

# Bioenergy and Climate Change: U.S. View

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**Global Bioenergy Partnership (GBEP): Promoting  
Bioenergy Towards Sustainable Development And  
Climate Change Mitigation**

**UNFCCC COP 13 Side Event**  
**Bali, Indonesia**  
**December 12, 2007**

# Outline

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- **U.S. Biofuel Policy**
- **Work in GBEP on GHG Methodologies**



# Why Bioenergy?

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## Multiple Benefits

- **Energy Security**
- **Economic Development**
  - Diversify and expand domestic agriculture portfolio while decreasing dependence on export markets
- **Environmental Sustainability**
  - Renewable source of power, fuels, and chemical feedstocks, displacing fossil fuels
  - Enhanced air quality
  - Greenhouse gas mitigation



# What's a Gigaton of CO<sub>2</sub>e?

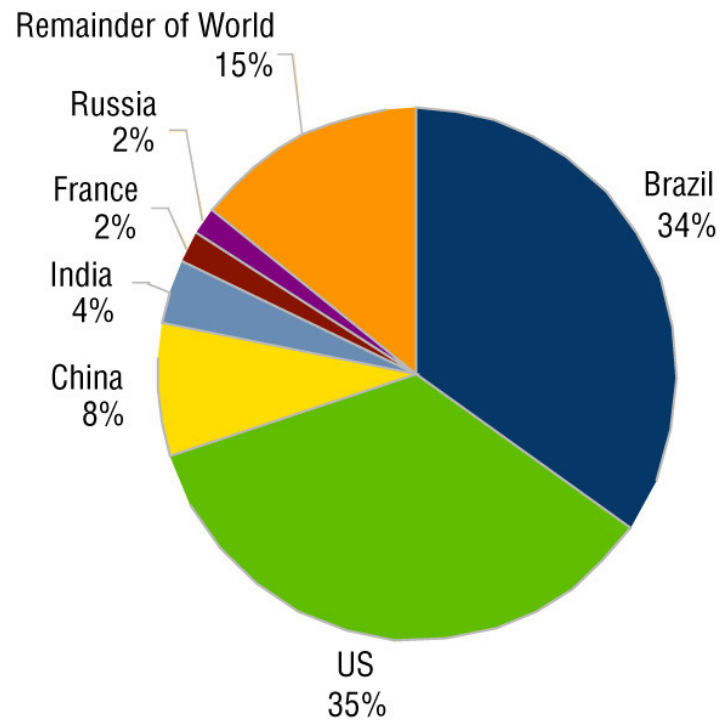
Technology	Actions that Provide One Gigaton CO <sub>2</sub> / Year of Mitigation or Offsets
Coal-Fired Power Plants	Build 273 “zero-emission” 500 MW coal-fired power plants* - <i>Equivalent to about 7% of current global installed coal-fired generating capacity of 2 million MW.</i>
Geologic Sequestration	Install 1,000 sequestration sites like Norway’s Sleipner project (1 MtCO <sub>2</sub> /year) - <i>Only 3 sequestration projects of this scale exist today.</i>
Nuclear	136 nuclear power plants of 1 GW instead of new coal-fired power plants without CCS - <i>about 1/3 of existing worldwide capacity.</i>
Efficiency	Deploy 273 million new cars at 40 miles per gallon (mpg) instead of 20 mpg (or at 14 km/L instead of 7 km/L).
Wind Energy	Install capacity for about 4 times the current global wind generation capacity of 74 GW instead of new coal-fired power plants without CCS.
Solar Photovoltaics	Install capacity to produce 273 times the current global solar PV generation instead of new coal-fired power plants without CCS.
Biofuels	Convert a barren area of about 4800,000 km <sup>2</sup> - About 2 times the size of the United Kingdom.
CO <sub>2</sub> Storage in New Forest	Convert a barren area of about 900,000 km <sup>2</sup> - Greater than the size of Germany and France combined.

Giga-Tonnes = 10<sup>9</sup> Metric-Tonnes (1000 Kilograms)

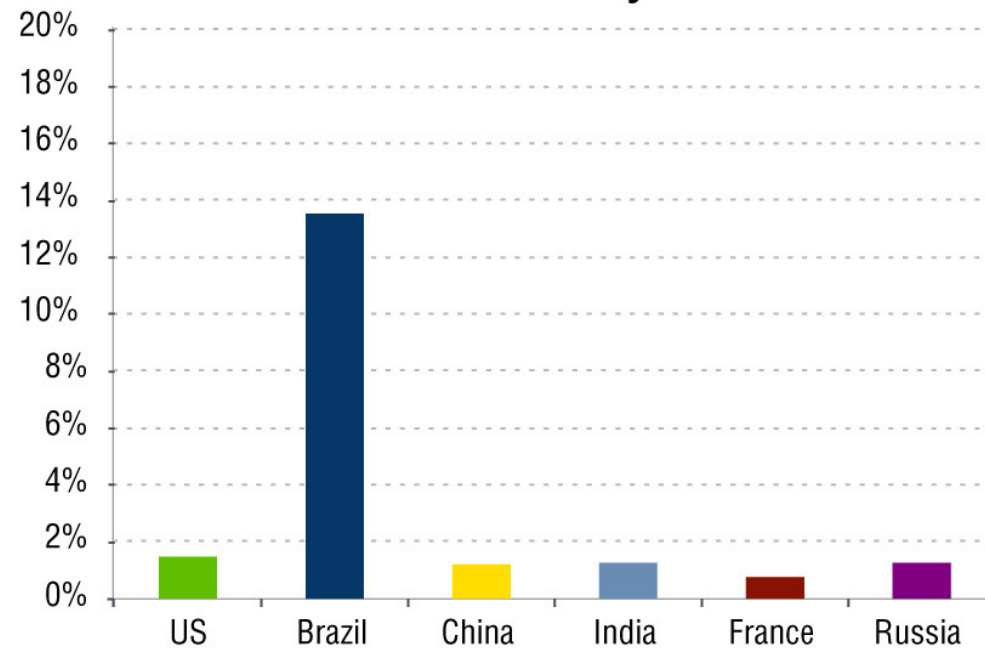
# World Supply Bio-Based Ethanol as a Transportation Fuel



## World Supply of Ethanol



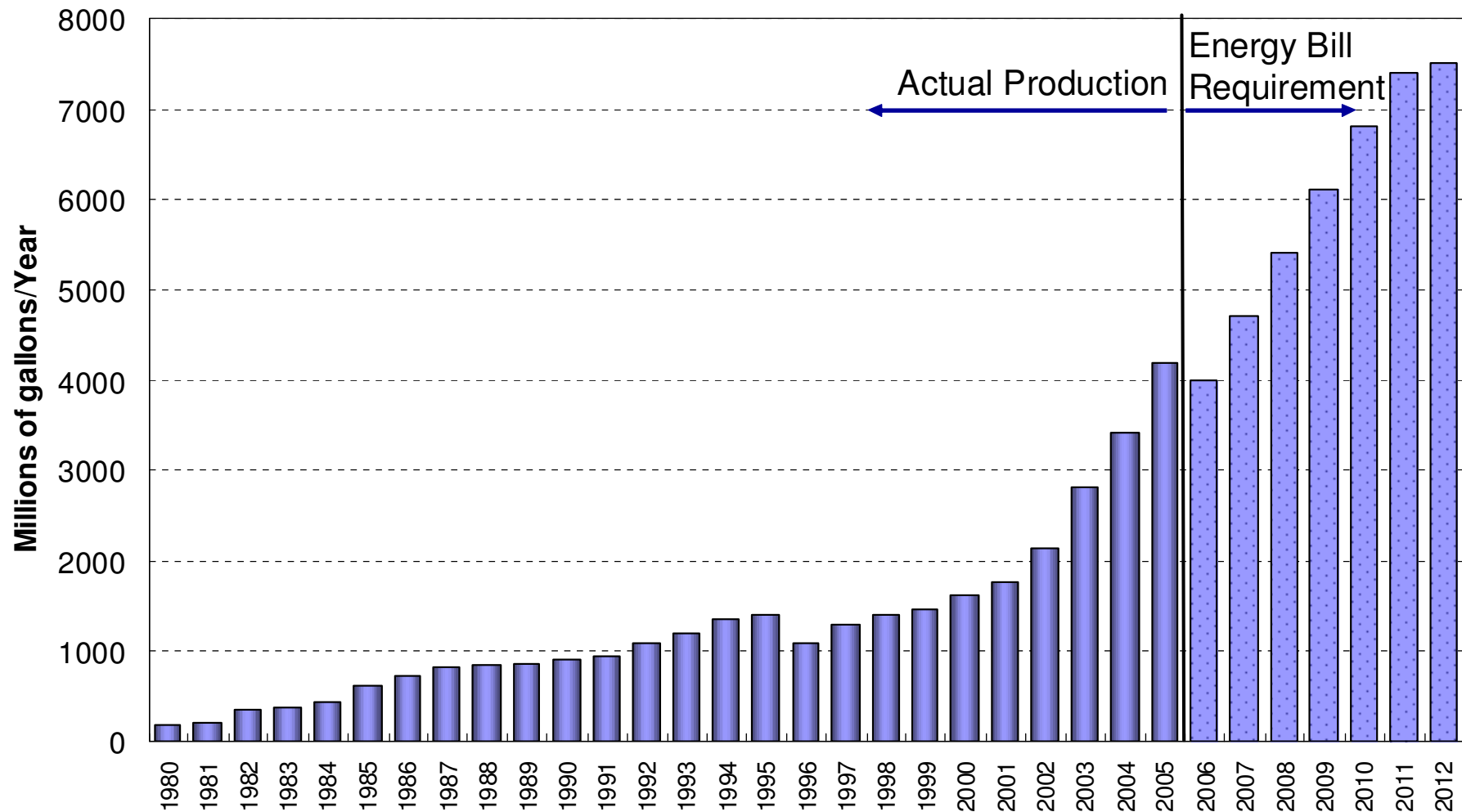
## Percent of Transportation Fuel Demand Met by Ethanol



Source: EIA 2003 and Renewable Fuels Association, 2005

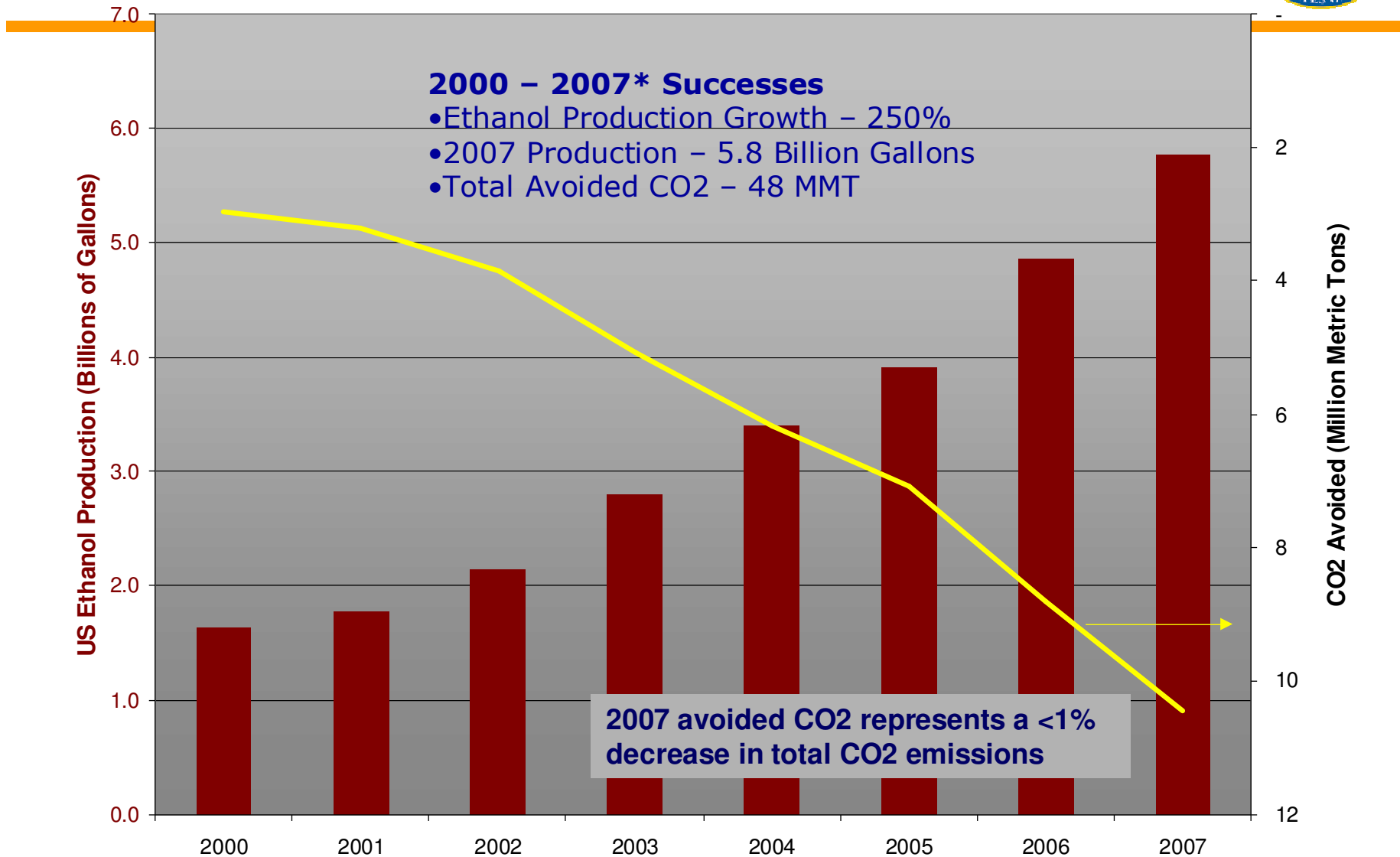


# U.S. Ethanol Production



Source: Renewable Fuels Association

# U.S. Ethanol Production and Avoided CO2



\*All 2007 numbers are projections.

Sources: EIA and Renewable Fuels Assoc.

# “Twenty in Ten”

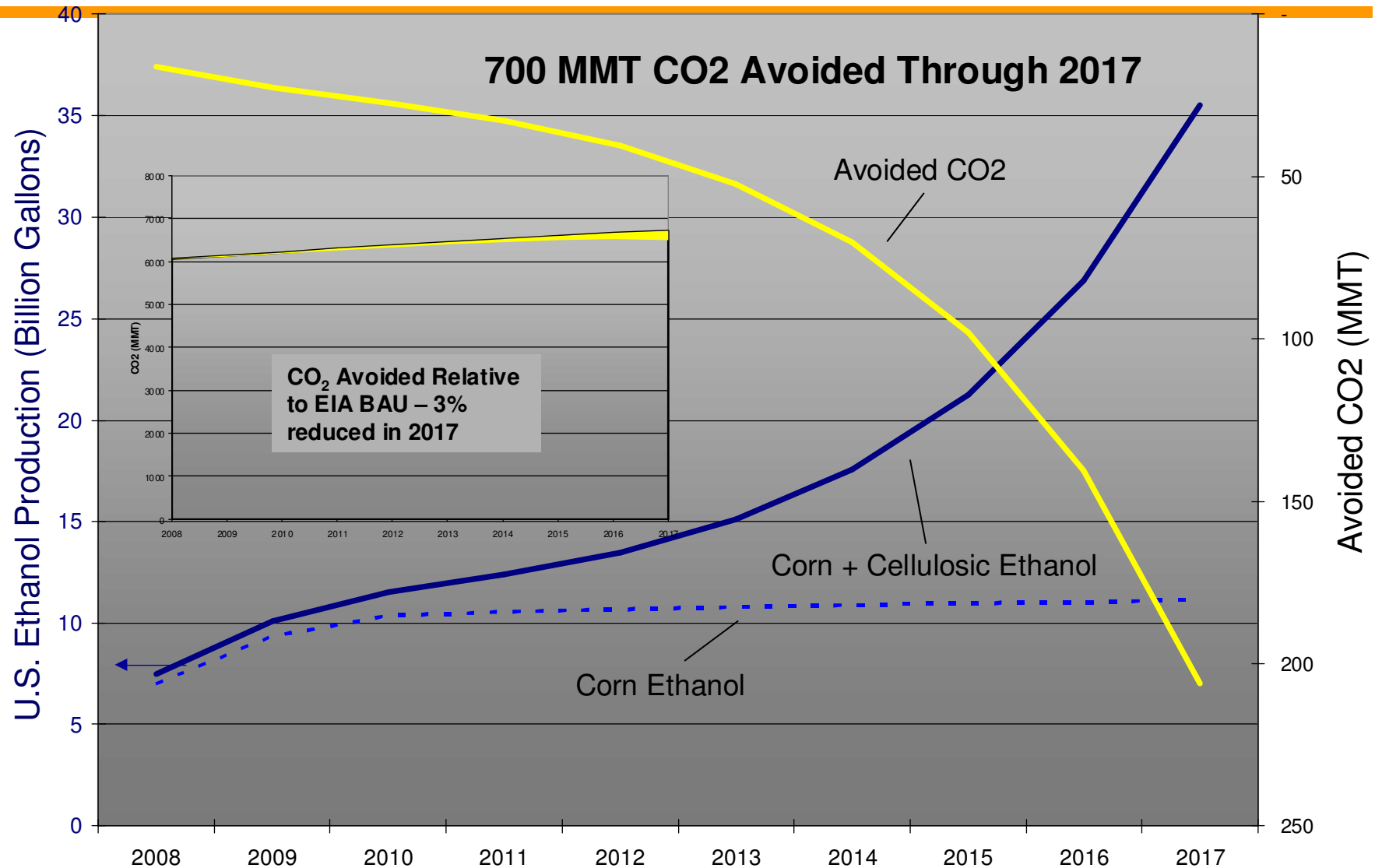


- In the President’s 2007 State of the Union Address, he announced the “Twenty in Ten” plan to reduce U.S. gasoline usage by 20 percent in 10 years.
- America will reach President’s goal in 2017 by:
  - ❖ increasing the required renewable and alternative fuel content of gasoline; and
  - ❖ reforming CAFE fuel economy standards for cars and extending the current rule for light trucks.
- The plan will help:
  - ❖ increase the Nation’s energy security; and
  - ❖ address climate change concerns by significantly reducing and potentially stopping the growth in GHG emissions from cars & light trucks, potentially avoiding up to 170MMTCO<sub>2</sub>e in 2017.
- Legislation sent to Congress.
- In response to Supreme Court ruling, President issue E.O. directing cabinet agencies to implement initiative through regulation.

*It's in our vital interest to diversify America's energy supply—the way forward is through technology. We must continue changing the way America generates electric power, by even greater use of clean coal technology, solar and wind energy, and clean, safe nuclear power. We need to press on with battery research for plug-in and hybrid vehicles, and expand the use of clean diesel vehicles and biodiesel fuel. We must continue investing in new methods of producing ethanol, using everything from wood chips to grasses, to agricultural wastes.*

**President George W. Bush  
2007 State of the Union  
Address**

# 20-in-10 Ethanol Ramp and CO2 Impact



Sources: CO2 BAU – EIA; Corn Ethanol Production – EIA; Cellulosic Ethanol Production and CO2 Avoided – USDOE - EERE



# Biofuels Initiative

- **Goal: To make production of cellulosic ethanol from corn and other organic materials available as a competitive energy alternative by 2012.**
- **FY 2008 request: \$179MM**
- **February 2007: DOE announces up to \$385MM for 6 biorefinery projects expected to produce more than 130 million gallons of cellulosic ethanol per year.**
- **May 2007: DOE announces up to \$200MM for small-scale cellulosic biorefineries.**
- **June 2007: DOE announces \$375 million for three new Bioenergy Research Centers to accelerate basic research in the development of cellulosic ethanol and other biofuels**



Next generation biorefineries will be fully integrated facilities that can process grain or biomass crops into a full range of commodity and consumer products.

# Harmonizing GHG Methodologies



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- USG hosted first GBEP taskforce meeting October 2007
  - Participants from Canada, France, Germany, Italy, Japan, UK, US, UNEP, UNF, ICCT, UCB, and ISU.
  - Group decided it was possible to develop a checklist of common elements to be included in a GHG methodology.

# Main Components of a Checklist



1. GHGs to be included in checklist
2. Direct land-use change
  - Above-ground biomass
  - Soil carbon
3. Production Cycle
  - Farm/forest to gate
  - Farm/forest gate to tank
4. Wells to Wheels
5. Comparison to Petroleum Fuel Replaces

# Key Issues Still Needing Resolution



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- Methodology Issues
    - Energy balance (co-products included?)
    - How to allocate emissions from co-products
    - Transparency about default values/models
  - Externalities
    - Inclusion of criteria pollutants?
    - Indirect land-use change included?
    - N<sub>2</sub>O fixing?
  - Future Considerations
    - How is cellulosic accounted for?