Go ‘green’ with Agrecol
Welcome!

Prairie Enthusiasts  
2009 Annual Banquet  
Invasive Plant Association of Wisconsin

Biofuels & Prairies

Speaker, Mark Doudlah  
Wingra Room, 3:30pm

This session will focus on the logistics of harvesting biofuel from natural areas, and how this process could serve as a new management tool.

Nature’s Plan

Native Prairie – much more than another monoculture: nature’s intended biofuel

Nature’s Biofuel Plan: It’s in our hands - Now!
1 acre of prairie grass yields about 4-5 tons of biomass pellets. This can heat an average home through one Midwest heating season.

The majority of energy used in Wisconsin is for heating:

- **State owned building**
  (75% heating vs. 25% electricity)
- **Commercial**
  (58% heating vs. 42% electricity)
- **Residential**
  (74% heating vs. 26% electricity)

There’s a lot of opportunity to expand the use of locally-grown renewable fuel for heating!

<table>
<thead>
<tr>
<th>Table 1.1: Comparison of Heating Value of Fuels</th>
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<tbody>
<tr>
<td><strong>Fuel Type</strong></td>
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<tr>
<td>Wood Chips</td>
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<tr>
<td>Natural Gas</td>
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<tr>
<td>Natural Pellets</td>
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<tr>
<td>Soybeans</td>
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<tr>
<td>L.H. Oil</td>
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<tr>
<td>Electricity</td>
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<td>Fuel Oil (BP)</td>
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Fuel costs and CO₂ emissions associated with home heating

Prairie’s aggressive root systems are CO₂ negative

Agrecol Biomass Pellets
Pellets milled from native prairie plant biomass

Residential Pellet stove burning Biomass Pellets
Switchgrass – Panicum Virgatum

- “Model Energy Crop”
- Native (non-invasive)
- Broad distribution in U.S.
- Perennial
- High yield potential
- Compatibility with conventional farming
- Conservation (soil, water quality and wildlife)
- Carbon sequestration

Switchgrass is a strong candidate for pelleting – with 96% of the BTU’s of wood pellets.

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Genetic selection of Native Species for Biomass

- Species selection criteria:
  - Tonnage
  - Winter-hardy
  - Vegetation vs. Reproduction
  - Disease Resistance
  - Leaf vs. Stem weight and diameter
  - Nutrients in above ground biomass

Monoculture vs. Diversity

- High-diversity grasslands had increasingly higher bioenergy yield that were 238% greater than monoculture yields after a decade*

*Journal of Science, December 2006 David Tilman, “Carbon-Negative Biofuels from Low-Input High-Diversity Grassland Biomass”
Agrecol's Energy Seed Mix-
“it all starts with seed”
Restoring Nature’s Balance

90% grasses:
- Switch Grass
- Big Bluestem
- Indian Grass

10% wildflowers and legumes:
- Early Sunflower
- Canada Tick Trefoil

Rotational Harvesting

- 50/50 Harvest
- If you must harvest all fields, leave 8-10” stubble
- Harvest after July 4th or better yet, August 1st - for songbirds
- Leave unharvested areas along riparian areas of shrubs

Biofuel Pellet Production Steps
Little Bluestem production field after seed has been stripped off - ready to be mowed.

Mowing Indian Grass

Indian Grass windrows
Bagging

Densification Flow Chart

Hammer Mill further sizes the chopped native Biomass

Native Biomass after milling
Pellets are extruded through this 1/4” diameter die

Exterior of the Extrusion Die
Aspect ratio (Length/Diameter) is 9:1 for grass

Pellets in the hopper bin after cooling

Pellets in mini bulk storage bags
Agrecol’s pellet boiler for radiant heat

Ash exiting the boiler -- to be spread on biofuel production fields

2.5 mBTU burn chamber

“Growing Wisconsin Energy” A Native Grass Pellet Bio-Heat Roadmap for Wisconsin
Published June 2008
Copies of this report are available on the Agrecol website at www.agrecol.com.
Estimated cost of Pelleted Switchgrass

- $50/ton baled (assume $100/rent & 5 tons/acre yield)
- Avg FOB farm $70-$90/ton (assume $100-200/acre profit)
- Trucking costs: $4.68/ton (30 miles@ $3.75/loaded mile)
- Avg FOB pellet mill - $74.68-$94.68/ton
- Costs to pellet - $40-$60/ton
- $114 - $154/ton pelleted

Proposed Business Model

- Grow switchgrass on marginal acres
- Marginal acres converted to corn are not sustainably profitable
- Net income ($250/acre) sufficient for landowners to choose switchgrass on marginal acres if long-term contract
- Pelleting: Ease of handling, transporting, storing

Start now! Expand biomass heating now – begin building a feedstock supply chain for future biofuel.

Food, Conservation and Energy Act 2008
(2008 Farm Bill)

- Biomass Crop Assistance Program (BCAP)
- Cap $45/ton for five years
- Cost-share installation of prairie

Prairie Restoration + Heat:

Everyone Wins!