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# Office of the Biomass Program



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# Outline of Information



- **Program Objectives**
- **Industry Landscape**
- **Existing Biofuels Projects**

# Program Overview



## • Mission Statement

- Develop and transform our renewable and abundant biomass resources into cost competitive, high performance biofuels, bioproducts, and biopower. This will be achieved through targeted research, development, and demonstrations leading to deployment in integrated biorefineries, supported through public and private partnerships.

## • Program's Goals

- **Short Term:** Foster breakthrough technologies needed to make cellulosic ethanol cost competitive by 2012 (cost target: \$1.33/gal).
- **Mid Term:** Help create an environment conducive to maximizing the sustainable production of biofuels by 2017, including cost-effective technology, sufficient infrastructure, appropriate policies, and supportive consumers (cost target: \$1.20 per gal).
- **Long Term:** Increase the supply of renewable fuels to 36 billion gallons by 2022.

## Program Initiatives



- 2006 State of the Union
  - Advanced Energy Initiative
    - “make cellulosic ethanol cost competitive” by 2012.
- 2007 State of the Union & Congress
  - “Twenty in Ten” Initiative & 25% in 25

### Statutory Guidance:

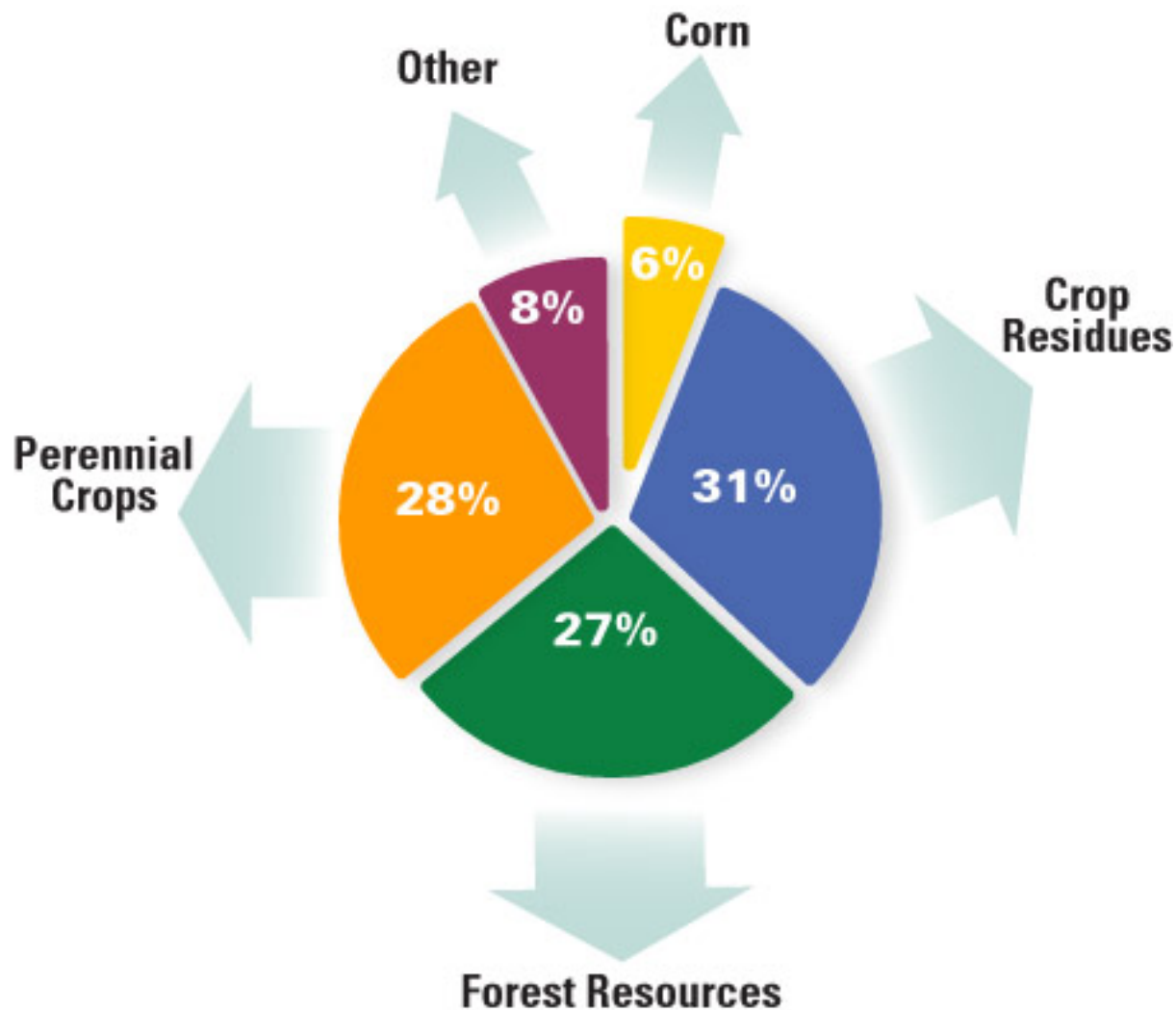
EPAAct 2005 – Section 932 requiring the Secretary to solicit and select commercial scale biorefineries that can be replicated

EISA 2007 – Title II requiring development of advanced fuels and environmentally sound development of biorefineries.  
Codified in EISA 2007 RFS

# Long-Term Potential Sources of Sustainable Biomass to Help Meet Goal of 36 Billion Gallons by 2022



1.3 Billion tons\* of Biomass =  
about 30-35 billion  
gallons of biofuel



\*1 Billion tons = ~8,800 Nimitz Class Aircraft Carriers,  
which are 1/5 mile from bow to stern  
and 3/4 of a football field wide

## 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.

# Agenda



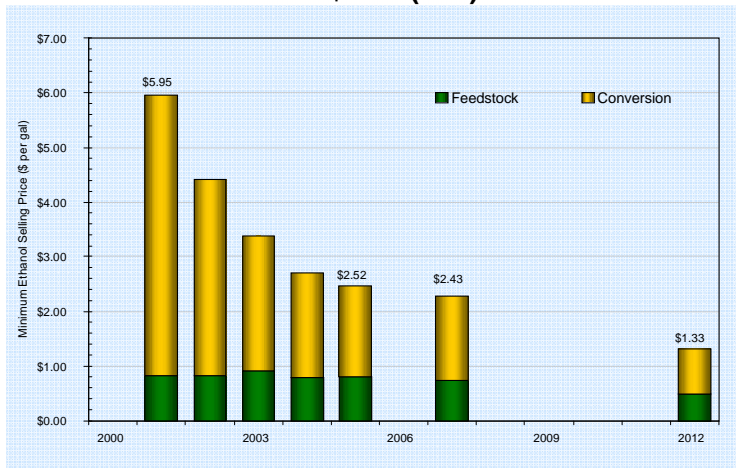
- Program Objectives
- **Industry Landscape**
- Existing Biofuels Projects

# The Industry Landscape: Trends

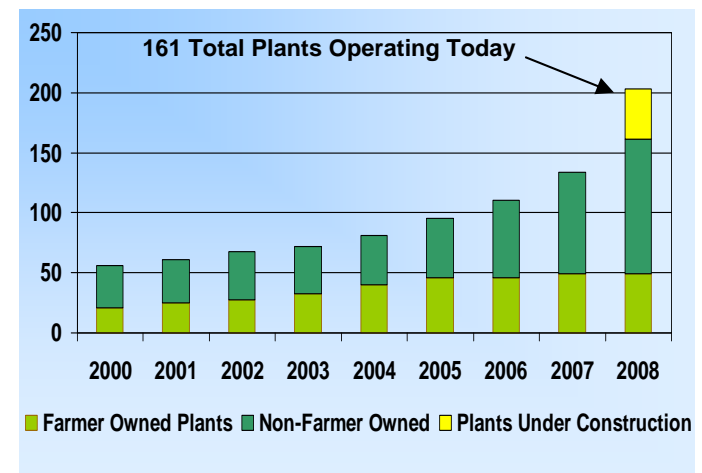


- The growth in the existing ethanol and biofuels industry has been over 50% per year
- Current corn ethanol capacity and including plants under construction will easily meet the EISA corn ethanol cap
- The combination of cellulosic biofuels cost reduction and current demonstration projects are poised to spur investment in advanced biofuels helping to achieve the RFS objectives of EISA

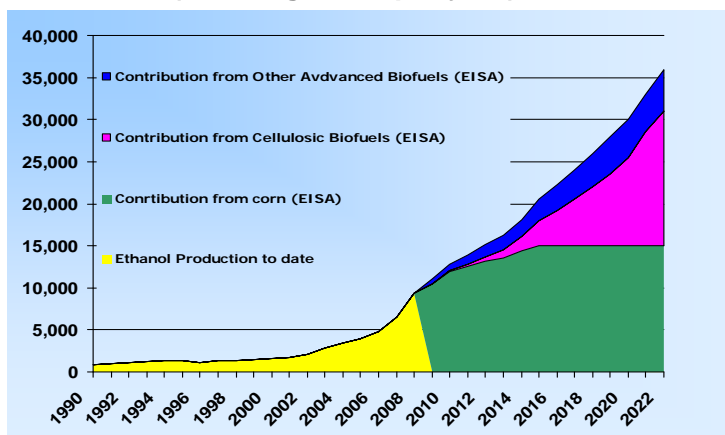
State of Technology (yr \$2007(est.))



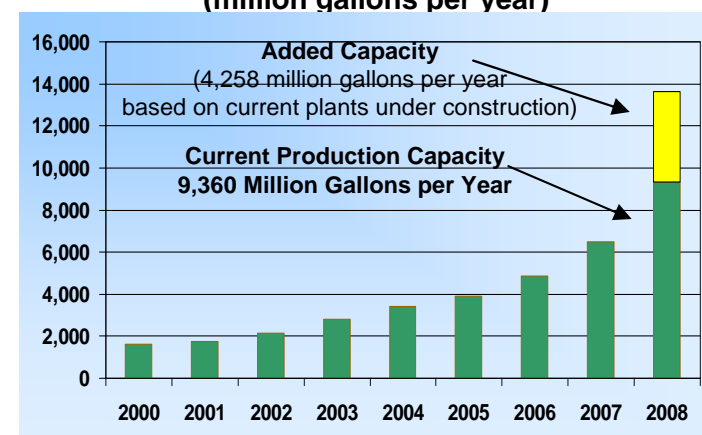
U.S. Ethanol Production Facilities 2000 - 2008



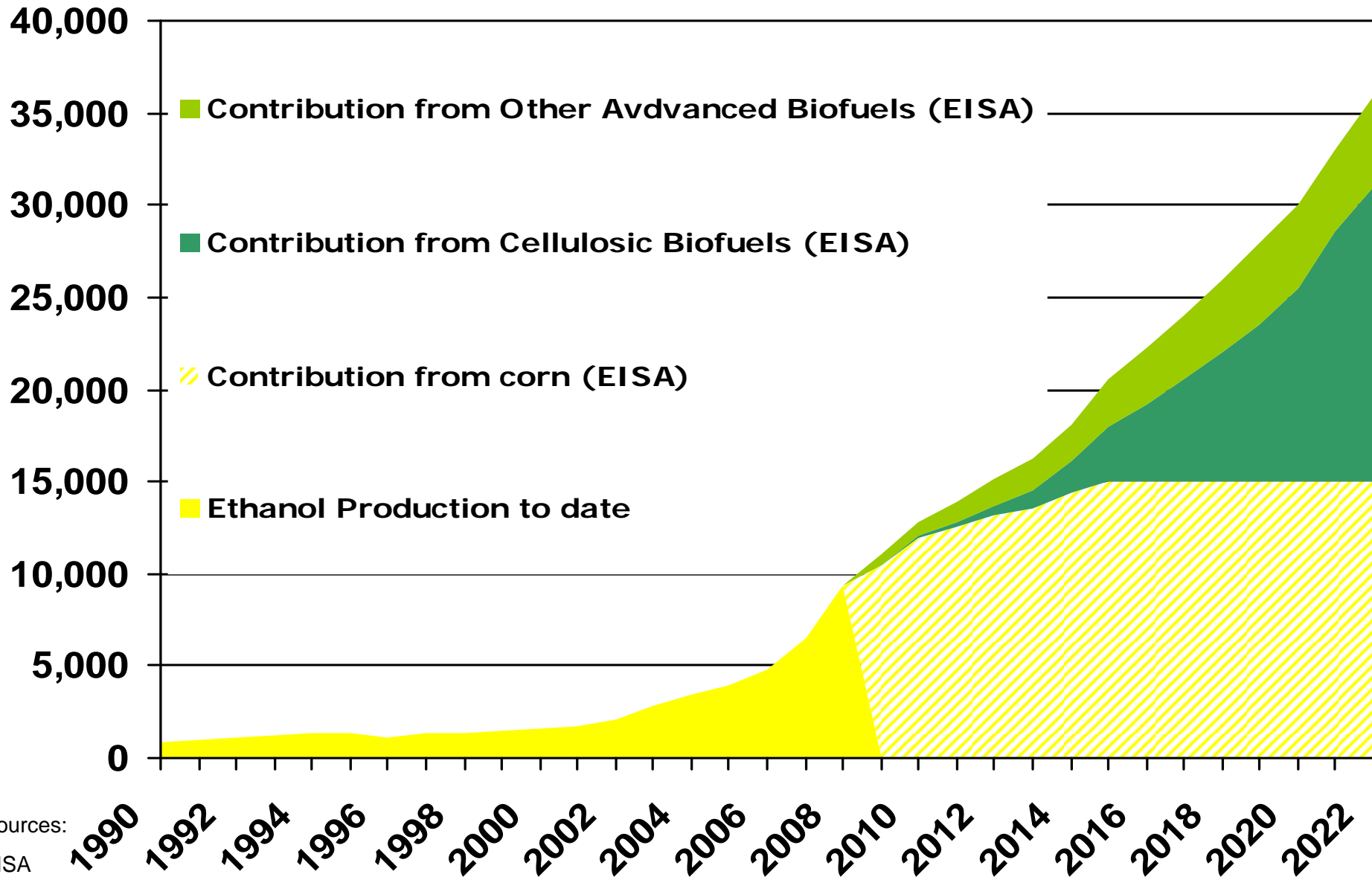
U.S. Biofuels Production and EISA Requirements (million gallons per year)



U.S. Ethanol Production Capacity (million gallons per year)



# U.S. Biofuels Production and EISA Requirements (Million Gallons/Year)



Sources:  
EISA  
Renewable Fuels Association (As of July 14, 2008)

# The Industry Landscape: Trends



## **However:**

- The following recent trends and conditions are threatening both the existing and future biofuels industry
  - Low biofuels prices relative to petroleum
  - High feedstock costs
  - Negative publicity
  - Escalating materials and construction costs
  - Threatened and potentially shifting policies
  - Credit crisis
- Although conditions will eventually improve, it will take commitment to weather the storm

# The Industry Landscape: Investing Road Blocks



## Non - Market

- Negative publicity
- Perpetration of negative myths
- **Lack of hard data to “completely “disprove negatives and prove positives**
- Decision makers prefer a “sound bite” answer rather than an explanation
- Intangible accusations such as
  - **Not sustainable**
    - Negative energy balance
    - Food versus fuel
    - **Resource intensive**

## Technical

- Conversion Operating Cost
- Plant Capital Cost
- Enzyme Development
- Fermentative Organism Development
- Syngas Clean-Up
- Pyrolysis Oil Stabilization
- Energy Crop Development
- Feedstock Harvesting and Collection
- Feedstock Storage

## Policy

- Shifting policies
- RFS under attack
- Possible removal of tariff on imported biofuels
- Lack of a tangible system for GHG and carbon reduction credits
- Long term policy commitment in question

# Agenda



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# Leveraging Partnerships to Achieve Goals



- **Commercial-Scale Biorefineries (up to \$272 million)**
  - Four cost-shared, integrated biorefinery demonstration projects to produce 80 million gallons of cellulosic ethanol in 5 years using variety of conversion technologies and cellulosic feedstocks
- **10%-Scale Biorefinery Validation (up to \$240 million)**
  - Cost-shared, integrated biorefinery demonstrations using cellulosic feedstocks to produce renewable fuels; one-tenth of commercial scale
  - Nine selectees announced for a total investment of \$240 million
- **Ethanologen Solicitation (up to \$23 million)**
  - Five selected research teams working on microorganisms
- **Enzyme Solicitation (up to \$33.8 million)**
  - Four selected research teams working on inexpensive enzyme systems for commercial biomass hydrolysis
- **Thermochemical Solicitation (up to \$16.7 million)**
  - Integration of gasification and catalyst development
  - Pyrolysis oil stabilization
- **Joint DOE-USDA Solicitation (\$18 million)**
  - Biomass R&D Initiative: 20 awards announced March 2008
  - \$5.2 million of \$18 million funded by DOE
- **University Solicitation (\$4.4 million)**
  - Six selections announced today for applied research in enabling R&D including algae



# Major DOE Biofuels Project Locations Geographic, Feedstock, and Technology Diversity



- Nine Small-Scale Biorefinery Projects
- Four Commercial-Scale Biorefinery Projects
- Four Improved Enzyme Projects
- Five Projects for Advanced Organisms
- Five Thermochemical Biofuels Projects
- Three Bioenergy Centers
- DOE Joint Solicitation Biomass Projects

- Regional Partnerships**
- South Dakota State University, Brookings, SD
  - Cornell University, Ithaca, NY
  - University of Tennessee, Knoxville, TN
  - Oklahoma State University, Stillwater, OK
  - Oregon State University, Corvallis, OR