U.S. Department of Energy Biomass Program

Growing A Robust Biofuels Economy

Regional Feedstock Partnership Planning Meeting
February 27, 2008
U.S. Commitment to Ambitious Biofuels Goals

Energy Independence & Security Act of 2007:

- Expand use of renewable fuels to 36 billion gallons annually by 2022
- Cellulosic biofuels component
  - 3 billion gallons by 2015
  - 16 billion gallons by 2022
- Conventional corn starch
  - 15 billion gallons by 2015 (maximum)
Need to Move Beyond Extreme Views of Biofuels
-- It’s Neither a Curse nor a Miracle Cure

Recent press has presented challenges
• Indirect land use change
• Water use
• Workers rights

Grow Biofuels on Sound Principles
• Enable cost-effective production of cellulosic biofuels
• Life Cycle Models need to incorporate land use to factor in GHG reductions
• Much research remains and needs to be performed on “Indirect” land use
• Bioenergy feedstocks should not be grown on environmentally sensitive lands
We Need Balanced Analysis, Constructive Dialogue, and Smart Policies

  - EISA requires GHG reductions and periodic reevaluation.
- The US can encourage land use policies that restrict development of ecologically sensitive lands.
- DOE and the State Department are working to address global sustainability issues with international partners, including environmental organizations, industry, and others.
  - Sustainability requires careful assessment of all impacts on water, land use, GHG, fertilizer use, and socio-economic issues.
  - Global standards for sustainable development, if well crafted, could promote adherence to best practices in developing biofuels industries,
- We welcome open discourse on all topics of concern and encourage broad dissemination of plans and ideas.
Lifecycle Greenhouse Gas Emissions Associated with Different Fuels

- **Gasoline**
  - Petroleum

- **Corn Ethanol**
  - Current Average
  - Natural Gas

- **Sugarcane Ethanol**
  - Biomass

- **Cellulosic Ethanol**
  - Biomass

Reductions:
- 19% Reduction
- 28% Reduction
- 52% Reduction
- 78% Reduction
- 86% Reduction

**Commercial-Scale Biorefineries (up to $385 million)**

- Six cost-shared, integrated biorefinery demonstration projects to produce 130 million gallons of cellulosic ethanol in 5 years using variety of conversion technologies and cellulosic feedstocks

**10%-Scale Biorefinery Validation (up to $200 million)**

- Four cost-shared, integrated biorefinery demonstrations using cellulosic feedstocks to produce fuels, chemicals, and substitutes for petroleum-based feedstocks and products; one-tenth projected scale for first-of-a-kind commercial facilities

**Ethanologen Solicitation (up to $23 million)**

- Five selected research teams working on microorganisms

**Enzyme Solicitation (up to $33.8 million)**

- Creating commercially available, highly effective, inexpensive enzyme systems for biomass hydrolysis; second phase: cellulase development with cost-sharing industry partners

**Thermochemical Conversion (up to $7.75 million)**

- Integration of gasification and catalyst development

**Joint DOE-USDA Solicitation ($18 million)**

- Biomass R&D Initiative
Major DOE Biofuels Project Locations

Legend

- Company Name
- Process Technology
- Feedstock Type
- (Site Location)

Six Commercial-Scale Biorefinery Projects; DOE will invest up to $385 million

Four Small-Scale Biorefinery Projects; DOE will invest up to $114 million (first round)

Three Bio-Energy Centers; DOE will invest up to $405 million

* Acquired by NewPage Corporation
Biomass Resource Development

- **Primary focus**—*Sustainable crop development*
  - **Fall 2007**—Inventory existing plots from replicated field trials of dedicated energy crop & CRP lands
  - **Spring 2008**—Propose experimental design for replicated field trials of dedicated energy crops and CRP lands
  - **Spring 2008**—Agricultural residue removal tool (ARS/INL- led)
    - Corn stover FY08 focus (immediacy of problem)
    - Small grain straws sustainability
  - **Spring/Summer 2008**—Conduct field trails
  - DOT/SGI projects may support
• **Biomass Resource Assessment**
  – Assets
    • Opportunities for many types of feedstock
    • Large land areas of underutilized biomass
  – Challenges
    • Water and climate issues
    • Infrastructure
    • Energy crop Scale-up
  – SGI involved in development and population of “GIS Atlas” (ORNL-led)
• Education & Outreach
  – Continued development/population of BIOWEB as an accessible information source on the Internet
  – Extension activities
    • SARE (Sustainability)
    • Experiment Stations
    • Extension
Schedule of Activities Needed to Achieve Commercial Production at Scale

**Feedstock**
- R&D
  - Develop sustainable land management practices
  - Inventory regional supplies
  - Basic research into plants
- Implementation
  - Farmers revise practices

**Conversion**
- Plant construction
- Testing
- 1st Generation Plants
- Construction
- Commercial Production

**Infrastructure**
- R&D
  - Materials compatibility
  - Intermediate Blends Testing
- Devise standards
- Regulatory framework for infrastructure build established

**Policy**
- EPA GHG Rule finalized
- Current RFS met
- VEETC Expires
- RFS requirement of 500 mgy cellulosic biofuels

**Ongoing throughout the period:**
- Health & safety protection
- Ownership & financing structure development

**Commercialization in 2012,** assuming R&D breakthroughs in conversion technologies
DOE Regional Feedstock Partnership
Contacts

Contractual Contacts - GO
- Roxanne Dempsey – SGI Lead
- Laura Margason – NEPA
- James Cash – SGI Monitor

DOE HQ Contacts
- John Ferrell – Feedstock Supervisor
- Laura Neal (acting) – SGI Lead
- Alison Goss Eng – GIS Task Lead & Sustainability

Technical Support Contacts – Nat’l Labs
- Richard Hess – Corn Stover Removal & Feedstock Logistics
- David Muth – Corn Stover Removal
- Tom Ulrich – Herbaceous
- Anthony Turhollow – Herbaceous & General
- Mark Downing – Woody & General
- Tris West – GIS

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Information Resources

- DOE Biomass and Biofuels Program - www.eere.energy.gov/biomass/
- DOE Office of Science, Bioenergy Research Centers - http://genomicsgtl.energy.gov/centers/
- Bioenergy Feedstock Information Network - http://bioenergy.ornl.gov/
- Biomass R&D Initiative – www.biomass.govtools.us
- USDA Farm Bill proposals – www.usda.gov
- Grant Solicitations - www.grants.gov