

UNIVERSITY OF MINNESOTA

**EXTENSION**

## **Woody Biomass: The Basics**

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Fueling the Future:

The Role of Woody Biomass for Energy Workshop

April 2, 2009,

Brainerd

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[www.extension.umn.edu/agroforestry](http://www.extension.umn.edu/agroforestry)

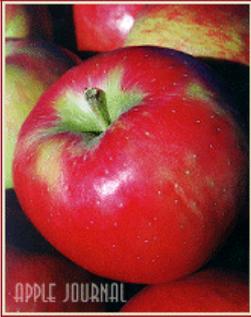
# Woody Biomass: The Basics



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*"Making Things Happen"*



"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

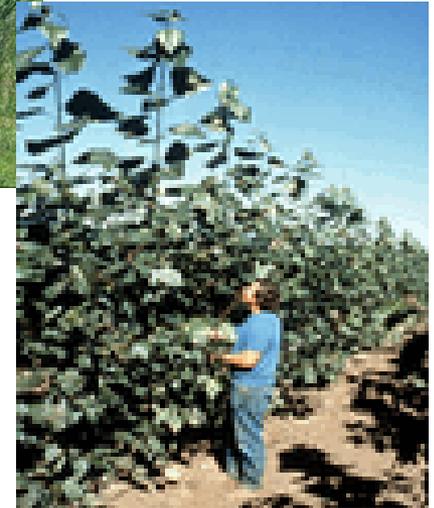


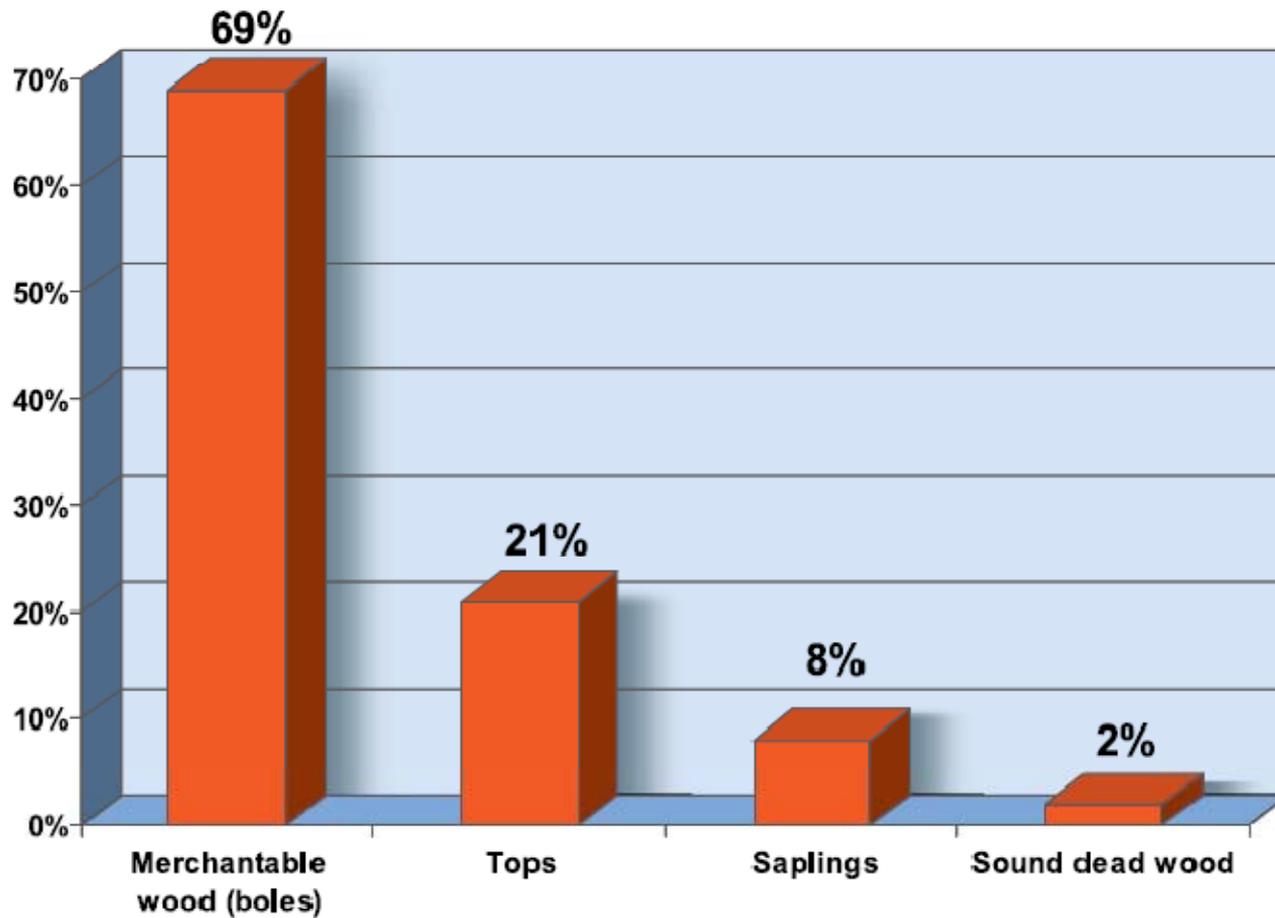
# Woody Biomass:

- 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 6.7 billion dry tons.

# 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?

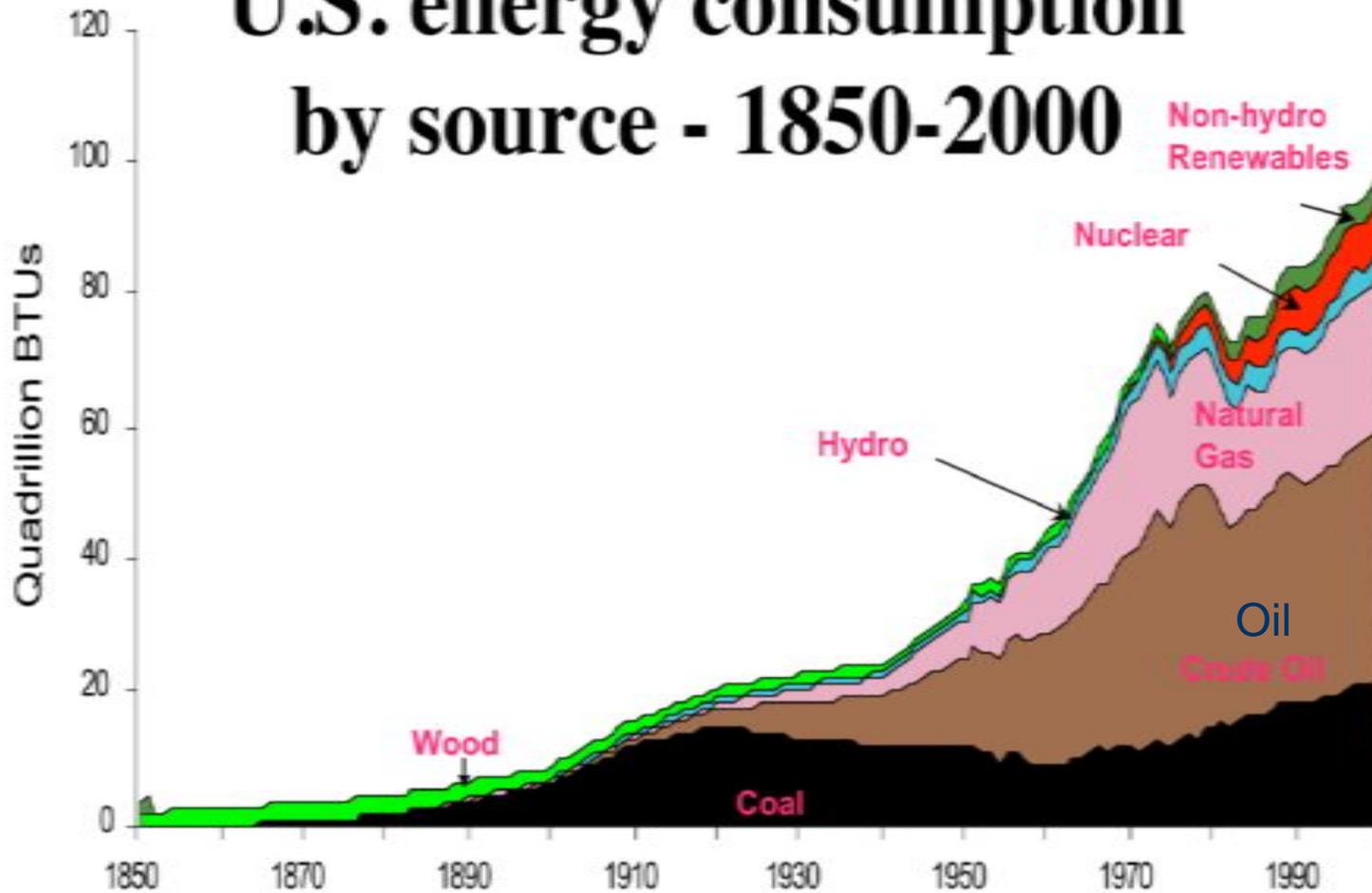
In 2000, the U.S. used about

100 Quads of energy per year

or

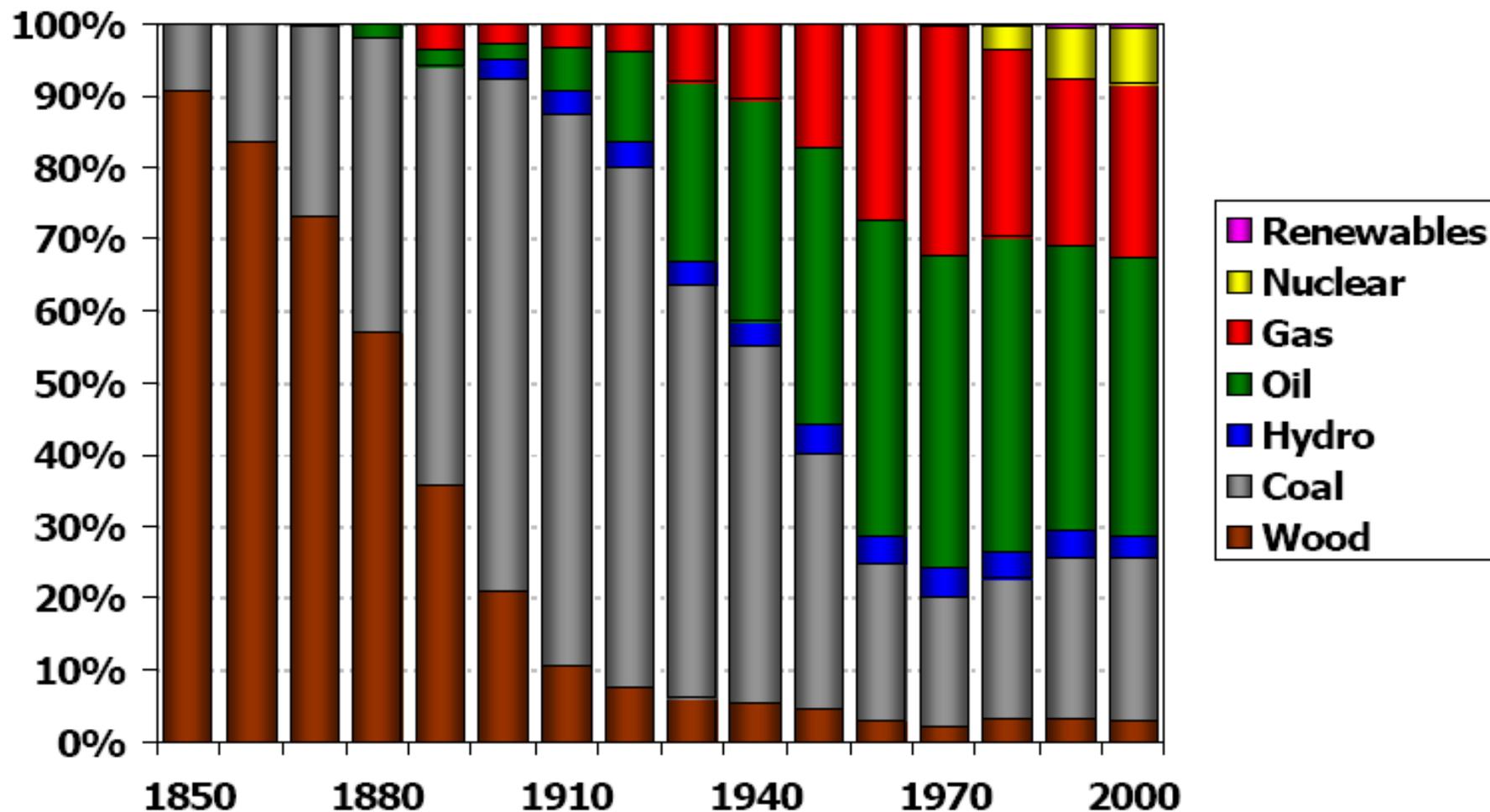
100,000,000,000,000,000 BTU's

# U.S. energy consumption by source - 1850-2000



Source: 1850-1949, Energy Perspectives: A Presentation of Major Energy and Energy-Related Data, U.S. Department of the

# US energy supply since 1850



Source: EIA

# Biomass Math

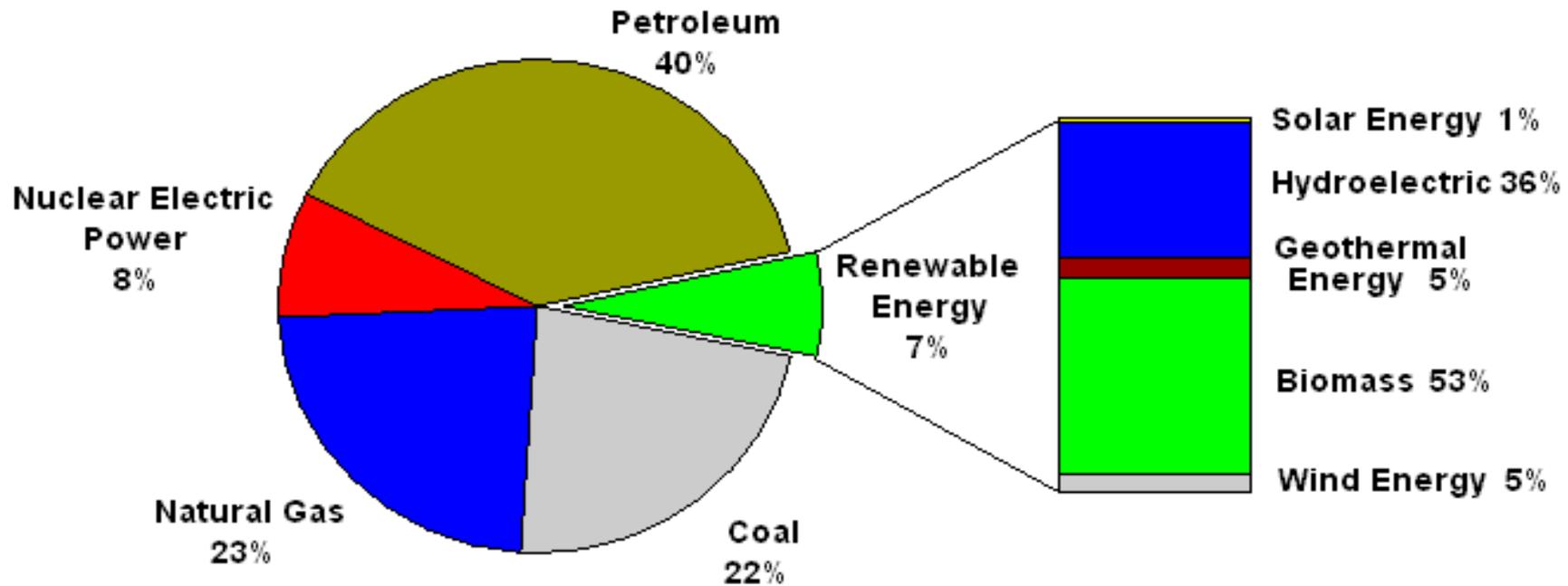
**2 Green Tons (~50% moisture) = 1 Dry Ton (0% moisture)**

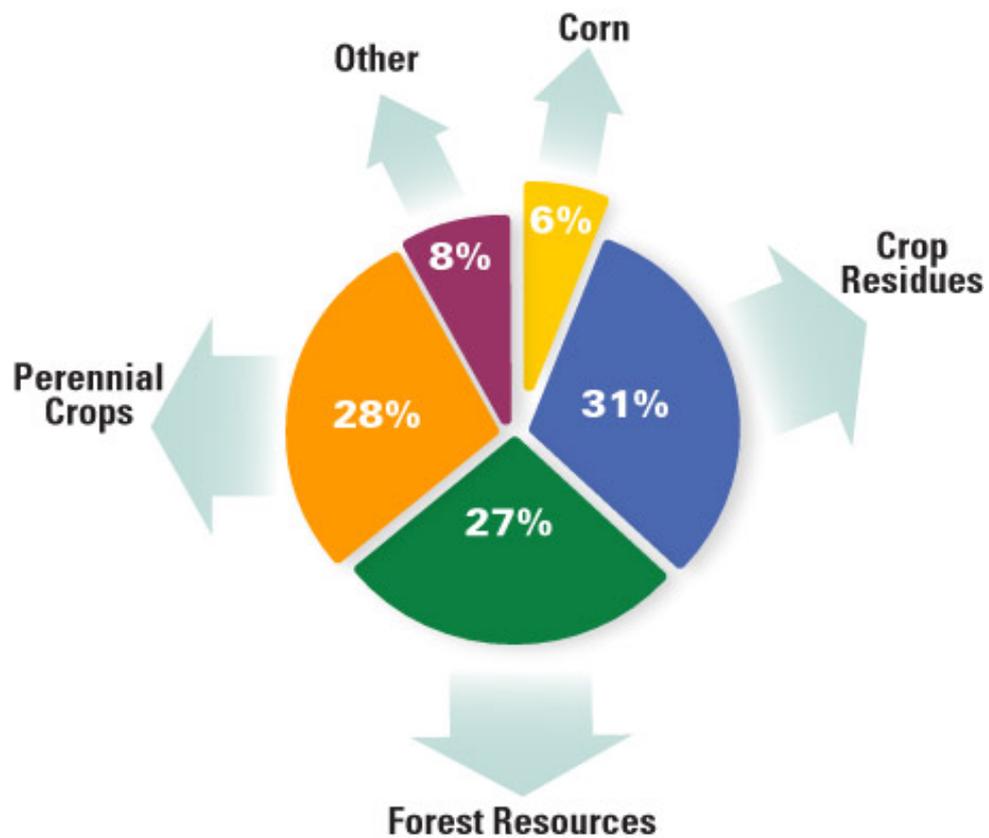
**1 cord of Wood = 1 Dry Ton = 18,000 BTU's**

**2 Dry Tons of Wood = 1 Ton of Coal = 200 gal. Fuel Oil**

Total = 101.605 Quadrillion

Total = 6.830 Quadrillion Btu

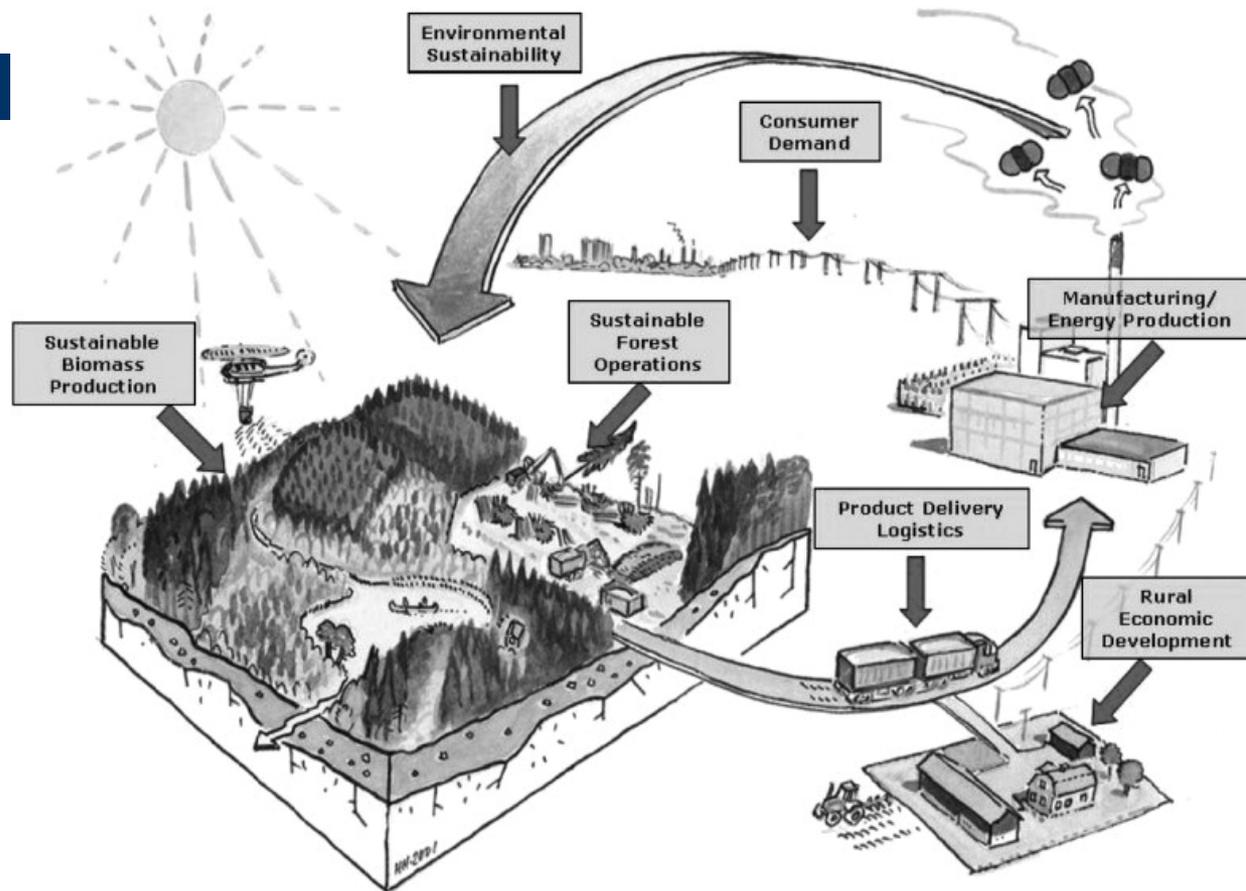




### **Projected U.S. Biofuel Sources**

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

# Critical components of a sustainable bioenergy and bio-based products value chain



(adapted from IEA Bioenergy Task 31).

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# Energy Options – Biomass Conversion!

