Woody Biomass: The Basics

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Fueling the Future:
The Role of Woody Biomass for Energy Workshop

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"The fuel of the future is going to come from apples, weeds, sawdust – almost anything. There is fuel in every bit of vegetable matter..."

– Henry Ford, 1925
Biomass

- Any organic matter that is available on a renewable or recurring basis

- Stuff that grows

- Capturing the sun's energy that comes to earth and turning that energy into products
Woody Biomass

- Trees and woody plants, including limbs, tops, needles, leaves, and other woody parts.
- Grown in a forest, woodland, or rangeland environment.
- Products or by-products of forest management, restoration or fuel reduction treatments.
- Includes urban forests.
Biomass Feedstocks

- Logging Residues
- Pre-merchantable Thinnings
- Non-commercial Species
- Poor quality Wood
- Salvage Wood
- Mill Waste
- Dedicated energy crops (Willow, Hybrid Poplar)
- Brushlands
- Grasses
- Crop Residues (Corn Stocks)
- The merchantable wood or the conventional forest products component includes the boles and sound dead wood.
- The forest residue fraction suitable for bioenergy and biobased products includes the tops and some fraction of saplings considered to be overstocked.
- The total forest residue resource is about 0.7 billion dry tons.
Projected U.S. Biofuel Sources

Source: Biomass as Feedstock for a Bioenergy and Bioproducts Industry: Technical Feasibility of a Billion Ton Annual Supply. 2005. DOE and USDA.
Benefits of Woody Biomass

Economic benefits:

- Landowners
  - Increased income potential
  - Reduced site preparation costs
- Communities
  - Economic diversification
  - New markets for forest products/ New Businesses
  - Energy Independence
Benefits of Woody Biomass

Environmental benefits:
- Carbon Sequestration
- Air Quality
- Reduce Wildfire Risk
- Recovery of Degraded Land
- Wildlife Habitat
- Reduced Mortality due to Insect and Disease
Challenges

- Collection and Harvest
- Sustainability/Management of the Resource
- Transportation
- Storage
- Processing
- Technology/Industry Development
- Economics
- Environmental
Why the interest in Biomass?
In 2000, the U.S. used about 100 Quads of energy/year OR 100,000,000,000,000,000 BTUs.
Role of Renewables - present

Compared With Other Resources, 1973-2007

Compared With Other Resources, 2007


Figure 10.1 Renewable Energy Consumption (Quadrillion Btu)

Total and Major Sources, 1973-2007

Use of Renewables will grow

Non-fossil energy use grows rapidly, but fossil fuels still provide 79 percent of total energy use in 2030

EIA Annual Energy Outlook 2009 Reference Case Presentation -- December 17, 2008
Biomass will be an important component

Nonhydropower renewable power meets 33% of total generation growth between 2007 and 2030
Economic stimulus bill

- Ten-fold increase over 2008
Biomass Math

2 Green Tons (~50% moisture) = 1 Dry Ton (0% moisture)

1 cord of Wood = 1 Dry Ton = 18,000,000 BTUs

2 Dry Tons of Wood = 1 Ton of Coal = 200 gal. Fuel Oil
Critical components of a sustainable bioenergy and bio-based products value chain

(adapted from IEA Bioenergy Task 31).
Energy Options – Biomass Conversion!

Bingham Medal Lecture, October 10, 2006