

U.S. Agriculture's Role in the International Biofuel Market

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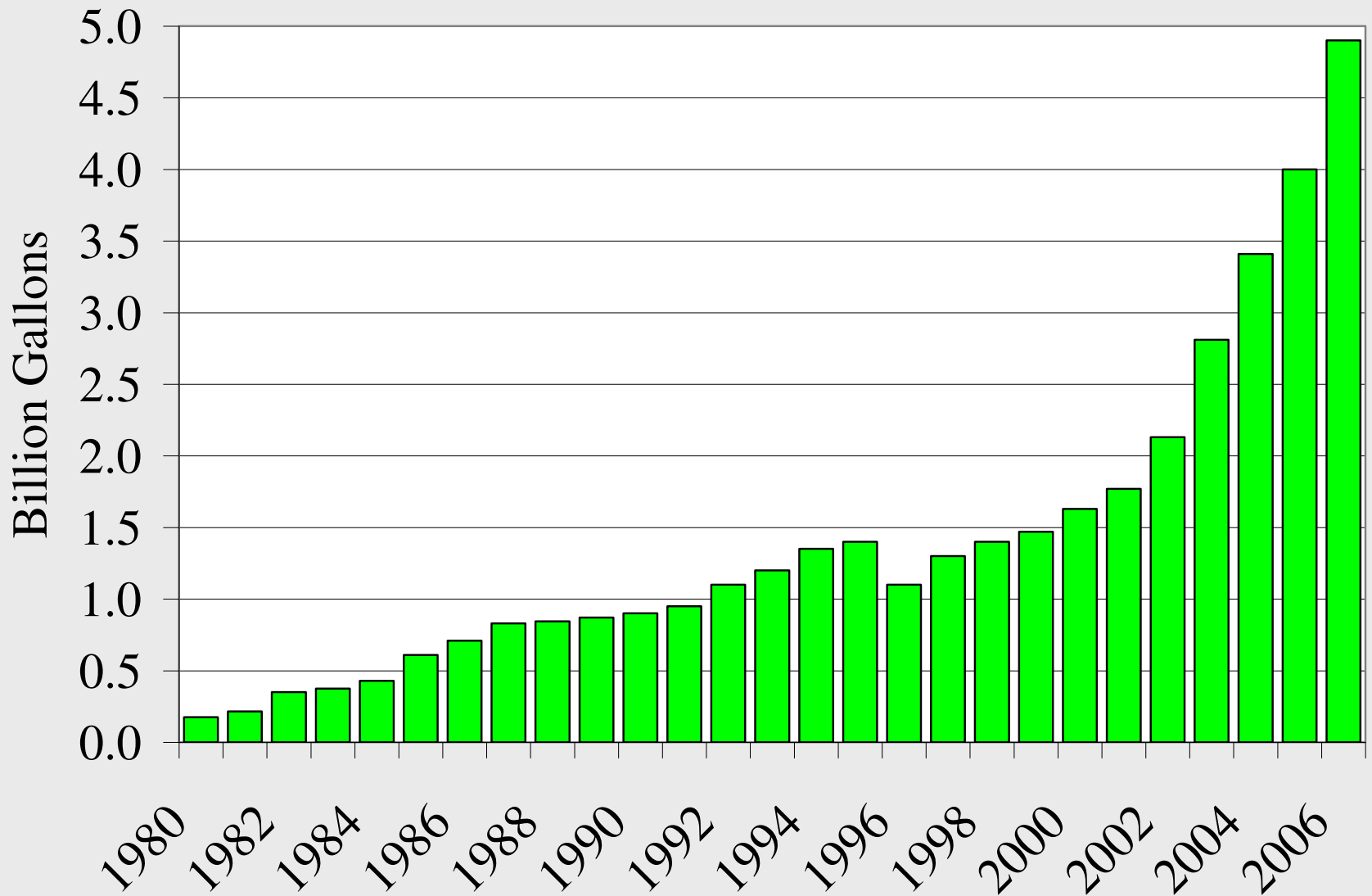
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2007 Wisconsin Fertilizer, Agrilime and Pest Management
Conference

Madison, Wisconsin

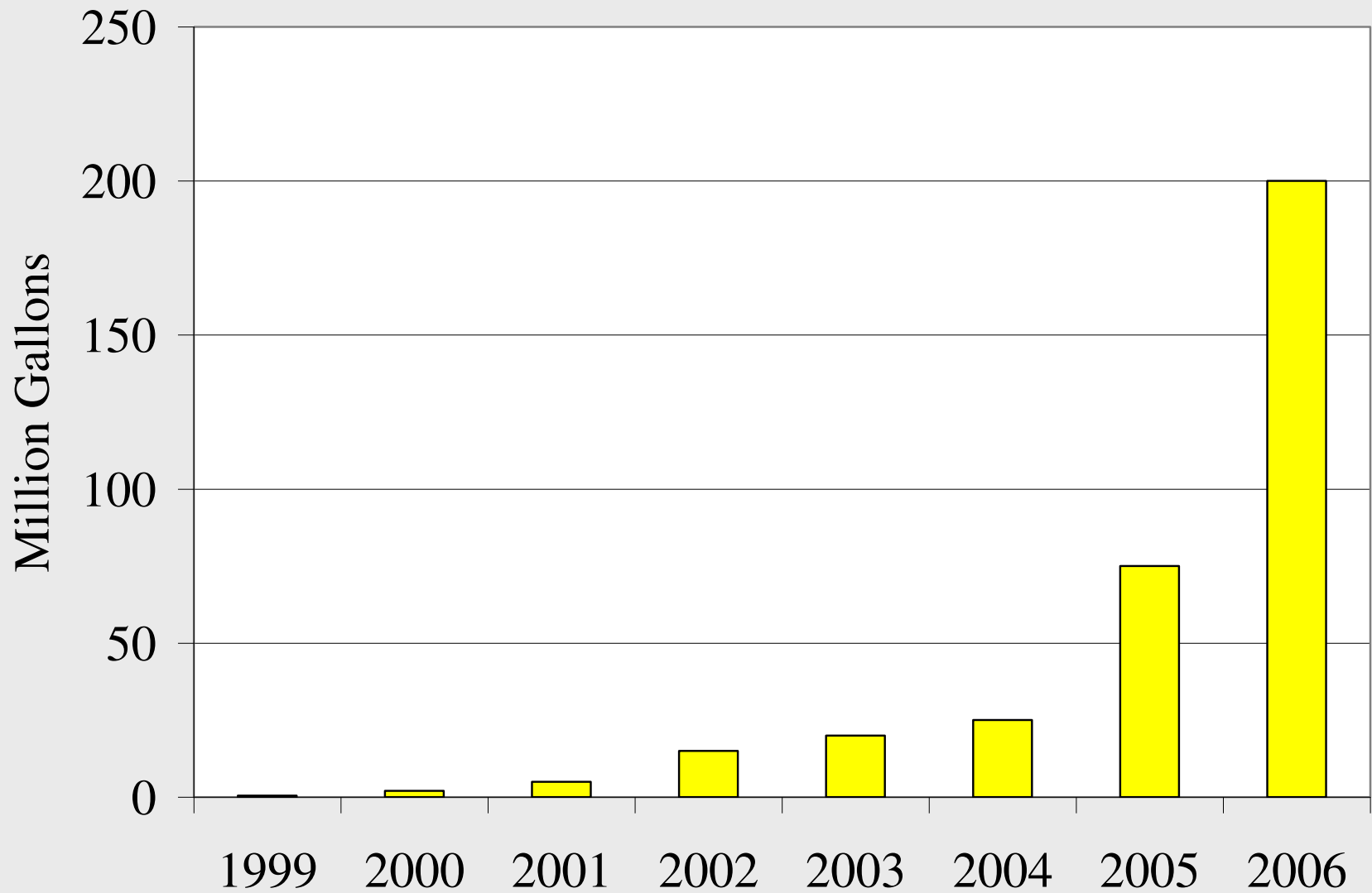
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Ethanol Explosion



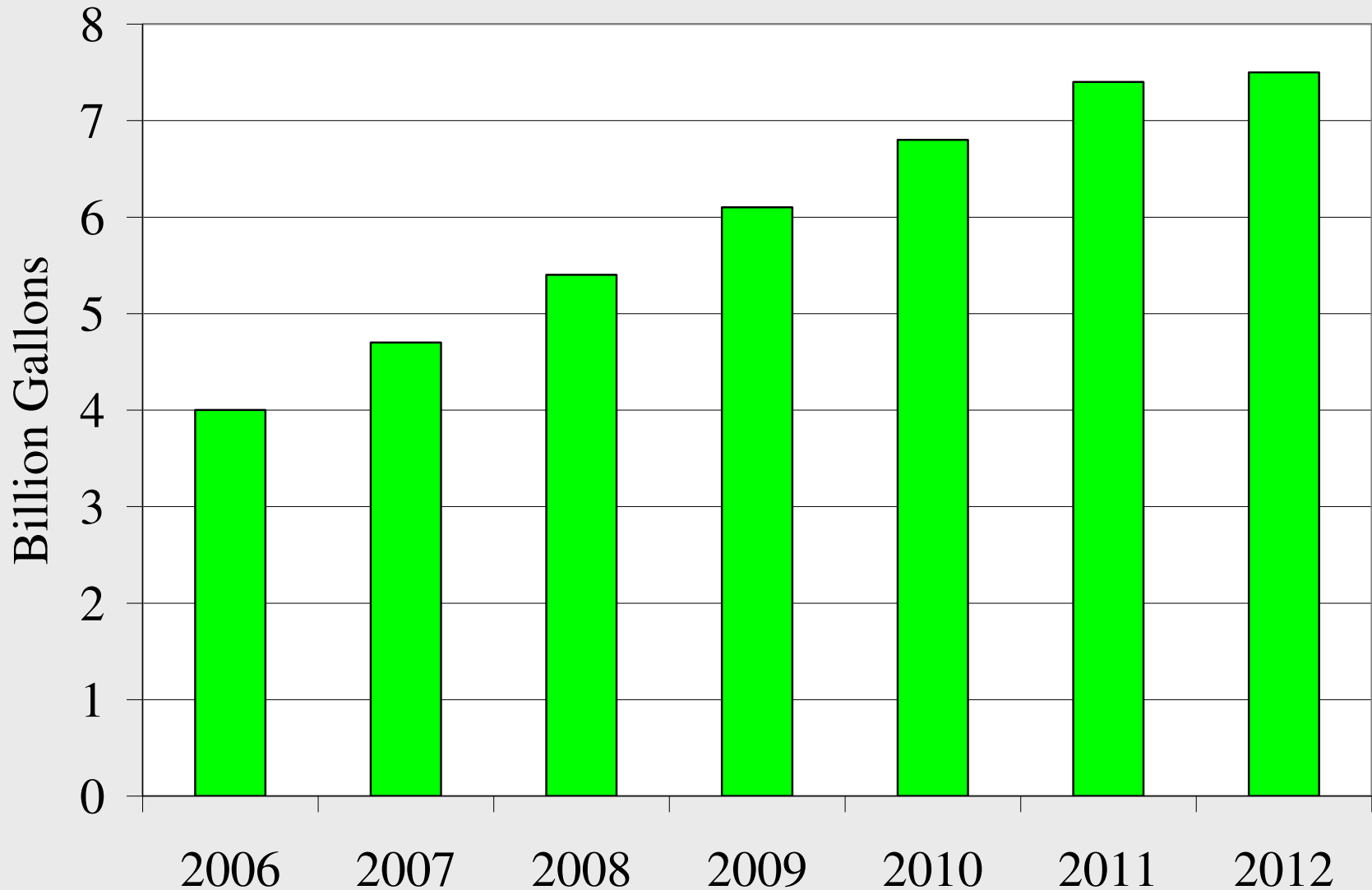
Source: Renewable Fuels Association

Biodiesel Growth



Source: National Biodiesel Board

Renewable Fuels Standard



Source: Renewable Fuels Association

Ethanol Industry Snapshots

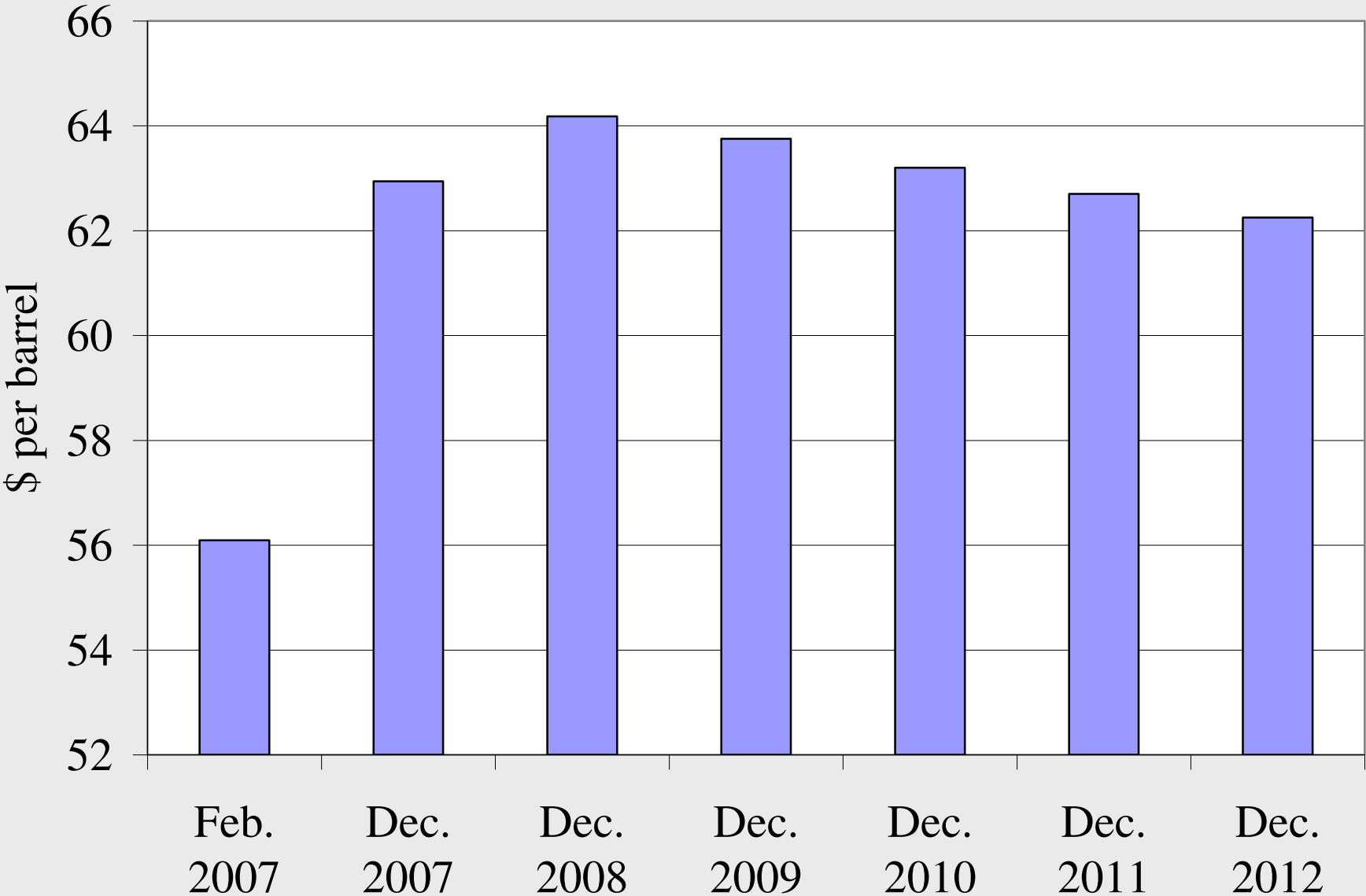
| | Ethanol Plants | Capacity (mgy) |
|-----------|----------------|----------------|
| Jan. 2000 | 54 | 1,749 |
| Jan. 2001 | 56 | 1,921 |
| Jan. 2002 | 61 | 2,347 |
| Jan. 2003 | 68 | 2,707 |
| Jan. 2004 | 72 | 3,101 |
| Jan. 2005 | 81 | 3,644 |
| Jan. 2006 | 95 | 4,336 |
| Jan. 2007 | 110 | 5,386 |

Source: Renewable Fuels Association

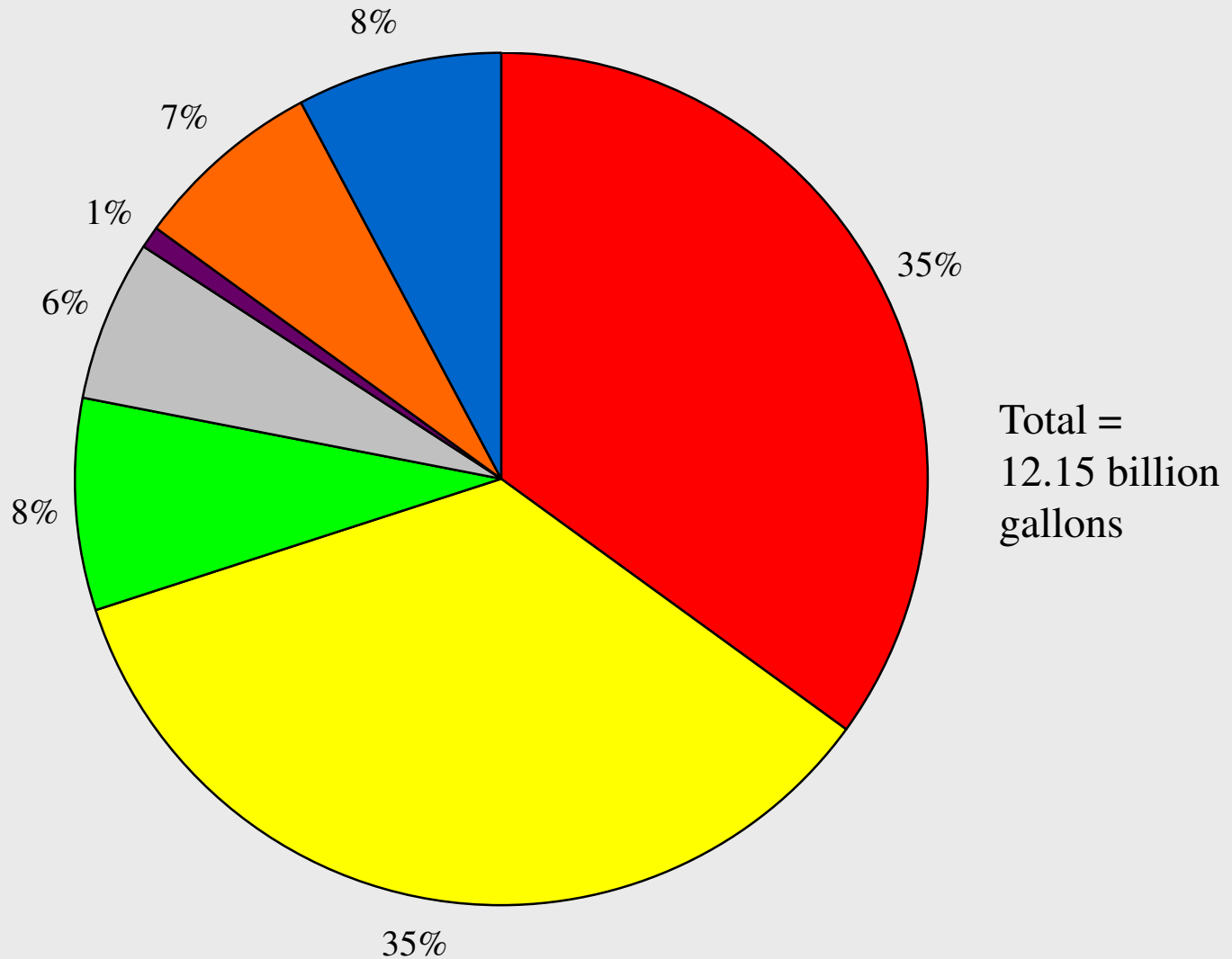
Where Are We Headed?

- Based on construction announcements for ethanol plants, by the end of 2008, ethanol production capacity could exceed 12 billion gallons
- Announced biodiesel capacity exceeds 2 billion gallons

Oil Futures As Of 1/8/2007

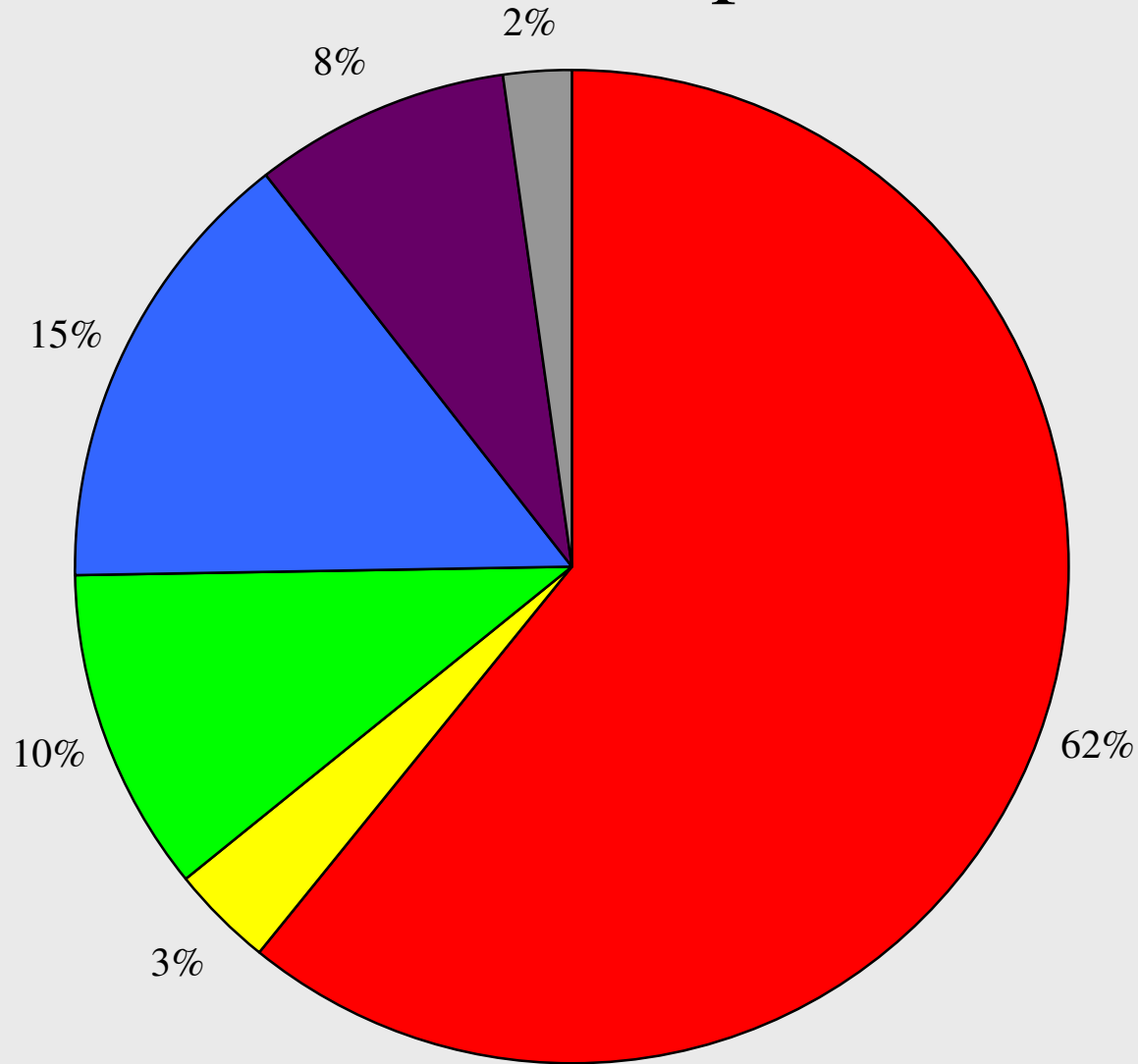


World Ethanol Production, 2005



■ U.S. ■ Brazil ■ China ■ Europe ■ Africa ■ Asia ■ Rest of World

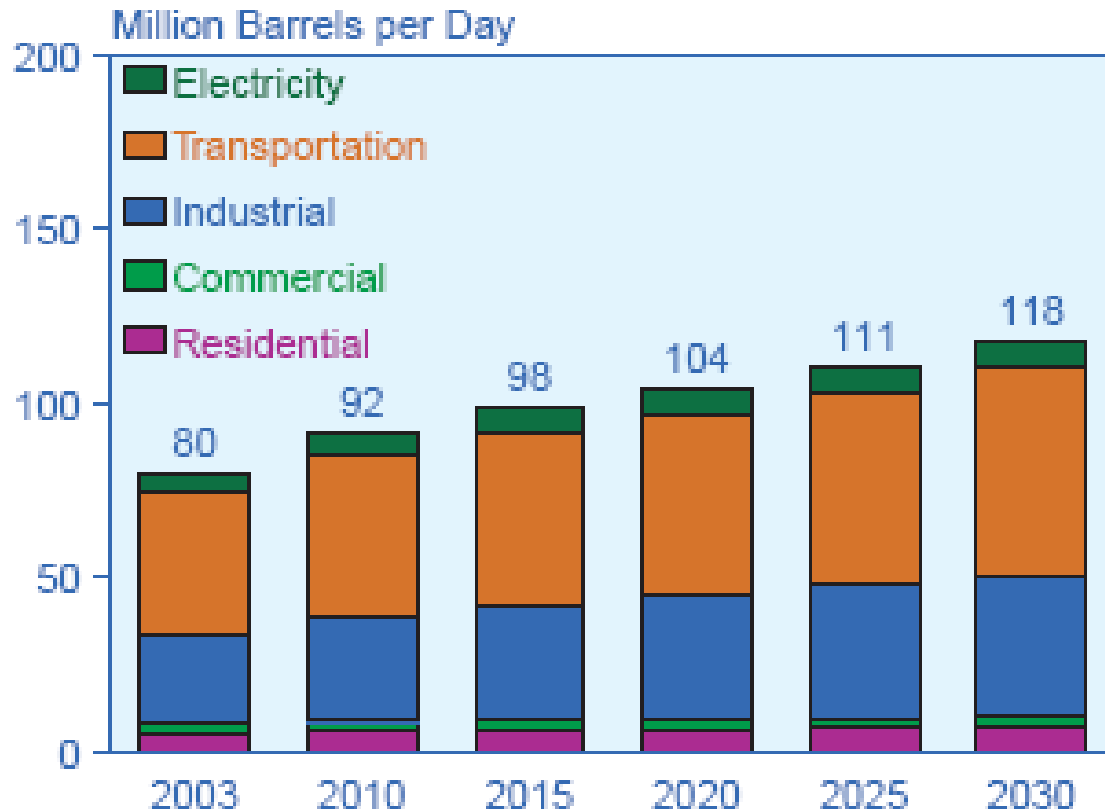
World Ethanol Imports, 2006



■ U.S. ■ EU ■ India ■ Japan ■ South Korea ■ Rest of World

Projected World Oil Consumption

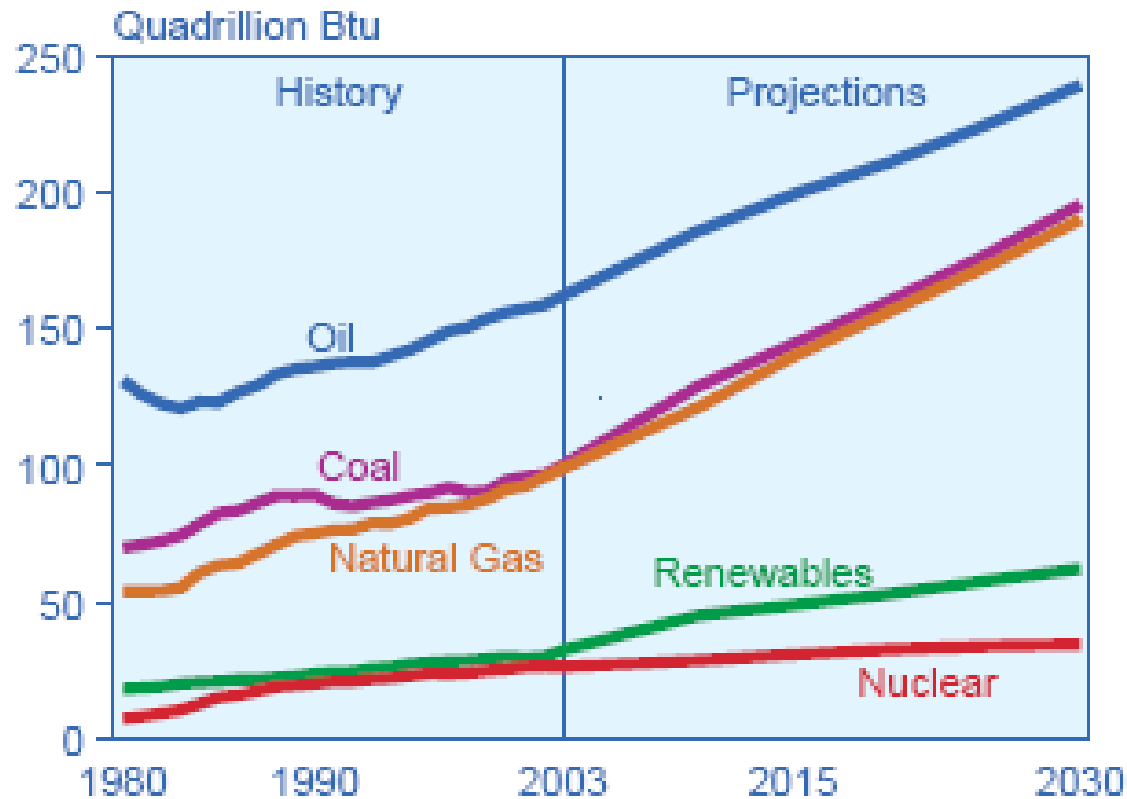
Figure 26. World Oil Consumption by Sector, 2003-2030



Sources: 2003: Derived from Energy Information Administration (EIA), *International Energy Annual 2003* (May-July 2005), web site www.eia.doe.gov/ieal. Projections: EIA, *System for the Analysis of Global Energy Markets* (2006).

Projected World Energy Sources

Figure 3. World Marketed Energy Use by Energy Type, 1980-2030



Sources: History: Energy Information Administration (EIA), *International Energy Annual 2003* (May-July 2005), web site www.eia.doe.gov/iea/. Projections: EIA, *System for the Analysis of Global Energy Markets* (2006).

Biofuel Feedstocks

- Corn – U.S., China
- Sugarcane – Brazil, Central and South America, Southeast Asia, India
- Soybean Oil – U.S., Brazil
- Rapeseed and Sunflower Oil – Europe
- Palm Oil – Malaysia and Indonesia

Biofuel Programs

- U.S. – Renewable Fuels Standard
- Brazil – Ethanol blend requirement, preferential tax policies
- Argentina – Require use E-5 blend over the next 5 years
- India – 5% ethanol in all gasoline
- EU – 5.75% biofuel (energy content) target by 2010

Biofuel Programs

- Columbia – Mandated use of E-10 in big cities
- Venezuela – Phasing in a national E-10 blending mandate
- Japan – Long term goal of replacing 20% of oil needs with biofuels or gas-to-liquid fuels
- Canada – 45% of gasoline to be E-10 by 2010
- Thailand – Mandating nationwide E-10 in 2007

Biofuel Programs

- China – Mandates E-10 blends in five provinces
- Philippines – Will mandate E-5 and 2% biodiesel in 2007

Trade Barriers

- U.S. tariff of 2.5% plus 54 cents per gallon
- Brazil and Argentina – 20% tariff
- European Union – 87 cents per gallon tariff
- Canada – 19 cents per gallon tariff
- Thailand – 30% tariff
- India – 186% tariff

U.S. Energy Department Projections

- U.S. liquid fuel demand will grow by 1% a year through 2030
- U.S. ethanol production will average a 5.2% growth rate
- But U.S. ethanol imports will average a 8.4% growth rate
- The U.S. will remain a net importer of ethanol

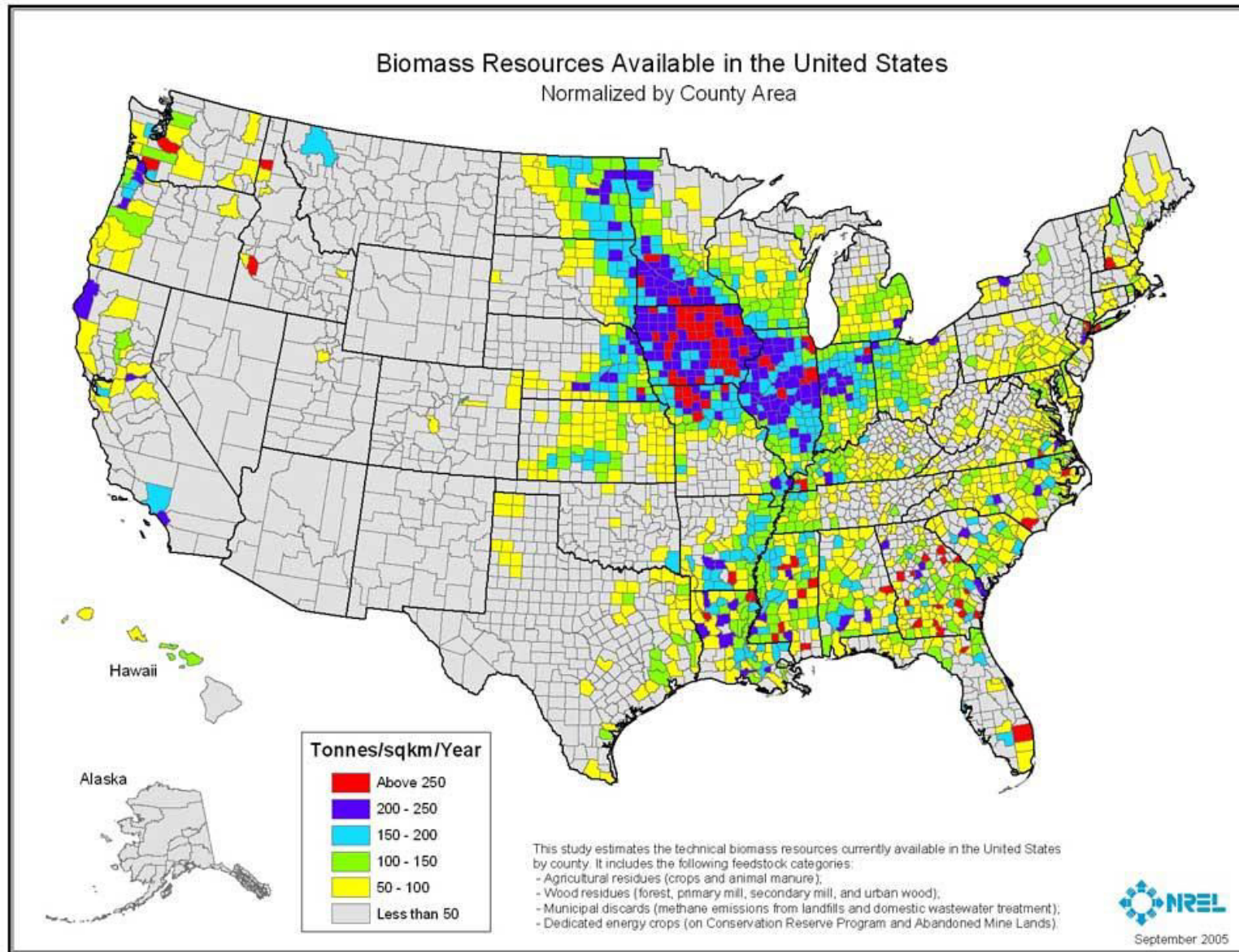
U.S. Energy Department Projections

- World petroleum demand will grow by 1.3% per year
- China's petroleum needs increase 3.2% per year
- India's oil requirements go up 2.3% per year

Given Energy Demand Projections...

- The U.S., China, India, the EU, Japan, and South Korea are all expected to be importers of ethanol over the next decade
- Brazil will be the major exporter of ethanol
 - Already exports roughly 25% of production, over 1 billion gallons

U.S. Biomass



Cellulosic Ethanol ...

- Ethanol derived from any lignocellulosic or hemicellulosic matter that is available on a renewable basis
- Sources: trees, wood and crop residues, grasses, fibers, energy crops, and other non-petroleum wastes
- Federal legislative support via the Biomass Research and Development Act of 2000, extended by the 2002 Farm Bill and the Energy Policy Act of 2005

U.S. Production Incentives

- Goal: 1 billion gallons of cellulosic biofuel per year and biofuel price-competitiveness by 2015
- Per gallon production incentive set by the Sec. of Energy until
 - 2008 or
 - 100 million gallons per year of cellulosic biofuel
- Then a reverse auction sets the incentive until
 - 2015 or
 - 1 billion gallons per year of cellulosic biofuel

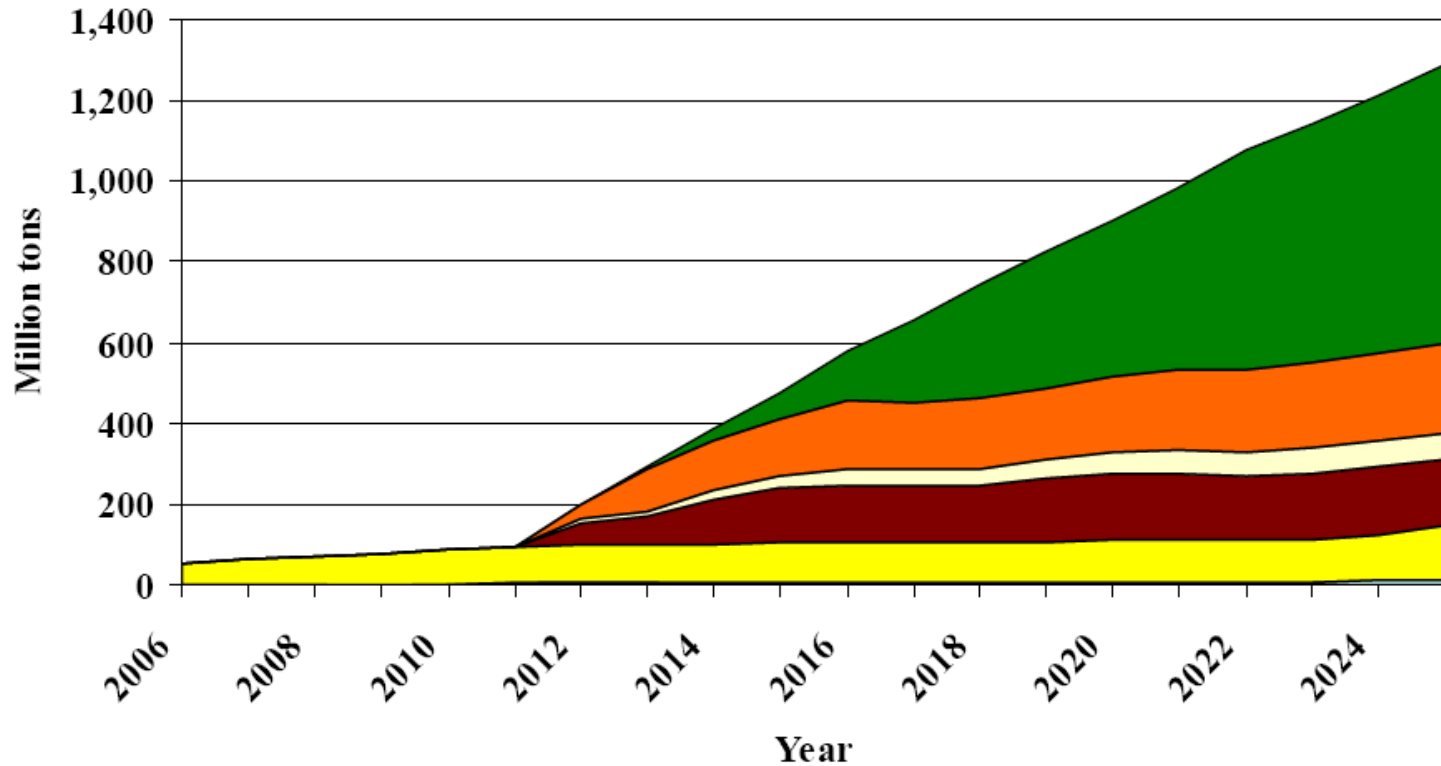
Production Incentives (cont.)

- Bidders submit desired incentive and estimated production
- Incentive paid on actual production
- Funding for auction set at \$250 million

Other Features of the Energy Act

- Preprocessing and harvesting grants for cellulosic biomass
- Minimum target of 250 million gallons of renewable fuel from cellulosic biomass by 2013
- Production credit: 1 gallon of cellulosic biomass ethanol = 2.5 gallons of renewable fuel (until 2013)
- Additional loan guarantees and grants

Potential Outlook for U.S. Biomass



□ Soybeans

■ Corn Grain

■ Wood Residue

■ Straw

■ Stover

■ Ded. Energy Crops

Source: U. of Tennessee, "25% Renewable Energy for the U.S. by 2025", Report, November 2006