Agricultural and Woody Biomass: 
Contrasts and Comparisons

This Webinar is brought to you by:
Biomass Thermal Energy Council (BTEC)

With the generous support of the
U.S. Forest Service
Wood Education Resource Center

1 PM ET, September 28, 2011

“The work upon which this publication is based was funded in whole or in part through a grant awarded by the Wood Education and Resource Center, Northeastern Area State and Private Forestry, U.S. Forest Service. This institution is an equal opportunity provider.”
I. Introduction - Seymour

Joseph Seymour - Moderator

- Executive Director - Biomass Thermal Energy Council (BTEC)
Quick notes

- Two Audio Options: Streaming Audio and Dial-In.
  1. Streaming Audio/Computer Speakers (Default)
  2. Dial-In: Use the Audio Panel (right side of screen) to see dial-in instructions. Call-in separately from your telephone.

- Ask questions using the Questions Panel on the right side of your screen.

- The recording of the webinar and the slides will be available after the event. Registrants will be notified by email.
Speakers

- **John Bootle**, Founder, Renewable Energy Resources
- **Paul Cerosaletti**, Senior Educator, Cornell Cooperative Extension
- **Steve Flick**, Chairman of the Board, Show Me Energy Cooperative

Moderator

- **Joseph Seymour**, Executive Director, BTEC
Presentation Outline

I. Introduction – Joe Seymour
II. Sourcing and Processing – John Bootle
III. Combustion Technology – Paul Cerosaletti
IV. New Market Opportunities – Steve Flick
V. Q & A, Next Events – Joe Seymour

[Full presentation will be available online, www.biomassthermal.org/resource/webinars.asp]
Introduction to BTEC

The Biomass Thermal Energy Council (BTEC) is the industry trade association dedicated to advancing the use of biomass for heat and other thermal energy applications.

Why was BTEC established?

1. To **advocate for and promote** the industry in the national energy policy debate
2. To **reach out** to and **educate** the public and decision makers on the benefits and advantages of using biomass for heat
3. To develop biomass energy **research and analysis** that enables sound investment and policy decisions
Introduction BTEC

BTEC’s membership*

* As of September 22, 2011
I. Introducing BTEC - Seymour

BTEC Membership

Abundant Power  
ACT Bioenergy  
Alliance for Green Heat  
American Agriculture Movement  
American Wood Fibers  
APEX  
**Bear Mountain Forest Products**  
Beaver Wood Energy  
Biomass Combustion Systems  
Biomass Commodities Corporation  
Biomass Energy Resource Center  
Biomass Energy Works  
Bionera Resources Inc.  
Biowood Energy  
Chip Energy  
Clean Power Development  
Comact Equipment  
Confluence Energy  
Continental Biomass Industries  
Control Labs  
Corinth Wood Pellet  
Cousineau Forest Products  
Dejno’s  
Ecostrat  
Enviva LP  
Ernst Biomass  
**Forest Energy Corporation**  
Froling Energy  
Froling GmbH  
Fuel Pellet Technologies  
FutureMetrics  
Gavilon Group  
Green Clean Heat  
Indeck Ladysmith  
Innovative Natural Resource Solutions  
International Renewable Energy Technology Institute  
**International WoodFuels**  
Jesse E. Lyman Pellets  
Krieg DeVault  
Lignetics of Virginia  
Maine Energy Systems  
Maine Pellet Fuels Association  
**Marth**  
Missouri Corn Growers Association  
Montana Community Development Corporation  
National Network of Forest Practitioners  
**New England Wood Pellet**  
Northeast Mill Services  
Oregon Forest Industries Council  
PA Pellets  
Pellet Technology USA  
Pelletter  
**Plum Creek**  
Pratt & Whitney Power Systems - Turboden  
Proe Power Systems  
Public Policy Virginia  
Rainforest Alliance  
Ray Albrecht/The Fulton Companies  
Renewable Energy Resources  
Resource Professionals Group  
Sandri Companies  
Santa Energy Corporation  
Sewall Company  
Skanden Energy  
State of Montana Department of Natural Resources and Conservation  
State University of New York  
Tamm Biomass  
Twin Ports Testing  
Vapor Locomotive Company  
Vecoplan  
Vermont Wood Pellet  
Viessmann  
West Oregon Wood Products  
Western Ag Enterprises  
Westervelt Renewable Energy  
Wilson Engineering Services  
Wisconsin Energy Conservation Corporation  
WoodFuels Virginia LLC  
Woodmaster  
**WoodPellets.com**  
Zilkha Biomass Energy
Project made possible by the USDA FS WERC

- BTEC awarded a grant from the USDA Forest Service’s Wood Education and Resource Center (WERC) in June 2010 to advance education and outreach on biomass thermal energy.

- The Center's mission is to work with the forest products industry toward sustainable forest products production for the eastern hardwood forest region.

- Previous webinars available at: www.biomassthermal.org/resource.

- All questions and attendee feedback will help form future activities.

Remember to answer the survey at the webinar’s conclusion!
John Bootle

- Founder, Renewable Energy Resources

Sourcing and Processing
Renewable Energy Resources

Biofuel from grassland
Sustainable and Local
“Field to Flue”

RER inspecting grass in field prior to harvest

Delivery for processing

RER Compacting Switchgrass into Briquettes

Flue

Boiler

Delivery to boiler

September 2011

Renewable Energy Resources
Crop Biomass—Why it is important

Flow Diagram of Sustainable Biomass for New England and New York
(in green tons)
Analysis by FutureMetrics

Potential Annual Sustainable Forest Harvest
55,400,000 Green Tons

Potential Annual Dedicated Energy Crops Harvest
23,304,000 Green Tons

Not Available for Harvest
16,939,000 Tons

Sawlogs
8,391,000 Tons

Pulpwood
14,935,000 Tons

half of remaining potential removed to keep estimate conservative
7,440,000 Tons

Total Potential Biomass
19,092,000 tons

half of potential energy crops removed to keep estimate conservative
11,852,000 Tons

WOOD BIOMASS 39%

CROP BIOMASS 69%
Benefits

• Highest efficiency – direct heating
  – Economic Benefits
    • Low cost and sustainable
    • Local production
      – $$ stay in local economy
    • Local fuel supply
      – Fuel security
    • Benefit to local community more important than $$ alone
    • Consistent with National objectives for energy use
  – Environmental benefits
    • Crop biomass is faster method to reduce carbon emissions than wood
    • Improved wild life/bird habitat
      – Late harvested after birds have bred
    • Deep roots
      – Improved soil quality
      – Improved water quality
Crop Species

• Agricultural waste
  – Mulch hay
  – Corn stover
    • Low cost

• Specialist energy crops
  – Switchgrass, Miscanthus, Arundo, Etc
    • Higher yields
      – 3 ½ - 15+ ton/acre
    • Yields depend on length of growing season
Energy Content

• All grasses have about the same energy content
  – ≈ 16 MBTU/dry ton
    • Grasses have different mineral contents,
      – % of leaves
        » Ash content
        » Slagging & Fouling
        » Corrosion
        » Emissions
      – Experience demonstrates that all issues associates with high mineral content can be effectively eliminated with correct combustion and harvesting

• Test results show
  – Switchgrass burns cleaner than some other grasses
Grass Biomass Fuels

**Fine Chop, 5-6 lb/ft³**
- Feeds through auger system
- Requires large storage volume
- Higher PM emissions

**Coarse Chop 2.5 lb/ft³**
- Lowest cost
- Large storage volume
- Problems with boiler feed system
- Higher PM emissions

**Briquettes 35 lb/ft³**
- Lowest PM emissions
- Lowest storage volume
- Lowest cost transportation
- No problems with boiler feed system
Material Handling to Boiler

- Grass briquettes are dumped into storage pit
  - On-site storage- 3-5 days supply at peak load
- Fuel is feed by auger from storage pit to boiler
  - Multi-fuel handling capability able to handle and burn either wood chip or grass biomass
Boiler System

• Crop Biomass is reliable and well proven
  – Hospitals, schools, colleges, etc.
  – Examples
    • Benton, PA, Burkeville: VA, Schools: MD & NY, Ski area and hotels, Power plants, Mid-west, Europe

• Many boiler manufacturers
  – Challenger, Skanden, Messersmith, Hurst, Viessmann, Chiptech, Etc.
    • Not all are multi-fuel

• Recommendation
  – True multi-fuel boiler system
    • Capable of burning any biomass – Wood or Crop
      – Automatic computer controlled fuel feed systems
      – Automatic ash removal system
      – Remote monitoring
  – Greater fuel security can burn any biomass fuel
    • Results in high reliability & great security
Typical Boiler Systems

- 45 yr old biomass boiler
  - 220 HP
- 10 tons/day
  - Chopped switchgrass
  - Chopped miscanthus
- Fixed grate
- Clear ash by hand
  - 1 time per day
- No slagging or fouling issues

- 2 yr old biomass boiler
  - 225 HP
- 3.5 tons/day
  - Briquetted switchgrass
    - Cleanest burn
  - Chopped switchgrass
- Firing on demand
- Automatic ash removal augers
- No slagging or fouling issues

Grass biomass burns efficiently in commercial boilers
Emissions

- States have different Clean Air permitting requirements
  - So check local requirements
- EPA regulations
  - Particulate matter limited to 0.07 lb/MMBTU
  - To comply with regulations
    - Systems will require multi-cyclone and bag-house to achieve new EPA levels
  - Monitor CO to ensure clean burn

<table>
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<tr>
<th>Emissions</th>
<th>LB/MMTU</th>
<th>0.238</th>
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<tr>
<td>Filterable Particulate</td>
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<tr>
<td>Nitrogen Oxides</td>
<td>LB/MMTU</td>
<td>0.289</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>LB/MMTU</td>
<td>0.130</td>
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<tr>
<td>Switchgrass Consumed</td>
<td>LB/HR</td>
<td>420</td>
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<table>
<thead>
<tr>
<th>Fuel analysis</th>
<th>Moisture &amp; Ash Free</th>
<th>Moisture Free</th>
<th>As Received</th>
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<tbody>
<tr>
<td>Moisture Total</td>
<td>%</td>
<td>13.58</td>
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<tr>
<td>Ash</td>
<td>%</td>
<td>3.25</td>
<td>2.81</td>
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<tr>
<td>Volatile Matter</td>
<td>%</td>
<td>86.89</td>
<td>84.07</td>
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<tr>
<td>Fixed Carbon</td>
<td>%</td>
<td>13.11</td>
<td>12.68</td>
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<tr>
<td>Gross Heating Value</td>
<td>BTU/lb</td>
<td>8432</td>
<td>8158</td>
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<tr>
<td>Sulfur</td>
<td>%</td>
<td>0.3</td>
<td>0.29</td>
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<tr>
<td>Carbon</td>
<td>%</td>
<td>49.98</td>
<td>48.36</td>
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<tr>
<td>Hydrogen</td>
<td>%</td>
<td>6.06</td>
<td>5.88</td>
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<tr>
<td>Nitrogen</td>
<td>%</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>Oxygen</td>
<td>%</td>
<td>43.26</td>
<td>41.85</td>
</tr>
</tbody>
</table>
Lessons

• How and when Grass- biomass is harvested is important
  – Grass for biomass is different than grass to feed cows
  – Biomass standards are necessary
  – Time of harvest is important if grass harvested early results in higher emissions

• Benefits of Briquettes
  – Briquettes are more dense than chopped grass
  – Lower transport costs
  – Less frequent fuel deliveries
  – Burns better
  – Reduced PM
  – Easier to manage boiler
Standards

• Standards are important to produce a consistent high quality product with low emissions
• RER are preparing a general standard that will include
  – Species
    • Switchgrass
    • Big Blue Stem
    • Indian Grass
    • Wild Flowers & Legumes
  – Harvest time
    • Moisture content
    • Mineral content
  – Cutter height
    • Avoid stones
  – Bale
    • Size – shape and size for ease handling and processing
    • Sisal – natural fiber
Summary

**Benefits of grassy biomass**
- Fuel security
- Grown within 30 mile radius
- $$$ stay in local economy
- Lowest long term cost
- Consistent with State objectives for energy use
- Fastest method to reduce carbon footprint
- More information
  - John Bootle
  - Renewable Energy resources
  - JohnBootle@Switchgrass-RER.com
  - 802-379-8553

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Traditional</th>
<th>Limited</th>
<th>Highest</th>
</tr>
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<tbody>
<tr>
<td>Oil</td>
<td></td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>Wood chips</td>
<td>Popular in NE USA</td>
<td>Unstable?</td>
<td>Lowest</td>
</tr>
<tr>
<td>Grass biomass</td>
<td>Widespread in Europe</td>
<td>Competition</td>
<td>Lowest</td>
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<tr>
<td></td>
<td></td>
<td>Out of state</td>
<td>short term</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Local</td>
<td>project life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 mile radius</td>
<td></td>
</tr>
</tbody>
</table>
Additional information

- John Bootle
- 802-379-8553
- Email - JohnBootle@Switchgrass-RER.com

- Adam Dantzscher
- 802-578-8347
- Email - Adam@Switchgrass-RER.com

Renewable Energy Resources
63 Southshire Drive
Bennington, VT 05201
Paul Cerosaletti

- Senior Educator, Cornell Cooperative Extension

Combustion Technology
The Catskill Grass Bio-Energy Project:
Perspectives on Ag and Woody Biomass Combustion

Paul Cerosaletti
Cornell Cooperative Extension of Delaware County
Delaware County:
Home to.....

Nearly 2 Million acres of haycrop harvested annually in NYS.......

......There are nearly 1.5 million acres of unused or under utilized ag land in NYS.
The Catskill Grass Bio-Energy Project

• A Production to Consumption Research and Demonstration Project:
  – Grass biomass production and processing
  – Demonstrate combustion residential and small business applications
  • 9 demonstration sites
  – Educate public on grass biomass thermal bioenergy
Grass Biomass as a Fuel

Grass biomass can be a high energy fuel!

BTU Content: EnviroEnergy Grass Pellets vs. Selected Commercial Wood Pellets

Grass energy content is 95% that of Wood

Grass Average

Wood Average

Grass biomass can be a high energy fuel!
Ag and Wood Biomass: Comparisons and Contrasts

Combustion
Contrasts and Comparisons: Combustion

1. Functionality
2. Emissions
Combustion technology

- Most combustion units on the market have been developed for, and work well with wood pellets.
- Some units are marketed for corn
- A few are now developed for “biomass”

What’s the difference? – What are the issues?
Potential issues with grass combustion

1. Clinkering (melting of ash)
2. Corrosion potential
3. Convenience
4. Emissions

Slide Courtesy of Dr. Jerry Cherney Cornell University
Ash Content of biomass

11. Lawn grass clippings
   Alfalfa hay or silage for cattle

10. Grass silage for cattle

9. Straw (range of 5-11%)

8. Grass hay for cattle

7. Perennial grass with fertility management

6. Perennial grass with fertility management and/or in-field leaching

5. Overwintered switchgrass

4. Corn grain

3. Short rotation willow

2. Hardwoods

1. Softwoods

Slide Courtesy of Dr. Jerry Cherney Cornell University
Nitrogen Content of biomass

- Wood
- Switchgrass/Miscanthus
- Straw/managed perennial grasses
- Grass silage for cattle
- Alfalfa hay or silage for cattle
- Lawn grass clippings
- Perennial grasses/weeds; low fertility
- Corn grain
- Switchgrass/Miscanthus
- Straw/managed perennial grasses
Biomass Combustion Issues

Nitrogen
Possibility of NOx emissions.

Potassium
Contributes to corrosion and buildup.
Contributes to particulate emissions.

Chlorine
Catalyzes corrosion and buildup.
Contributes to particulate emissions.
Possibility of dioxins and other toxics.

Sulfur
Contributes to particulate emissions.
Contributes to sulfate deposits.

For Grass: Minimize through fertilization & leaching.
Contrasts and Comparisons: Combustion

- Emissions:
  - Ag biomass higher in Nitrogen content
    - = higher NOx emissions
  - Grass similar (or lower) in CO and SO$_2$ emissions.
  - Particulate emissions - Grass maybe lower
Contrasts and Comparisons: Combustion

- Thermal Biomass Common Ground:
  - When having the emissions discussion we need to be also talking about "Life Cycle" Greenhouse Gas Production.
  - Thermal biomass wins this argument
Most all can feed pellets without difficulty.

The melting point of biomass ash is exceeded, unless combustion is very closely controlled.

The stove/furnace must have an active mechanism to manage ash.
Grass Combustion Successes

• Have found units that will work with grass biomass
• Have burned 97 tons of grass pellets to date in project.
• Little clinkering under normal burn.
• Have realized significant fuel savings.
Ashokan Center Fuel Oil Usage

Ashokan Center Heating Fuel Oil Usage, Main Lodge

Started heating with grass pellets Jan. 1 2010
Combustion Experience

• Insufficient support from manufacturers for their products – particularly home/business scale heaters.
  – Dealer networks don’t emphasize service.
  – Mechanical issues not entirely resolved.
• This is not fluid mechanics
  – Need recognition of ag biomass and develop technology accordingly.
Ag Biomass Compatible Biomass Hydronic Pellet Furnaces Examples

- Verner - Czech
- Reka – Danish
- Brandelle – Canadian
- Bio-Burner – USA
Ag Biomass Compatible Indoor Biomass Stoves Examples

- Harman P series
- Quadrafire Mt. Vernon
- Paromax Europa
Ag Biomass: Challenges/Opportunities for the Future
A Vision for Ag Biomass

• **Eat Local** - *Heat Local!*
  – A large population of people that want to be energy independent and support *local* agriculture and the *local* economy
  – We need to capitalize on this
    • **Educational Campaign** with Public re. Biomass!!
      – Biomass in general/ Ag Biomass
      – Local biomass
A Vision for Ag Biomass

• “Build It and They Will Come”
  – Need for large “anchor users” (municipal scale) to support development of industry.

• “Don’t Stay Off the Grass”
  – Opportunity for appliance industry to develop units that work with wide range of biomass types.
A Vision for Ag Biomass

• “Biomass for the Masses”
  – Need technology that is affordable.
  – Range of users
  – Small stove technology works – and there are a lot of people that want to use grass biomass and deal with its issues.
  – Mid scale technology (<1,000,000 BTU) - “Opportunity area”.
A Vision for Ag Biomass

• Local Biomass Feed Stock development and management.
• Continued Ag Biomass research.
• Address regulations.
  – Certify Ag Biomass types as approved fuels;
• Get more examples of heating with biomass out there.
• Build this industry from the ground up – do it right.
Visit us on the Web!
www.ccedelaware.org
IV. New Markets - Flick

Steve Flick

- Chairman of the Board, Show Me Energy Cooperative

- New Markets
Show Me Energy Cooperative
Developing Energy Today for America’s Tomorrow

SHOW ME ENERGY
COOPERATIVE
660-656-3780
www.goshowmeenergy.com
Creating Energy Today for America’s Tomorrows

[Image of flowers and a sign for Show Me Energy Cooperative]
Developing Partnerships

- Show Me Energy Cooperative
  - Research and Development
  - Economic Development
  - Producer and Farmers
  - Sustainable Harvest
  - End Users Coal Burning UTILITIES
Show Me Energy Cooperative has as its guiding vision a commitment to establish an **innovative, profitable, leading model** for production of **advanced biomass based fuels** which may be replicated across the country by small producer owned cooperatives that will provide a positive economic impact on the regions where they are located.
Objectives

- Innovation
- Creating Jobs
- Economic Development
Where is Centerview, Missouri?
BCAP = Biomass Crop Assistance Program

• 20,000 acres signed up in 7 weeks!
Dedicated Energy Crops

Polycultures – Native Grass

**BCAP Approved Mixes**

<table>
<thead>
<tr>
<th>Mix</th>
<th>Description</th>
<th>Cost per acre</th>
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<tbody>
<tr>
<td>1</td>
<td>Spring Seeded Upland</td>
<td>$98.41</td>
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<tr>
<td></td>
<td>Pure Line Seed (PLS) Rates for seed drilled into residue or a tilled field</td>
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</tr>
<tr>
<td></td>
<td>Big Bluestem, Roundtoe</td>
<td>3.0 pounds/acre x $7.80 = $23.40</td>
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<tr>
<td></td>
<td>Indiangrass, Rumex</td>
<td>3.5 pounds/acre x $7.90 = $27.70</td>
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<tr>
<td></td>
<td>&quot;Switchgrass, Blackwell&quot;</td>
<td>1.8 pounds/acre x $6.90 = $12.51</td>
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<tr>
<td></td>
<td>Illinois Bundleflower, Native</td>
<td>0.5 pounds/acre x $23.00 = $11.50</td>
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<tr>
<td></td>
<td>Purple Prairie Clover, Native</td>
<td>1.5 pounds/acre x $19.00 = $28.50</td>
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<tr>
<td>2</td>
<td>Fall Seeded Upland</td>
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<td>Pure Line Seed (PLS) Rates for seed broadcast and then rolled</td>
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<td>Big Bluestem, Poundtoe</td>
<td>4.5 pounds/acre x $7.80 = $34.50</td>
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<td>4.5 pounds/acre x $7.90 = $35.55</td>
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<td>&quot;Switchgrass, Blackwell&quot;</td>
<td>2.7 pounds/acre x $9.50 = $25.65</td>
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<td>Illinois Bundleflower, Native</td>
<td>1.4 pounds/acre x $22.00 = $30.80</td>
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<td>Purple Prairie Clover, Native</td>
<td>1.5 pounds/acre x $19.00 = $28.50</td>
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<td>3</td>
<td>Spring Seeded Lowland</td>
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<td>Pure Line Seed (PLS) Rates for seed drilled into undisturbed field in lowland sites</td>
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<td>Canada, Virginia Wild Rye</td>
<td>8.2 pounds/acre x $7.00 = $57.40</td>
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<td>&quot;Switchgrass, Blackwell&quot;</td>
<td>2.1 pounds/acre x $9.50 = $19.65</td>
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<td>0.9 pounds/acre x $22.00 = $19.80</td>
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<td>Purple Prairie Clover, Native</td>
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<td>Fall Seeded Lowland</td>
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<td>Pure Line Seed (PLS) Rates for seed broadcast and then roller</td>
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<td>Canada, Virginia Wild Rye</td>
<td>12.3 pounds/acre x $7.00 = $86.10</td>
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<td>4.1 pounds/acre x $9.50 = $38.85</td>
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<td></td>
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<td>1.0 pounds/acre x $19.00 = $19.00</td>
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</table>

*Add $7.00 per pound for Kanlow and/or Alamo/"Switchgrass*

**Discounts:**
- If you order and pay for before Oct 1, 2011 you get 5% off
- If you order more than 20 acres you get 5% off
Delivery of Biomass to Centerview

Weight, Moisture, BTU, and Sugars
Biomass Energy
Pellets

Show Me Energy Coop has developed an Advanced Biofuel
Recognized by USDA
DOE Approved Technology

Grassoline

Contrasting labels for standard and flex fuel.
Blue - FLEX FUELS
Blends above E10 clearly labeled "for flex fuel vehicles only"

Separate hoses for flex fuel and standard fuel (preferred)

Contrasting labels for standard and flex fuel.
White - Standard Fuels

E10 = 87% Unleaded/13% EB5
E30 = 85% Unleaded/35% EB5
Benefits to the State of MO

- Farmers’ Income
  - Increase Value Added Income Per Acre
- Rural Community Development
  - Job Creation – Green Collar Jobs
- Renewable Energy Use through Utility Companies
  - Urban and Rural Utilities Benefit
- Cleaner Water with Renewable Energy Crop Growth
- Energy Production Without Effecting the Feedstock Supply for Animals or Humans
Benefits to the United States

This presentation relies upon the USDOE EIA 2009 AEO Reference Case data ...

Annual Energy Outlook 2009
With Projections to 2030

U.S. Department of Energy (DOE) regularly publishes energy forecasts
The Challenge

U.S. Electricity Supply Challenge

How big is the effort to add by 2030 200,000 MW to U.S. electric power generating capacity?
The Reality

... and, if the growth were satisfied with coal-fired projects ...

- 200,000 MW
- $500 billion @ $2,500 / kW
- 500 MW average plant size
- 400 projects
- Commission a new 500 MW plant every 3 weeks until 2030
Diverse Portfolio Needed

... or, if the growth were satisfied with wind turbine projects

- 200,000 MW
- $400 billion @ $2,000 / kW
- 1.5 MW wind turbines
- 133,000 projects
- BUT, wind turbines operate only 40% of the time
- $1,000 billion
- 333,000 projects
- Commission **40 new 1.5 MW wind turbines every day** until 2030
Questions?
Contact Information

- www.goshowmeenergy.com
- Steve Flick, Board Chairman
- sflick@goshowmeenergy.com
- Plant Phone: 660-656-3780
- Office Phone: 816-597-3822
Ask questions using the Questions Panel on the right side of your screen.

All questions and comments will be recorded and incorporated in the webinar summary report.

Also, please take a few moments to answer the survey questions.
Other Resources

- **biomassthermal.org/resources**
  - Podcasts
  - Interviews with key industry leaders (10+, also on iTunes Podcasts)
  - Factsheets (biomass background, job data, technology, etc.)
  - Presentation (comprehensive program information)
Upcoming Events

- Northeast Biomass Show
  - October 11-13, Pittsburgh
More Information

- **This Webinar will be available** by Monday, Oct. 3.

- **Sign up** to receive BTEC news at on our website.

- **Join BTEC for:**
  -- Frequent and timely regulatory, policy and market intelligence updates
  -- Business Development opportunities and networking with other biomass leaders
  -- Visibility as a supporter of the market’s growth
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For more info or to join, go to: [www.biomassthermal.org/membership](http://www.biomassthermal.org/membership)
Thank you!

If you want to learn more about the biomass thermal industry, BTEC, or membership, visit www.biomassthermal.org