

ETHANOL INDUSTRY SITUATION & TRENDS

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MANHATTAN, KANSAS

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Ethanol Industry Issues

- Ethanol Profitability
- Feedgrain Use for Biofuels
- Biofuels Contribution to U.S. Energy Supplies
- Industry Structure: United States & Kansas
- Resource Use Issues
- Cellulosic Ethanol Potential

Ethanol Profit Margin per Gallon

<u>Prices</u>	<u>July 07</u>	<u>Sept. 08</u>	<u>Oct. 09</u>
Corn (\$/bu.)	\$3.27 ²⁵	\$5.48 ⁽¹⁾	\$3.33 ^{5 (2)}
Ethanol	\$1.90 ⁵	\$2.20	\$1.87 ⁶
RBOB	\$1.98	\$2.85 ⁴	\$1.74 ⁰⁹
Profit Margin	<u>+\$0.26</u>	<u>+\$0.01⁽³⁾</u>	<u>+\$0.25 ⁽⁴⁾</u>

¹ Prices Sept. 2008. Breakeven corn price: \$5.52

² Prices Oct. 5, 2009. Breakeven corn price: \$4.30

³ Ethanol profit for a 100 million gallon plant = \$1.0 million

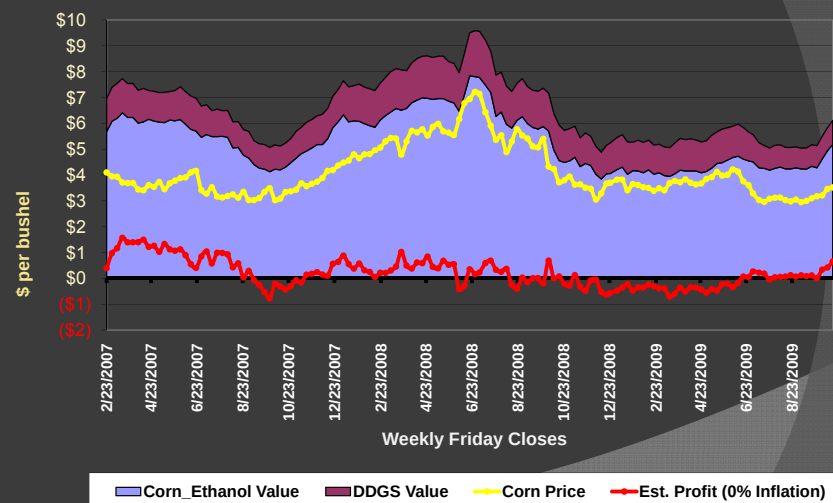
⁴ Profit = \$25.0 million for a 100 million gallon plant
Distiller's Grain revenue would be about \$45 million.

Ethanol Profit Margin Estimates Weekly Averages



Corn Ethanol + WDG \$Value vs Profits

Nebraska / Kansas #s, Feb. 2007 – Oct. 2009



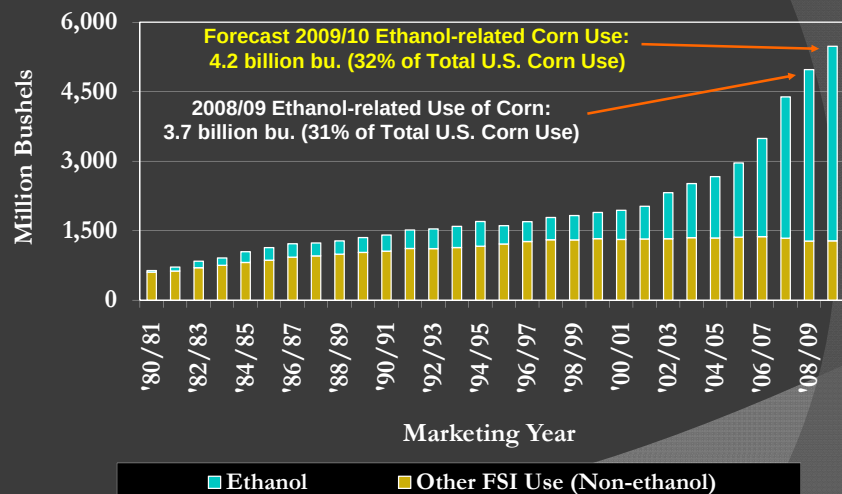
U.S. Corn Supply-Demand

2007/08 - 2009/10 Mktg Yrs (October 9, 2009 USDA WASDE)

	2007/08	2008/09	2009/10
Planted Ac. (mln.)	93.5	86.0	86.4
Harvested Ac (mln.)	86.5	78.6	79.3
Yield (bu./ac.)	150.7	153.9	164.2
Beg. Stocks	1,304	1,624	1,674
Production	13,038	12,101	13,018
Total Supplies	14,362	13,739	14,702
<i>Ethanol</i>	3,049	3,700	4,200
<i>Other Food, Seed, Indust.</i>	1,338	1,276	1,280
<i>Exports</i>	2,437	1,858	2,150
<i>Feed & Residual</i>	5,913	5,231	5,400
Total Use	12,737	12,065	13,030
End Stocks (%S/U)	(13%) 1,624	(14%) 1,674	(12.8%) 1,672
U.S. Ave. Farm \$	\$4.²⁰	\$4.⁰⁶	\$3.⁰⁵ - \$3.⁶⁵

U.S. Corn Food, Seed & Industrial Use

1973/74 - 2009/10 Mktg Yrs (October 9, 2009 USDA WASDE)



U.S. Grain Sorghum Supply-Demand

2007/08 - 2009/10 Mktg Yrs (October 9, 2009 USDA WASDE)

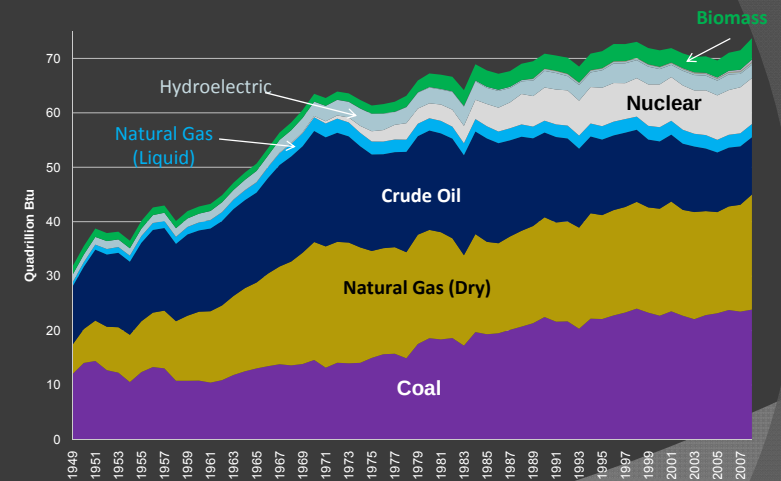
	2007/08	2008/09	2009/10
Planted Ac. (mln.)	7.7	8.3	6.6
Harvested Ac (mln.)	6.8	7.3	5.7
Yield (bu./ac.)	73.2	65.0	64.0
Beg. Stocks	32	53	55
Production	497	472	364
Total Supplies	530	525	418
Food, Seed, Indust.	35	95	90
Exports	277	143	140
Feed & Residual	165	232	140
Total Use	477	475	370
End Stocks (%S/U)	(11%) 53	(12%) 55	(13%) 48
U.S. Ave. Farm \$	\$4.⁰⁸	\$3.²⁰	\$2.⁶⁰ - \$3.²⁰

U.S. Energy Consumption by Energy Source, Years 2003-2008 (Quadrillion Btu)

Energy Source	2003	2004	2005	2006	2007	2008
Fossil Fuels	84.1	85.8	85.8	84.7	86.2	83.4
Coal	22.3	22.5	22.8	22.4	22.7	22.4
Coal Coke Net Imports	0.1	0.1	0.0	0.1	0.0	0.0
Natural Gas	22.9	22.9	22.6	22.2	23.6	23.8
Petroleum	38.8	40.3	40.4	40.0	39.8	37.1
Electricity Net Imports	0.0	0.0	0.1	0.1	0.1	0.1
Nuclear Electric Power	8.0	8.2	8.2	8.2	8.5	8.5
Renewable Energy	6.2	6.3	6.4	6.9	6.8	7.3
Biomass	2.8	3.0	3.1	3.4	3.6	3.9
Biofuels	0.4	0.5	0.6	0.8	1.0	1.4
Waste	0.4	0.4	0.4	0.4	0.4	0.4
Wood Derived Fuels	2.0	2.1	2.1	2.2	2.1	2.0
Geothermal Energy	0.3	0.3	0.3	0.3	0.3	0.4
Hydroelectric Conventional	2.8	2.7	2.7	2.9	2.4	2.5
Solar/PV Energy	0.1	0.1	0.1	0.1	0.1	0.1
Wind Energy	0.1	0.1	0.2	0.3	0.3	0.5
Total Energy (Quadrillion Btu)	98.21	100.35	100.49	99.88	101.55	99.31

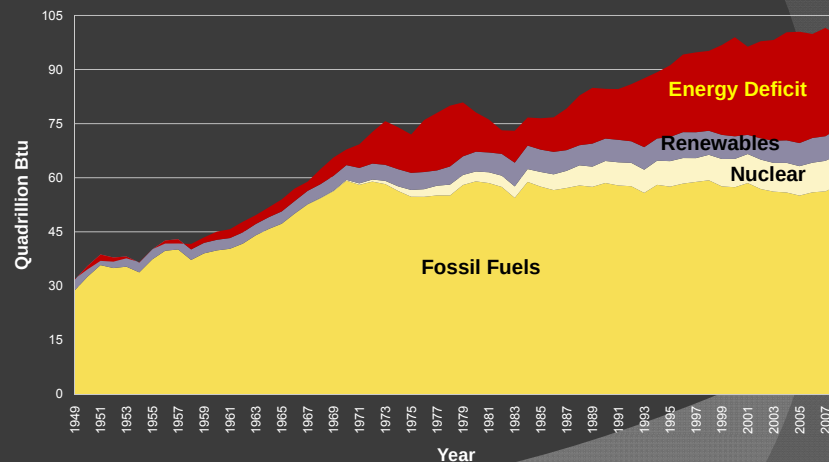
U.S. Energy Production: 1949-2008

Quadrillion Btu (Source: U.S. Energy Information Administration)



U.S. Energy Use, Production & Deficits: 1949-2008

Quadrillion Btu (Source: U.S. Energy Information Administration)

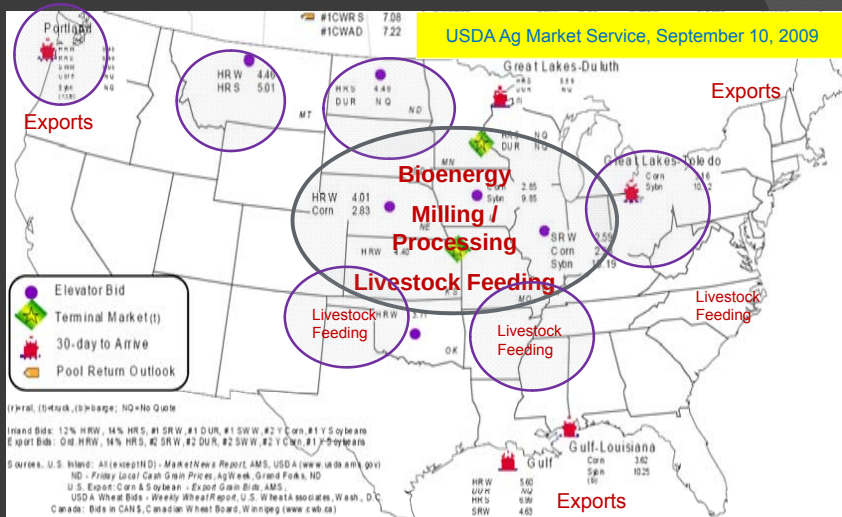


U. S. Ethanol Plants

Source: Refiners Fuel Association, October 15, 2009



U.S. Regional Grain Demand

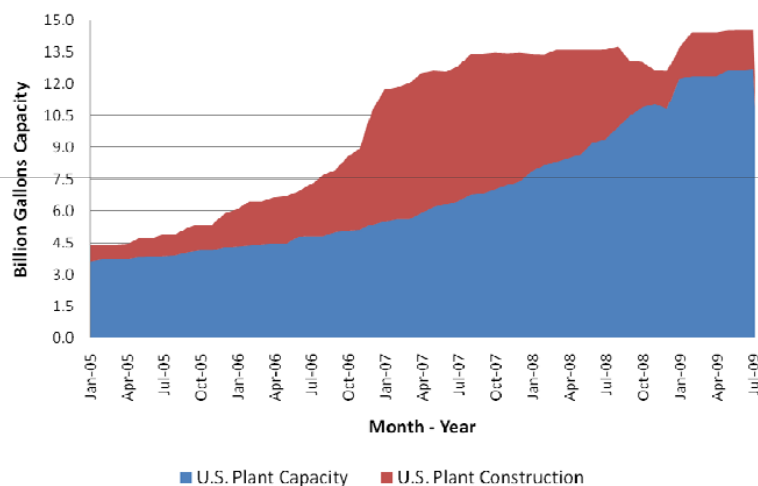


U.S. Ethanol Industry at a Glance

- | | 2008O | 2009J | 2009S ¹ |
|---|-----------------------------|-------|--------------------|
| Number of Ethanol Plants | 168 | 172 | 201 |
| Operating ethanol plants: | 168 | ? | ? |
| Plants under const. or expanding: | 43 | 23 | ? |
| Production capacity operating (BGPY) | 9.9 | 10.6 | 11.5 |
| Projected name plate capacity: | 14.5 BGPY end of 2010 | | |
| Max starch-based ethanol inclusion: | 15 billion gallons by 2015. | | |
| Corn used for ethanol production and percentage of U.S. crop: | | | |

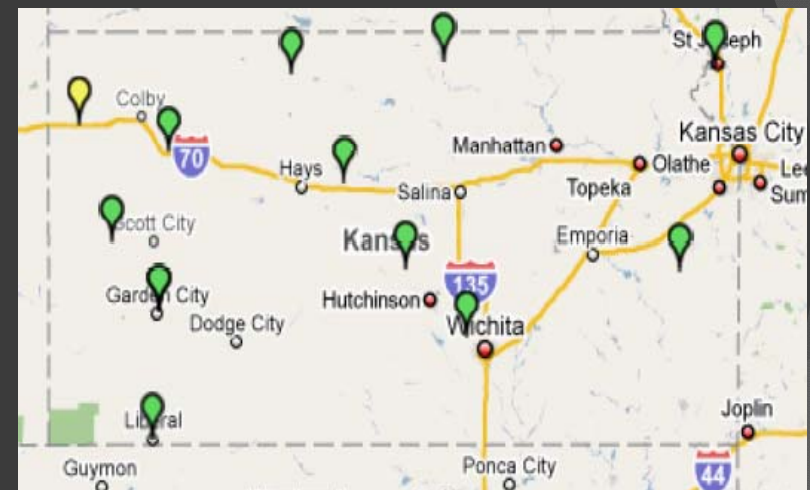
	Bu.(bil.)	Bu.(bil.)	% of Crop
2006/07 –	2.1	10.5	20
2007/08 –	3.0	13.0	23
2009/10 –	4.2	13.0	32
2014/15 –	5.0	15.0	33

Figure 3. U.S. Fuel Ethanol Completed Plant Capacity & Capacity Planned for Construction
Monthly: January 2005 through July 2009



Kansas Ethanol Plants

Source: Refiners Fuel Association, October 15, 2009



Kansas Ethanol Plants

Company	Location	Current Capacity (million gallons)	Bushels of Grain Used (million bushels)
MGP Ingredients	Atchison	10 mg	3.6 mb
Arkalon Energy (Conestoga)	Hayne	110 mg	39.0 mb
Western Plains Energy	Campus	45 mg	16.1 mb
Abengoa Bioenergy	Colwich	25 mg	8.9 mb
Bonanza Bioenergy (Conestoga)	Garden City	55 mg	19.6 mb
Reeve Agri-Energy	Garden City	15 mg	5.4 mb
East Kansas Agri-Energy	Garnett	35 mg	12.5 mb
ESE Alcohol	Leoti	1.5 mg	0.5 mb
Kansas Ethanol LLC	Lyons	55 mg	19.6 mb
Prairie Horizon Agri-Energy	Phillipsburg	40 mg	14.3 mb
White Energy	Russell	48 mg	17.2 mb
NESIKA Energy LLC	Scandia	10 mg	3.6 mb
Total for All Ethanol Plants		449.5 mg	160.6 mb

(Source: Kansas Ethanol Website: www.ksgrains.com/ethanol/kseth.html, information current through August 6, 2009)

Water Use by Ethanol Plants

For Grain Dry Milling Processes

- **Process Water** $\approx$ 33% of Plant Use
 - **Water in contact with grain**
 - *Mixing, slurry, fermentation, saccharification processes*
- **Non-Process Water** $\approx$ 67% of Plant Use
 - **Water not coming in contact with grain**
 - *90% of non-process water used in heating-cooling*
- **Plant Water Use:** 4.²³ gal. / gal. ethanol
 - **Water use for a 40 mln gal. capacity Ethanol Plant**
 $\approx$ *Water use by 2 ¾ pivot irrig. systems / yr (18-20 a.i.)*

Net Energy Balance

Alternative Energy Sources

<u>Product</u>	<u>Energy Out / Energy In</u>
Gasoline	0.81
Ethanol from grain	1.67
Ethanol from cellulose	2.00
Diesel	0.83
Bio-diesel	3.20

Source: Congressional Research Service, RL32712, May 18, 2006

Comparing Corn & Cellulosic Ethanol

	<u>Corn</u>	<u>Cellulosic</u>
Capital cost per gallon	\$2.00	\$5-6.00 est.
Raw mat. cost per ton	\$200	\$100
Enzyme cost per ton	\$3.15	\$33.00
Ethanol yield per dry ton	100-110 gal.	75-90 gal.
Conversion process	simple	complex
Water use per gallon	3-5	6-10
Processing time, days	2	7
Cost of prod. per gallon	\$2.00	\$3.50 est.

Sources: Testimony of Keith Collins, USDA Chief Economist, 26 Aug. 2006; Popp and Hogan presentation at Farm Foundation Conference 12-13 April 2007; and M. Woolverton calculations.