

UNIVERSITY OF MINNESOTA

EXTENSION

Woody Biomass: The Basics

Diomy Zamora, Extension Educator/Assistant Extension Professor, UMN Extension

Fueling the Future:

The Role of Woody Biomass for Energy Workshop

March 26, 2009

Ponsford

Sponsored by:

University of Minnesota Extension, White Earth Tribal College, Natural Resource Conservation Service, Soil and Water Conservation District – Becker County

www.extension.umn.edu/agroforestry

Woody Biomass: The Basics



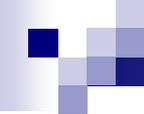
Diomy Zamora
Assistant Extension Professor
UMN Extension



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

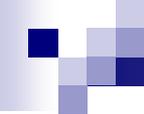
– Henry Ford, 1925





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



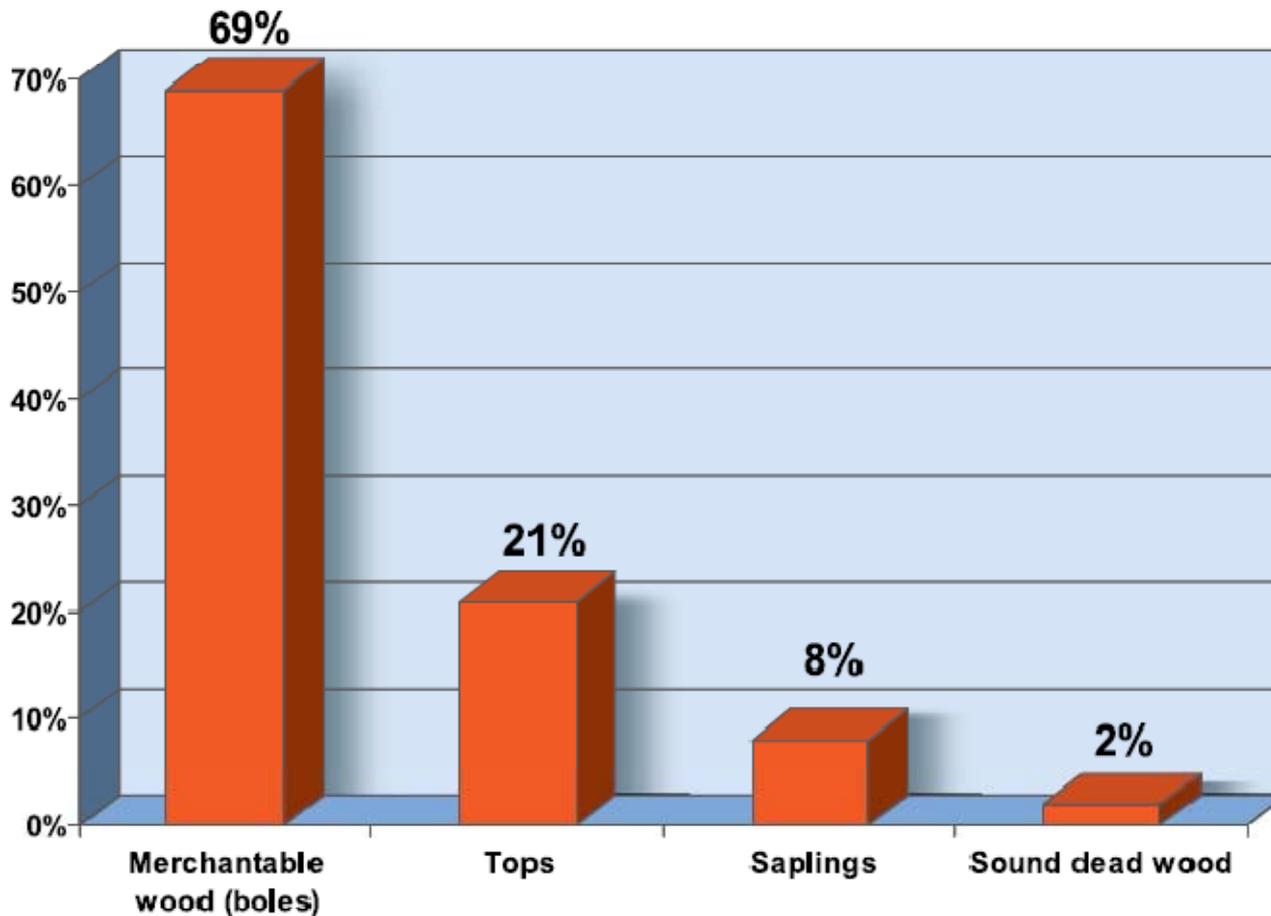
Woody Biomass

- 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.

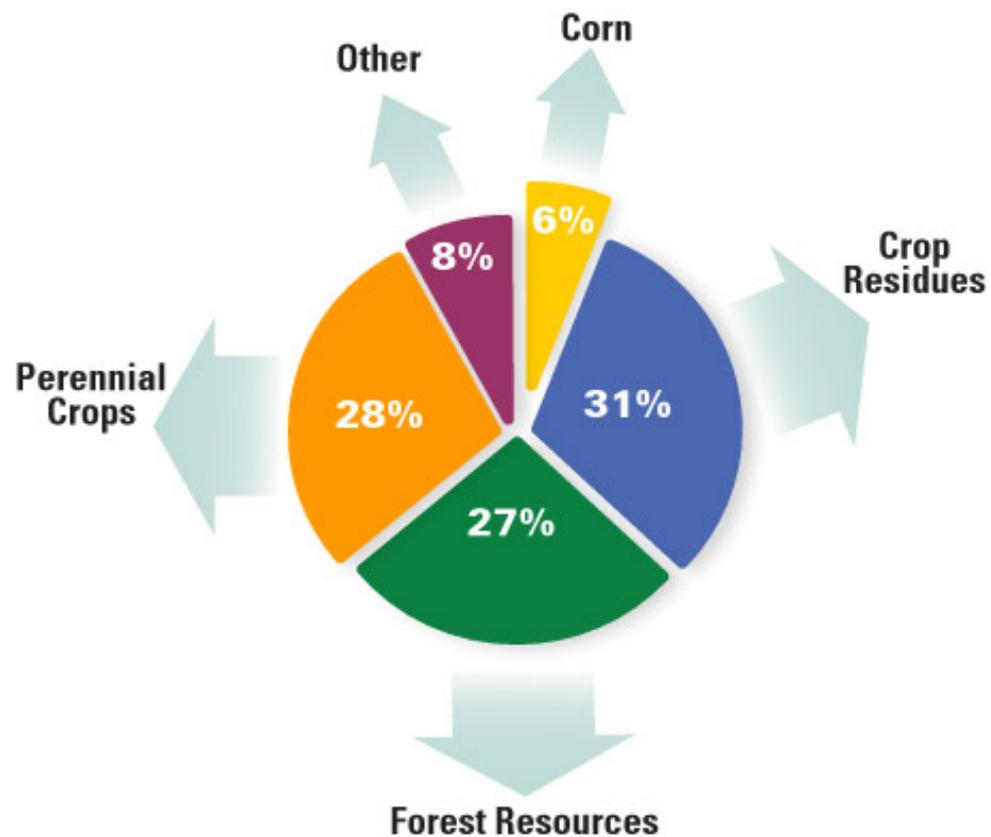
Biomass Feedstocks

- 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 6.7 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

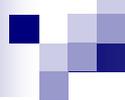


Benefits of Woody Biomass

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



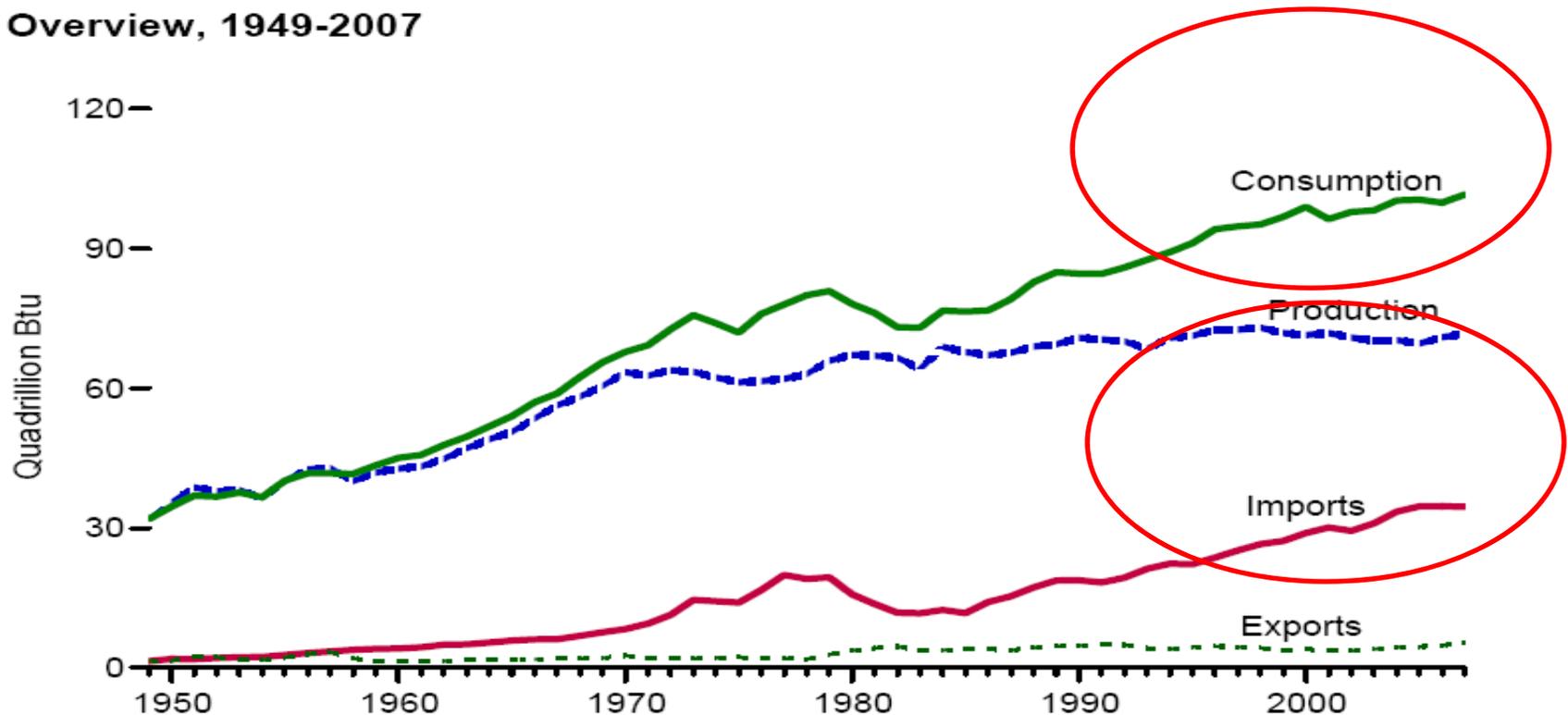
Why the interest in Biomass?

Energy Production and Consumption 1949-2007

In 2000, the U.S. used about 100 Quads of energy/year OR
100,000,000,000,000,000 BTUs

Figure 1.1 Primary Energy Overview

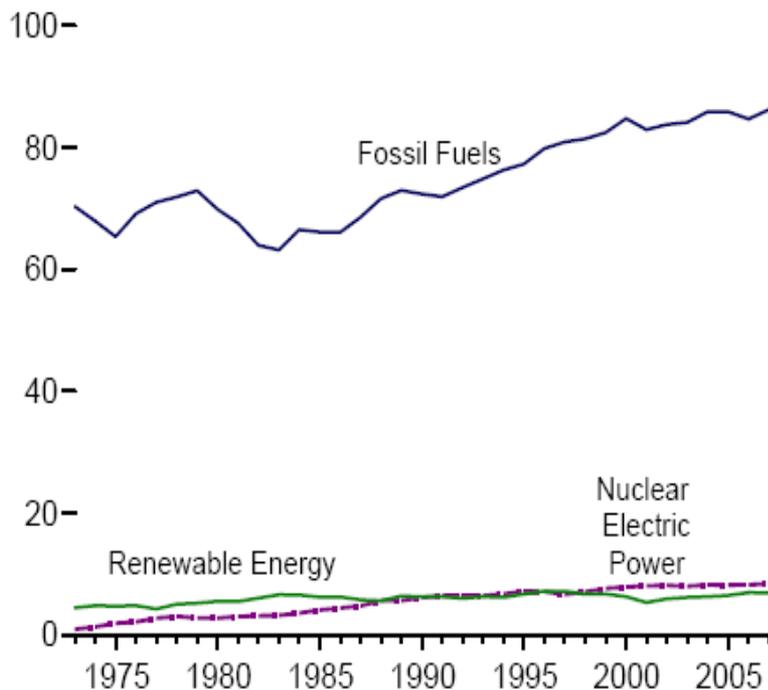
Overview, 1949-2007



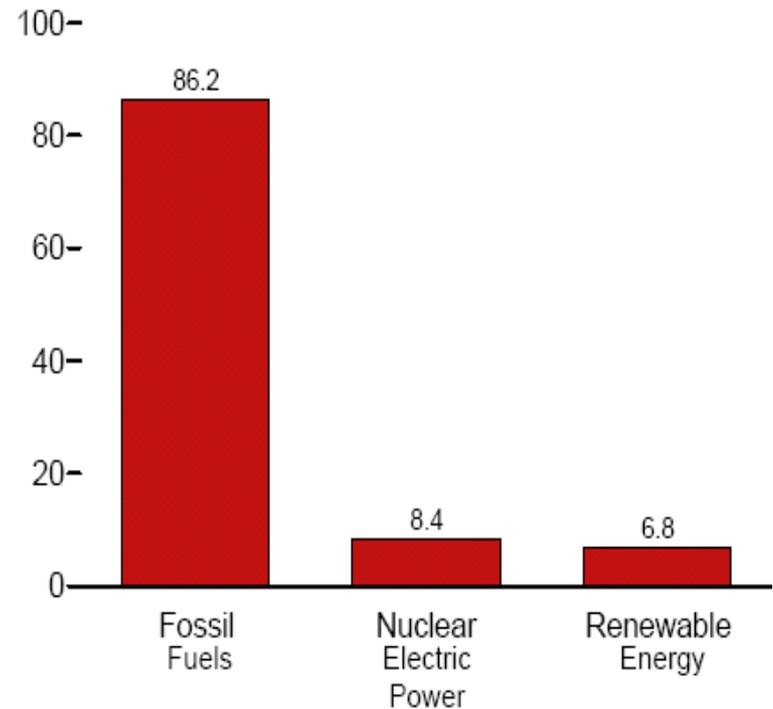
Source: Energy Information Administration – Annual Energy Review –2007

Role of Renewables - present

Compared With Other Resources, 1973-2007



Compared With Other Resources, 2007

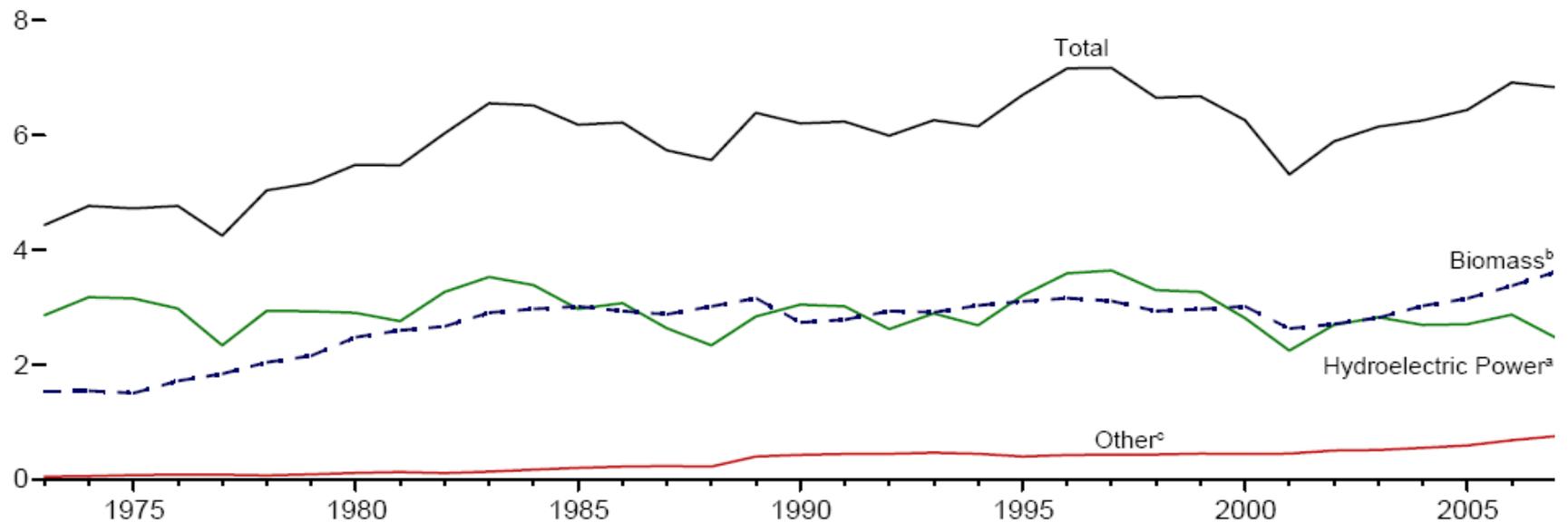


Source: Energy Information Administration – Monthly Energy Review – Jan. 2009

Renewable Energy Consumption 1973-2007

Figure 10.1 Renewable Energy Consumption
(Quadrillion Btu)

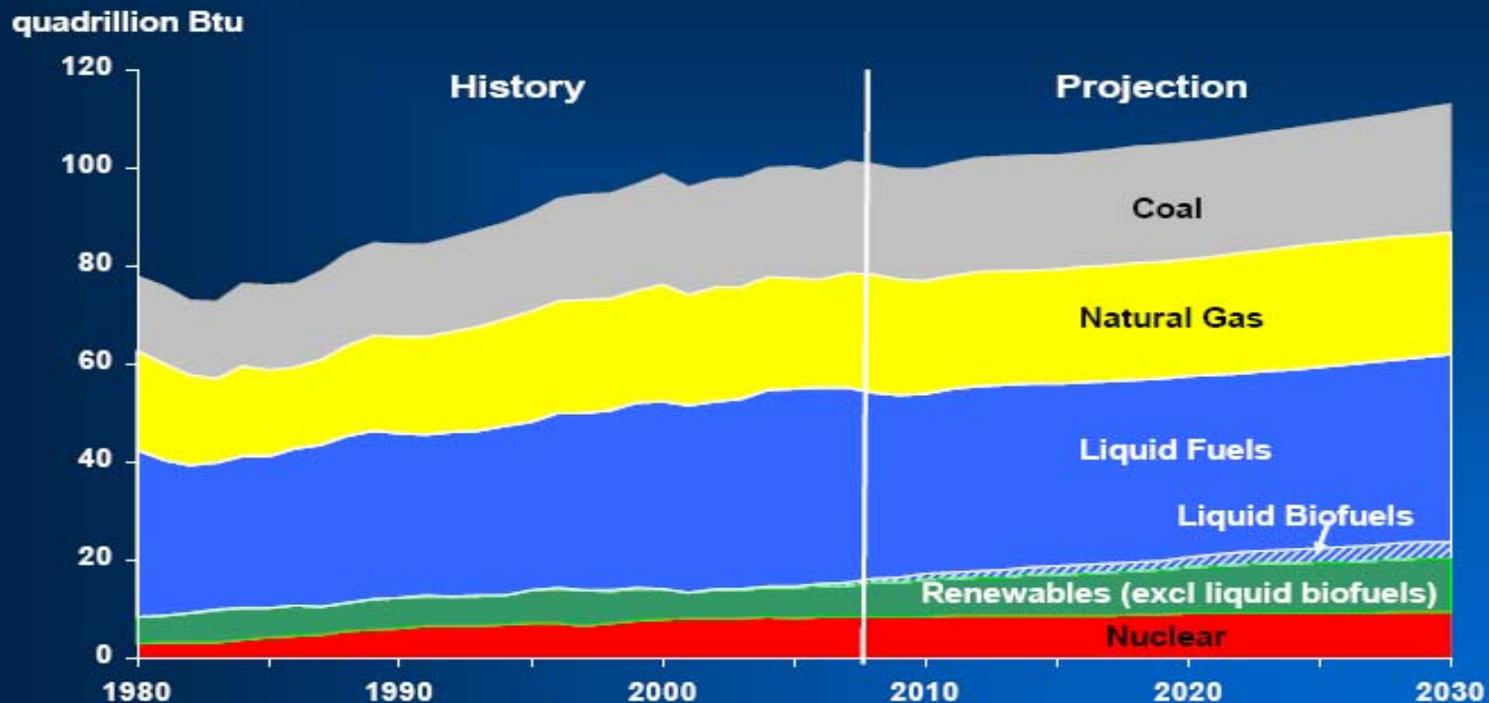
Total and Major Sources, 1973-2007



Source: Energy Information Administration – Monthly Energy Review – Jan. 2009

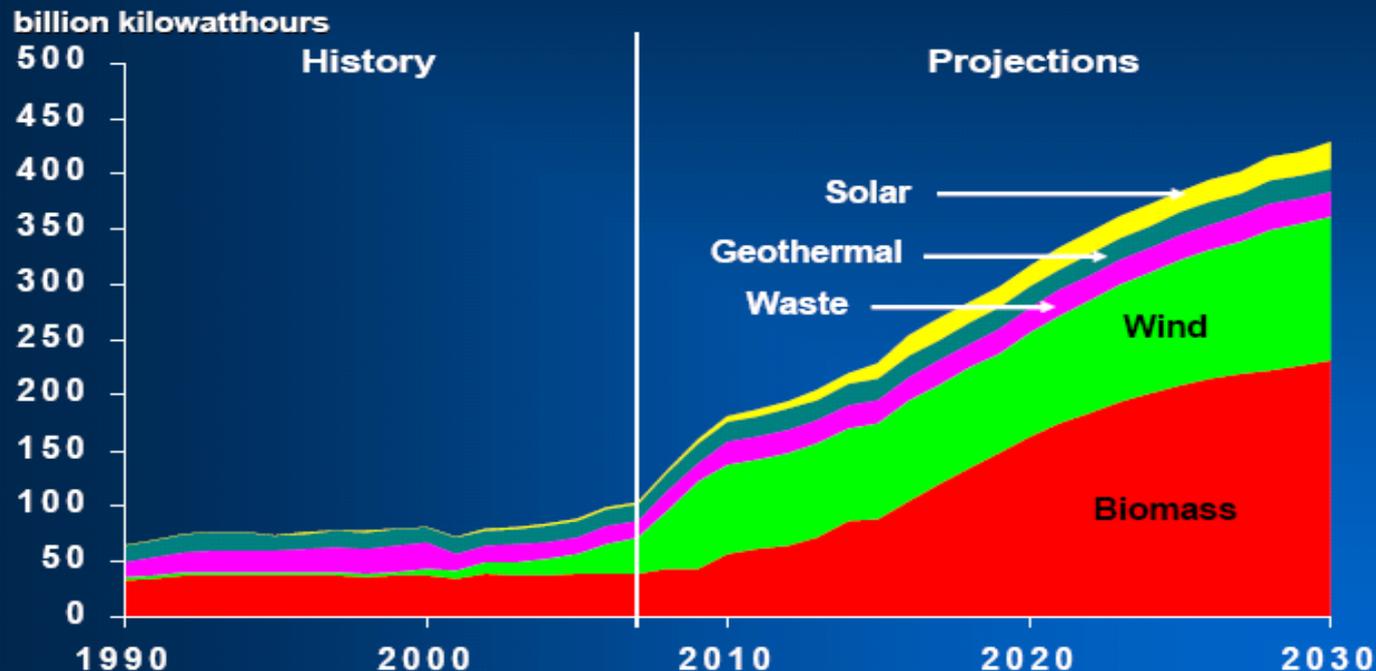
Use of Renewables will grow

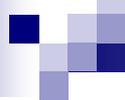
Non-fossil energy use grows rapidly, but fossil fuels still provide 79 percent of total energy use in 2030



Biomass will be an important component

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





Economic stimulus bill

- \$16.8 billion for the DOE Office of Energy Efficiency and Renewable Energy (EERE).
- Ten-fold increase over 2008

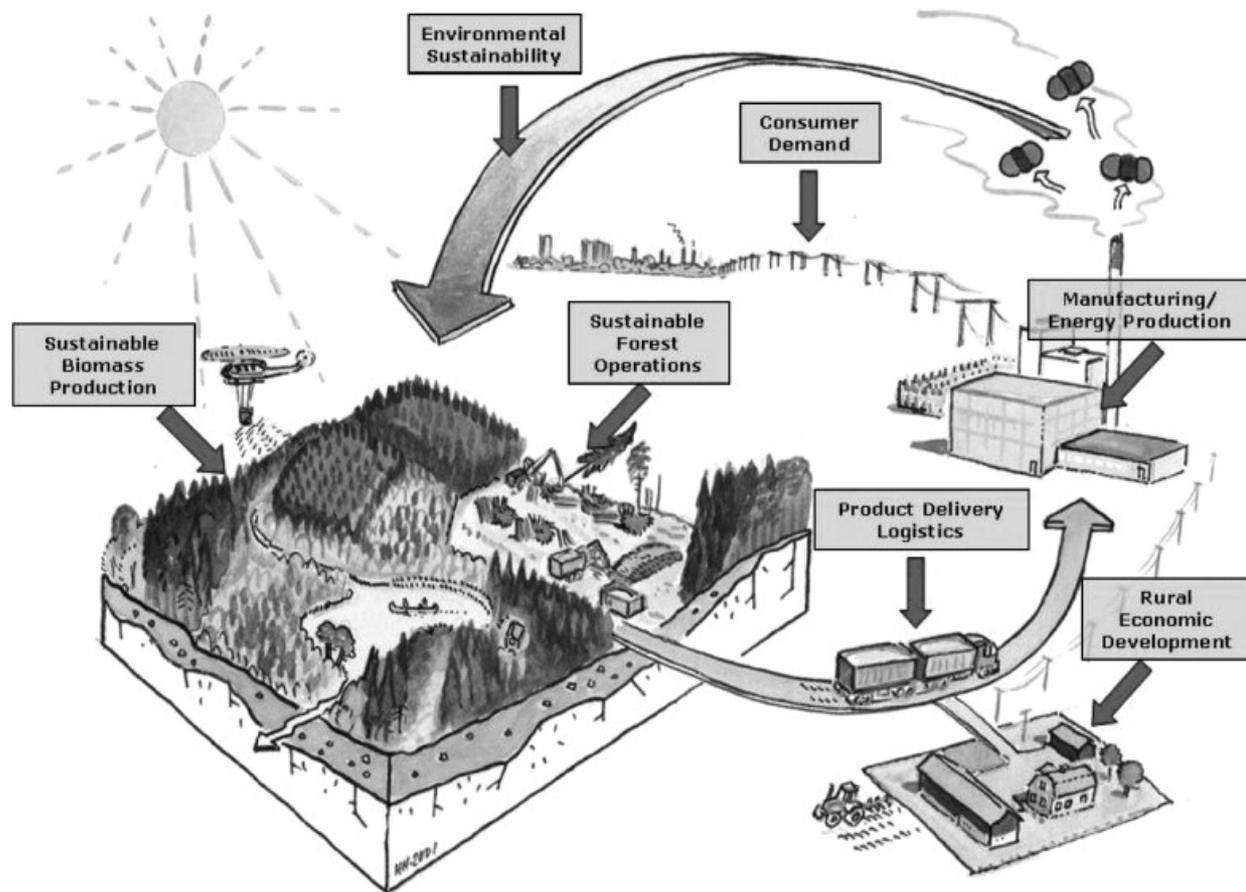
Biomass Math

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!

