Bioenergy and Conservation

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EESI Briefing: Bioenergy in the Farm Bill – Options for Conservation
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Great Plains Institute

• Formed in 1997
• Bring together diverse leaders to solve critical development issues
• Current focus:
  – Energy security based on a renewable and carbon-neutral energy system
• Funded by foundations, stakeholders, individuals and government

The region we serve

We are a 501 (c) 3 nonprofit based in Minneapolis but incorporated in 5 states.
No “silver bullet” solution
Biomass Projects at GPI

- Biomass Working Group – state policy project
- Native Grass Energy Research
- North Central Bioeconomy Consortium
CRP as a Biomass Program?

• Can harvesting be done consistent with the conservation goals of the program?
• How does CRP stack up as a feedstock supply program relative to other proposed programs?
• What are the risks of doing nothing to CRP?
• What might be the characteristics of an ideal CRP-like biomass program?
Aggressive National Biofuels Goals

• More than 4 billion gallons annual production today
• Federal RFS of 7.5 billion by 2012
• SOTU: 35 billion gallons by 2017
• DOE projection: 60 billion gallons by 2030
• 25x25
We can’t accomplish our goals with corn alone

- **Current (US)**
  - Moderate displacement of oil and carbon
    - Starch Ethanol
    - Oilseed Diesel

- **Future**
  - Significant displacement of oil and carbon
    - Enzymatic for liquid fuels and bioproducts
    - Pyrolysis for liquid fuels, charcoal, and chemicals
    - Gasification for natural gas replacement, electricity, and chemicals

Based on grains and seeds only

Rest of Plant, virtually any product of photosynthesis
What Emerging Technology Can Also Make Possible

• **Transportation Fuels is a Huge Market,**
  – Relatively indiscriminate about feedstocks

• **Flexible technology brings new ability to farm for multiple benefits**
  – Soil
  – Water
  – Bio-diversity
  – Wildlife habitat
  – CO2 sequestration
  – Recreation
  – Risk mitigation

• **Perennial mixed grasses are viable energy feedstock**

![Bar chart](chart.png)

**Species**

- BB
- In
- In/BB
- Sw
- Sw/BB
- Sw/In
- Sw/In/BB

2004 NS
What does GPI’s research say about CRP and bioenergy production?

- **Agronomic research (SDSU)**
  - Switchgrass cultivar development
  - Comparative studies plots east-west, north-south in region
  - 2 and 3-way mixture studies
  - Wildlife assessment
  - Soil carbon assessment

- **Fuel processing (UND EERC and Ensyn)**
  - Bio-oil intersection with grasses and harvest management
  - Bio-oil yields
  - Extraction of ethanol, ethanol amines, resins, residual

- **Economic and policy implications (U of MN and GPI)**
  - Farm-scale economics with additional revenue streams
  - Extrapolated process economics
  - Policy reforms that could speed commercialization
Effect of harvest timing (anthesis and killing frost) and harvest frequency (every year and alternate years) on biomass production in Moody Co., SD for 2003-2004
Similar management for birds and biomass

Anthesis

Killing frost

Picture taken July 1, 2004, Moody County, SD
Fuel Processing and Harvest Interface

Seasonal changes in ash content of Chariton Valley, Iowa, switchgrass; similar trend observed with Monona Farms (Pennsylvania) switchgrass
Switchgrass (Sw), big bluestem (BB), and indiangrass (In) biomass production grown alone and in all 2- and 3-way mixtures. Plots were seeded in 2002 at Brookings, SD.
Birds and Mixtures

80 sites in SD and MN
- 14 switchgrass
- 12 intermediate wheatgrass
- 20 warm-season mixtures
- 12 cool-season mixtures
- 16 native prairie remnants

Vegetative structure at sites
- Species diversity
- Height-density
- Litter depth

Songbirds (occurrence and density measured)
- Clay-colored Sparrows
- Grasshopper Sparrows
- Savannah Sparrows
- Bobolinks
- Western Meadowlarks
- Sedge Wrens (Warm Season)
- Dickcissel (similar across types)

Finding:
Grasslands with greater plant diversity had higher avian richness, occurrence and density.

Diversity was similar in harvested and unharvested stands, but actual species differed.
Business as Usual: Loss of Permanent Cover

- High land rents, high corn prices are decreasing re-enrollment in CRP and other programs
- Drought-tolerant corn is moving into “marginal” land
- There are calls for early outs from CRP contracts
- Conversion of all types of land, including native pasture
What will keep land in permanent cover

• A working lands program that allows revenue other than govt. payments to support good practices,
• A cellulosic biofuels/products industry using sustainably-produced native grass
• Manage risk to develop an industry that can use a variety of biomass feedstocks to produce fuel and products
Whatever you call it…

- **Soil erosion prevention**
  - Possibly improved by polycultures, likely not impacted by harvesting
- **Carbon sequestration and soil health**
  - Possibly improved by harvesting
- **Wildlife benefits**
  - Bird populations protected by every other year harvest/late fall or early spring harvest time.
  - Planting multiple grass species promotes healthy habitat while creating ample biomass
  - Monoculture switchgrass still supports diverse bird populations
CRP as a Biomass Program

- Time-tested approach for partnering with land owners to establish perennial cover,
- Budget pressures may argue against creating new programs, or expanding existing programs,
- A perennial crop pilot program should cover establishment costs and land rent,
- There are successful energy pilot programs in CRP now!
Characteristics of a CRP Energy Program

- Limited number of acres, linked to actual projects,
- Research on impacts on wildlife, soil, and water,
- Certain lands off-limits to harvesting,
- Harvesting outside nesting season, every other year harvest,
- Mixtures encouraged,
- Leave a stubble for over-winter cover.
Other Activities

• State Policy
  – North Dakota
  – Minnesota
  – Iowa
  – Wisconsin
  – South Dakota
Other activities cont...

North Central Bioeconomy Consortium (NCBEC)

- State Departments of Ag, Ag. Exp. Stations, Extension.
- Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
Accessing our work

- Biomass Working Group State Policy Menu
- Native Grass Final Report
- Native Grass Economic Feasibility Report

- [www.nativegrassenergy.org](http://www.nativegrassenergy.org)
Thank you!

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