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**THE CURRENT STATUS AND POLICY FRAMEWORK FOR  
INDUSTRIAL BIOMASS IN THE UNITED STATES**

**BY  
Dr. Marvin Duncan  
USDA/OCE/OEPNU**

November 19, 2008



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- **This presentation has five sections**
    - **Background**
    - **Current biofuels production**
    - **Legislative initiatives**
    - **Growing reliance on biofuels and biobased industrial products**
    - **Concluding comments**



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- **Background**

- **Industrial use of biomass increased early in the last century and then declined**

- **The Chemurgic movement in the U.S. fostered the use of biological materials in industrial products**
    - **Biological sciences at the time limited the innovative development of biobased industrial materials**
    - **Emergence of the domestic oil industry and petroleum refining provided more cost effective fossil energy based alternatives**



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- Renewed interest in biobased products**
    - Initially viewed as a means to augment farm product demand**
    - Enhanced environmental sensitivity and growing attention to climate change issues sparked new demand**
    - Advances in biologic sciences supported new product development**
    - Chemical and energy companies sought domestic supply sources to achieve more stable feedstock costs and greater security of supply**



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**– Legislative and administrative support**

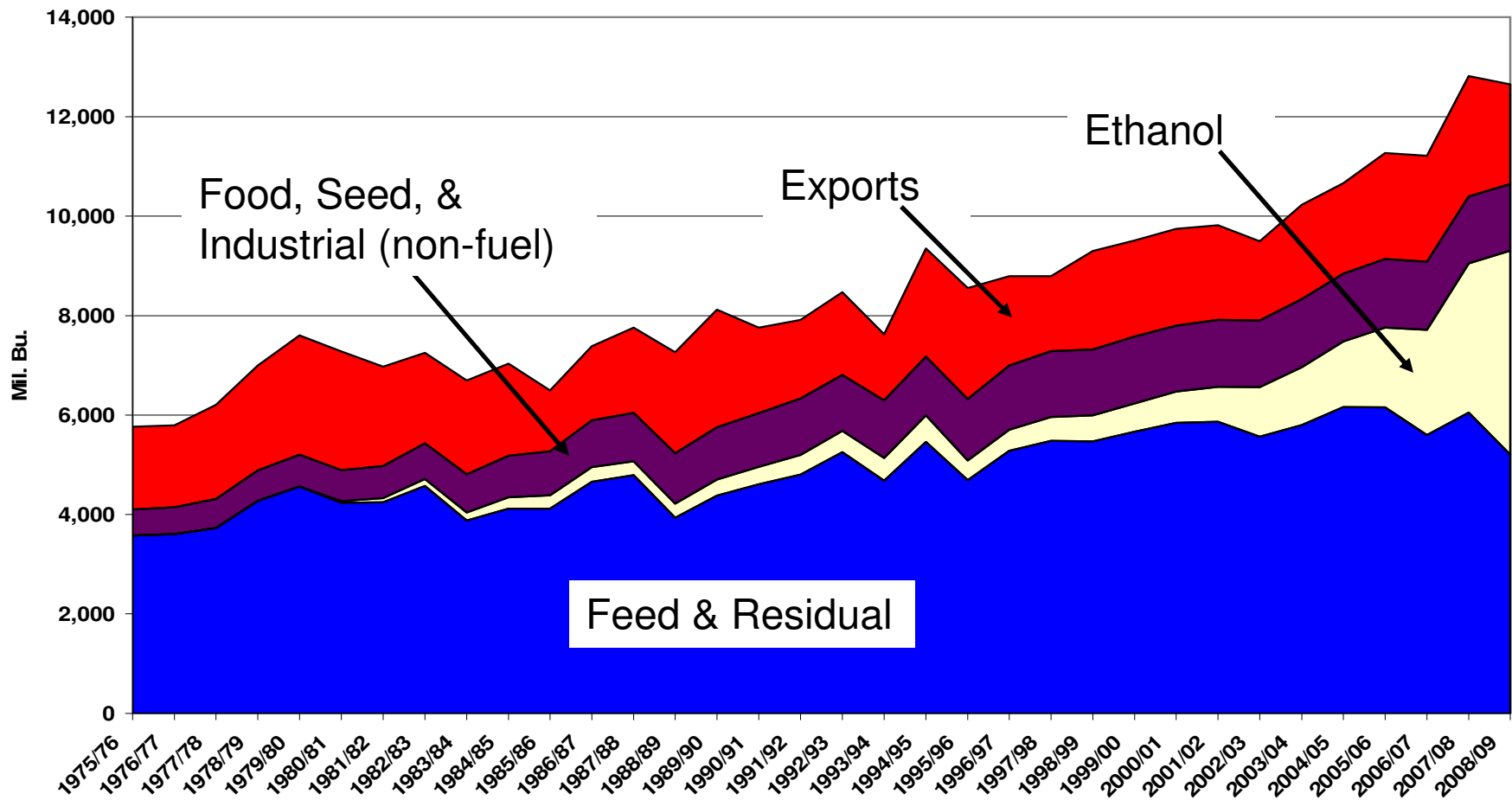
- **Energy Policy Act of 1992 provided incentive payments, tax credits, and alternative fuel fleet requirements**
- **Presidential executive orders (such as E.O. 13423) supporting the use of renewable and biobased resources**
- **The current President's leadership in national energy policy development increased the focus on renewable products**
- **Executive orders under the previous President's administration also supported renewable power and biofuels**



- **Current biofuels production**
  - **Ethanol production capacity**
    - Total annual plant capacity of 13.615 billion gal.
    - 203 plants, including those under construction
    - If corn is exclusive feedstock will require 4.863 billion bushels
  - **Biodiesel production capacity**
    - 228 plants, including those under construction
    - Total annual plant capacity of 3.47 billion gallons
    - If all output were from soybean oil, would require oil output from 2.4 million bushels (however, not all is from soybean oil)
    - Waste grease and processing plant waste are feedstocks
    - Unlikely that production will come close to plant capacity because of unfavorable economics

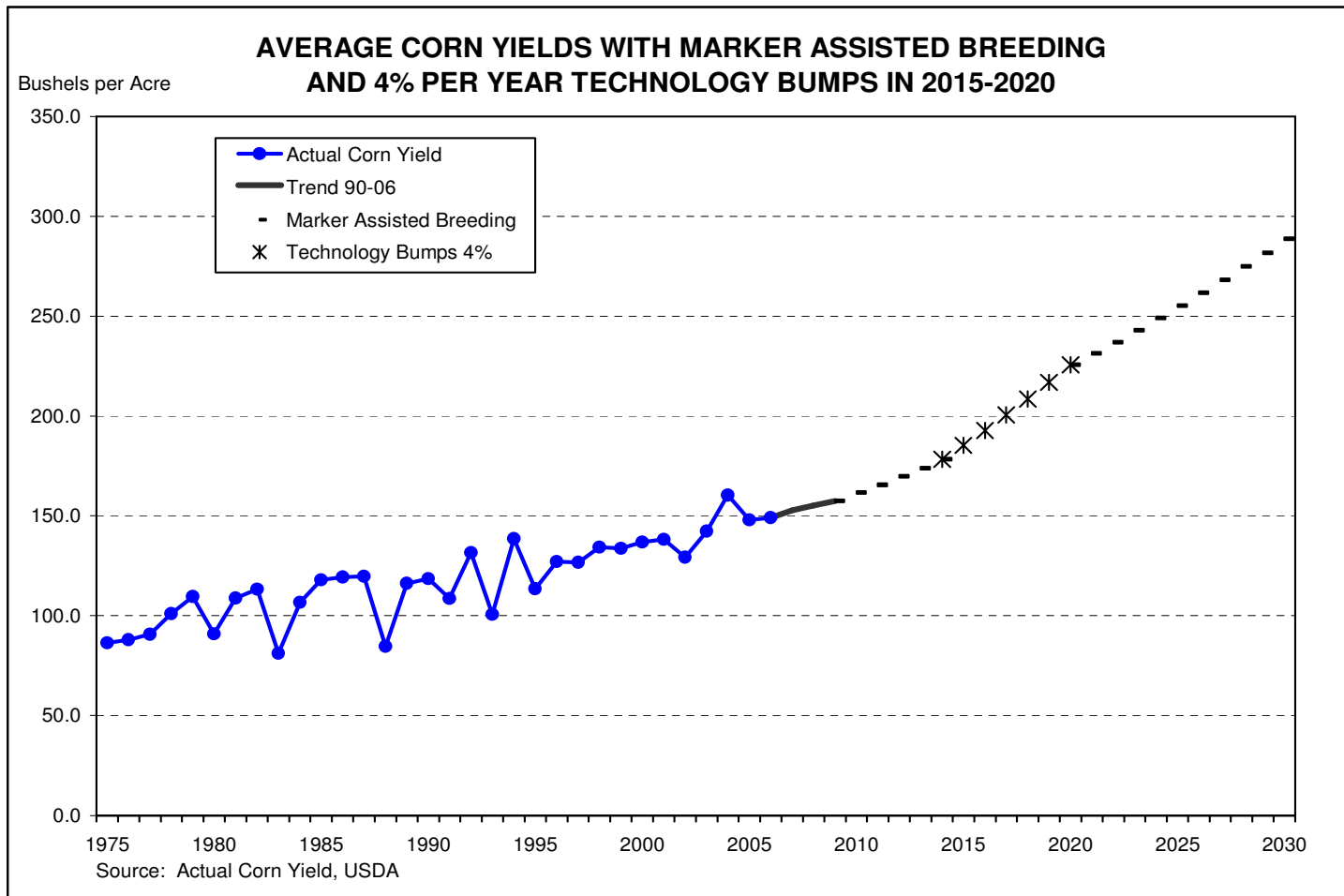


### U. S. Corn Use





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- **Legislative Initiatives**

- **Biomass Research and Development Act of 2000**

- **Created Biomass R&D Board with membership from 11 Federal departments/agencies to coordinate Federal government biofuels and biobased products efforts**
    - **Created technical advisory panel to evaluate and recommend research and development strategies**
    - **Provides competitive grant funding to support development and demonstration projects**
    - **\$35 million per year is authorized, FY 2009-20012**



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- Healthy Forest Restoration Act of 2003**
  - **Aims to reduce dense undergrowth through thinning, making biomass available to customers**
  - **Provides grants and assistance to local communities to remove valueless forest material**
- Ongoing Forest Service Research**
  - **Develops new wood based products**
  - **Develops improved techniques to develop biofuels and biobased products from woody plant material**



**– Energy Policy Act of 2005**

- **Provides support to develop cellulosic biorefinery demonstration projects, six projects were funded to explore different technologies**
- **Provided for a 7.5 billion gallon renewable fuels standard by 2012 with 250 million gallons to be derived from cellulosic biomass**
- **Provided a variety of incentive programs for biofuels including extension of the ethanol tax credit of \$0.51 per gallon of ethanol, \$1.00 per gallon of agri-biodiesel, and \$0.50 per gallon of waste grease biodiesel**
- **Tax credit of \$0.10 per gallon to small agri-biodiesel and ethanol producers**

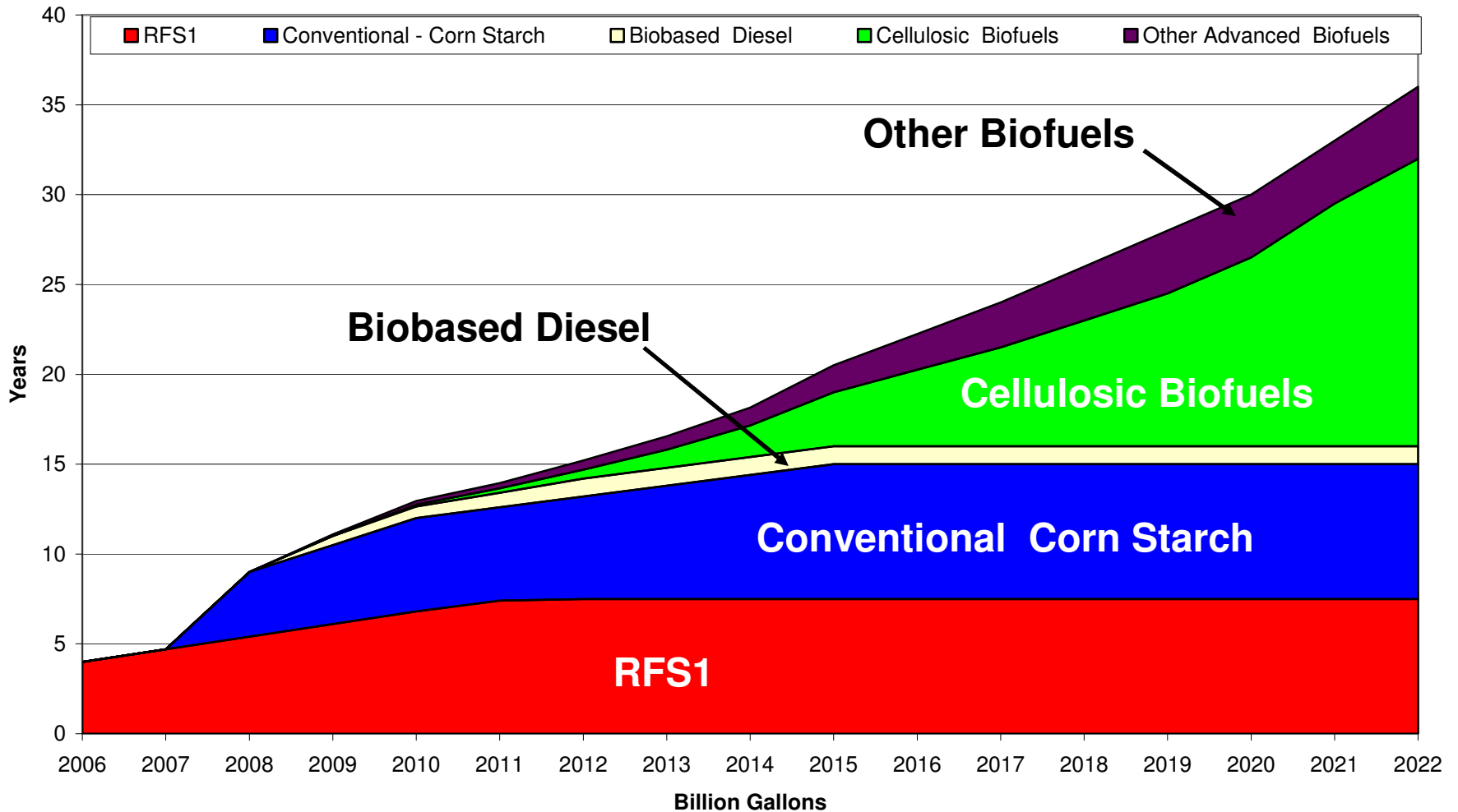


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- Energy Independence and Security Act of 2007**
    - Expansion of Renewable fuel standard to 36 billion gallons**
    - Lifecycle greenhouse gas emission reductions from 2005 baseline transportation fuel emissions**
      - Current ethanol plants grandfathered in**
      - Advanced biofuels must meet 50% reduction**
      - Biomass based diesel must meet 50% reduction**
      - Cellulosic biofuels from biomass must meet 60% reduction**
      - Reductions include direct and indirect green house gas emissions**



# EISA – EPACT Renewable Fuels Standard





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- Sun Grant Initiative**
    - Land grant college focused
    - Breeding programs for biomass grasses
    - Production practices for biomass
    - Research on new plants to be used as feedstocks
  - Cooperative State Research Education and Extension Service**
    - Administers program of competitive grants and Congressional earmark grants to researchers in academe, NGOs, and industry
    - Primary focus is support of basic and applied research



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- **2002 Farm Bill with first ever energy title**
    - Created new grant and loan programs to support renewable and biomass energy research, development, and demonstration
    - Biobased products preferred procurement initiative
    - Biodiesel education program
  
  - **2008 Farm Bill with expanded energy title**
    - Extended and substantially expanded grant and loan programs of the 2002 Farm Bill and added new programs
    - Lowered ethanol tax credit to 45 cents per gallon and created \$1.01 tax credit for cellulosic ethanol
    - U.S. Forest Service authorized to undertake research and development of biomass resources
  
  - **2008 Financial Assistance Package**
    - All biodiesel feedstocks qualify for \$1.00 per gallon tax credit through 2010



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- **Growing reliance on biobased industrial products and biofuels brings:**
    - **Search for new biomass sources and recycling of organic waste materials**
    - **Research to develop more efficient enzymes**
    - **A more stable platform for industrial products**
    - **Increased alternatives for manufacturing biobased chemicals from biomass**
    - **Lighter environmental, health, and green house gas footprint than is usually true for fossil feedstocks**



## U.S. Biobased Products

### Market Potential and Projections Through 2025 Projected Global Markets of Chemical Sectors (Billion U.S. \$)

Chemical Sector	2005		2010		2025	
	Total	Biobased	Total	Biobased	Total	Biobased
Commodity	475	0.9	550	5-11	857	50-86
Specialty	375	5	435	87-110	679	300-340
Fine	100	15	125	25-32	195	88-98
Polymer	250	0.3	290	15-30	452	45-90
<b>Total</b>	<b>1,200</b>	<b>21.2</b>	<b>1,400</b>	<b>132-183</b>	<b>2,183</b>	<b>483-614</b>

The value of pharmaceuticals is excluded in this table

Sources: Bachmann, 2005: Cygnus Business consulting and Research; Informa Economics, et.al.



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- **A new USDA report on biobased products titled:**

***U.S. Biobased Products  
Market Potential and Projections  
Through 2025***

- ***The URL for the report is:***

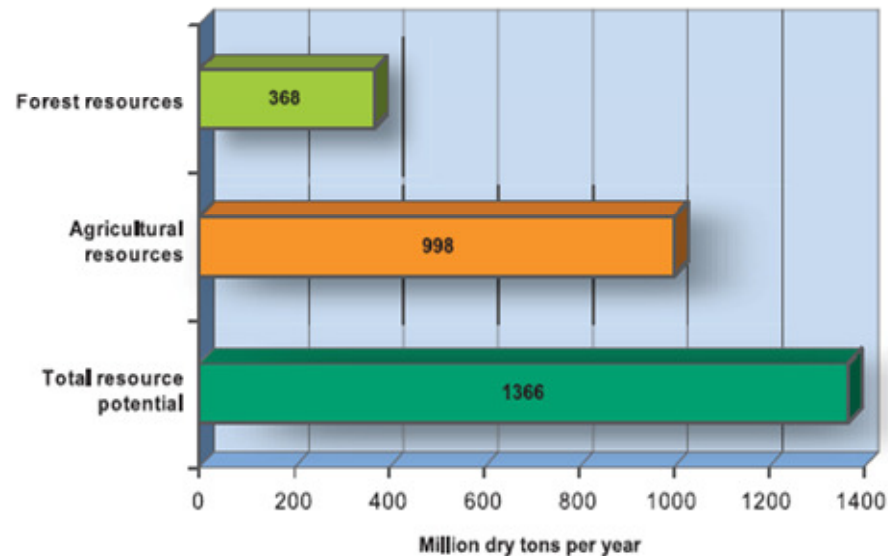
***[www.usda.gov/oce/reports/energy/index.htm](http://www.usda.gov/oce/reports/energy/index.htm)***

***Then click on the report title***



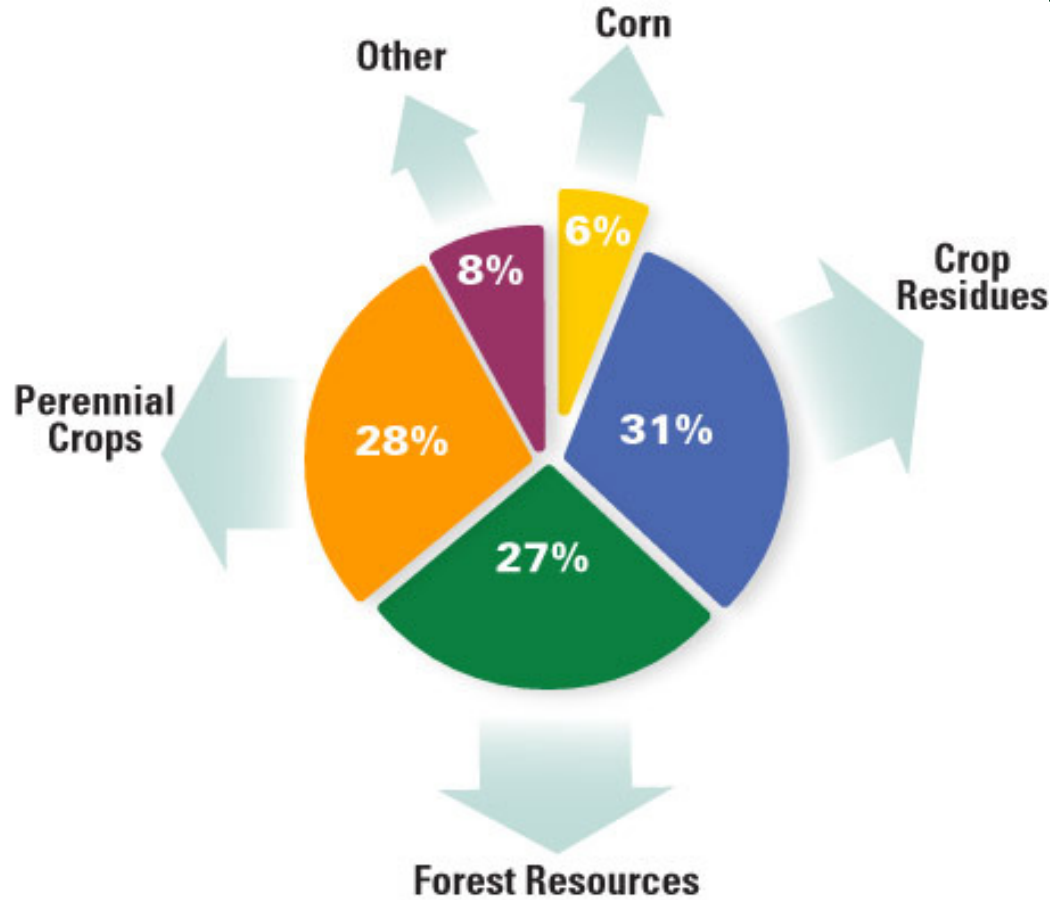
## *Are There Sufficient Biomass Resources to Replace 1/3 of the U.S. Petroleum Requirements?*

- Yes, land resources can provide a sustainable supply of more than 1.3 billion dry tons annually and still continue to meet food, feed, and export demands (USDA baseline)
- Realizing this potential will require R&D, policy change, stakeholder involvement
- Required changes are reasonable given current trends and time for biorefinery scale-up and deployment





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**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.

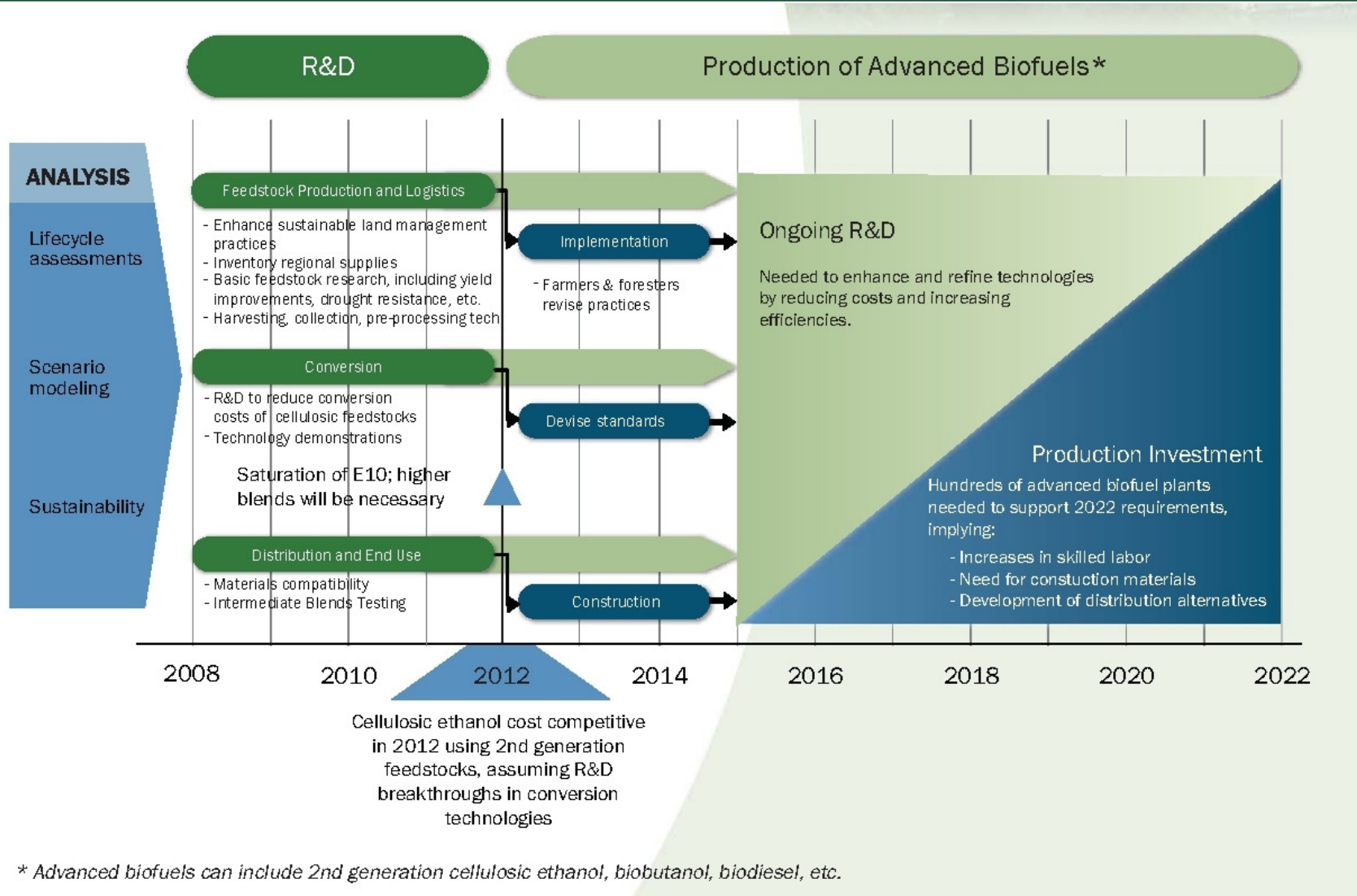


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- **Biomass Research and Development Board's 2008 National Biofuels Action Plan**
    - **Maximize sustainability**
    - **Increase feedstock production**
    - **Improve feedstock logistics**
    - **Work to advance conversion science and technology**
    - **Improve distribution infrastructure**
    - **Improve biofuels blending capability**
    - **Assure environmental and health safety**
  - **The Board's time line for the action plan**



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**– Operational challenges yet to be solved**

- **Limitations on necessary water resources for feed stock production and processing**
- **Logistics issues in collecting and transporting biomass to processing plant and moving products to customers**
- **Appropriate plant scale where radius from which biomass feedstock can be collected is quite small**
- **Development and marketing of co-products to enhance economic feasibility – the biorefinery model**
- **Developing efficient product distribution**
- **Creating conversion efficiency needed to be profitable**
- **Identifying necessary profitability required to bid land resources from other crops**



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- **Conclusion**

- **U.S. is creating broad based policy framework to support biofuels and biobased products**
- **Active research under way to identify best strategies and technologies – but it is too soon to identify just one winning approach**
- **U.S. is attentive to environmental issues and food versus fuel issues**
- **A number of significant issues remain to be solved**
- **Transition to a biobased economy will be measured in decades**
- **Must be recognition of value environmental attributes bring**
- **Eventually the biobased economy must be economically viable without government incentives**