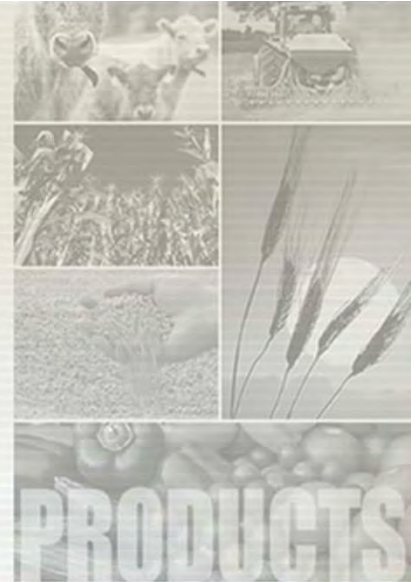


The logo for Intrepid Potash, featuring the word "INTREPID" in a bold, red, sans-serif font and "POTASH" in a lighter, grey, sans-serif font. The text is positioned to the right of a tilted, olive-green square.

# Biofuels Overview

Fertilizer Outlook and Technology Conference, November 16, 2010

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Market Research Analyst, Intrepid Potash

# Outline



- Current US Ethanol policy
- Importance of Corn as feedstock
- Emerging technologies
- Ethanol on the world stage
- Industry economics

# Blending Limit



Blend wall* (bgy)			
E10	E15 for model years		
	2007+	2000+	all cars
<b>13.8</b>	<b>15.9</b>	<b>17.9</b>	<b>20.7</b>

- On October 13, the EPA approved E15 for use in cars made after 2007.
  - It is expected to make a decision for cars made from 2001-06 in December.
  - E85 use is inconsequential (only 0.3% of US cars run on E85)
- Demand increase will be limited by market, infrastructure and implementation constraints
  - Gas price, pump certification, labeling, consumer education

\*assuming 2007-2010 model years cars use 20% of transport fuel, model year 2001-2006 use 40%, and the US fuel market is 138 bgy (EIA).

# Tax Credits Set to Expire



- Expiring at the end of 2010:
  - \$0.45/gal tax credit for blenders (VEETC)
  - \$0.54/gal + 2% ad valorem tariff on Ethanol Imports
  - \$0.10/gal credit for small ethanol producers
  
- Expiring end of 2012:
  - \$1.01/gal credit for cellulosic producers
  
- Expired end of 2009:
  - \$1.00/gal credit for Biodiesel producers
  
- Proposals have been made to either lower the amount of the credit or eliminate it in favor of expanding infrastructure and installing blender pumps



# Environment surrounding tax credit extension



- Tax Credit renewal depends on lame duck session
  - Arguments for credits/tariff:
    - Job creation
    - Protection from cheap/subsidized imports
    - Tariff cancels out US subsidizing imports
    - Needed to stimulate investment in new technology
    - Reimburses Blenders for compliance with RFS2
  
  - Arguments against:
    - Redundant with RFS2 minimum volumes
    - Corn ethanol is a mature industry
    - Free Trade
    - Food vs. Fuel
    - Questionable GHG reduction benefits of Ethanol
    - Potential cost cutting target (cost \$5 billion in 2009)

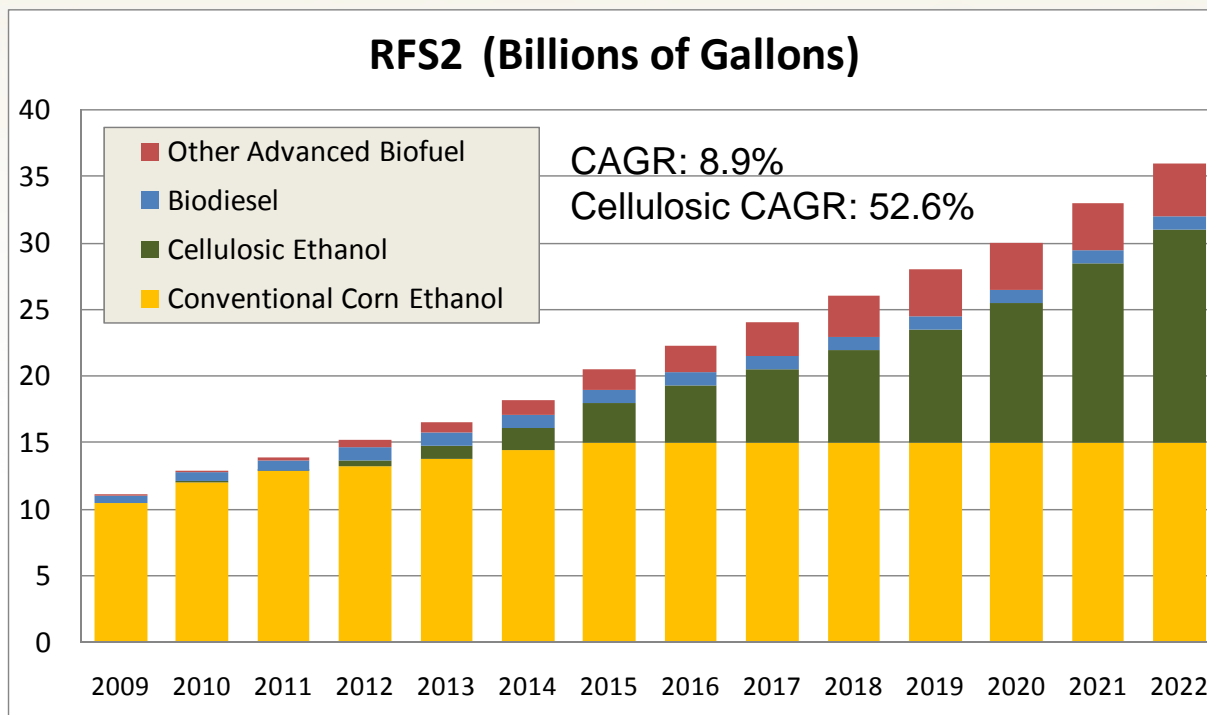


# Renewable Fuels Standards Ensure Minimum Demand

Million Gallons	2011	2022
<b>Corn Ethanol</b>	12,600	15,000
<b>Biodiesel</b>	800	1,000
<b>Cellulosic</b>	5-17*	16,000
<b>Other Advanced</b>	300	4,000

\*Originally set at 250 million gallons, EPA will release final revision by Nov. 30

- Energy Independence and security act of 2007 (EISA) established RFS2 (replacing RFS1, established in 2005)

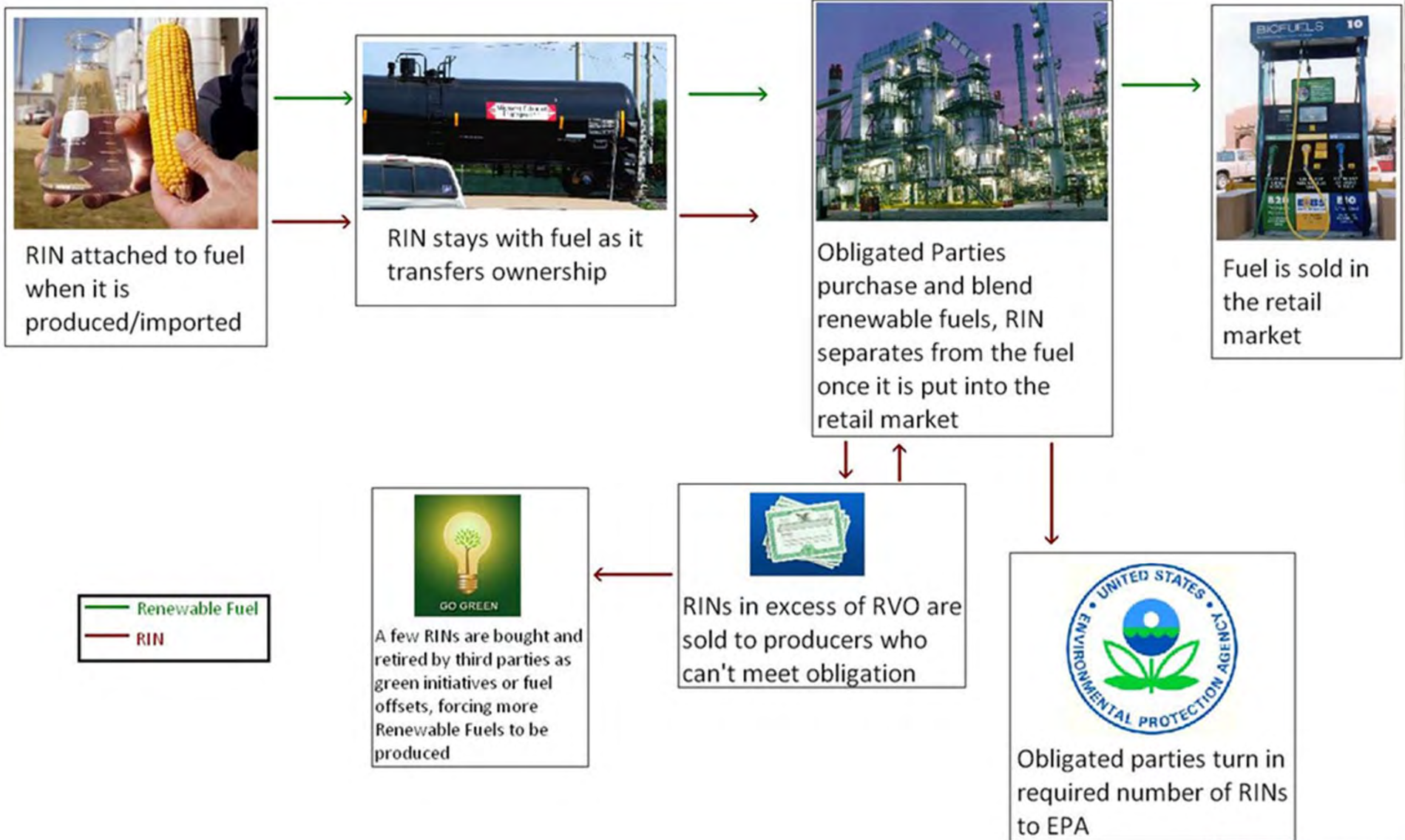


- Other advanced biofuels can be cellulosic, biodiesel, sugarcane, RDIF, algal, or anything else that meets GHG standards and is not derived from corn starch

Source: Energy Independence and Security Act of 2007

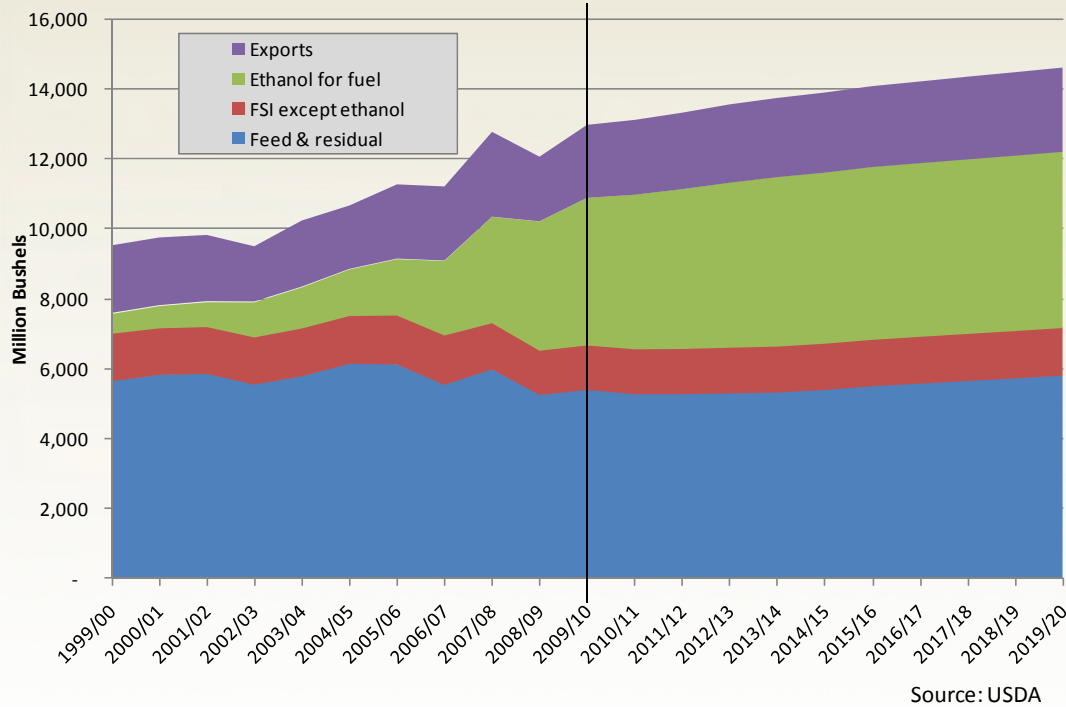


# How RFS2 is Enforced: Renewable Identification Numbers (RINs)

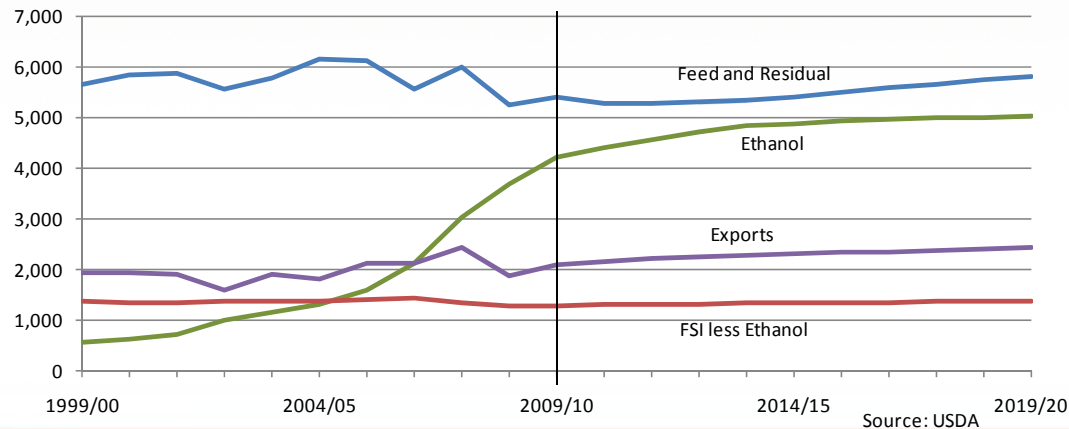


# Expanding Corn Supply Has Met Ethanol Demand

USDA Projected US Corn Utilization



Source: USDA



Source: USDA

- Ethanol Demand has driven growth in Corn Use
- Other uses have remained relatively flat
- Ethanol should level off at around 30-40% of total use
- If the US becomes a structural ethanol exporter, use could go up
- USDA forecast assumes imports are used to meet mandates; if RFS2 is met entirely with US ethanol, use would be 0.2-0.4 billion bushels more each year, leveling off at 5.3 in 2015\*

\*assuming current yield of 2.8 gal/bu

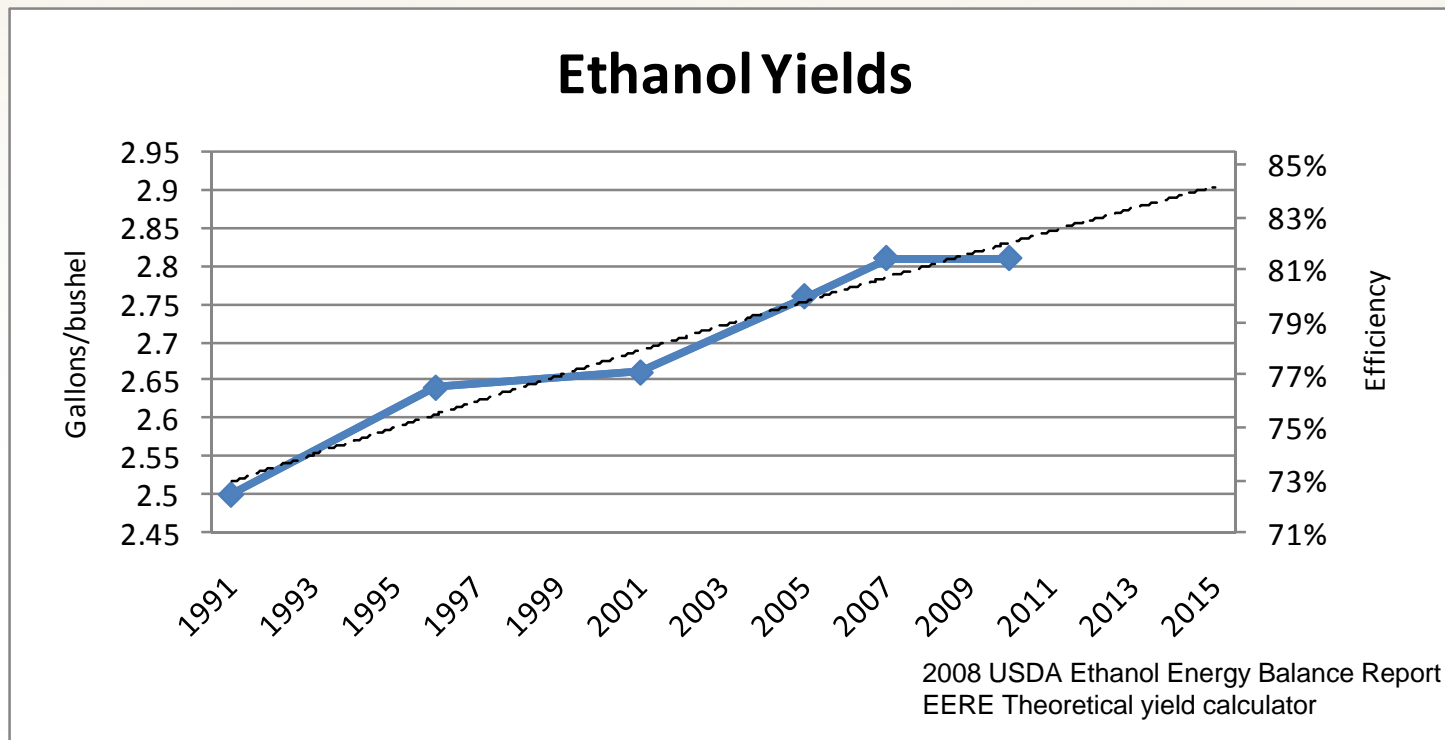
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# Improving Efficiency

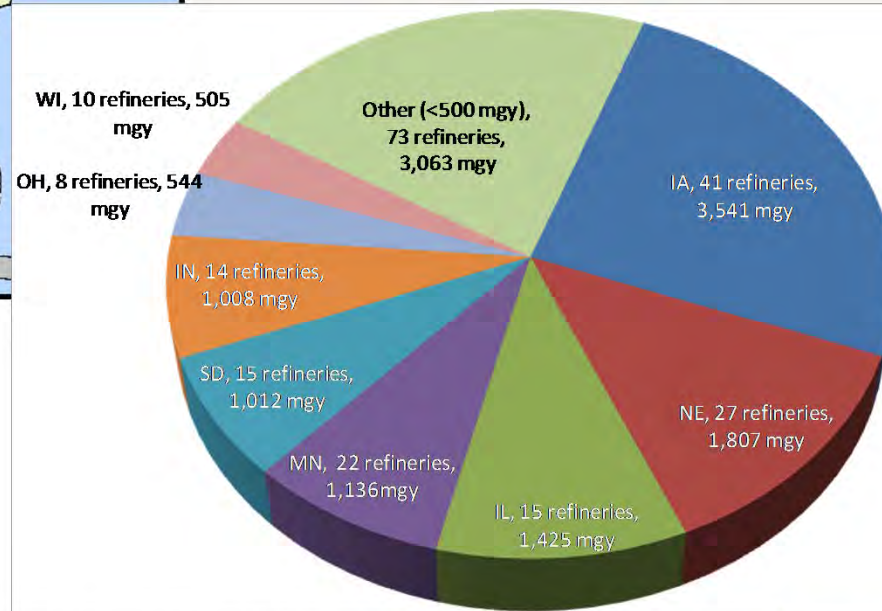
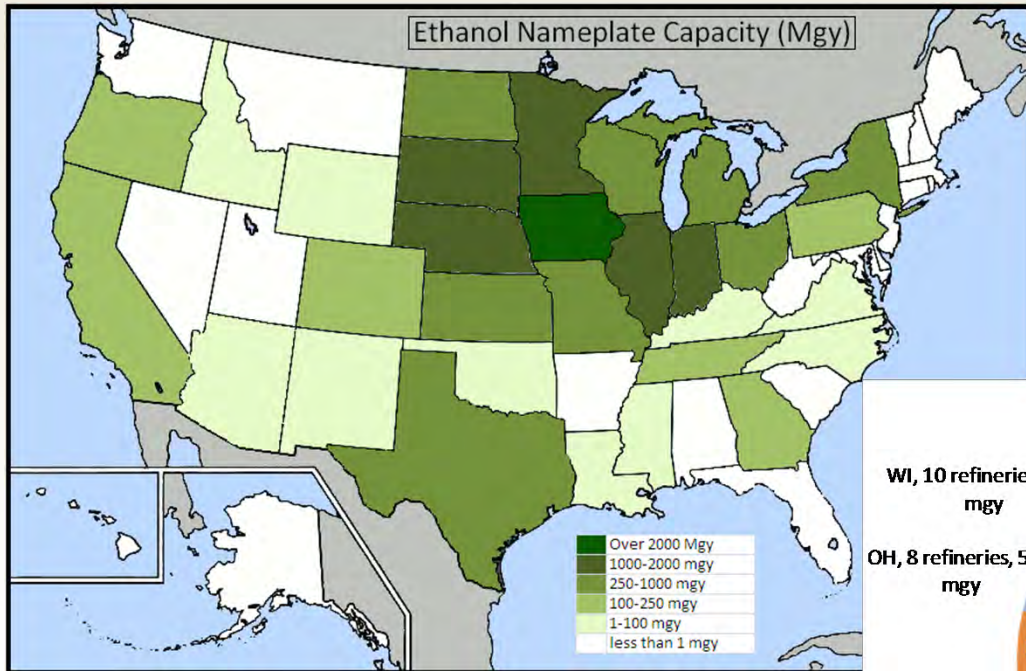


- Current industry average: 2.8 gal/bu (81% efficient)
  - Max. theoretical yield: 3.47 gal/bu
- A 2008 USDA study found that corn ethanol contains about 2.3 BTUs of energy for every 1 BTU of fossil fuel consumed in production, a ratio that has also been improving over time



# Production Concentrated in Midwest

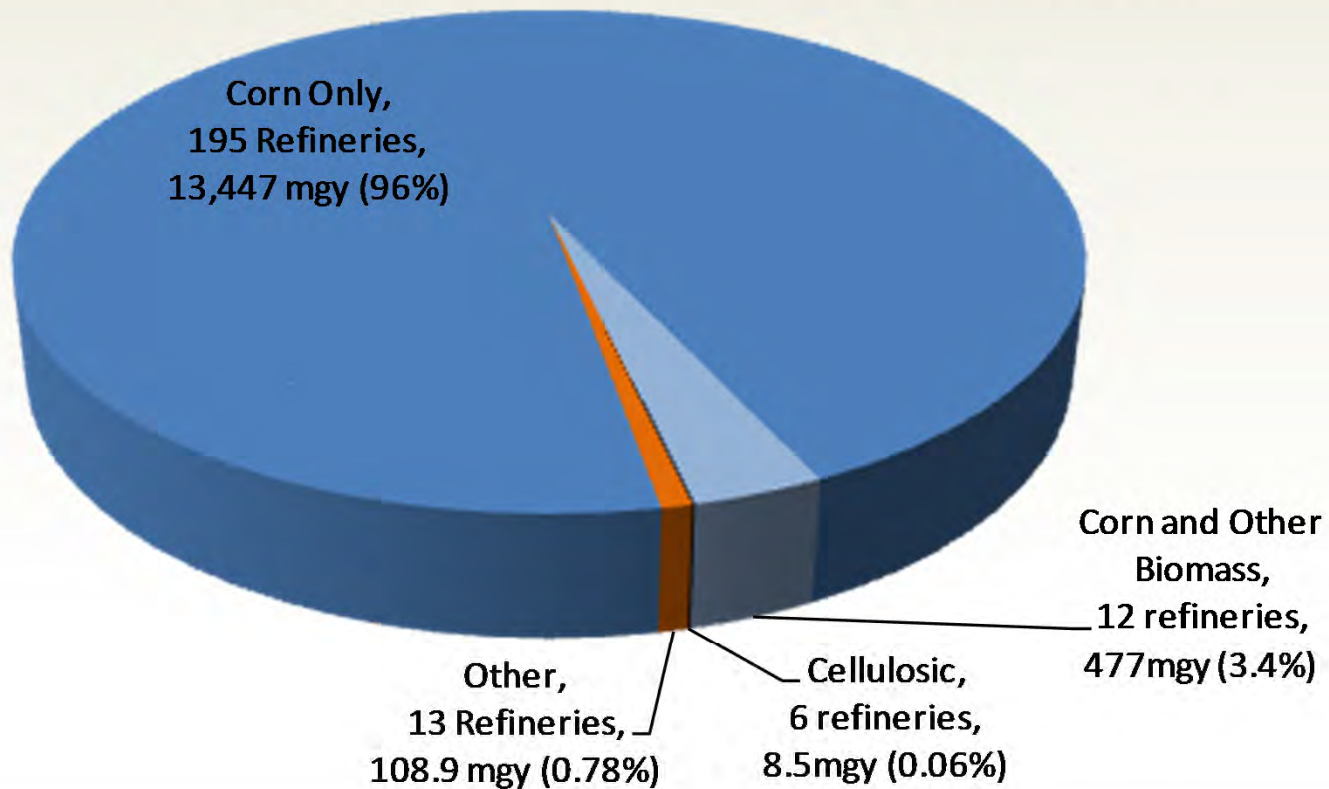
- Total Capacity: 14 billion Gallons/year
  - Potential corn use (2.8 gal/bu): 4.8 billion bushels



Sources: Renewable Fuels Association, Ethanol Producer Magazine **INTREPID POTASH**

# Corn is Feedstock for Over 95% of Production Capacity

## US Total Nameplate Capacity (MGY)



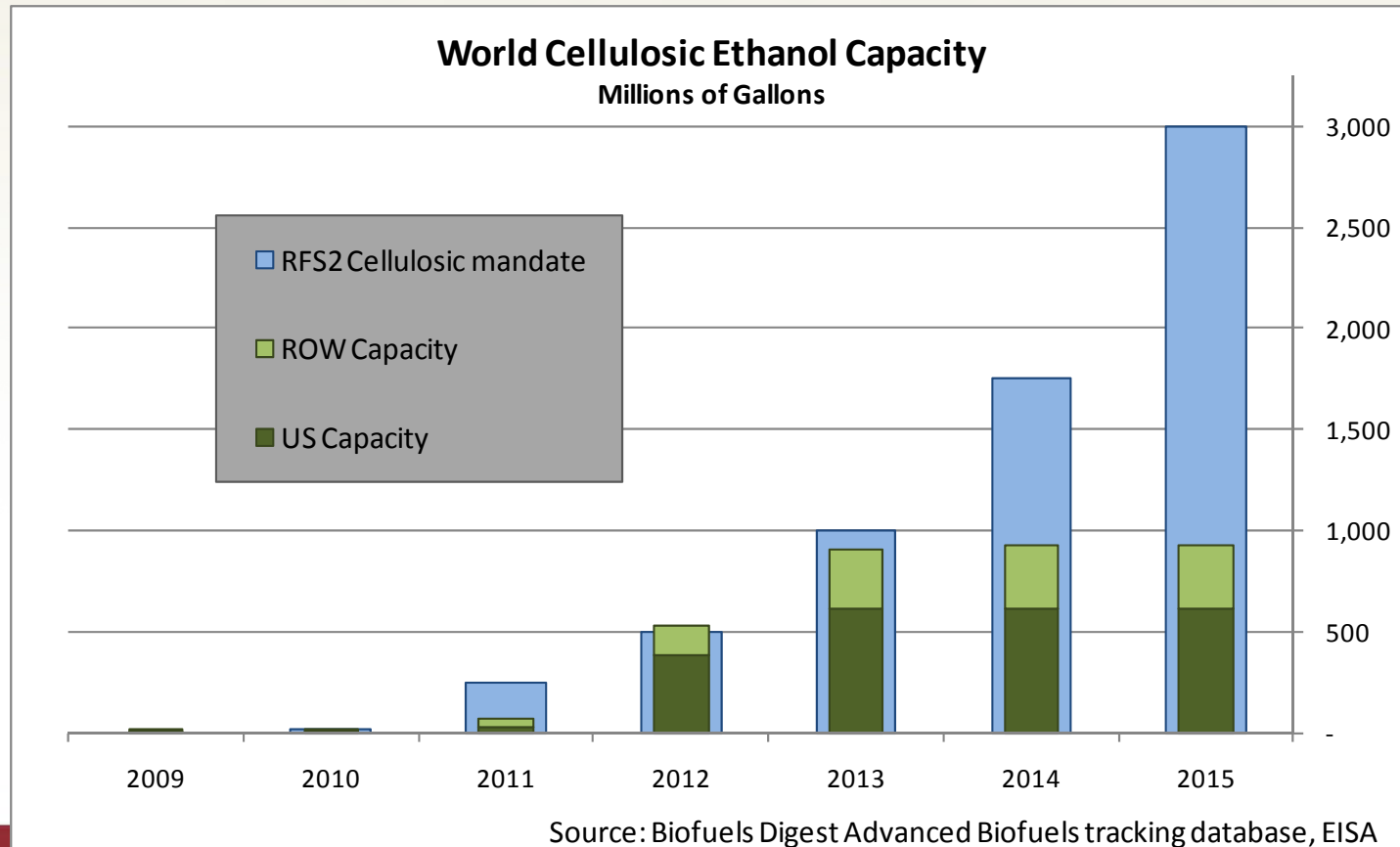
Sources: Renewable Fuels Association, Ethanol Producer Magazine



# Cellulosic capacity falls short of mandates

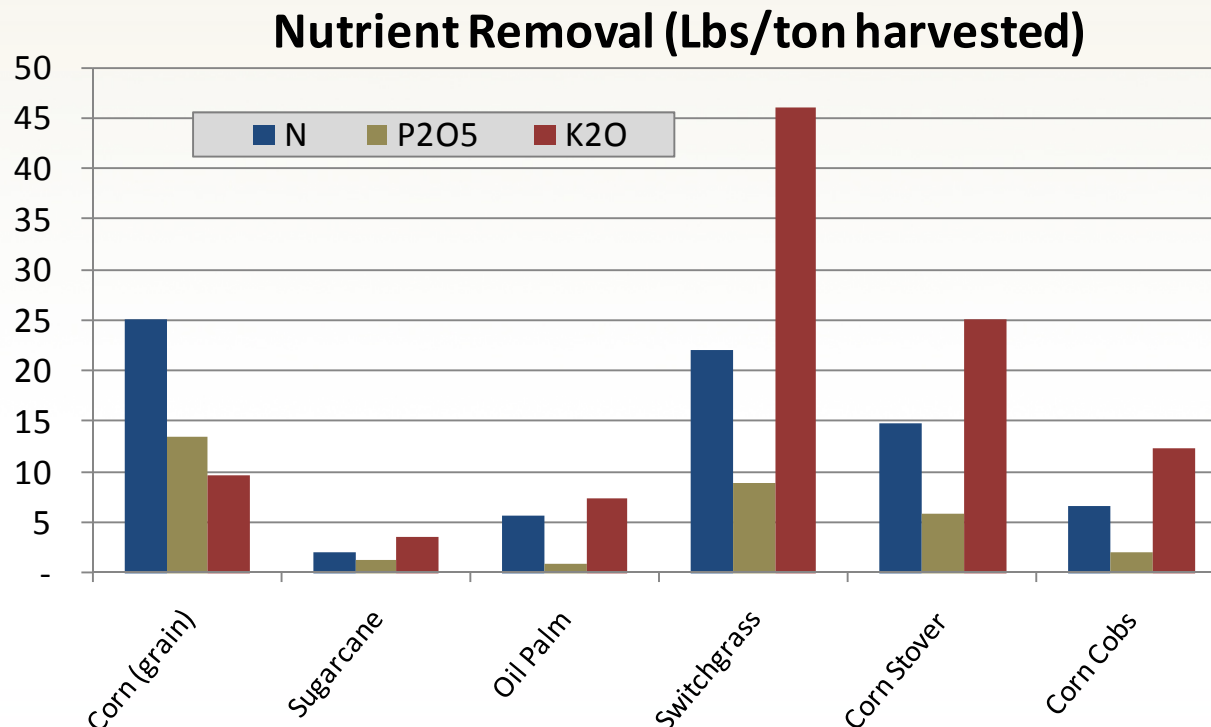


- Feedstocks: crop residues, municipal solid waste (MSW), Wood waste, “energy crops” e.g. Switchgrass, Miscanthus
- EISA calls for cellulosic to generate most of production growth
  - RFS2 calls for 1 billion gallons by 2013, 16 billion gal by 2022



# Impact of Cellulosic Production on Fertilizer Use

- Feedstocks (switchgrass, corn stover, wood waste etc.) contain large amounts of nutrients, especially K, which would be removed from fields
  - It is uncertain how much of the K is recoverable and how much would have to come from fertilizer
  - Switchgrass replaces some N through fixation
  - One byproduct of cellulosic is biochar ash, which contains P, K and S



# University of Minnesota Bio-Ash Fertilizer Study



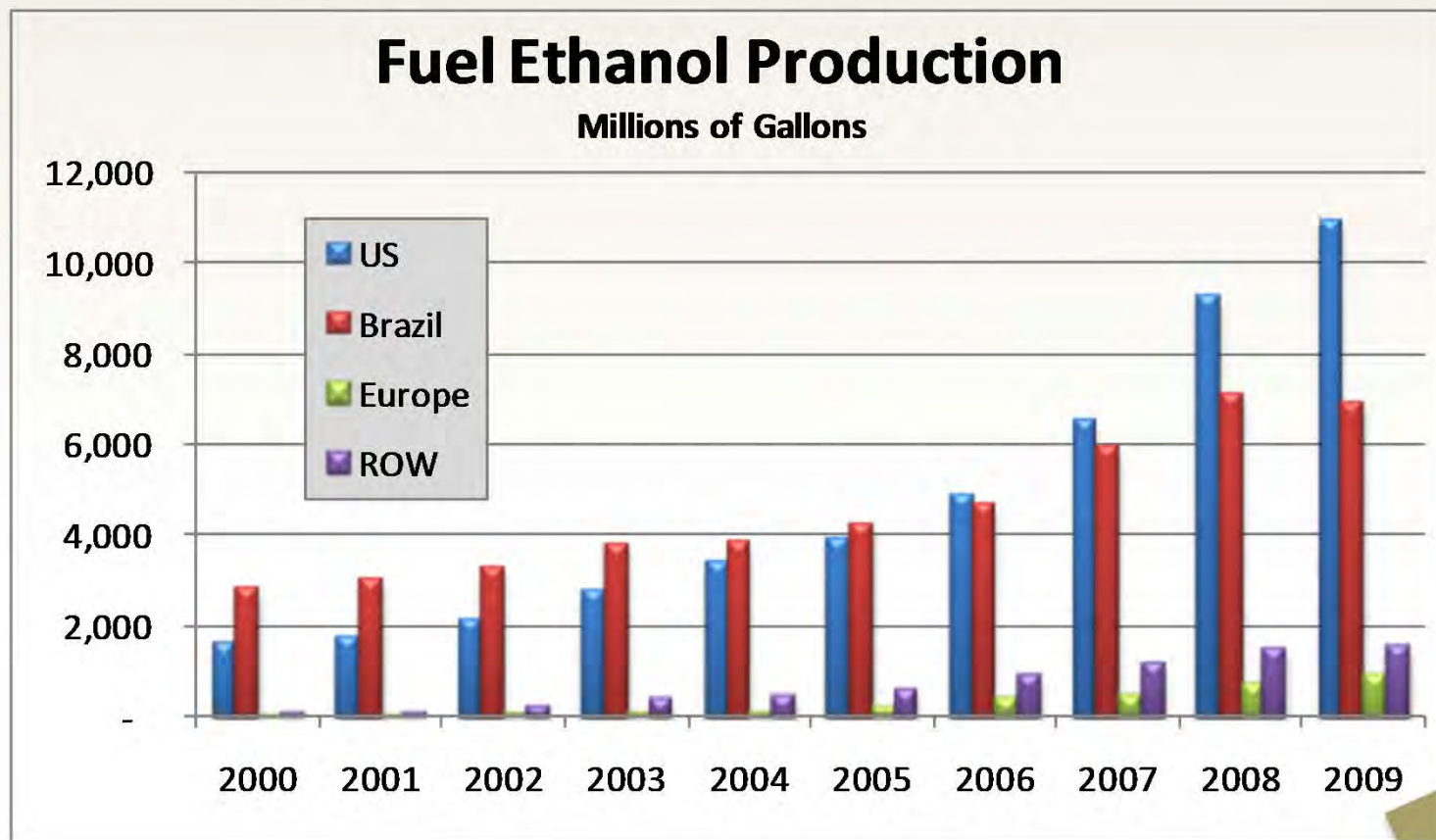
- No measurable agronomic benefit to char ash
  - K and other nutrients not available to plants as fertilizer
- Ash also contained sulfur – 5.7 % in FB, 1.6% in CF, 0.03% in Biochar
- In addition to P, K and S in the other ashes also contributed to yield response

Ash	FB	CF	Biochar	Potash	TSP	Control
Source	Burning Distiller Solubles	Burning Turkey Manure	Pyrolysis of wood chips and corn cobs	N/A	N/A	N/A
Nutrient Content	0-13.5- <b>9.9</b>	0-17.6- <b>16.2</b>	0-0.1- <b>0.9</b>	0-0- <b>60</b>	0-44- <b>0</b>	0-0- <b>0</b>
Lb/acre of K <sub>2</sub> O applied	221	118	121	120	0	0
Yield (bu/A)	221	218	194	208	219	192

Source: Agricultural Utilization Research Institute, University of Minnesota **INTREPID POTASH**

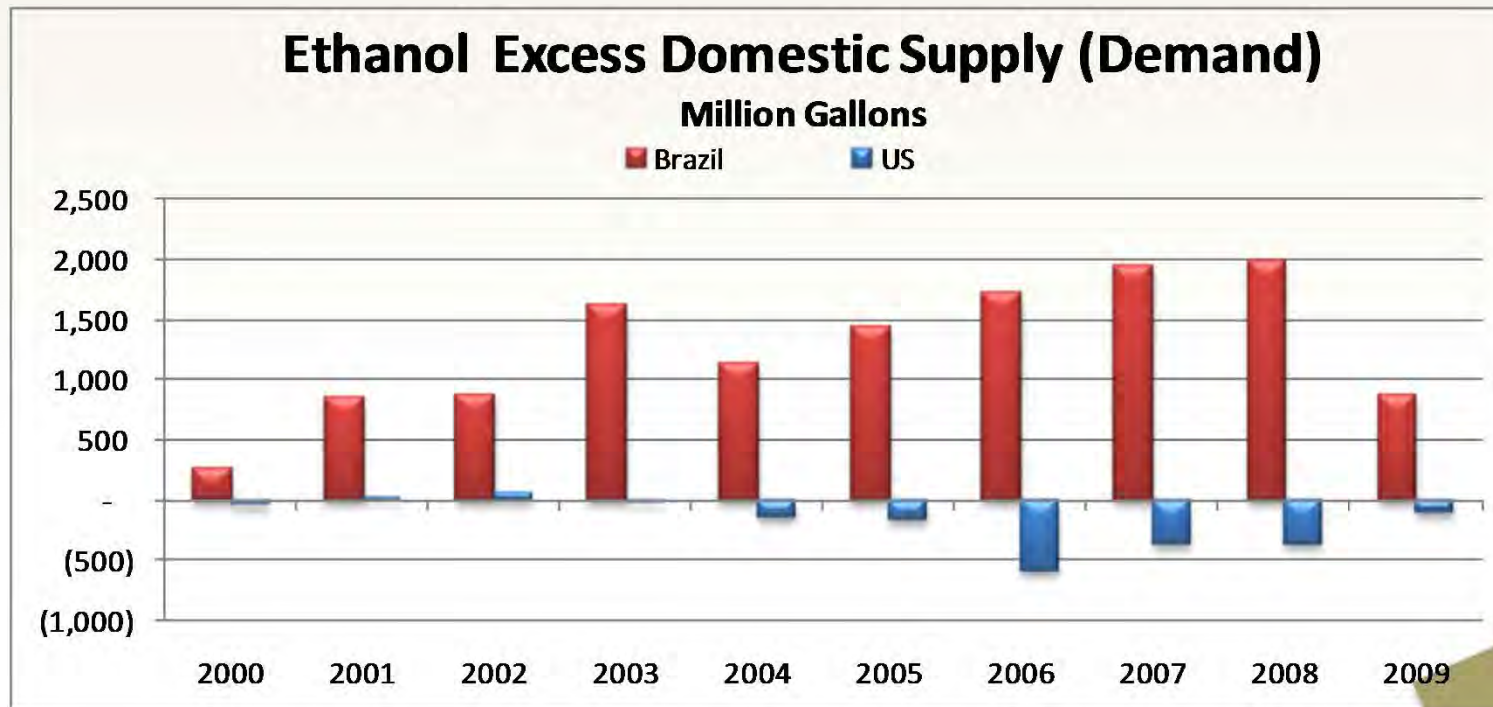
# World Fuel Ethanol Production

- World leaders: US (corn), Brazil (Sugarcane)
- Brazilian domestic market more mature than US, better suited to being a structural exporter



# US as a Potential Net Exporter

- US: Net imports of only 9.3 mg in first 7 months of 2010, on pace for 16 mg
- RFS2 advanced biofuel requirement could mean more imported sugarcane ethanol from Brazil
- Allowing VEETC to expire will harm future exports
  - Lifting tariff would hurt US trade balance by making imports cheaper

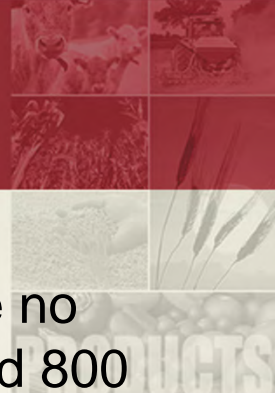


Source: US Energy Information Administration

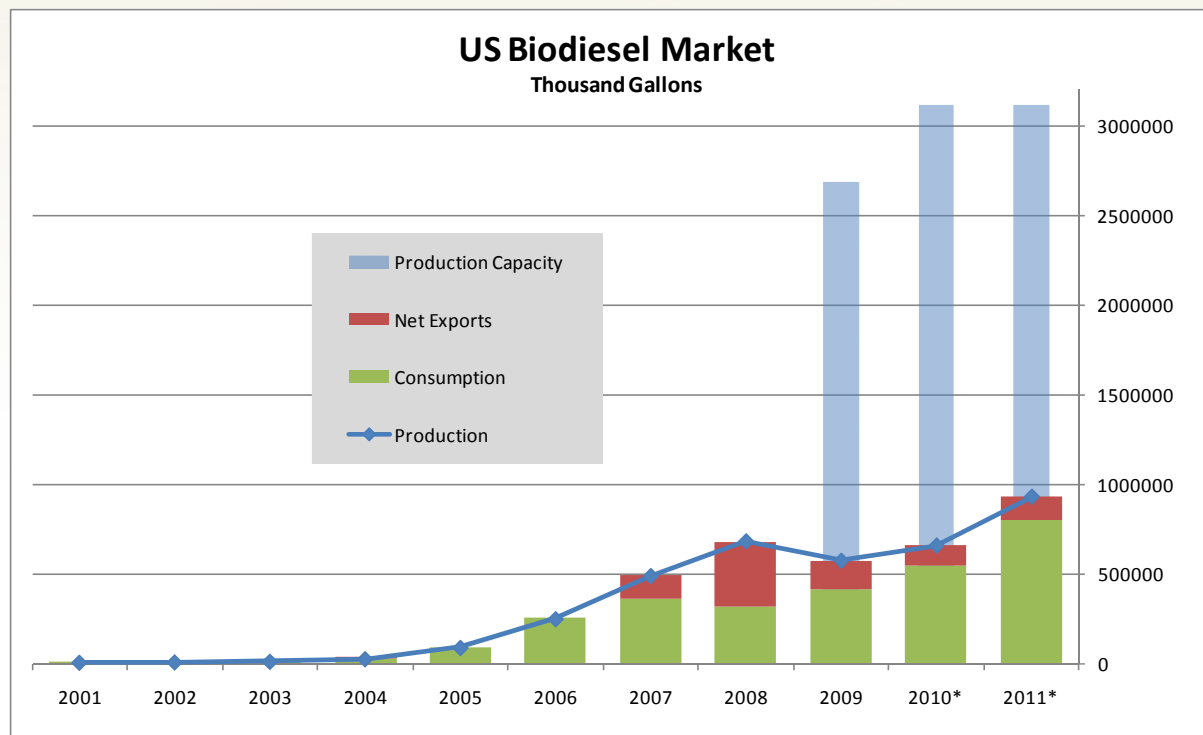
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# Biodiesel operating at 20% capacity



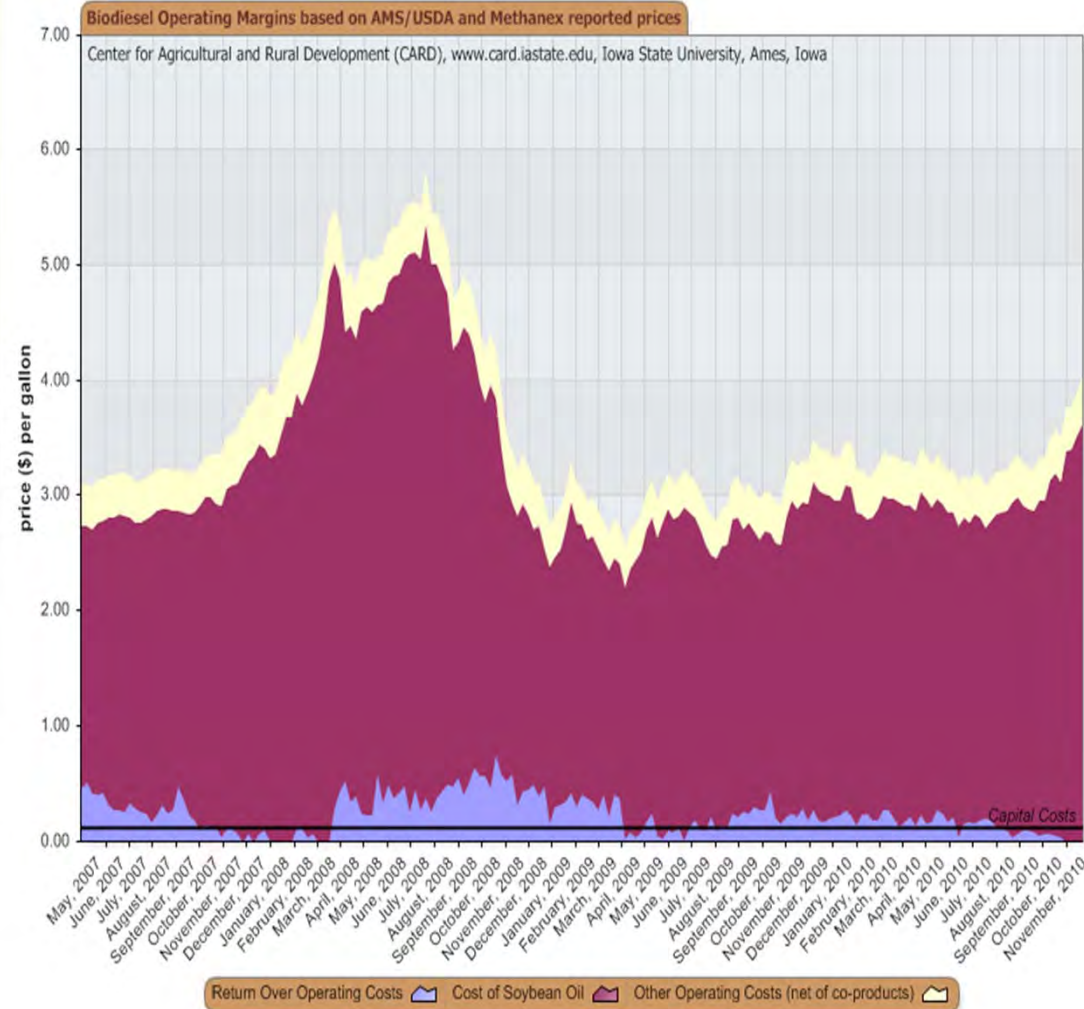
- Primary feedstock: soybean oil
- Tax Break lapse and EU Import restrictions have hurt industry
- Production expected to be no higher than RFS mandated 800 million gal in 2011
- Primary export market: EU



Sources: US Energy Information Administration, National Biodiesel Board



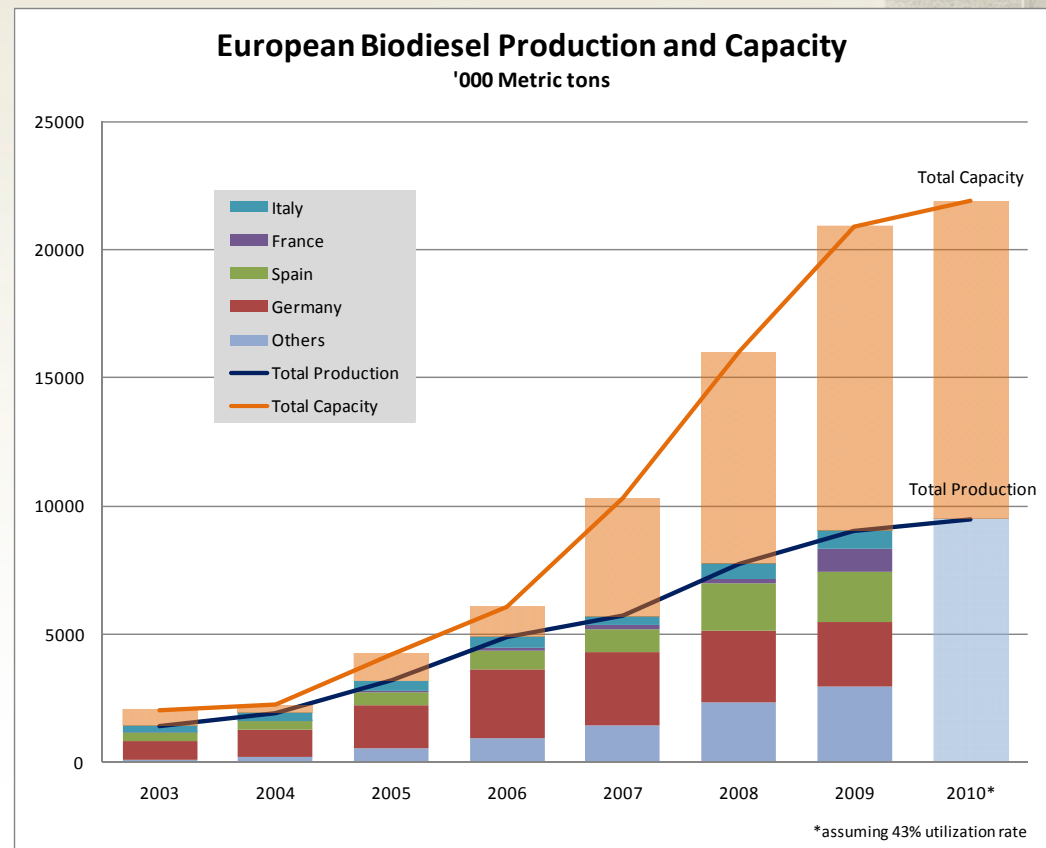
# Biodiesel margins are small or negative



- 7.6 lbs of soy oil are needed to produce 1 gallon of Biodiesel
- Soy Oil feedstock is by far the largest cost component
- Loss of \$1/gal credit, high feedstock prices and EU import restrictions are detrimental to the industry

# European Biodiesel

- Primary feedstock:  
Rapeseed oil
- Import biodiesel from US, Argentina, Malaysia
  - Cheaper to import than produce
  - Feedstock (esp. palm oil) from Asia
- Some producers switching to bioethanol, citing profitability
- Some concerns over sustainability of Palm oil as a feedstock

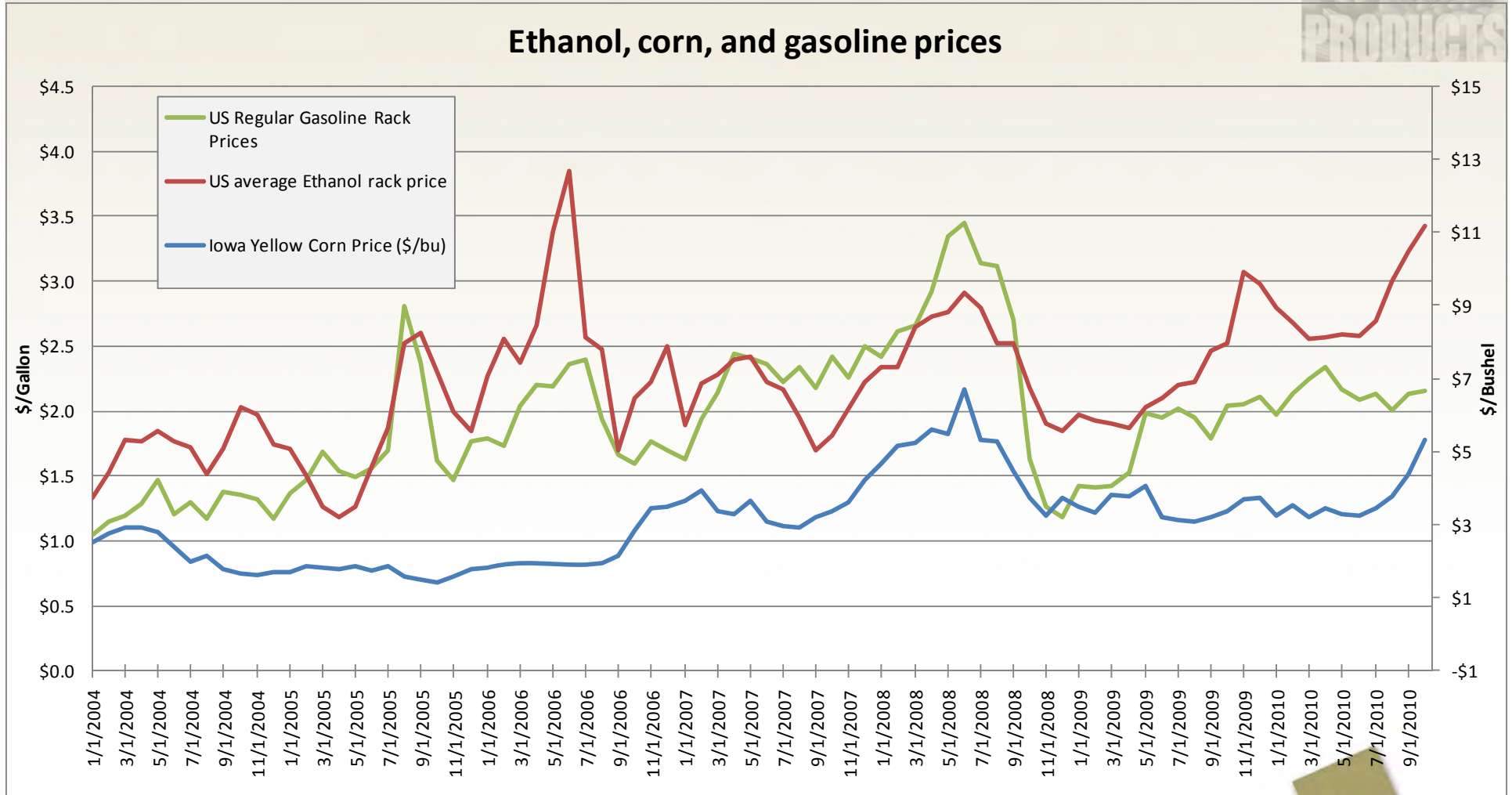


Source: European Biodiesel Board

# Prices tend to stay in balance long term



■ Ethanol correlated to both gasoline and corn prices



Source: Bloomberg

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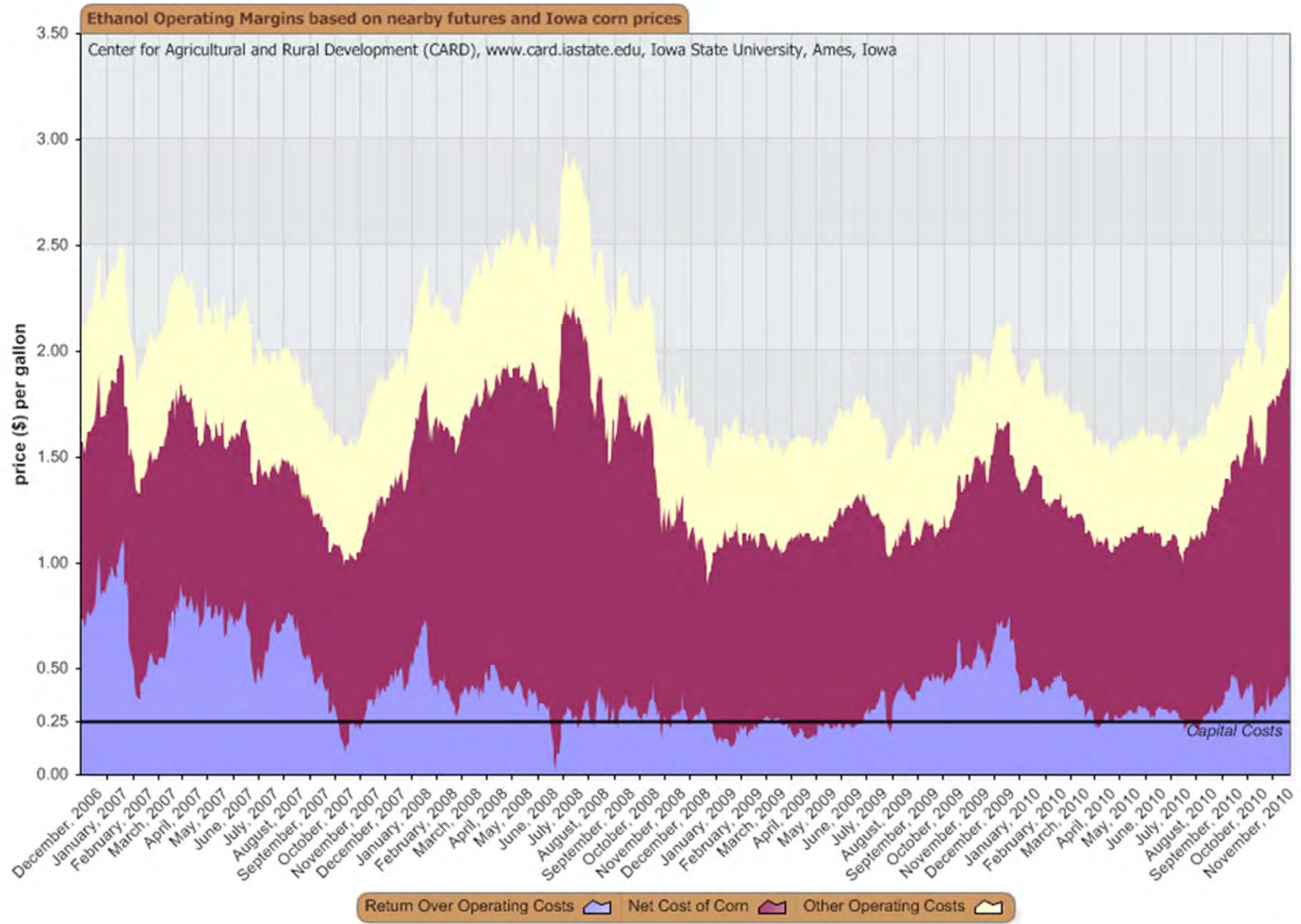
# Margins



- The largest and most variable input cost in ethanol production is Corn
  - Other large components are Natural Gas and Electricity
  - For US Biodiesel it is Soybean Oil, followed distantly by methanol
  
- Despite current high corn prices, Ethanol margins have been strong
  - Of 4 major margin components, 3 are favorable
    - + High ethanol price
    - + High Dry Distiller's Grains price
    - + Low Natural Gas cost
    - High Corn cost



# Ethanol Margins



# Conclusions

- Pace of growth in corn as a feedstock is slowing
- If cellulosic takes off as expected, it will have significant implications for nutrient use
- We are currently at a pivotal point as far as policy is concerned



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