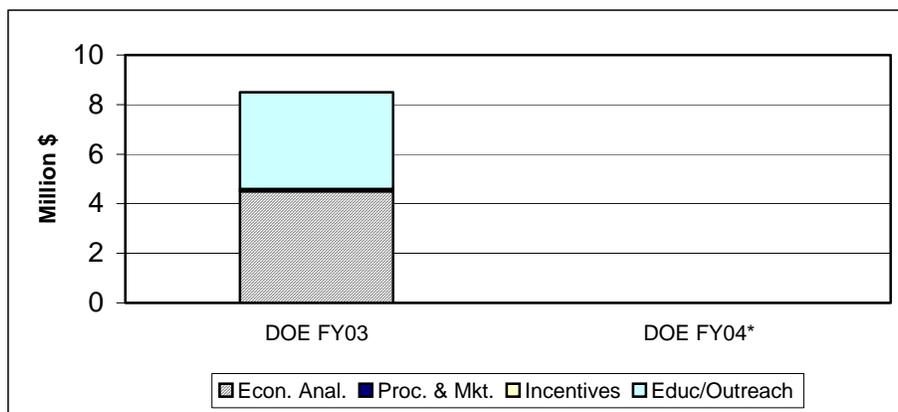
Renewable Diesel: Industrial Oils Platform Analysis, B-39

### **USDA - End-Products and Distribution Systems**

Establish Methods for Characterizing and Measuring Quality of Biomass for Conversion to Biofuel, A-7  
Examine Development of High Valued Products from Woody Biomass Feedstocks, A-24

## Funding in Public Policy Measures to Support Biomass Development<sup>4</sup>

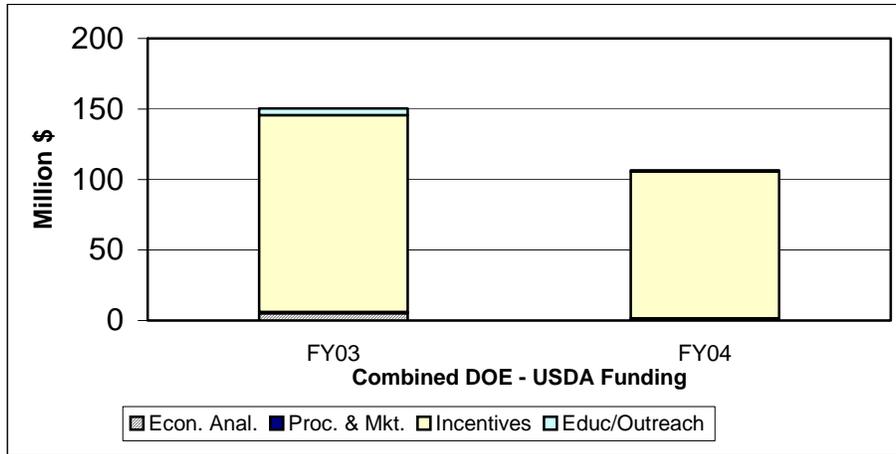
Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Economic Analysis <sup>5</sup>	\$4,514,691	\$630,000	\$5,144,691	\$0	\$634,000	\$634,000
Life Cycle Assessment	\$0	\$0	\$0	\$0	\$0	\$0
Procurement and Markets	\$100,000	\$1,000,000	\$1,100,000	\$0	\$1,000,000	\$1,000,000
Regulatory Measures	\$0	\$0	\$0	\$0	\$0	\$0
Incentives <sup>6</sup>	\$0	\$139,351,800	\$139,351,800	\$0	\$103,877,700	\$103,877,700
Biomass Resource Supply	\$0	\$0	\$0	\$0	\$0	\$0
Education and Outreach	\$3,865,000	\$1,000,000	\$4,865,000	\$0	\$1,000,000	\$1,000,000
R&D Investment	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$8,479,691</b>	<b>\$141,981,800</b>	<b>\$150,461,491</b>	<b>\$0</b>	<b>\$106,511,700</b>	<b>\$160,511,700</b>



<sup>4</sup> DOE does not fund policy development activities. FY03 analysis activities that could be used to support policy were listed in this category.

<sup>5</sup> Includes DOE Planning and Analysis Activities and State and Regional Funding

<sup>6</sup> Includes USDA Rural Development Undistributed Subcategory moved from Processing and Conversion



**KEY RESEARCH PROJECTS/FOCUS AREAS IN PUBLIC POLICY MEASURES TO SUPPORT BIOMASS DEVELOPMENT**

**DOE - Economic Analysis**

State Technologies Advancement Cooperative (STAC), B-46

**USDA - Economic Analysis**

Provide Policy and Economic Analysis on Biomass Issues to the Secretary of Agriculture, A-30

**USDA - Procurement and Markets**

Federal Procurement of Biobased Products, A-31

**USDA - Incentives**

Commodity Credit Corporation's (CCC) Bioenergy Program, A-20

Rural Business-Cooperative Service (RBS), A-36

**DOE - Education and Outreach**

Education Initiative, B-44

Consortium for Plant Biotechnology Research Initiative (Earmark), B-44

**USDA - Education and Outreach**

Biodiesel Fuel Education Program, A-32