

BIOMASS ACTIVITIES & FEEDSTOCKS STUDIED

Combustion Performance, Emissions Characterization, & Emissions Factors Development

- Herbaceous plants
 - Switchgrass – chopped and pellets
 - Big Blue Stem grass
- Woody biomass
 - Wood chips (Northern hardwoods and softwoods)
- Crops
 - Corn
 - Corn stover – chopped and pellets
 - Lignin & 'syrup' by-products from wheat straw & corn stover cellulosic ethanol plants
- Animal fats
 - Choice white grease
 - Lard
 - Tallow
 - Poultry fat
- Vegetable oil
 - Soybean oil
- Animal proteins
 - Meat & bone meal
 - Pork meal
 - Poultry meal
 - Feather meal
 - Blood meal
- Manures
 - Poultry litter
 - Cow manure
- Animal-tissue biomass
 - Cattle carcasses
 - Cull-cow specified risk materials (SRMs)
 - Fed-cattle SRMs
- Food industry wastes
 - Waste cocoa butter
 - Waste chocolate
 - Restaurant (yellow) grease
- Biodiesel
 - Soy based
- Algae-based biomass
 - Pressed algae (biocrude)

Resource Assessment

- Penn State Circulating Fluidized-Bed Boiler Biofuel Cofiring Feasibility Assessment – Resource Assessment & Characterization/ System Design/ Economic Analysis
- Pennsylvania Biomass Resource Assessment

Fuel Characterization/ Fundamental Studies

- Fundamental nitrogen evolution studies for burner design and NO_x control
 - Sawdust
 - Urban wood waste
 - Fresh switchgrass
 - Aged switchgrass
 - Corn stover
- Detailed analyses for agglomeration/deposition/corrosion
 - Manures (various)
 - Reed Canary grass
 - Switchgrass (various)
 - Big Blue Stem grass
 - Wood residues (various)
 - Corn stover
 - Pressed algae (biocrude)
 - Lignin & 'syrup' by-products from wheat straw & corn stover cellulosic ethanol plants
- Thermodynamic modeling to assess agglomeration and deposition
 - Manures (various)
 - Reed Canary grass
 - Switchgrass (various)
 - Big Blue Stem grass
- Wood residues (various)
- Pressed algae (biocrude)
- Lignin & 'syrup' by-products from wheat straw & corn stover cellulosic ethanol plants
- Biomass analyses for assessments, various fundamental studies, and full-scale operation
 - Sawdust
 - Wood chips and shavings (Red Oak, Pine, Poplar, Willow)
 - Switchgrass (various)
 - Big Blue Stem grass
 - Fatty acids
 - Coconut oil
 - Poultry litter
 - Dairy cattle manure
 - Beef cattle manure
 - Swine waste
 - Sheep manure
 - Horse manure
 - Waste Water Treatment Plant sludge
 - Waste Water Treatment Plant effluent
 - Mulch hay

- Mulch leaves
- Bale tarps
- Silo bunker covers
- Hard plastics (Horticulture)
- Plastic bags (bales)
- Railroad ties
- Pallets
- Burlap bags
- Paper mill sludge
- Recycled plastic/paper mixture
- Candy wrappers/waste candy mixture
- Waste cocoa butter
- Waste chocolate
- Waste paper cubes
- Biomass grinding study
 - Wood chips
 - Hardwoods
 - Softwoods
 - Sawdust
 - Poplar
 - Miscanthus
 - Corn stover
 - Alfalfa
 - Big Blue Stem grass
 - Straw
- Sugar yields for biorefinery applications
 - Tree-of-Heaven
 - Potato wastewater

Gasification

- Wood residues
 - Poplar
 - Red Maple
- Herbaceous plants
 - Switchgrass
- Animal proteins
 - Meat & bone meal
 - Blood meal
 - Poultry meal
- Animal-tissue biomass
 - Ground beef
 - Cattle carcasses
 - Specified Risk Materials
- Manure
 - Poultry litter pellets

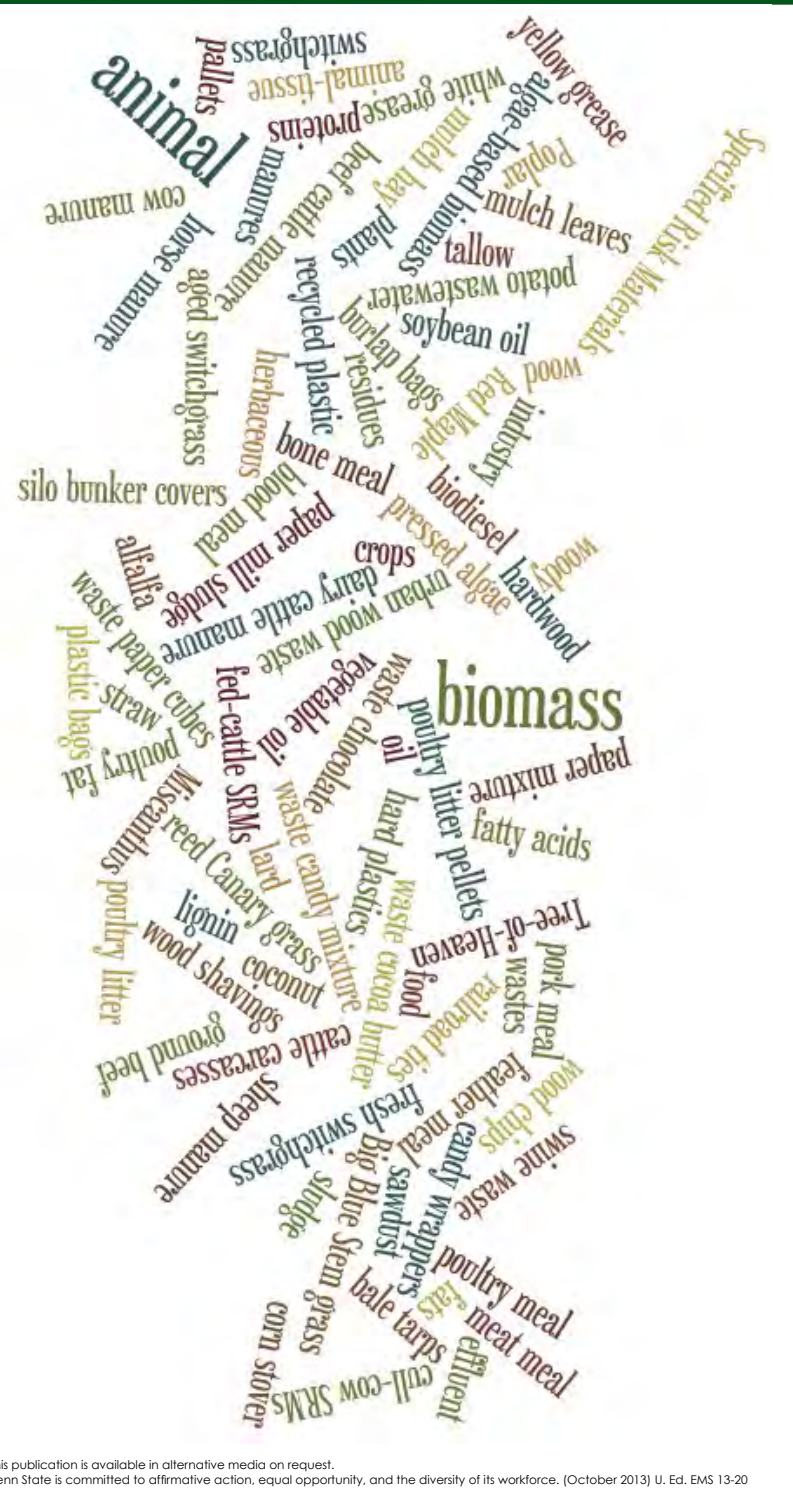
Torrefaction

- Wood residues
 - Wood chips

Database Development

- Electric Power Research Institute Biomass Properties Database for the electric utility industry (438 entries)
 - Woody biomass (139 entries)
 - Herbaceous biomass (136 entries)
 - Processed biomass (163 entries)





BIOMASS ACTIVITIES (STATIONARY COMBUSTION/ GASIFICATION/ TORREFACTION) & FEEDSTOCKS STUDIED

B. G. Miller and S. Falcone Miller research groups

