Summary of Program Presentations

for the

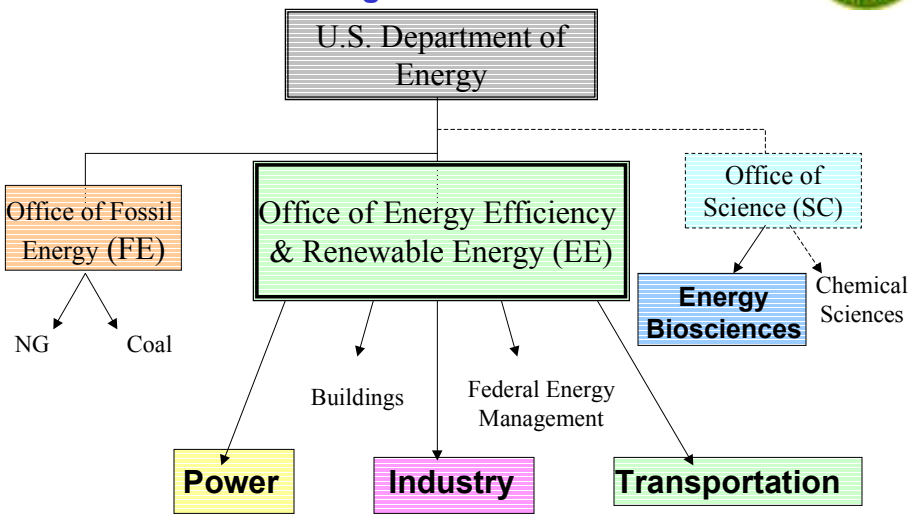
DOE National Bioenergy Center

Strategic Partnerships Workshop

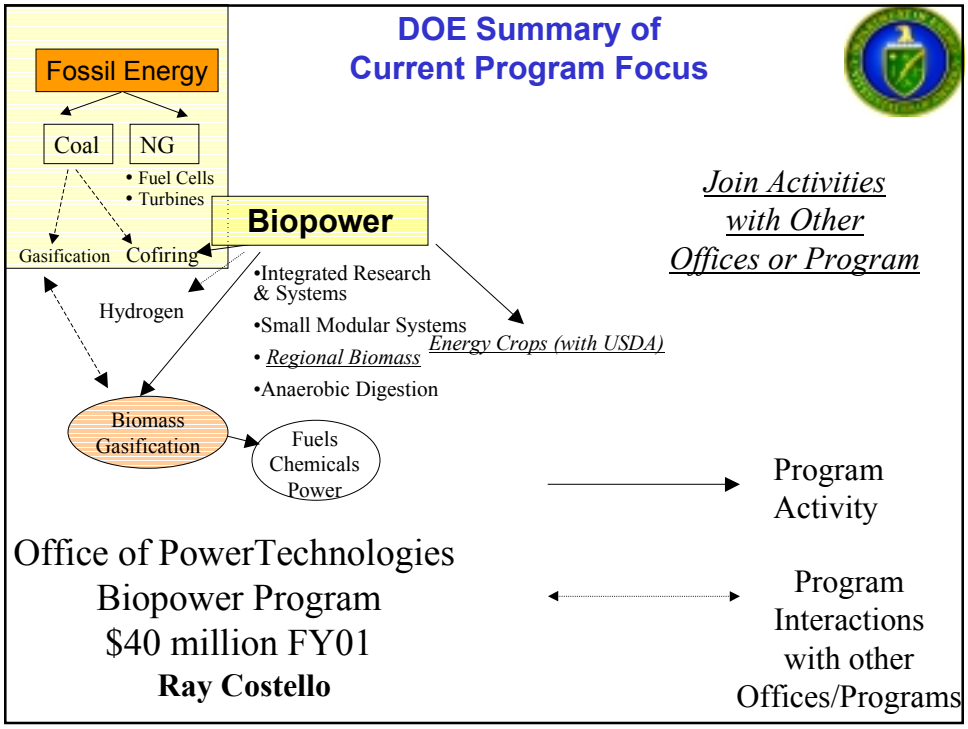
April 11 - 12, 2001

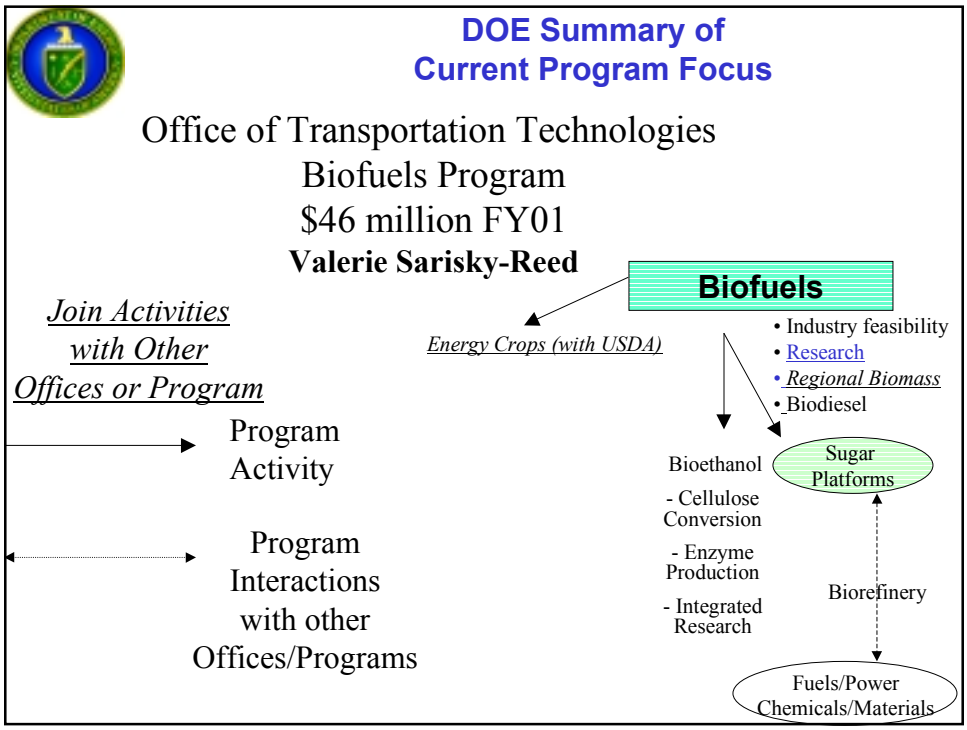
Colorado

Bioenergy and Biobased Products R&D Programs at DOE



Doug Kaempf, National Biobased Products and Bioenergy Coordination Office Co-Chair

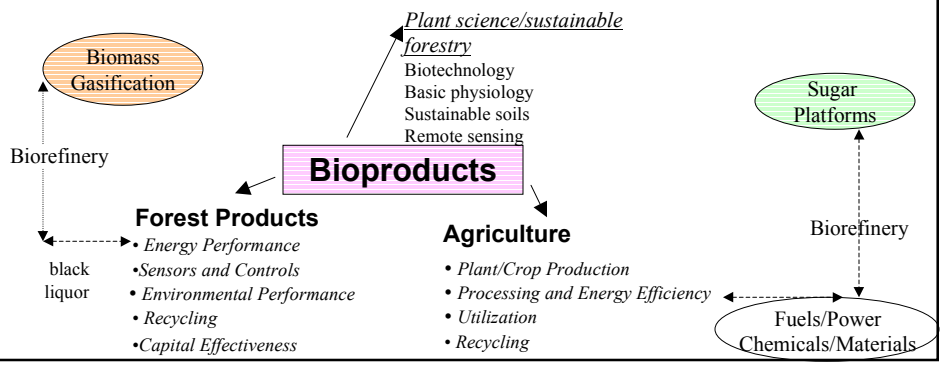

DOE Summary of
Current Program Focus
Fossil Energy
Coal
NG
• Fuel Cells
• Turbines
Gasification
Cofiring
Biopower
Hydrogen
•Integrated Research & Systems
•Small Modular Systems
• Regional Biomass
•Anaerobic Digestion
Energy Crops (with USDA)
Join Activities with Other Offices or Program
Biomass Gasification
Fuels Chemicals Power
Program Activity
Office of PowerTechnologies
Biopower Program
$40 million FY01
Ray Costello
Program Interactions with other Offices/Programs


DOE Summary of
Current Program Focus
Office of Transportation Technologies
Biofuels Program
$46 million FY01
Valerie Sarisky-Reed
Biofuels
Energy Crops (with USDA)
• Industry feasibility
• Research
• Regional Biomass
• Biodiesel
Join Activities with Other Offices or Program
Program Activity
Program Interactions with other Offices/Programs
Bioethanol
- Cellulose Conversion
- Enzyme Production
- Integrated Research
Sugar Platforms
Biorefinery
Fuels/Power Chemicals/Materials

DOE Summary of Current Program Focus

Office of Industrial Technologies
Industries of the Future Program
Forest Products and Agriculture
$22 million FY01
Mark Paster

Elements of the Program are the Current Technology Roadmap or Portfolio areas



3-Agency Plant Science
NSF, DOE, USDA
Plant Science

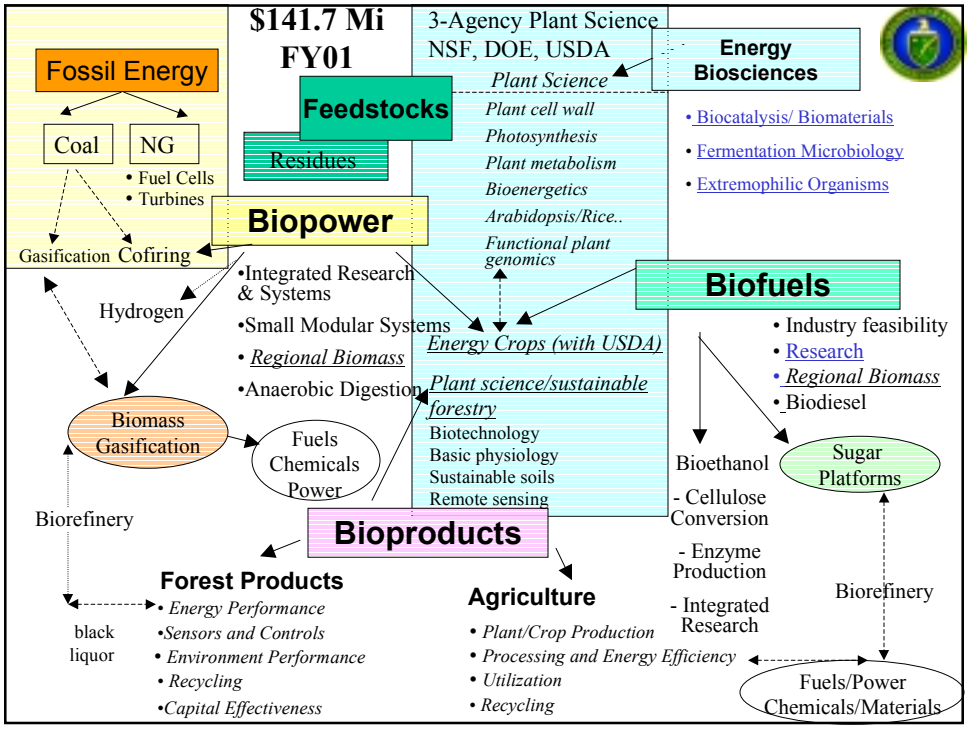
Plant cell wall
Photosynthesis
Plant metabolism
Bioenergetics
Arabidopsis/Rice...
Functional plant genomics

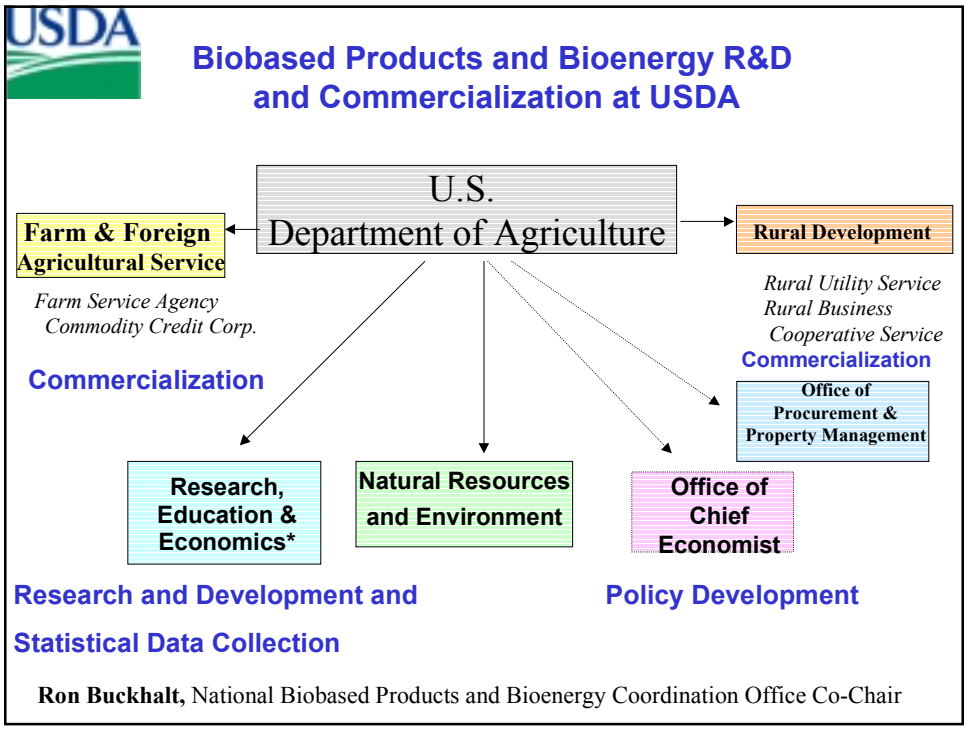
Energy Biosciences

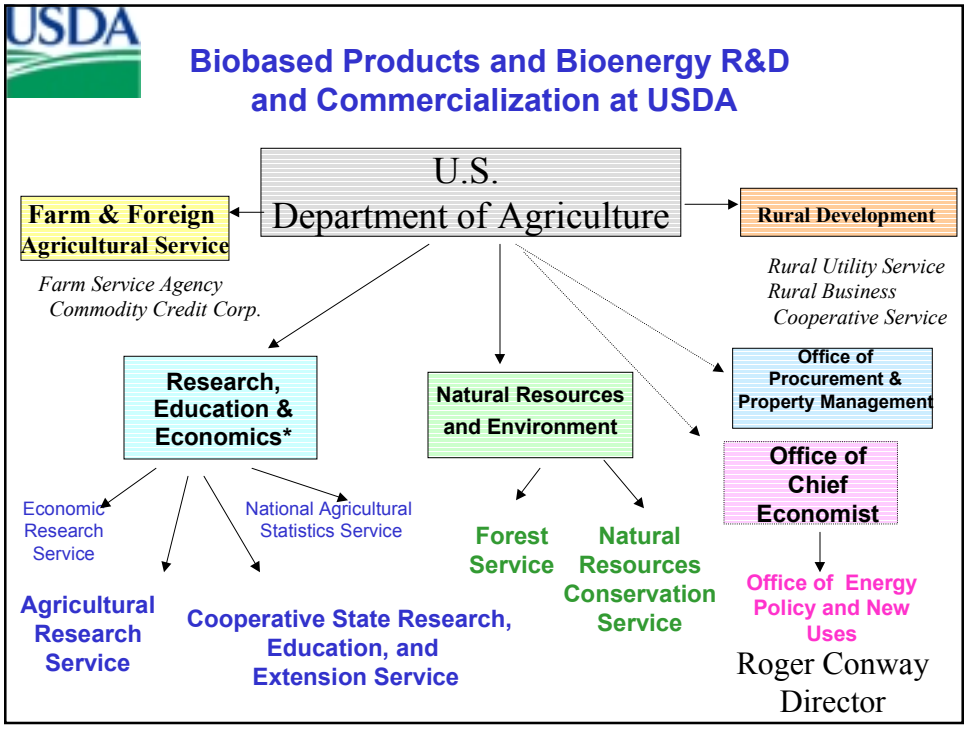
- Biocatalysis/ Biomaterials
- Fermentation Microbiology
- Extremophilic Organisms

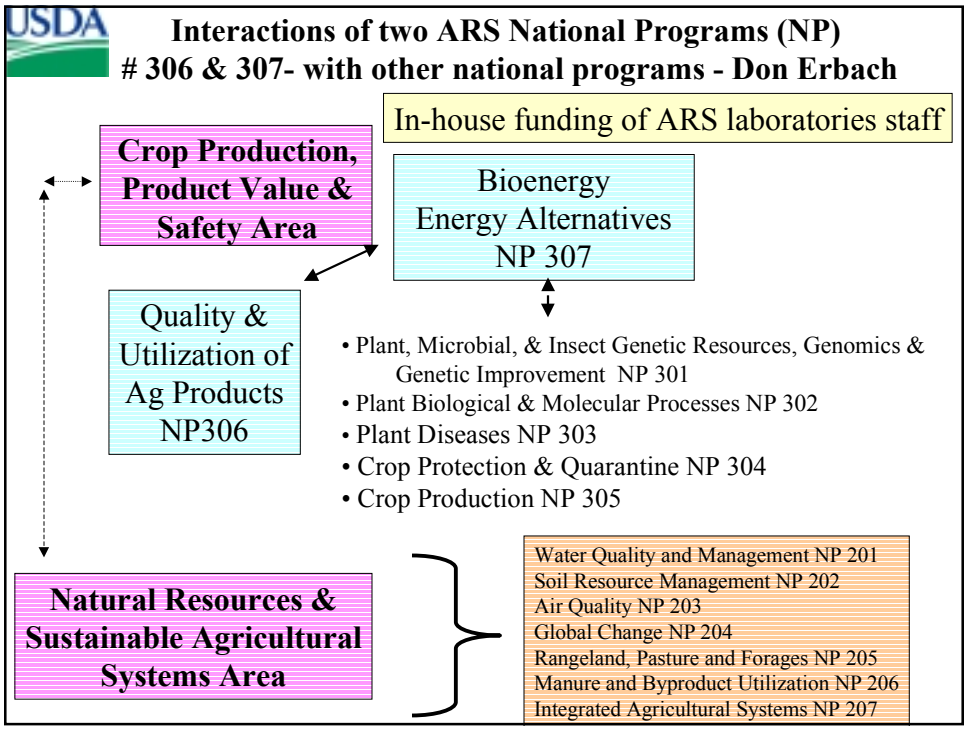
DOE Office of Science Summary of Current Program Focus

Energy Biosciences Program
$33.7 Mi FY01
Greg Dilworth


$141.7 Mi
FY01
3-Agency Plant Science
NSF, DOE, USDA
Fossil Energy
Coal
NG
• Fuel Cells
• Turbines
Gasification
Cofiring
Feedstocks
Residues
Biopower
Plant Science
Plant cell wall
Photosynthesis
Plant metabolism
Bioenergetics
Arabidopsis/Rice..
Functional plant genomics
Energy Biosciences
• Biocatalysis/ Biomaterials
• Fermentation Microbiology
• Extremophilic Organisms
Hydrogen
•Integrated Research & Systems
•Small Modular Systems
• Regional Biomass
•Anaerobic Digestion
Energy Crops (with USDA)
Plant science/sustainable forestry
Biotechnology
Basic physiology
Sustainable soils
Remote sensing
Biofuels
• Industry feasibility
• Research
• Regional Biomass
• Biodiesel
Biomass Gasification
Fuels Chemicals Power
Bioethanol
- Cellulose Conversion
- Enzyme Production
- Integrated Research
Sugar Platforms
Biorefinery
Bioproducts
Forest Products
• Energy Performance
•Sensors and Controls
• Environment Performance
• Recycling
•Capital Effectiveness
black liquor
Agriculture
• Plant/Crop Production
• Processing and Energy Efficiency
• Utilization
• Recycling
Biorefinery
Fuels/Power Chemicals/Materials


USDA
Biobased Products and Bioenergy R&D and Commercialization at USDA
U.S. Department of Agriculture
Farm & Foreign Agricultural Service
Farm Service Agency
Commodity Credit Corp.
Commercialization
Rural Development
Rural Utility Service
Rural Business
Cooperative Service
Commercialization
Office of Procurement & Property Management
Research, Education & Economics*
Natural Resources and Environment
Office of Chief Economist
Research and Development and Statistical Data Collection
Policy Development
Ron Buckhalt, National Biobased Products and Bioenergy Coordination Office Co-Chair


USDA
Biobased Products and Bioenergy R&D and Commercialization at USDA
U.S. Department of Agriculture
Farm & Foreign Agricultural Service
Farm Service Agency
Commodity Credit Corp.
Rural Development
Rural Utility Service
Rural Business
Cooperative Service
Research, Education & Economics*
Natural Resources and Environment
Office of Procurement & Property Management
Office of Chief Economist
Economic Research Service
National Agricultural Statistics Service
Forest Service
Natural Resources Conservation Service
Office of Energy Policy and New Uses
Agricultural Research Service
Cooperative State Research, Education, and Extension Service
Roger Conway
Director


USDA
Interactions of two ARS National Programs (NP) # 306 & 307- with other national programs - Don Erbach
In-house funding of ARS laboratories staff
Crop Production, Product Value & Safety Area
Bioenergy Energy Alternatives NP 307
Quality & Utilization of Ag Products NP306
• Plant, Microbial, & Insect Genetic Resources, Genomics & Genetic Improvement NP 301
• Plant Biological & Molecular Processes NP 302
• Plant Diseases NP 303
• Crop Protection & Quarantine NP 304
• Crop Production NP 305
Natural Resources & Sustainable Agricultural Systems Area
Water Quality and Management NP 201
Soil Resource Management NP 202
Air Quality NP 203
Global Change NP 204
Rangeland, Pasture and Forages NP 205
Manure and Byproduct Utilization NP 206
Integrated Agricultural Systems NP 207

ARS NP 306 - Product Quality/New Products & Processes
Current Focus Areas - $48.6 Mi, 74 projects - Frank Flora

Research Areas	Corn	Wheat	Soybean	Cotton
Improved Processing	- Mutant amylase enzymes		- Oil chem modification	
	- Coproducts of fuel ethanol production			
	- Cost reduction starch to ethanol			
Fractionation Technologies for Multiple Products				
	- Corn fractions improved separation	Protein and starch separation		
	- Corn fiber processing to ethanol and value added products			
KEY PRODUCT CATEGORIES				
Plant-based Plastics/Polymers	-Enzymatic modification to functional polymers			- Various
	-Biodegradable starch products			
Lubricants/Functional fluids			Industrial drying oils	
Inks			- Soybean inks	
Enzymes	-Cellulases, Amylases, Xylanases, Pectinases…			
Alternative Fibers				New uses
Absorbents/Adsorbents	- Corn residues			New products
Composites	- From corn constituents/residues	-Various		-Various
Adhesives/Bonding Products	- From sucrose (new epoxies)			
Biocontrol Products	- Insecticidal volatile attractants		-Biosurfactants	
Solvents/Cleaners/Chemical intermediates	- Various fermentation products		- Various products	
Cosmetic/Personal Care	-Stabilizers, viscosity control, dispersants		-New formulations	
Health Care Products			-New formulations	

ARS NP 307 - Bioenergy and Energy Alternatives
Current Focus - Don Erbach

Bioenergy
Energy Alternatives
NP 307

- Ethanol
- Biodiesel
- Energy Crops (Switchgrass)
- Energy Alternatives for Rural Practices
  - Water pumping
  & remote power
  -Wind/hybrid &
  -Wind stand alone

Cooperative State Research, Education and Extension Service - CSREES (total funding $561 Mi; Biofuel, bioenergy, chemicals, and materials $22.5 Mi) -- Hongda Chen

CSREES	FY01 Total Mi $	Biofuel, bioenergy, chemicals, materials: FY 00 Mi$**
Formula funding	$226.0	$4.2
Special	$83.0	$6.0
National Research Initiative*	$99.0	$2.3
Initiative for Future Agriculture & Food Systems (IFAFS)	$115.0	$9.0
SBIR	$12.0	$1.0
High Education	$26.0	
Total	$561.0	$22.5

*New interagency solicitation on Metabolic Engineering
** Probably underestimated; FY99 and FY98 projects multi-year funded not included

GRANTING ARM OF USDA
and link with Land Grant institutions
Grants can be multiyear

Cooperative State Research, Education and Extension Service - CSREES - Hongda Chen (>$22.5 Mi)

CSREES Program Element	Topics
National Research Initiative	Non-food Characterization/Process/Product Research
	Improved Utilization of Wood and Wood Fiber
	Agricultural Systems
	Plant Genome and others
Initiative for Future Agriculture & Food Systems (IFAFS)	Chemicals, materials, and products from biomass; Functional genomics of biocatalysts; guayule non-allergenic products, etc.
Special	Iowa Biotechnology Consortium
Formula funding	Industrial enzymes, adhesives and packaging systems

Forest Service - FS - Biomass R&D Programs
Howard Rosen ($12.5 Mi)

- Growing Feedstock (short rotation)
- Removal (harvesting methods)
- Conversion (lumber, composites, chemicals, energy, pulp, paper)

$9.5 Mi

Small Diameter and Low Value Sources

- Products and Utilization
- Forest Management
- Economics and Social

$3 Mi

Systematic Approach to Developing Biobased Products and Bioenergy - Marvin Duncan (Office of Energy Policy and New Uses)

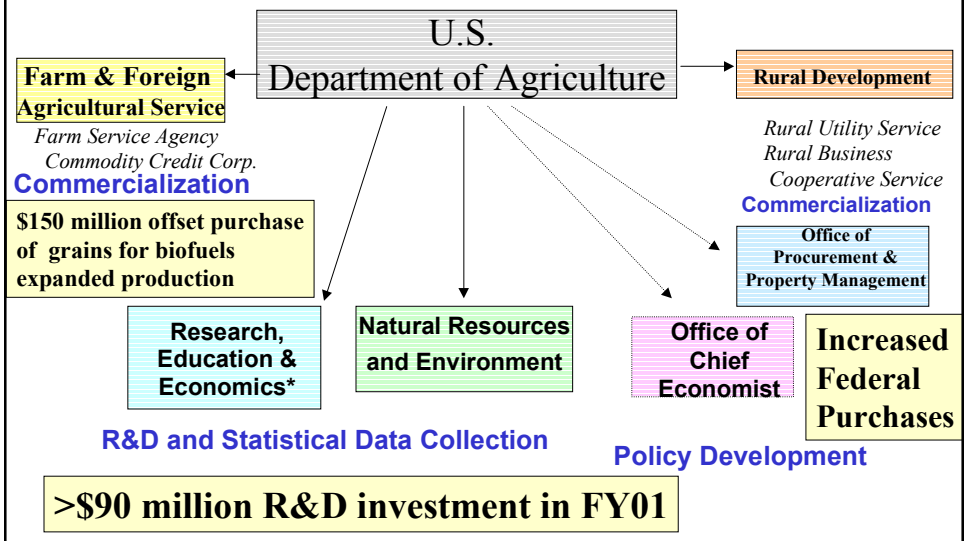
1.Research

- Broaden range of products
- Isolate/identify new uses for biomass products
- Reduce sugar costs
- Reduce gasification costs
- New biobased products pathways
- Perfect biorefinery concepts
- Clean biomass feedstocks
- Increase feedstock uniformity at reduced cost

2. Life Cycle Cost Analysis
3. Performance Testing
4. Regulatory Initiatives
5. Product Dev. & Comm.
6. Public Sector Incentives
7. Education & Outreach
8. Financing Issues

USDA Biobased Products & Bioenergy Coordination Council

Biobased Products and Bioenergy R&D and Commercialization at USDA



>$90 million R&D investment in FY01

Environmental Protection Agency	http://www.epa.gov
Industry Partnerships, Project XL	*http://www.epa.gov/ProjectXL/*
Methane Energy	*http://www.epa.gov/methane/*
Landfill Methane Outreach	http://www.epa.gov/lmop/
AgStar Partnership (joint with USDA and DOE)	http://www.epa.gov/outreach/agstar/
Office of Research and Development	*http://www.epa.gov/ORD/*
Environmental Technology Verification	http://www.epa.gov/etv/
Office of Pollution Prevention and Toxics	*http://www.epa.gov/internet/oppts/*
Green Chemistry	http://www.epa.gov/opptintr/greenchemistry/program.htm
Genetically Modified Microorganisms	http://www.epa.gov/opptintr/biotech
Plant Pesticides	http://www.epa.gov/pesticides/biopesticides
Extramural Research and Development	*http://www.epa.gov/AthensR/extmural/index.html*
Comprehensive Procurement Guidelines	*http://www.epa.gov/cpg*

Granting programs (Extramural, Green Chemistry)
Enabling programs (XL, Methane Energy, ETV, Procurement guidelines)
Regulatory programs (GMO, Plant Pesticides)

United States
Environmental Protection Agency

"...to protect human health and to safeguard the natural environment..."

Pollution into Products: Demand-Based Climate Mitigation -- Donn Viviani - EPA

- Linking growth (that produces CO2) to sequestering (e.g., biomass products) benefits growth and controls net emissions

- CO2 becomes a resource rather than a waste and growth is sustainable

- A closed-carbon, economic cycle, with product-sinks in gigatons and non-emitting production mechanisms