

# U.S. Ethanol Expansion: How the Agricultural Sector Adjusts & Challenges to Future Expansion

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AAEA Annual Meeting  
Orlando, Florida  
July 2008

## Presentation overview

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- Market and policy setting for U.S. ethanol expansion
- Commodity market adjustments
  - Crops
  - Livestock
- 2007 Energy Act
- Challenges to cellulosic-based ethanol expansion

## Market and policy setting for U.S. ethanol expansion

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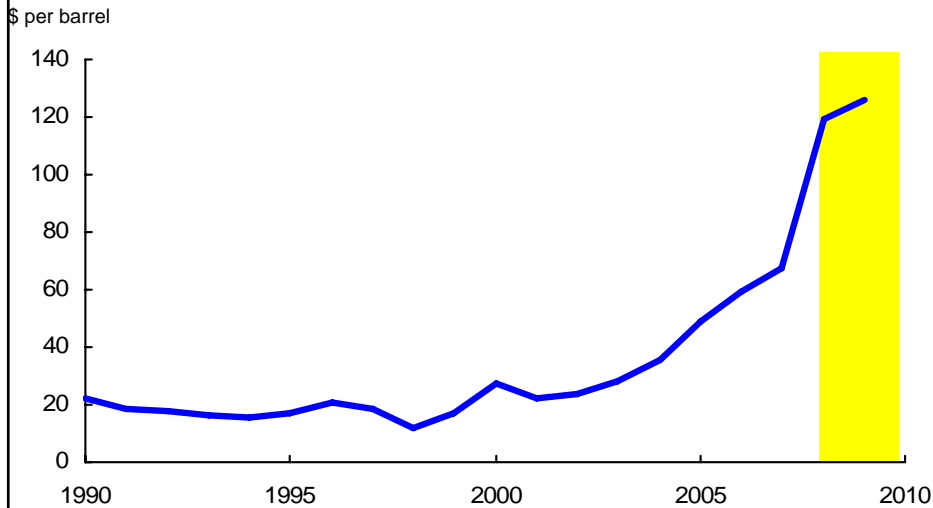
### Market and policy setting

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- Oil prices
- 2005 Energy Policy Act
- 2007 Energy Policy Act

## Crude oil prices, refiners' acquisition cost, imports

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Source: U.S. Department of Energy, Energy Information Administration, July 2008.

## Energy Policy Act of 2005

### Role in ethanol expansion

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- **Mandated Renewable Fuel Program**
  - Established minimum levels of renewable fuels to be used in gasoline
- Contributed to the elimination of the use of MTBE as a gasoline additive, adding to the expansion in ethanol

## U.S. ethanol expansion

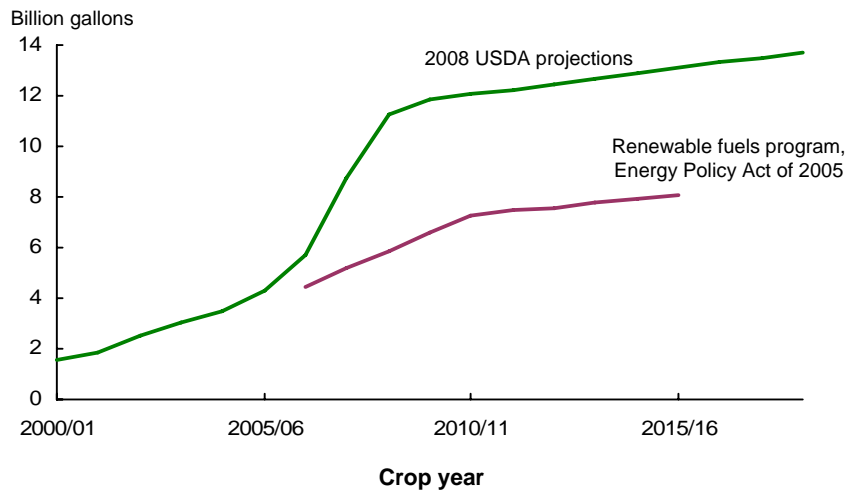
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### Ethanol expansion, implications for corn

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- Corn is currently the most economically viable feedstock in the United States for ethanol production
- Most of the expansion in ethanol production is from corn-based dry mills

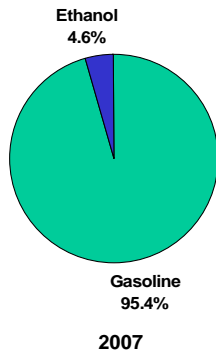
## Corn-based ethanol production projections exceed 2005 renewable fuels program mandate



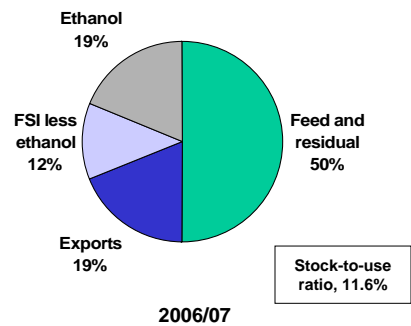
Source: USDA Agricultural Projections to 2017, February 2008.

## Ethanol's role in gasoline and corn markets: Current relationship

**Ethanol is small relative to overall gasoline use**



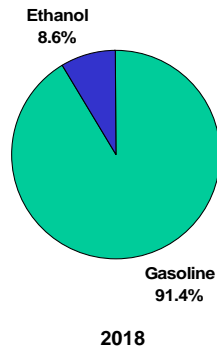
**But ethanol accounts for a large and growing share of corn use**



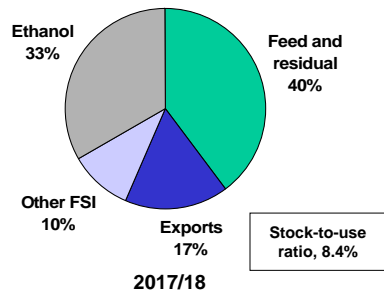
## Ethanol's role in gasoline and corn markets: Projected relationships in 10 years

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### Ethanol still small relative to overall gasoline use



### Ethanol accounts for one-third of corn use



Source: USDA Agricultural Projections to 2017, February 2008.

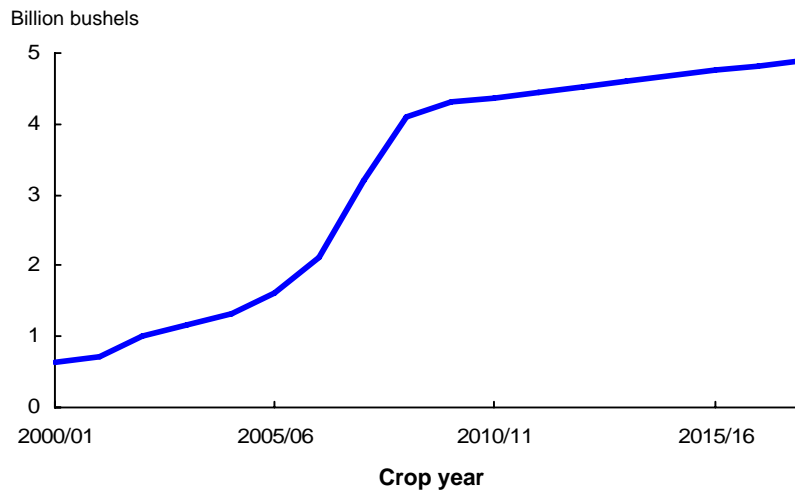
## How does the agricultural sector adjust? Crops

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## Corn used for ethanol production

### Large ongoing expansion

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Source: *USDA Agricultural Projections to 2017*, February 2008.

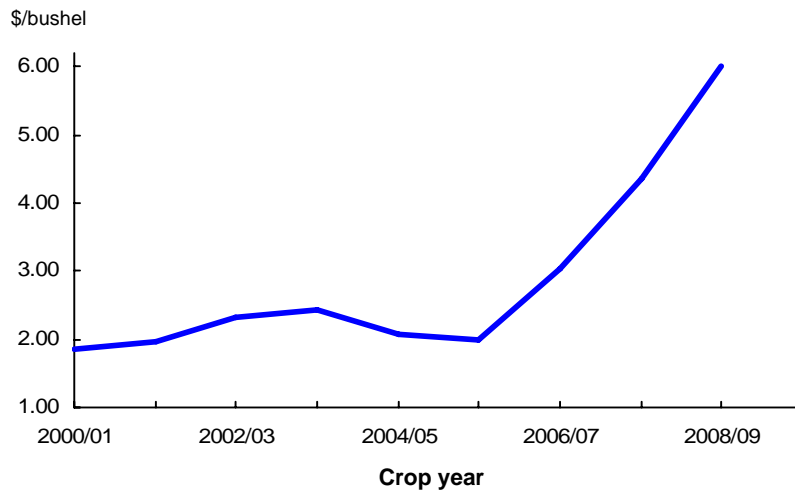
## Crop sector effects of ethanol expansion

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- Corn
  - Higher prices
  - Increased acreage
  - Reduced exports and non-ethanol domestic use
  - Lower stocks
- Soybeans
  - Lower acreage for competing crops, particularly soybeans
  - Reduced exports, domestic use, and stocks
  - Higher prices

## Corn price projections

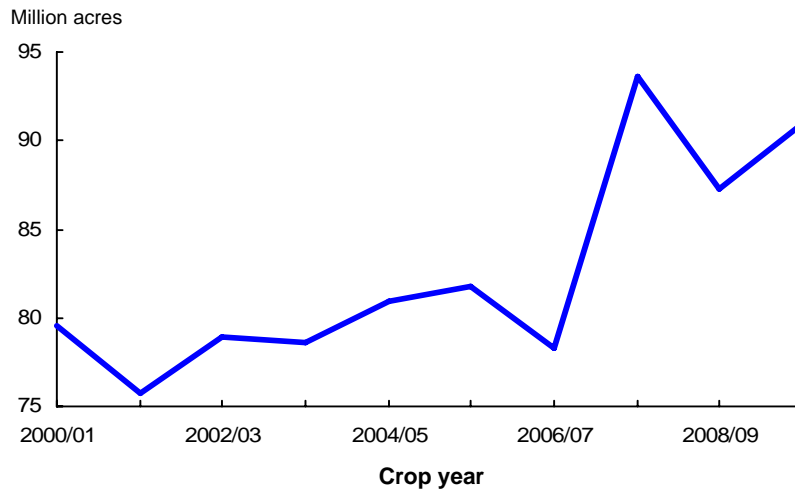
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Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

## Corn acreage projections: Planted area increases in response to higher corn prices

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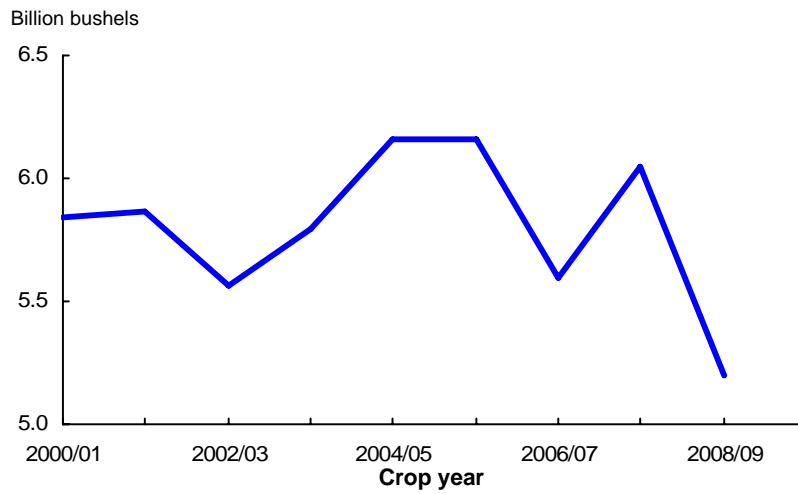


Source: USDA *Acreage* report, June 2008 and *USDA Agricultural Projections to 2017*, February 2008.



## Corn use projections: Feed use\* declines

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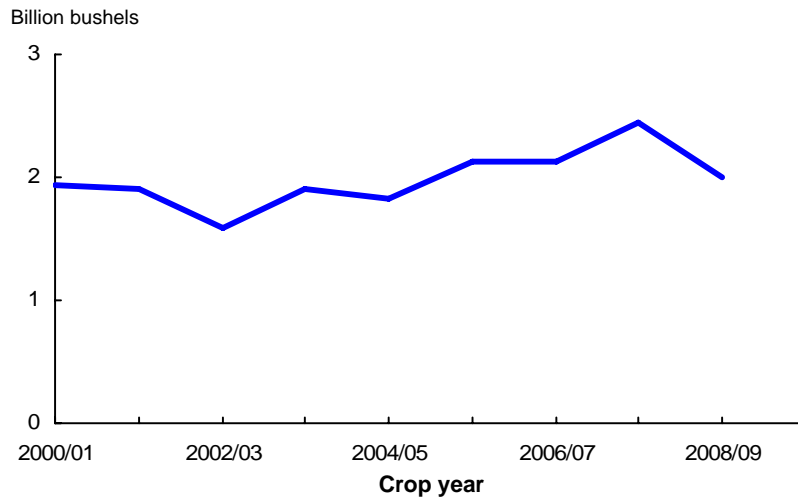


\* Includes statistical "residual"

Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

## Corn export projections: U.S. exports also fall

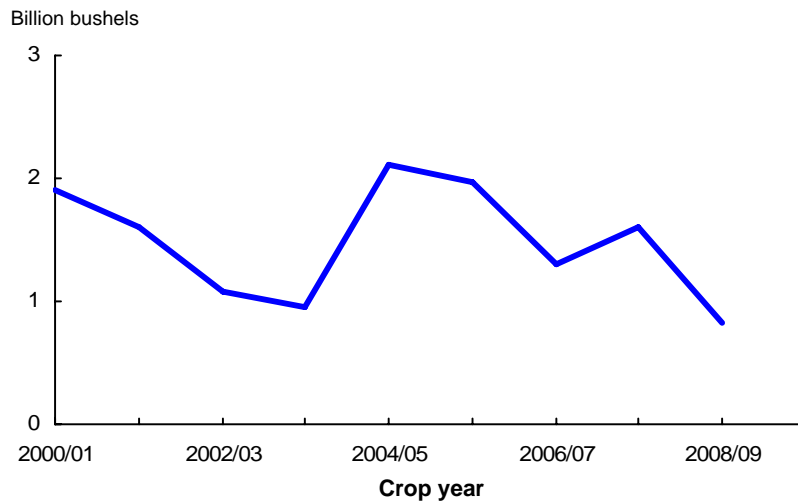
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Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

## Corn stocks projections: Ending stocks drop

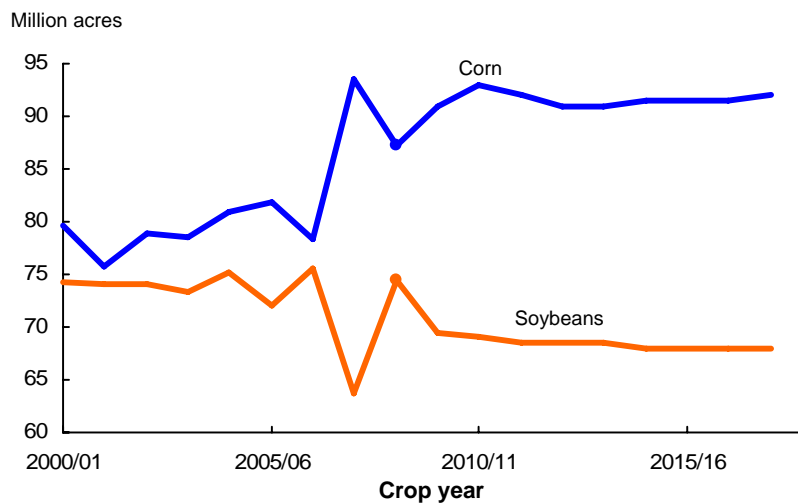
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Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

## Corn and soybean projected plantings: Much of the corn area expansion comes from soybeans

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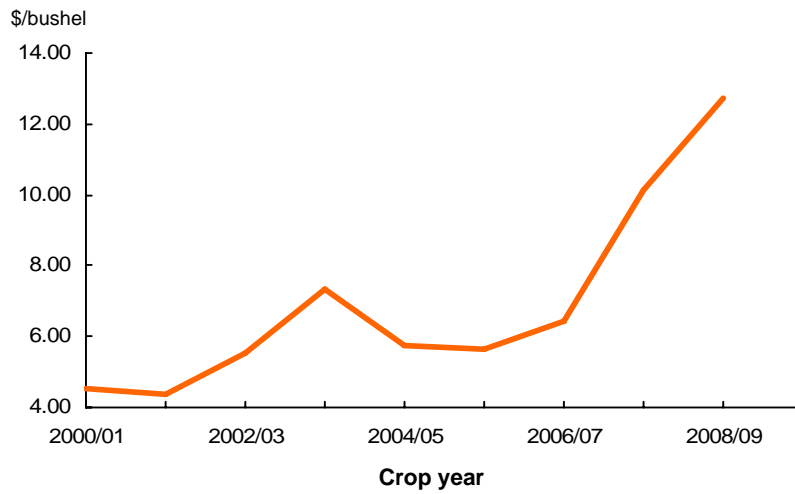


Sources: USDA *Acreage report*, June 2008 and *USDA Agricultural Projections to 2017*, February 2008.

## Soybean price projections:

Prices higher reflecting lower acreage and reduced supplies

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Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

How does the agricultural sector adjust?  
Livestock

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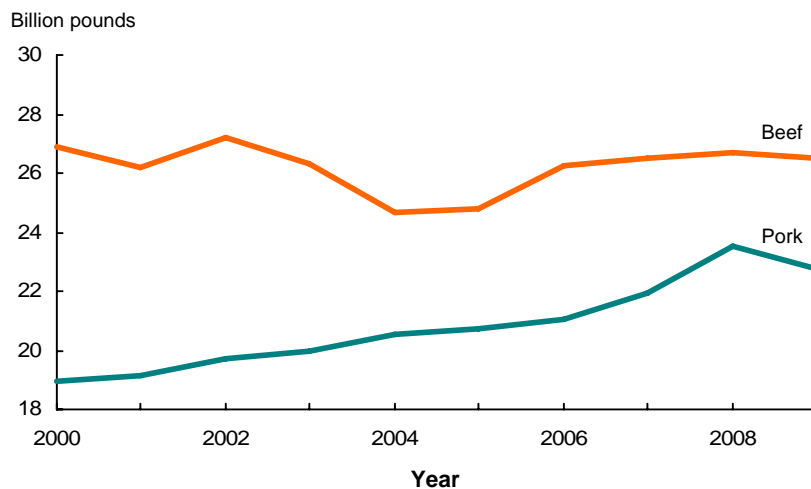
## Livestock sector effects of ethanol expansion

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- Higher corn prices
- Greater availability of ethanol production coproducts
  - Distillers grains from dry mill ethanol production
- Different effects across livestock types
  - Reflects feed conversion efficiencies
  - Also, ruminants can use distillers grains more readily than monogastric animals, which favors use by beef cattle
- Lower production for all meats, particularly in 2009 as ethanol production continues its expansion

## U.S. beef and pork production

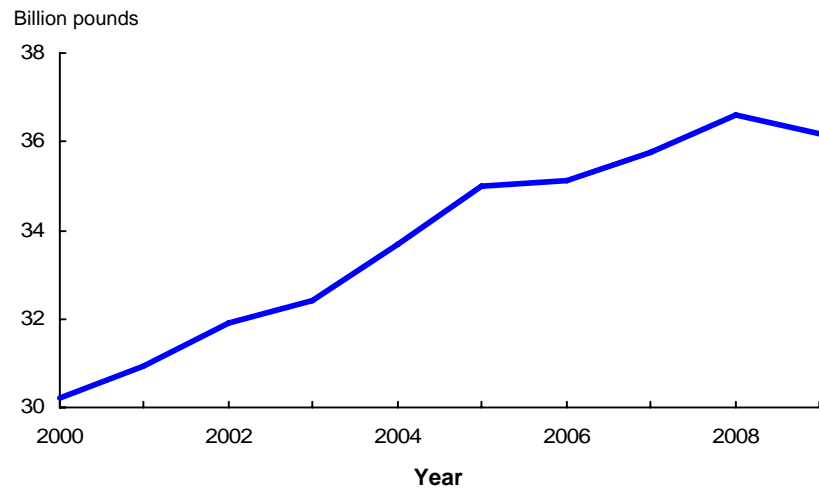
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Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

# U.S. broiler production

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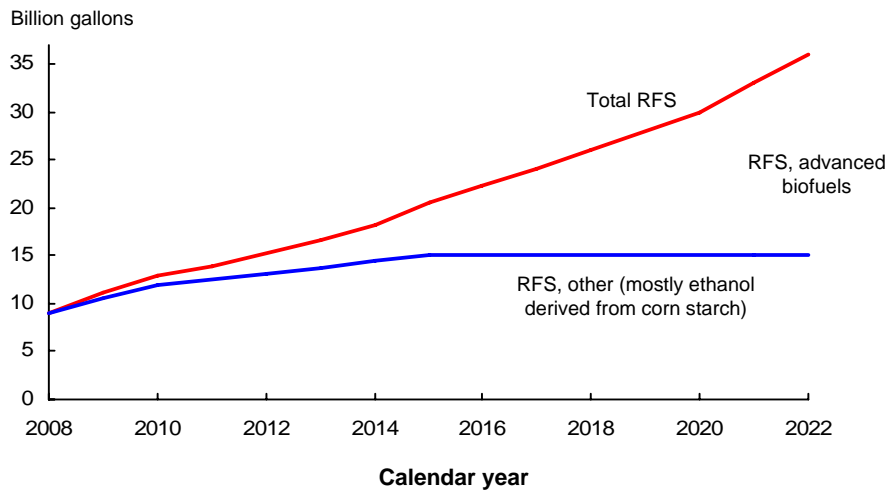


Source: USDA *World Agricultural Supply and Demand Estimates*, July 2008.

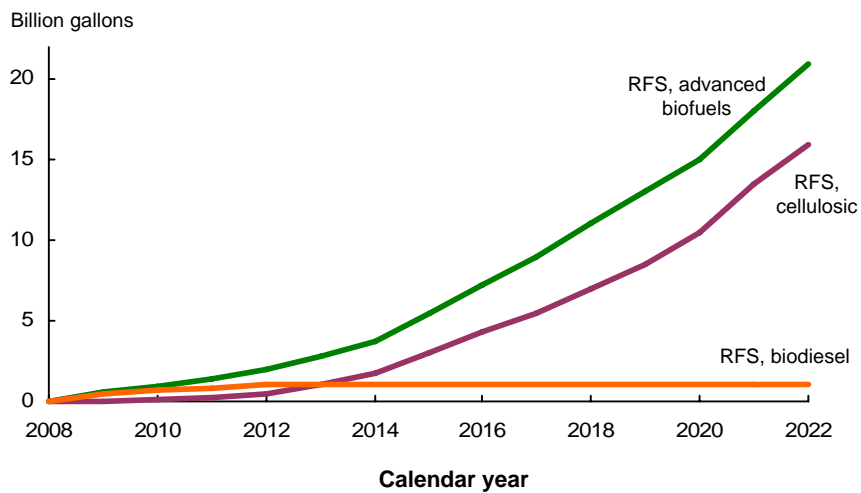
# 2007 Energy Act

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## Renewable Fuel Standard, 2007 Energy Act



## Renewable Fuel Standard, 2007 Energy Act



## Cellulosic feedstock challenges

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### Cellulosic feedstocks: Supply challenges

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- Supply challenges #1
  - Technical conversion feasibility
  - Cost containment and economic viability
- Supply challenges #2
  - Feedstock production & economic viability
  - Feedstock storage and delivery infrastructure
- Supply challenges #3
  - Ethanol distribution infrastructure
    - Pump certifications for mid-level blends
    - Wider availability and accessibility of E-85 pumps

## Cellulosic feedstocks: Demand challenges

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- Demand challenges #1
  - 10 percent blend wall
    - Legislative and regulatory barriers to higher, mid-level blends (other than E-85)
    - Automobile fleet and warranties
- Demand challenges #2
  - E-85 expansion
    - Automobile fleet transition to more flex cars