



# *Revitalizing the Farm Economy through Renewable Energy Development*

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# ***EESI: Seeking Innovative Environmental and Energy Solutions***



- Dedicated to promoting sustainable societies through innovative policies on energy, climate, transportation, agriculture, and smart growth
- Founded in 1984, by a bipartisan Congressional Caucus
- Provides timely information regarding science, policy, and technologies
- Organizes ~20 Congressional briefings a year
- Builds coalitions and networks
- Publishes 3 electronic newsletters
  - BCO – Bioenergy, Climate Protection & Oil Reduction
  - Climate Change News
  - National Clean Bus update
- EESI Associates Program allows companies and individuals to participate



# EESI Policy Report -- *The 2002 Farm Bill: Revitalizing the Farm Economy Through Renewable Energy Development*

- Pioneered the way for the Energy Title of the 2002 Farm Bill
- Farmers at the forefront of clean energy
- Policy Recommendations for incorporating energy in the Farm Bill
  - Conservation
  - Rural Development
  - Education
  - New Energy Title
- Where do we go from here?

# Ag can be a part of the Clean Energy and Climate Solution

- There is no silver bullet
- New technologies
- New feedstocks (including wastes)
- Conservation & Efficiency Efforts
- Decreased petroleum for transportation needs
  - Flex-Fuel Vehicles/Plug-In Hybrids
  - Biobased products and renewable energy can reduce fossil energy use

# Should the sustainable agriculture community be concerned?

- Energy Balance
- Sustainable Agriculture
- Capacity: Food, Feed, Fiber and Fuel?
- Biotechnology/conventional breeding
- Biodiversity
- Small/Family Farms

# Reports: Energy Balance

## ***Key reports find that ethanol has a positive energy balance***

- *The 2001 Net Energy Balance of Corn-Ethanol.* Shapouri, Duffield, McAloon, Wang. (USDA & Argonne National Lab, 2004 )
- *The Energy Balance of Ethanol: An Update.* Wang, Shapouri, Duffield. (USDA, 2002)
- *Allocation Procedure in Ethanol Production System from Corn Grain.* Seungdo, Dale. (Michigan State University, 2002 )
- *A Rebuttal to "Ethanol Fuels: Energy, Economic and Environmental Impacts" by D. Pimental.* Graboski, McCleeland. (Colorado School of Mines & National Corn Growers Association, 2002)
- *Effects of Fuel Ethanol Use on Fuel-Cycle Energy and Greenhouse Gas Emissions.* Wang, Saricks, Santini. (Argonne National Laboratory 1999)

# Reports: Sustainability & Capacity

## *Clean and Diversified Energy Initiative: Biomass Task Force Report. Western Governors' Association. 2006*

- Biomass has the potential to supply 15,000 MW electricity to the Western States by the year 2025 (21 states and territories)
- At a production cost of 8 cents per kWh, 10,000 MW could be provided
- Biomass could come from Forest (50%), Urban (35%) and Agriculture (15%) resources.
- Identifies significant benefits from bioenergy use (Waste Reduction)

<http://www.westgov.org/index.htm>

*Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion Ton Annual Supply.* Oak Ridge National Laboratory. 2005

- Is the United States capable of producing enough biomass feedstock to displace 30% of the current petroleum consumption?
- YES – 1 billion dry tons of feedstock a year needed and available from:
  - Forestland (368 million dry tons)
  - Agricultural land (998 million dry tons)



*Growing Energy: How Biofuels Can Help End America's Oil Dependence.* Nathanael Greene, NRDC. 2004

- By 2025, producing crops for biofuels could provide farmers with profits of more than \$5 billion/yr.
- Biofuels could be cheaper than gasoline and diesel, saving us about \$20 billion/yr. on fuel costs by 2050.
- Biofuels could reduce our GHG emissions by 1.7 billion tons/yr.

**All of this can be done in a cost-effective and environmentally safe way when paired with smart growth and fuel efficiency.**

# Research of Stephen P. Long, Crop Sciences, University of Illinois at Urbana-Champaign

As CO<sub>2</sub> increases – yields fall off in corn & soybeans

- Carbon and the Soil – Biomass can play role by:
  - CO<sub>2</sub> neutral
  - Soil protection
  - Carbon sequestration
  - Reduced nitrogen leaching/nitrogen fixing by many energy crops
- 15% of Illinois crop land planted with miscanthus could supply all of the state's electricity use

# Other Biomass-to-Energy Researchers

- Lee Lynd: Dartmouth College
- Robin Graham: Oak Ridge National Laboratory
- Donald C. Erbach: ARS, USDA
- George Frisvold: Associate Professor, Agricultural and Resource Economics, University of Arizona
- Peter Read: Senior Research Officer, Massey University, New Zealand
- Danny Day, President, EPRIDA, University of Georgia

# Benefits: Economic

- Creation of jobs: biofuels will spur economic growth and increase local employment opportunities
  - e.g. By 2004 ethanol industry created more than 147,000 jobs in all sectors of the U.S. economy. (*The New Harvest*)
- Hedges cost of fuel: Biofuels are viable substitutes for fossil fuels and can have impact of reducing fuel price and volatility

# Benefits: Environmental & Public Health

- Reduction of environmental damage associated to spills: Biofuels are almost completely biodegradable during their entire life cycle.
  - 1.5 million gallons spilled into U.S. oceans in a typical year, assuming no large spills (*EPA*)
- Protection of biodiversity
- Waste reduction: Biorefinery technologies can utilize a variety of waste products as a feedstock, e.g. crop residue, animal manure, and urban wood waste, thus reducing the need for less desirable methods such as field burning, lagoons, and landfills.
  - e.g. Controlled combustion of biomass in a power plant typically reduces conventional air pollutants associated with open burning by 90-99%. (*WGA*)

# Benefits: Environmental & Public Health

- Wildlife habitat enhancement: Less impact on habitat of wildlife, contrary to impacts of drilling and petroleum spills. In fact energy crop production could enhance habitat.
  - e.g. 57 species regularly use (short rotation woody crops) SRWC, 28 species breed in SRWC plots and species diversity is similar to natural shrub lands and eastern deciduous forests (*SUNY*)
- Soil improvement: By promoting the use of a wider variety of crops, biomass derived products and energy allow for better rotation systems.
  - e.g. Soil microarthropod diversity and density is similar to undisturbed early successional fields 4 years after planting SRWC (*SUNY*)
- Water quality improvement: Unlike traditional fuels, biofuels will have minimal toxicity impact on the water supply. Additionally, some energy crops could reduce soil erosion through complex root structures.
- Air Quality improvement: Biofuels and most biopower technologies have significantly better emission profiles than petroleum. (*RFA*)

# Benefits: Energy & Security

- Can reduce oil consumption and reliance on imported oil
- Can reduce trade deficit
- Could reduce transmission congestion:  
Biomass feedstocks are located across the country and allow for distributed power



# Benefit: Trade Policy

Development of much larger domestic markets for farm-based energy production and biobased products could reduce export pressures and WTO concerns.



# Benefits: Climate Change

- Reduction of CO<sub>2</sub> emissions: Fuels and power that are derived from biomass are carbon neutral, and therefore do not contribute to any net emissions of the CO<sub>2</sub> greenhouse gas.
  - e.g. Corn Ethanol Reduces GHG emissions by 12 -19% (Wang)
  - 5.7 million tons CO<sub>2</sub> emissions avoided in 2003 (RFA)
- Reduction of methane emissions: Alternative uses of biomass and organic waste can capture or avoid methane emissions.
  - e.g. anaerobic digesters catch emissions from animal waste

# 2002 Farm Bill (P.L. 107-171): Energy Title

- Sec. 9002 Procurement of Biobased Products (\$1 mil/yr)
- Sec. 9003 Biorefinery Development Grants
- Sec. 9004 Biodiesel Fuel Education Program (\$1 mil/yr)
- Sec. 9005 Energy Audit and Renewable Energy Development Program
- Sec. 9006 RE/EE Improvements (\$23 mil/yr)
- Sec. 9007 Hydrogen and Fuel Cell Technologies
- Sec. 9008 Biomass R&D Act of 2000 (\$63 mil/yr)
- Sec. 9009 Carbon Sequestration Research
- Sec. 9010 CCC Bioenergy Program (\$150 mil/yr)

# Farm Bill: Other important programs

## Rural Development (VI)

- Sec. 6401 Value-Added Agricultural Market Product Development Grants Program (\$40 mil/yr FY02-07)

## Conservation Programs (Title II)

- Sec. 2301 Environmental Quality Incentives Program (EQUIP)
- Sec. 2101 Conservation Reserve Program (CRP)
- Sec. 2001 Conservation Security Program (CSP)

# State Actions on Biomass

- Governor Pataki (R-NY)
  - Renewable fuels available at service stations all across the state
  - Renewable fuel tax-free
  - Incentives for biorefineries
  - Increased use of hybrid vehicles including plug-ins
- Renewable Fuel Standards
  - Hawaii - 85% of gasoline to contain 10% ethanol (starting in '06)
  - Minnesota - 20% of its transportation fuels must be renewable by 2012
  - Montana - 10% after in-state production of 40 million
  - California - 10% of fuel should be ethanol by 2007
- 21 States have Renewable Portfolio Standards (RPS)

# Changing Policy Landscape – Local and State Actions on biofuels (**more than 45 policies**)

- **1 Arkansas:** AR S.B. 363
- **2 Hawaii:** HI S.B. 2221 & HI S.B. 3207
- **3 Illinois:** P.L. Act No. 93-724 – ‘04, P.L. Act No. 94-62 – ‘05 & P.L. Act No. 94-346 – ‘05
- **1 Indiana:** P.L. No. 6 - 2005
- **3 Minnesota:** MN S.B. 1495, MN H.B. 2633 & MN S.B. 4
- **2 Montana:** MT H.B. 362, MT H.B. 644
- **3 Maine:** P.L. No. 474 – 1999, P.L. No. 698 – 2003 & P.L. No. 266 – 2003
- **1 Michigan:** Public Act No. 5 - 2003
- **1 Mississippi:** MS H.B. 928
- **4 Nebraska: (Signed by Governor)** L.B. 605, NE L.B. 479, NE L.B. 983 & NE L.B. 1065
- **5 North Dakota: (Signed by Governor)** ND H.B. 1390, ND S.B. 2019, ND S.B. 245, (Filled) ND H.B. 1309, ND S.B. 2222
- **1 New Jersey:** NJ S.B. 2313
- **4 Oklahoma: (Signed by Governor)** OK S.B. 878, OK H.B. 1398, OK H.B. 1556, (filled) OK S.B. 429
- **1 Rhode Island:** P.L. No. 484 – 2004
- **3 South Dakota:** SD H.B. 1279, SD S.B. 162 & SD S.B. 31
- **2 Tennessee:** TN H.B. 3067 & TN H.B. 1740
- **4 Washington:** WA H.B. 1240, WA H.B. 1241, WA H.B. 1242 & WA H.B. 1243
- **3 Wisconsin: (Signed by Governor)** WI S.B. 378, (filled) WI S.B. 39, WI S.B. 41
- **1 Wyoming:** WY H.B. 5

# Land Grant Universities

- More funding for agricultural practices for energy crops and related residues
- What are the appropriate feedstocks for different regions of the country?
- Need state/regional biomass inventories
- Appropriate Technologies
- Assistance on sustainable and rural development
- Factors that need to be considered
  - Climate
  - Soil
  - Native Species
  - Natural Pests
  - Farmer/community equity

# What needs to happen?

- Research on:
  - Feedstocks and Co-products
  - Cellulosic Technologies
  - Sustainable Harvesting
- Incentives for:
  - Production
  - Consumption
  - Infrastructure
- Education for:
  - Policymakers
  - Universities
  - Farmers
  - Environmental Groups
  - Health Organizations

# Governors' Ethanol Coalition (GEC) Recommendations

Requests total of \$550 million for FY07 for  
USDA/DOE Bioenergy Programs

- DOE Biomass Program: \$100 million
- Integrated Biorefinery Demonstration (Sec. 932(d) of EPACT '05): \$100 million
- USDA's Biomass Research and Development Program (Sec. 941 of EPACT '05): \$100 million for cellulosic
- 'Reverse Auction' Production Incentive for Cellulosic Biofuels (Sec. 942 of EPACT '05): \$250 million



# GEC Recommendations


## Creation of a National Bioenergy Trust Fund

- Serious national leadership effort needed
- Need consistently well-funded program of research, demonstration, and infrastructure development
- Current funding not consistent or adequate
- Example: DOE Biomass Program has a modest budget but has been constrained by Congressional earmarks (57% in FY06)

*The New Harvest: Biofuels and Windpower for Rural Revitalization and National Energy Security.* Energy Foundation. 2005

## **Recommendations to grow biofuels**

- First billion gallons of cellulosic on the ground through federal RD&D
- Increase Renewable Fuel Standard to 10% by 2013
- Improve financial incentives for capital investments in the ethanol industry
- Make all new vehicles Flexible Fuel Vehicles (FFVs)
- Spur market demand for FFVs through government procurement
- Improve vehicle fuel economy



# Roles of Agencies and Not-for-Profits

- Education and Outreach
  - Promote reports, studies and initiatives
- Fund RD&D for cutting-edge technologies
- Consensus building on the sustainability of technologies

# **(BCO) Bioenergy – Climate Protection – Oil Reduction Agriculture and Energy Network**

- Avenue of information for success stories from government agencies and NGOs
- Current information on feedstocks and new technologies
- Builds consensus with key stakeholders
- Legislative updates on pertinent policy
- Open forum for articles and commentary
- Goes to more than 900 individuals



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