



U.S. Department of Energy Biobased Products and Bioenergy Initiative

Douglas E. Kaempf

DOE Director

National Biomass Coordination Office

National Association of Conservation Districts

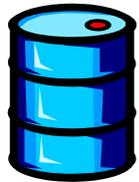
February 3, 2002



The Potential of Biomass

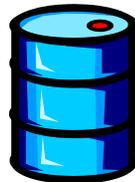
Petroleum transitioned from a single product to a multi-product industry...

Early 1900's



→ Kerosene

Late 1900's to Mid 2000's



→ Fuel gas
LPG
Gasoline
Jet fuel
Naptha
Diesel fuel
Lube oil
Coke
Fuel oil
Asphalt
Chemicals

Biomass for Energy will transition to a multi-product industry

**Early 1900's
and before**



→ Heat

Late 1900's



→ Heat
Electricity
Ethanol (corn)
Charcoal

Mid 2000's

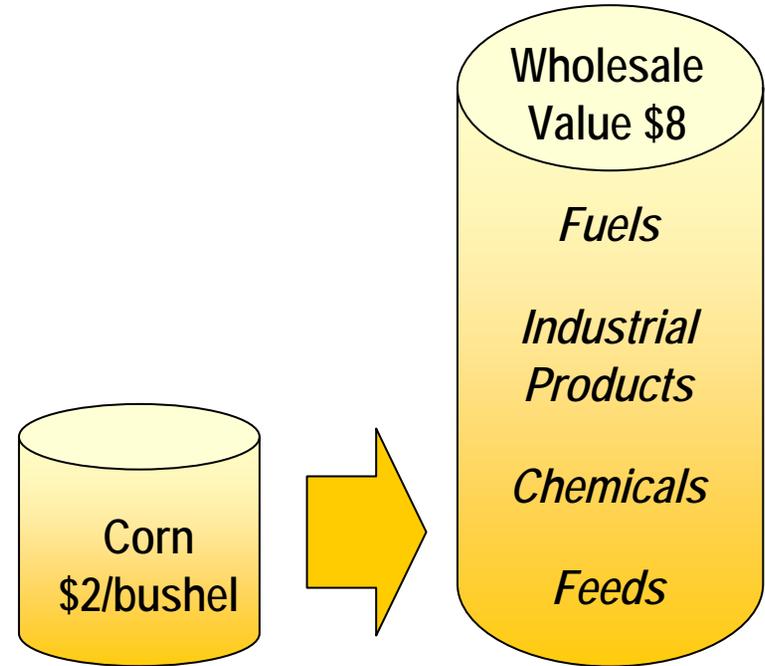
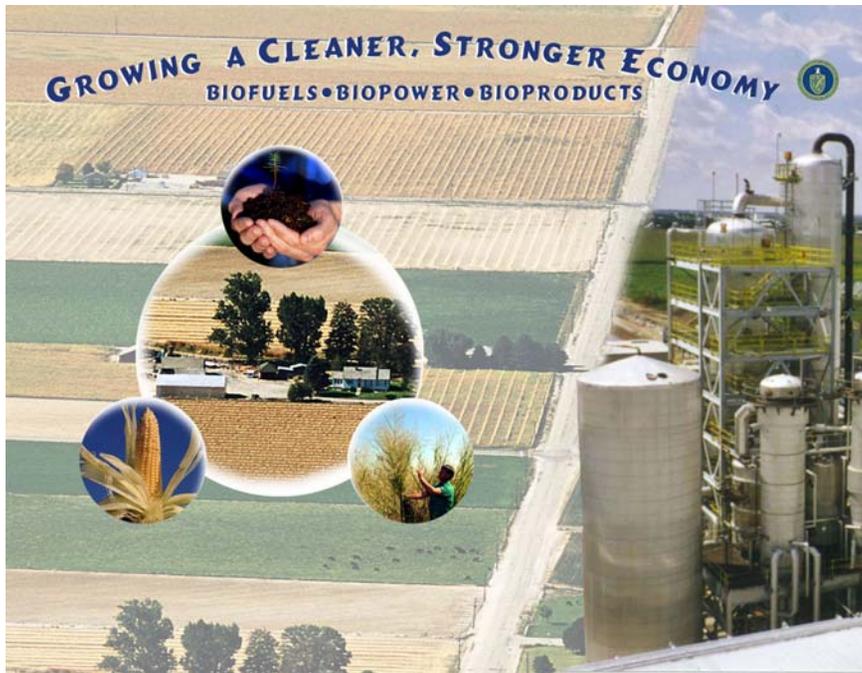


→ Chemicals
Plastics
Ethanol
Biogas
Heat
Electricity
Other fuels
Charcoal

**Biomass feedstocks can be altered
to optimize the desired output**



Why is Bioenergy Important to the Agriculture Industry?





The New Industrial Biorefinery



Biomass Feedstock

- Trees
- Grasses
- Agricultural Crops
- Agricultural Residues
- Animal Wastes
- Municipal Solid Waste

Conversion Processes

- Enzymatic Fermentation
- Gas/liquid Fermentation
- Acid Hydrolysis/Fermentation
- Gasification
- Combustion
- Co-firing

USES

Fuels:

- Ethanol
- Renewable Diesel

Power:

- Electricity
- Heat

Chemicals

- Plastics
- Solvents
- Chemical Intermediates
- Phenolics
- Adhesives
- Furfural
- Fatty acids
- Acetic Acid
- Carbon black
- Paints
- Dyes, Pigments, and Ink
- Detergents
- Etc.

Food and Feed



DOE R&D Activities

Enabling R&D

- **Distributed Generation**
- **Feedstocks**
- **Conversion, Concentration & Combustion**
- **Feedstock Substitution for Products**
- **Byproduct Value Streams**

Biosciences R&D

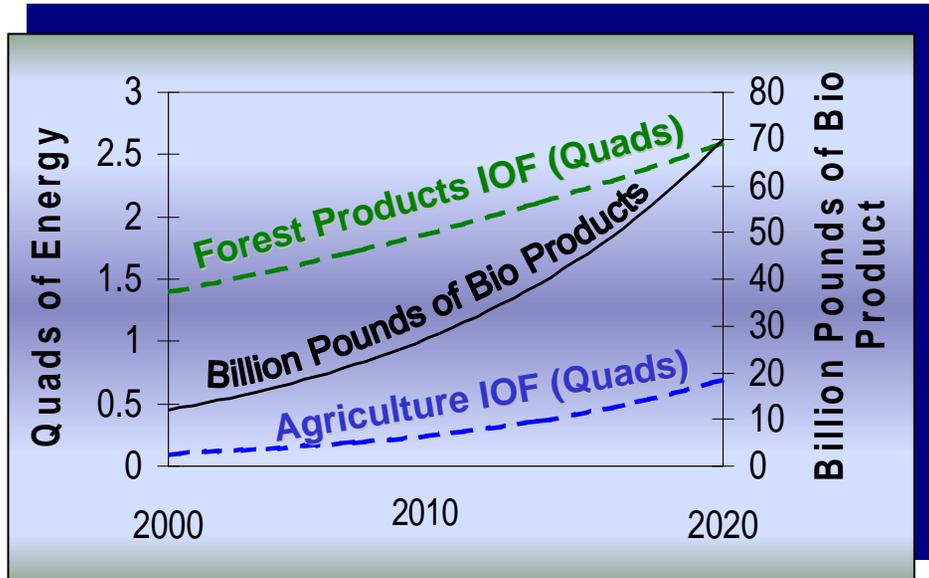
- **Plant Science**
- **Fermentation Microbiology**
- **Extremophilic Organisms**
- **Biomaterials and Biocatalysis**

Validation

- **Pilot and Full Scale**
- **Best Practices**
- **Case Studies**



Industrial Products Focus for FY02



Implementation and Focus

- Multi disciplines, multiple party R&D on Biobased Products
- Black liquor and hog fuel gasification
- New Forest Products Agenda 2020 to include biobased products focus area
- Integration with Biofuels and Biopower through common technology needs and biorefineries
- Education Initiative



BioProducts: Cargill Dow- PLA





Biopower Focus for FY 02



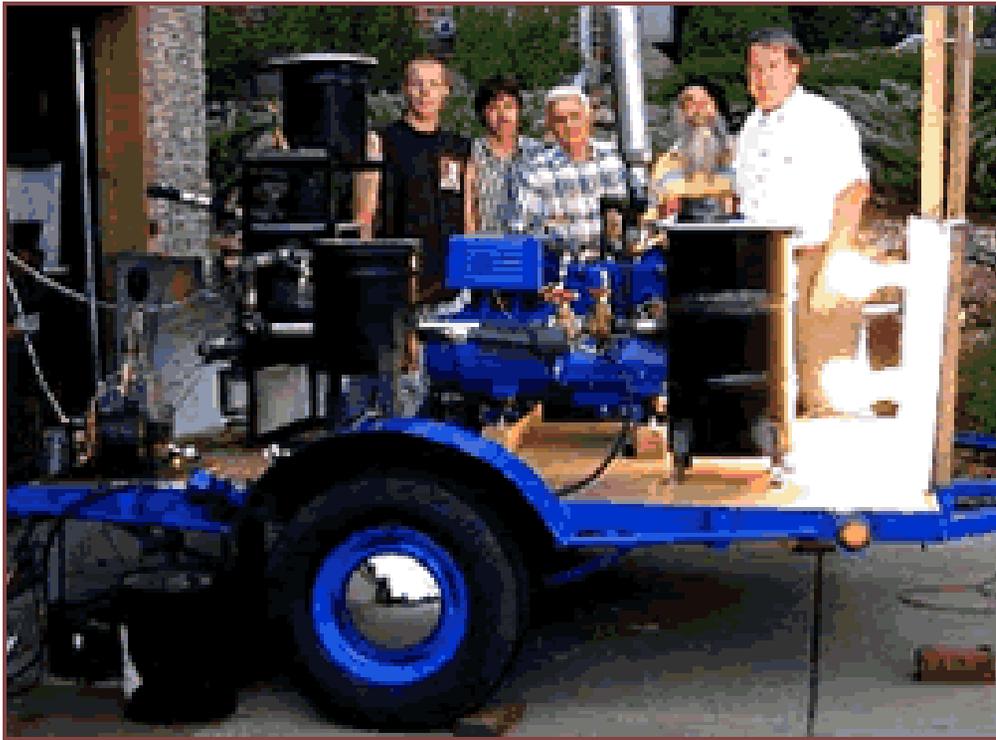
R&D

- Gasification (Reach 35–40% efficiencies)
- In Field Pre-processing of Feedstocks
- Small Modular (5KW–5MW sized systems)





Small Modular Biopower System



US DOE and Community Power Corporation

- 5-25 kw gasifier and combustion engine

- Fueled by wood or farm residues

- Heat and electricity for rural areas

Learn more about partnership opportunities with DOE's Biomass Power Program at:

www.eren.doe.gov/biopower

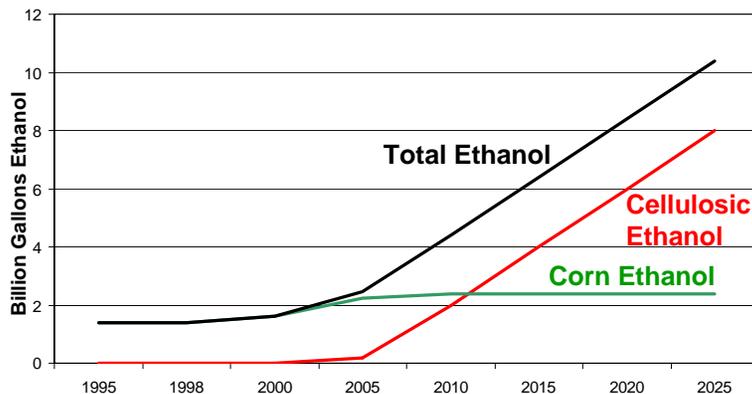


Fuels Focus for FY 02



Program Focus

- Ethanol cellulosic production research (\$1.07/gal by 2010)
- Yeast & Enzyme R&D
- Sugar Platform (4.4 cents/lb by 2005)





Carbon Storage Projects

Improved Agricultural Practices

Conservation buffers



Cover crops



Conservation tillage



Improved rotations





Chariton Valley Biomass Project





Key Areas for Integration



DOE

E
E
R
E

- Regulatory Flexibility
- MSW/biogas

- Education and Outreach
- Animal wastes
- Conservation Reserve Program lands for energy crops
- Products & Fuels
- Forest Management
- Fundamental Research





State Bioenergy Workshops

- **Partnership with the NACD's for workshops to get the word out**
- **Tie into existing network to the agriculture community**
- **Understand the farm community perspective**



Find Out More!

October 2001 Biobased Products and BioEnergy Newsletter - Message (HTML)

From: National Biobased Products and BioEnergy Coordination Office
To: dlewis@bcs-hq.com
Sent: Wed 10/3/2001 11:42 AM
Subject: October 2001 Biobased Products and BioEnergy Newsletter

Biobased Products and BioEnergy Newsletter

October 2001

The Monthly Newsletter of the National Biobased Products and BioEnergy Coordination Office

Feature Article

The Small Modular BioPower Imperative

Small modular biopower (SMB) systems can help solve problems associated with our Nation's aging energy infrastructure. SMBs are power generation units of less than 5MW that use biomass feedstocks, including waste materials and low-grade gases, as fuels. These systems can be located at the source of the feedstocks and/or where the power is needed. SMBs can also help electric utilities meet load requirements without having to invest in upgrades to existing plants, new large-scale utility plants, or transmission lines.

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Biomass Research & Development Initiative - Microsoft Internet Explorer

Address: <http://www.bioproducts-bioenergy.gov/>

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USDA, EPA, NSF, TVA, and other agency logos.

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www.bioproducts-bioenergy.gov