

Biofuels: Here to Stay or a Passing Fad?

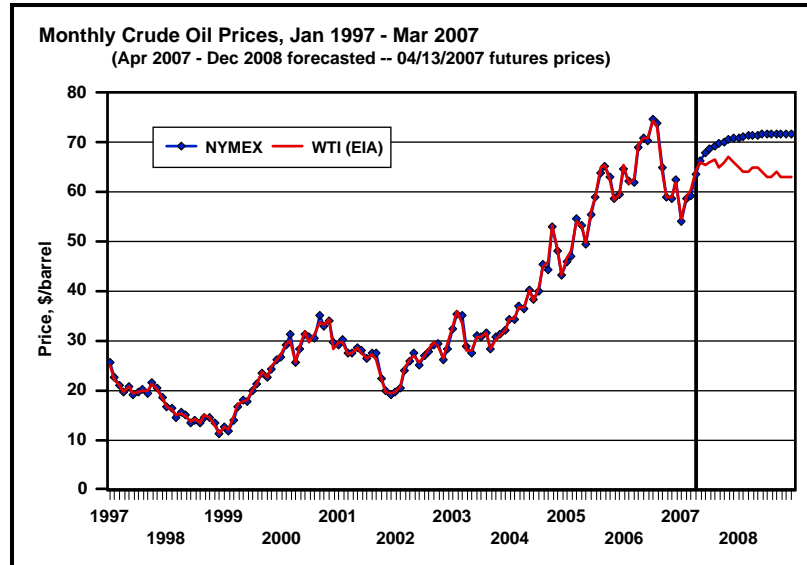
Terry L. Kastens, KSU Ag Economics
Kevin C. Dhuyvetter, KSU Ag Economics

MAB in the Heartland Alumni Conference
Junction City, KS
April 19, 2007



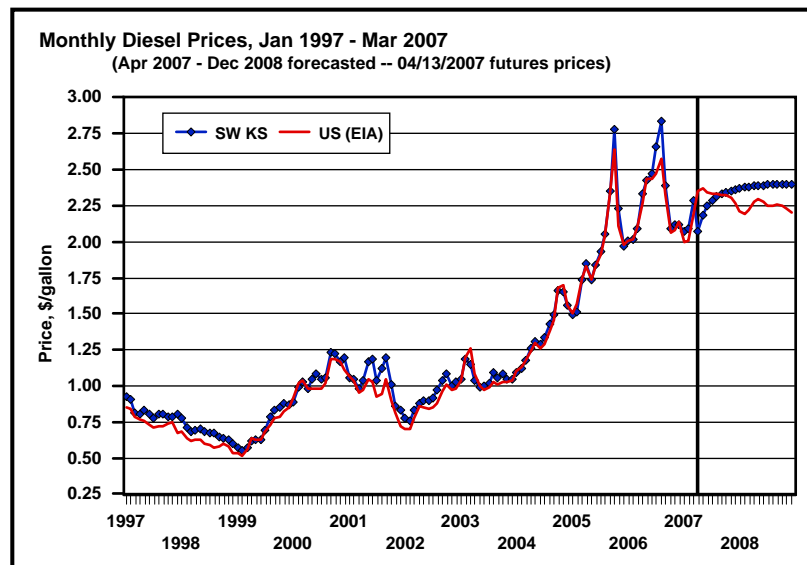
Outlook

Crude oil prices are forecasted to be slightly below 2006 level, but still at historically high levels ...



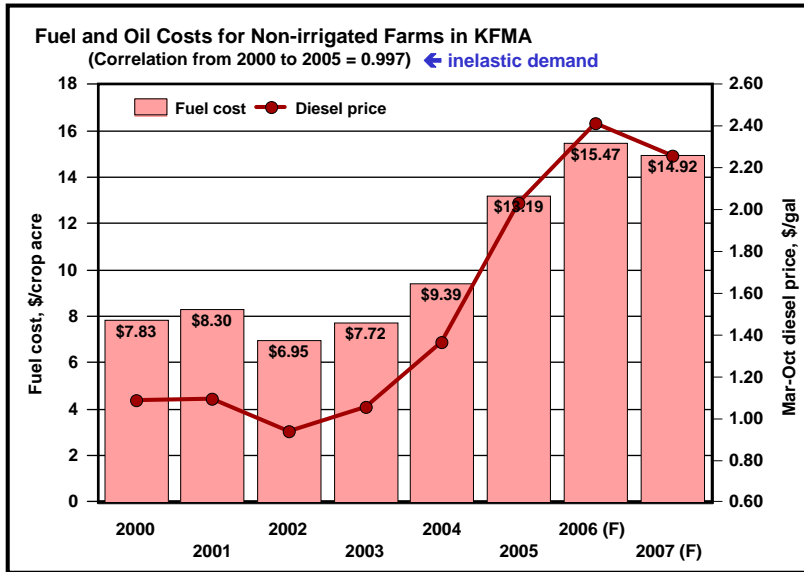
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Diesel prices are down from recent highs, but increasing crude oil prices translate into increasing diesel prices ...



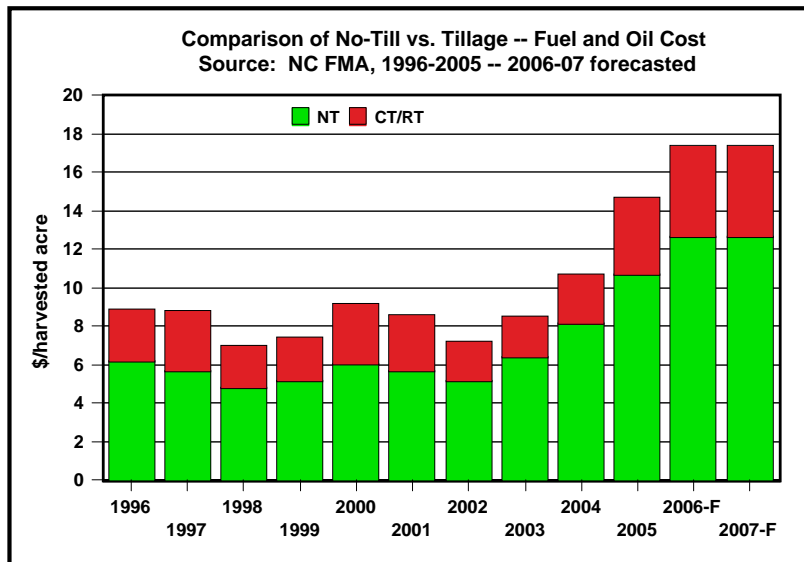
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Fuel costs per acre versus diesel prices...



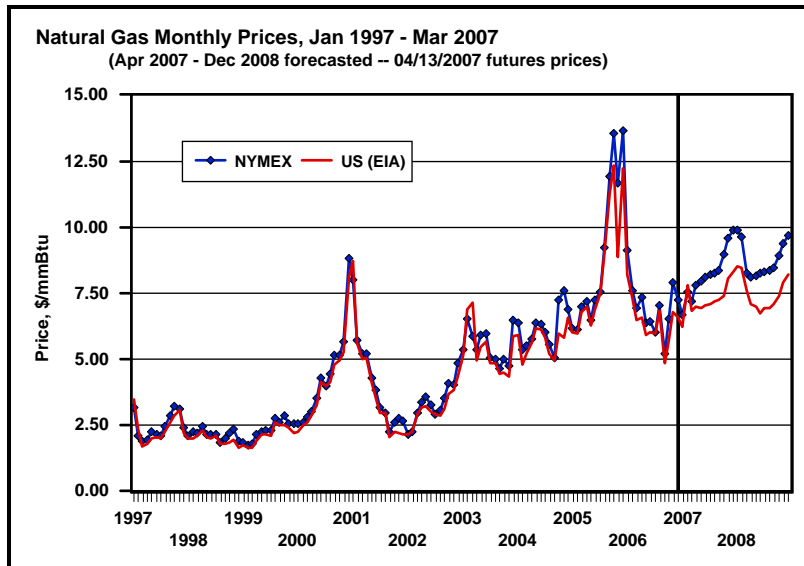
Without any change, costs in 2007 will be down slightly, but still very high.

Fuel-savings benefit of no-till increases at higher prices...



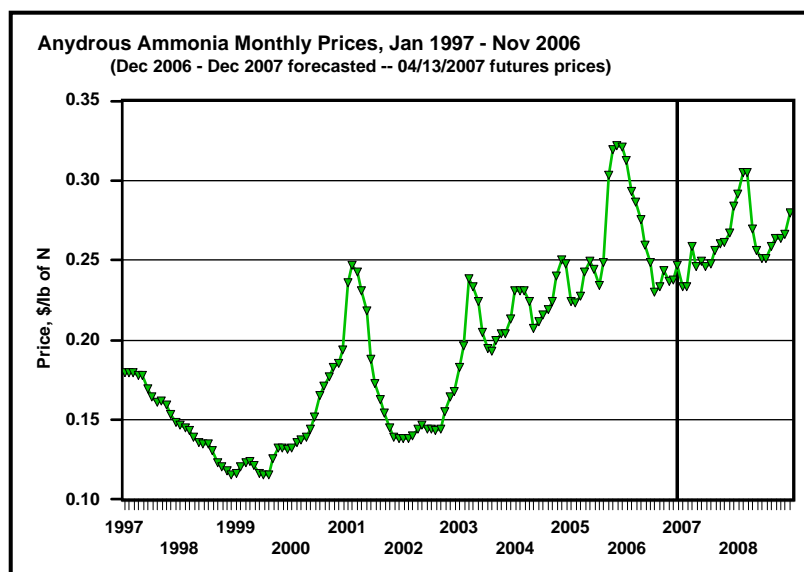
NT fuel generally 67-75% of CT/RT, savings could be as high as \$4/acre at current diesel prices...

Historical and forecasted natural gas prices



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Historical monthly nitrogen fertilizer prices, Corn Belt, thru Nov06



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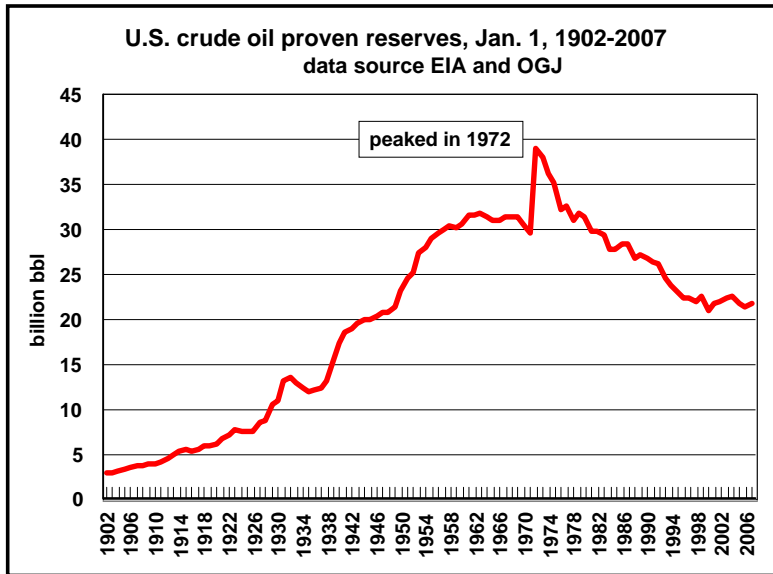
Running out of oil and U.S. energy independency



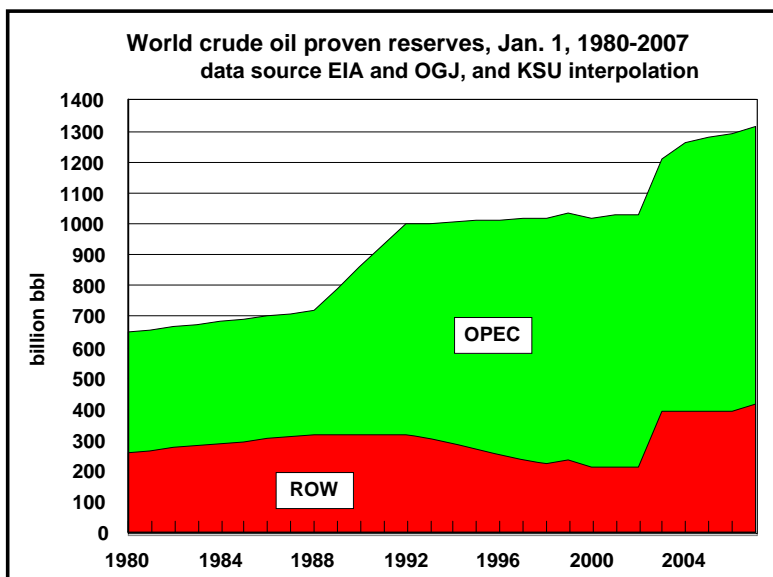
Scarce Energy?

- 1859: Drake discovers oil in Pennsylvania
- 1879: USGS formed to deal with running out of oil
- 1882: 95M bbl remain (Institute of Mining Engineers)
- 1918: 3 million cars on the road
- 1919: auto industry shouldn't ignore that only 20 years left (Scientific American)
- 1926: 4.5B bbl left in U.S. (Federal Oil Conservation Board)
- 1930: 18 million cars
- 1932: 10B bbl left in U.S. (Federal Oil Conservation Board)
- 1944: 20B bbl left in U.S. (Petroleum Administrator for War)
- 1950: 100B bbl left in world (American Pet. Institute)
- 1980: proven oil reserves 648B bbl
- 1993: proven oil reserves 999B bbl
- 2000: proven oil reserves 1016B bbl
- 2007: proven oil reserves 1317B bbl

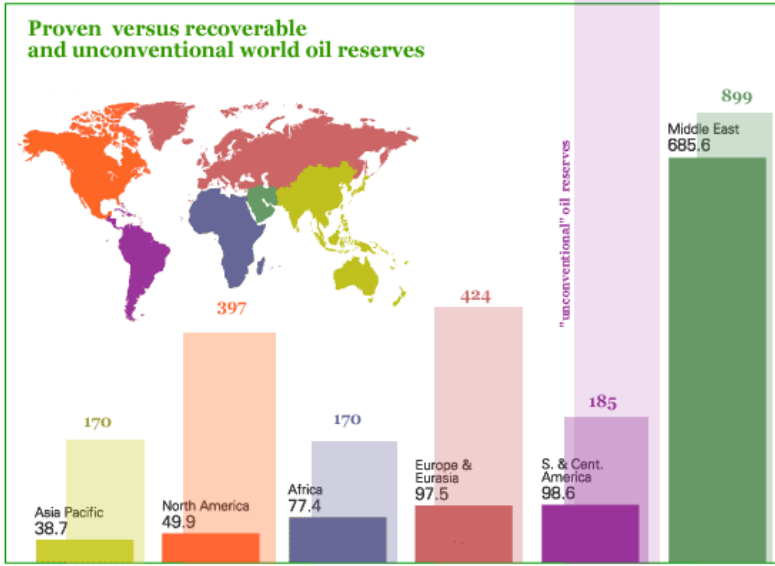
Scarcity is an economic issue, not a physical one



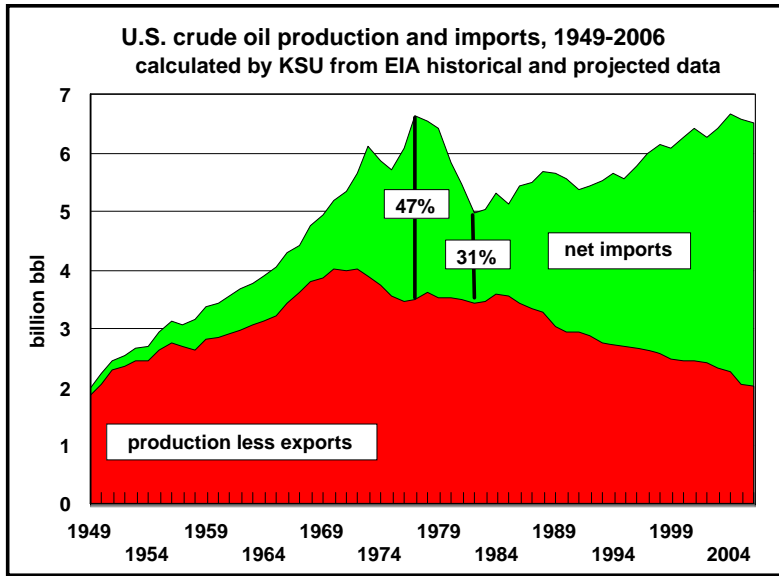
U.S. proven reserves are falling

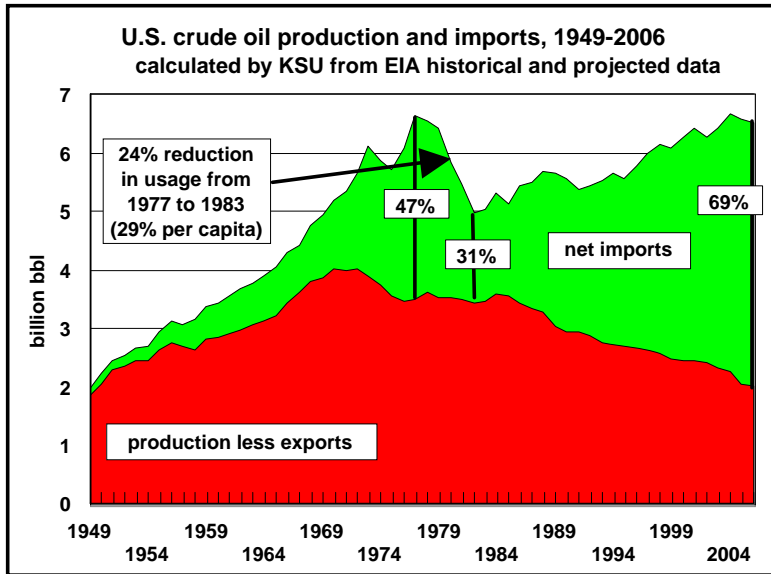


More dependency on OPEC, so also is a political issue

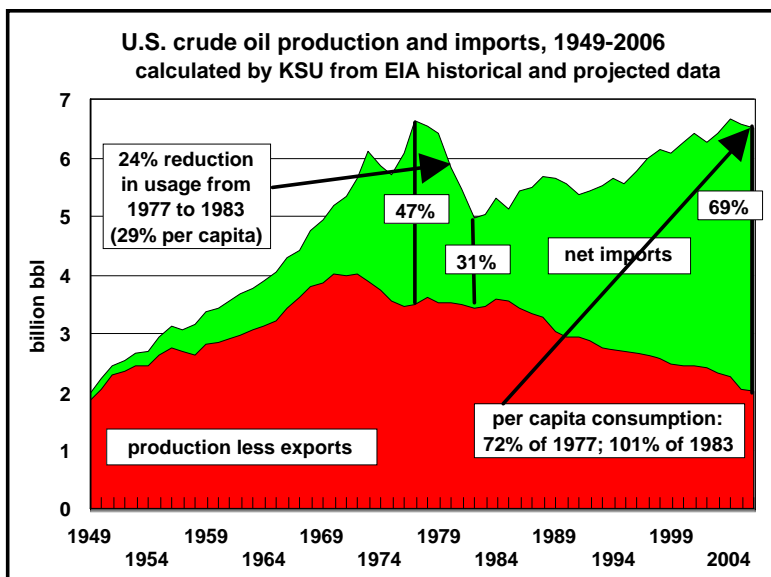


We can find a lot of oil in the western hemisphere if prices stay high

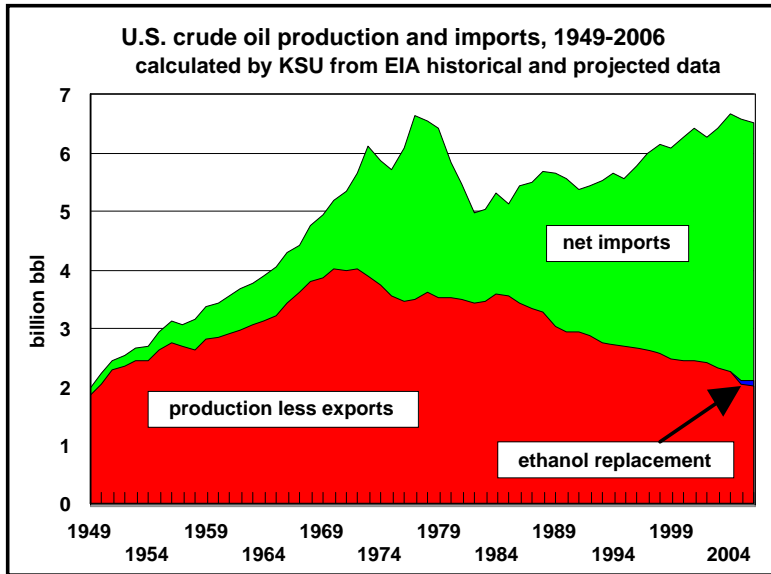




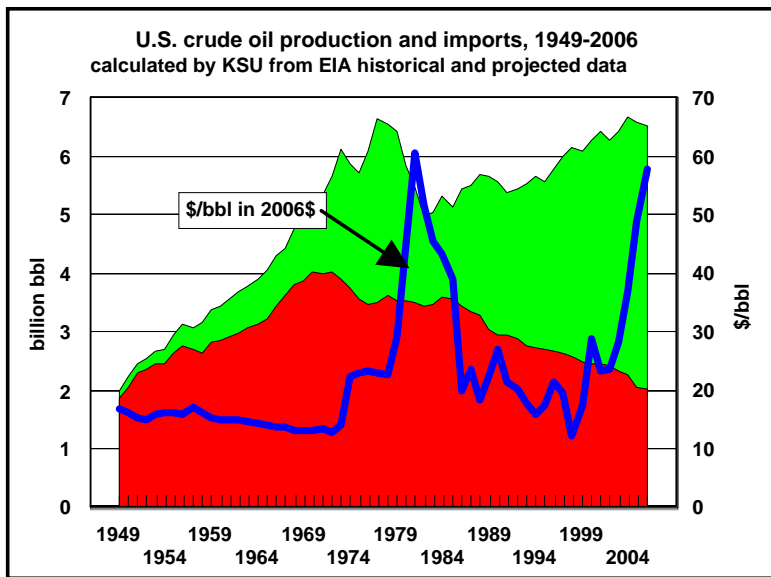
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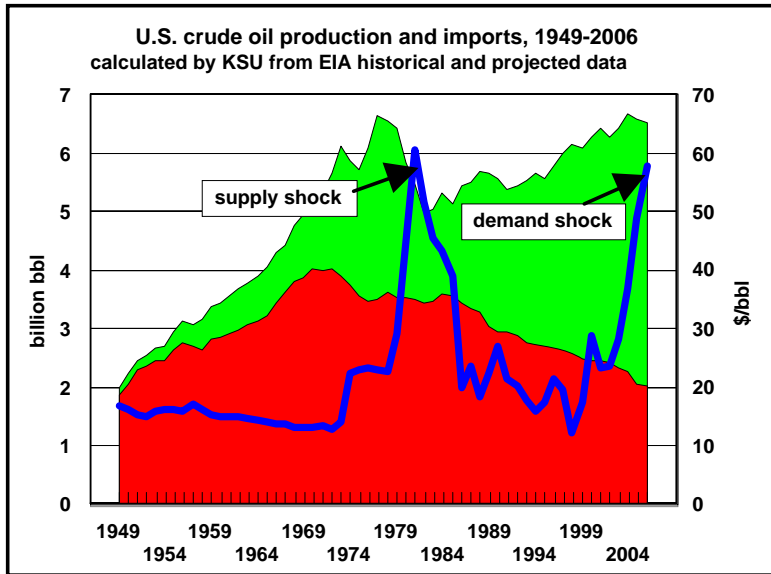


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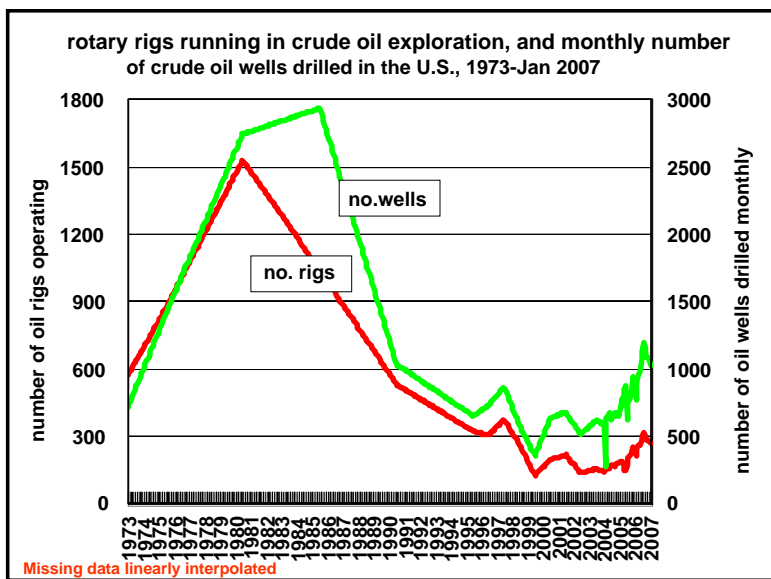


Is crude oil self-sufficiency a reasonable goal? Substitutes for crude? 7.5B gal ethanol might replace 0.098B bbl crude (2.18% of 2006 imports)

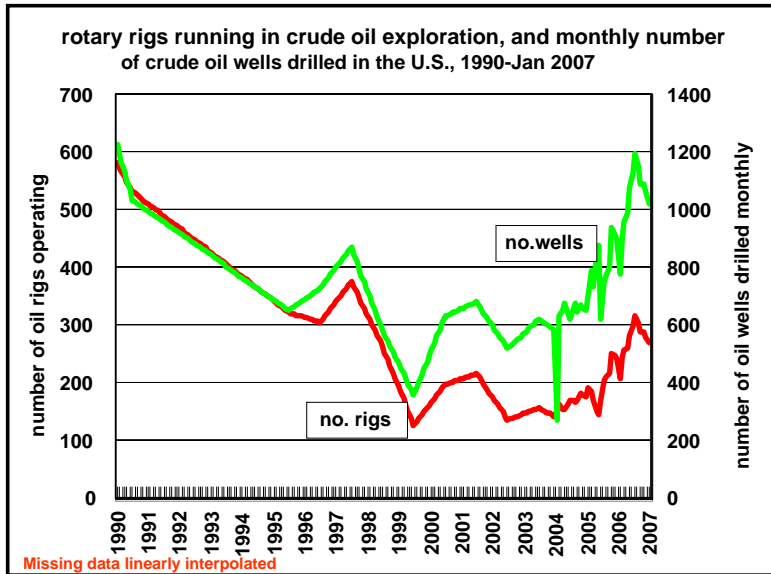




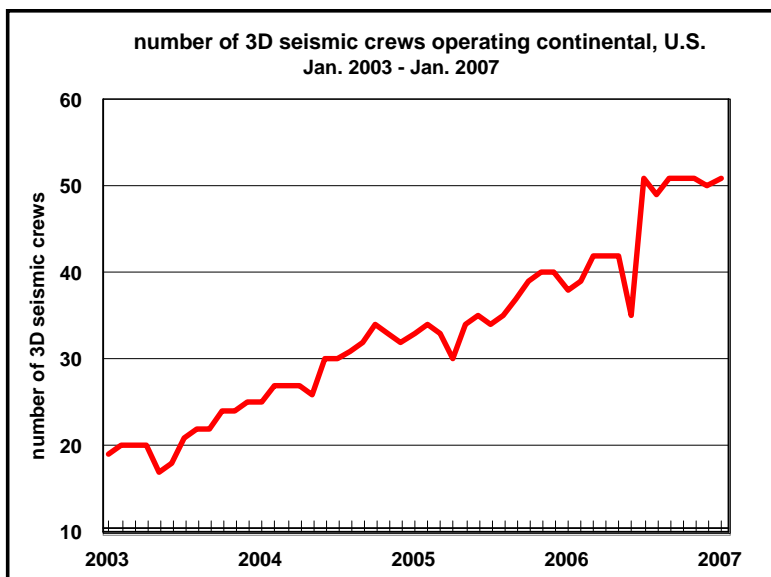
Markets will still work; but will prices fall as fast this time?



Price decimated the U.S. oil industry in the late 1980s and 1990s



Markets will work again and supply will increase as demand is tempered



The petroleum industry is NOT sitting idly by!

Renewable Energy



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Drivers of the Biofuels Industry

- **Ethanol**
 - States ban MTBE
 - States mandate ethanol inclusion
 - Subsidies
 - High energy prices
- **Bio-diesel**
 - Low sulfur requirements for diesel
 - Subsidies
 - High energy prices

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Major Renewable Energy Opportunities for Kansas Agriculture

- Ethanol from Commodity Crops
 - corn
 - sorghum
- Biodiesel
 - soybeans
 - animal fats
 - other feedstocks (annual and perennial oils)
- Bioethanol
 - herbaceous energy crops (switchgrass)
 - corn and other crop stovers
- Anaerobic Digestion of Livestock Manures
 - dairy operations only

Source: Richard Nelson, Biological and Agricultural Engineering, KSU

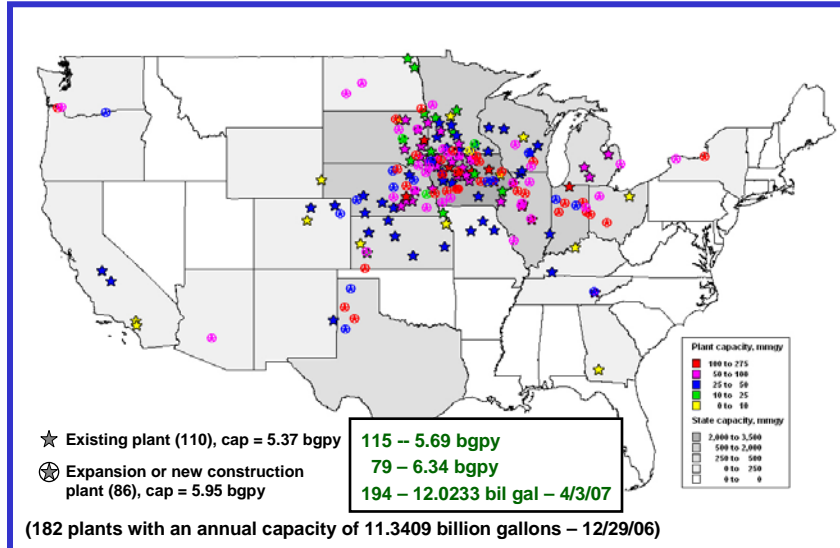
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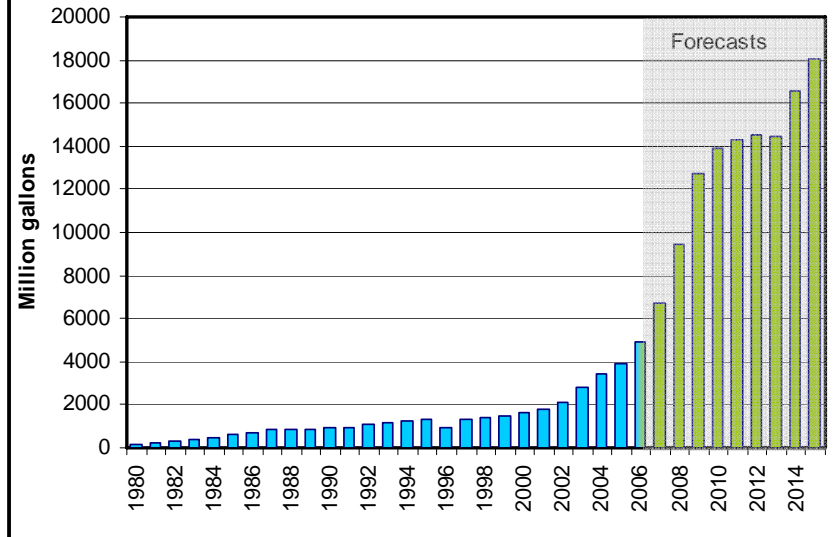
Existing and new ethanol plants

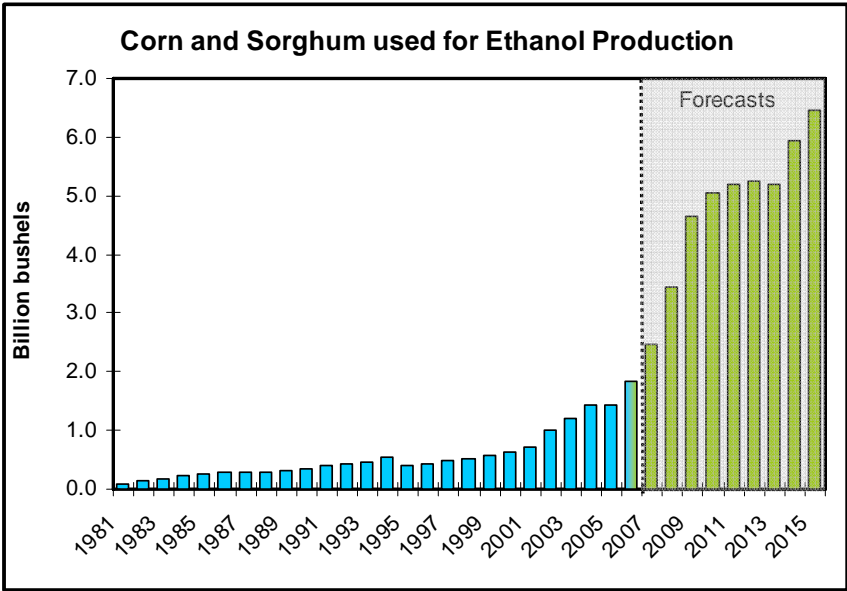
Source: Renewable Fuels Association (RFA), Kansas State University



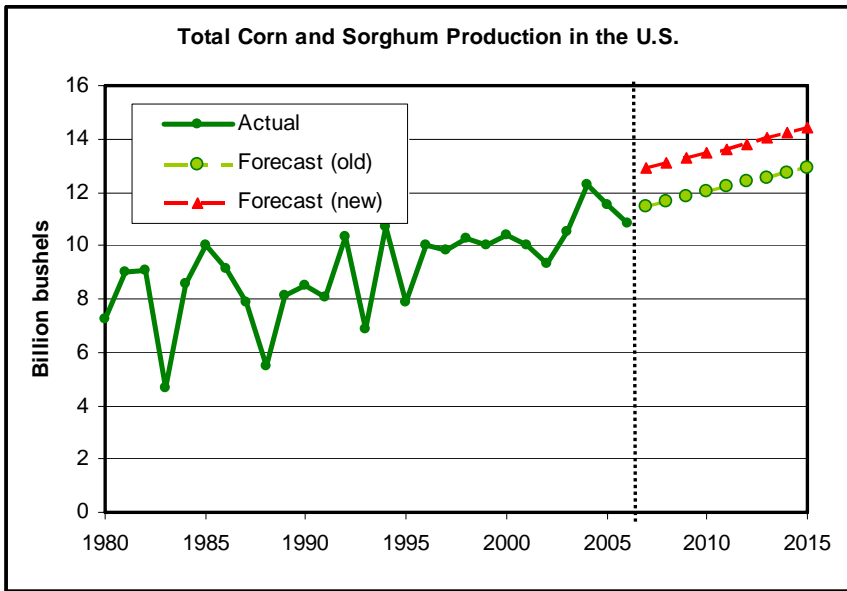
(143 plants with an annual capacity of 7.27 billion gallons – 7/26/06)

Total Ethanol Production





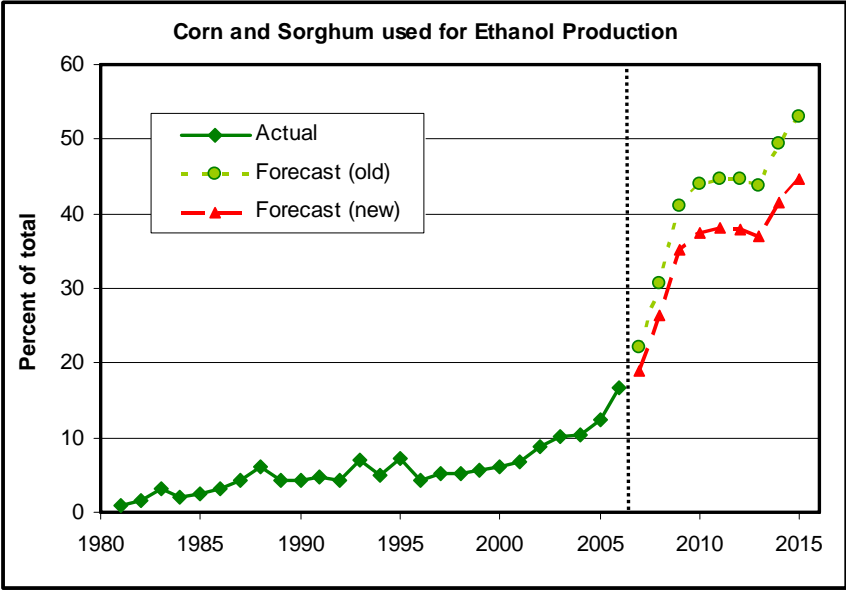
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Old forecast is based on linear trend from 1990-2006 only (no adjustment for acres)

New forecast is based on 2007 acres and 1990-2006 trend yield

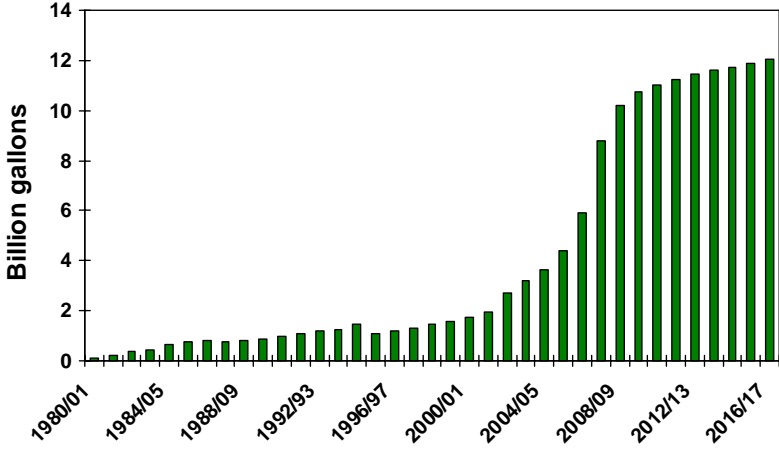
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Fairly obvious why we will need considerably more corn acres

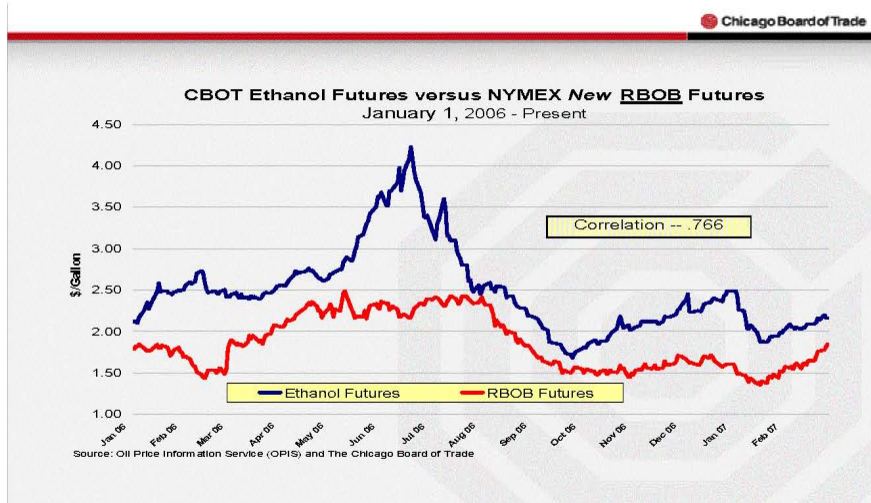
Projected Corn Ethanol Production

expect 12 bil. gal. in 2016/17– 30% of corn crop



Source: Collins, K. "The New World of Biofuels: Implications for Agriculture and Energy." EIA Energy Outlook, Modeling, and Data Conference, March 28, 2007

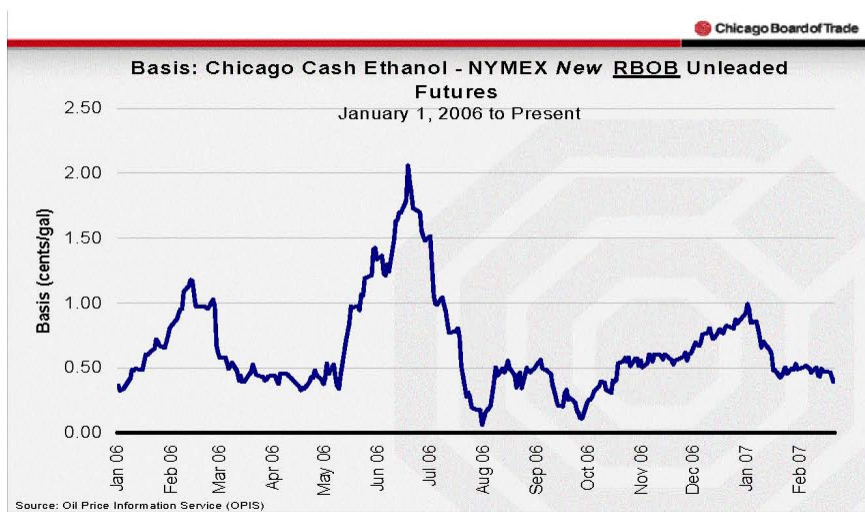
Is ethanol a substitute or an additive? More like gas every day . . .



RBOB (reformulated blendstock for oxygenate blending); RFG w/o oxygenate; will completely replace RFG (which contained oxygenate) as gasoline being traded

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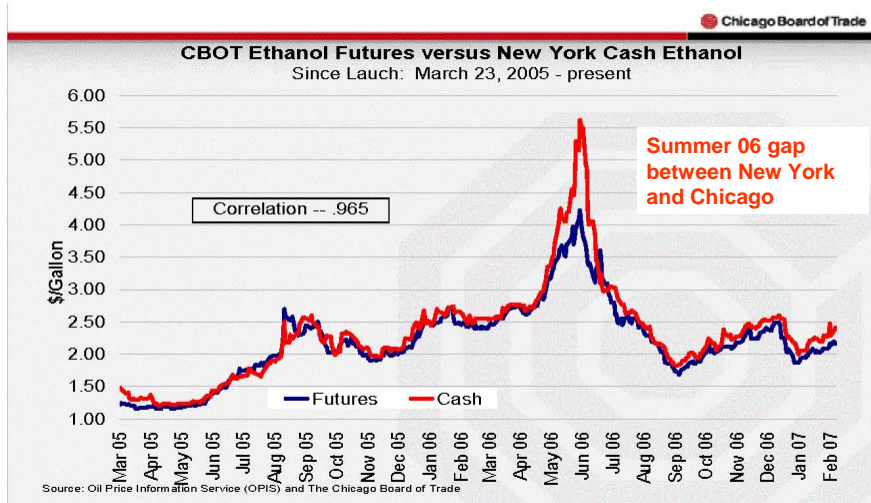
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Settling in on \$0.50 premium (subsidy?)
But, what about BTU difference?

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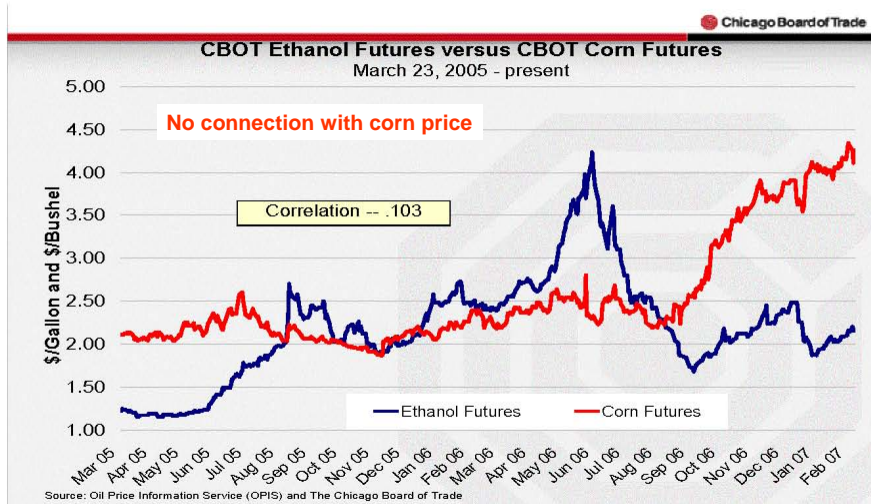
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New York saw ethanol \$3.50 above gasoline in summer 2006!

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Ethanol consideration for grain producers (July 31, 2006)

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CBT Corn - D Futures Click on the chart icon to view the graphical chart [print version](#)

Contract	Open	High	Low	Last	Change	Bid	Ask	Vol	Op Int	Time
SEP 06	0	2392	2364	2372*	-4			26498	403640	13:43
DEC 06	0	2560	2530	2534*	-6			46402	546433	13:43
MAR 07	0	2696	2670	2672*	-10			4029	118973	13:43
MAY 07	0	2790	2766	2770*	-6			520	24978	13:43
JUL 07	0	2880	2850	2856*	-6				961	13:43
SEP 07	0	2934	2910	2930*	-10				750	13:43
DEC 07	0	3024	3000	3004*	-14				518	13:43
MAR 08	0	3120	3114	3114*	-10				853	13:43
MAY 08	0	3194	3174	3174*	-24			5	2947	13:43
JUL 08	0	3260	3240	3242*	-16			1145	8856	13:43
SEP 08	0	0	0	3204*	-14			0	544	13:44
DEC 08	0	0	0	3236*	-20			1315	55004	13:43
DEC 09	0	3390	3376	3380*	-16			187	463	13:43

Click on the chart icon to view the graphical chart

Ethanol demand premium?

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Ethanol consideration for grain producers (Apr 17, 2007)

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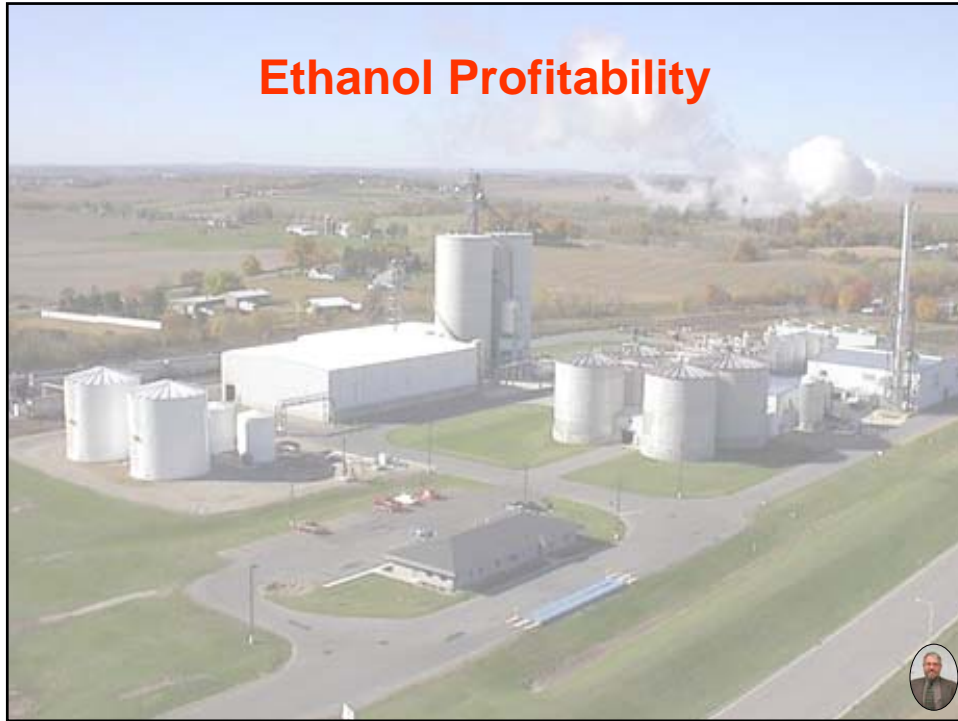
More Info	Month	Last	Chg	Open	High	Low	Volume	Open Int	Trade Time
chart options	May-07	353'2s	-1'0	368'0	369'4	352'4	503	195498	04/17/07 13:35
chart options	Jul-07	365'2s	-1'0	379'4	381'2	364'4	791	450432	04/17/07 13:35
chart options	Sep-07	370'4s	-1'4	385'4	386'2	370'0	153	93729	04/17/07 13:35
chart options	Dec-07	379'4s	-1'0	393'0	394'4	378'4	500	413745	04/17/07 13:35
chart options	Mar-08	389'6s	-1'0	404'0	405'0			47067	04/17/07 13:35
chart options	May-08	397'0s	-1'0	411'0	411'0			10621	04/17/07 13:35
chart options	Jul-08	401'0s	-1'0	415'0	415'0			25436	04/17/07 13:35
chart options	Sep-08	392'4s	-6'2	398'0	398'0	392'0	16	6242	04/17/07 13:35
chart options	Dec-08	391'0s	-6'4	400'0	401'0	390'0	112	109475	04/17/07 13:35
chart options	Mar-09	397'0s	-6'4	398'4	398'4	395'0	8	789	04/17/07 13:35
chart options	Jul-09	400'0s	-6'4	402'0	402'0	400'0	6	732	04/17/07 13:35
chart options	Dec-09	385'0s	-3'4	390'0	390'0	385'0	158	13489	04/17/07 13:35
chart options	Mar-10	389'0s	-2'4	390'0	390'0	389'0	4	40	04/17/07 13:35
chart options	Jul-10	393'0s	-1'4	---	---	---	0	71	04/17/07 13:35
chart options	Dec-10	384'0s	-1'0	384'0	384'0	384'0	3	1429	04/17/07 13:35

Tue, Apr 17, 2007 4:31 PM CDT *Quotes are in market time

Ethanol demand premium?

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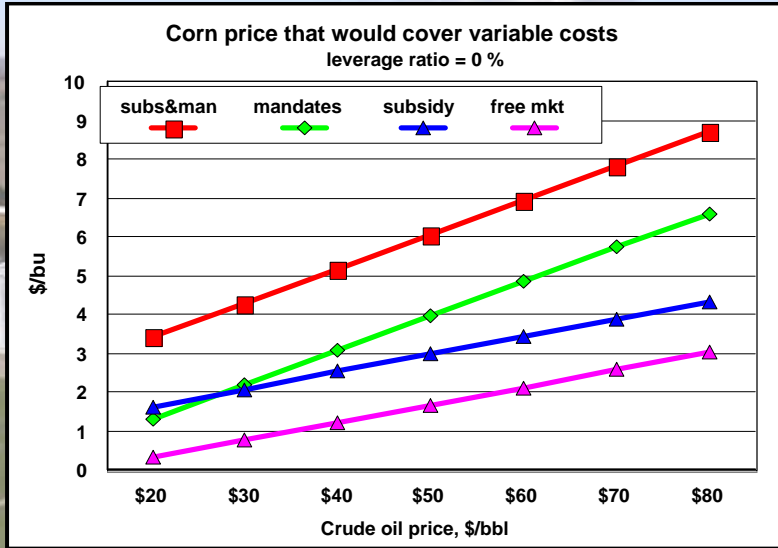
Ethanol Profitability



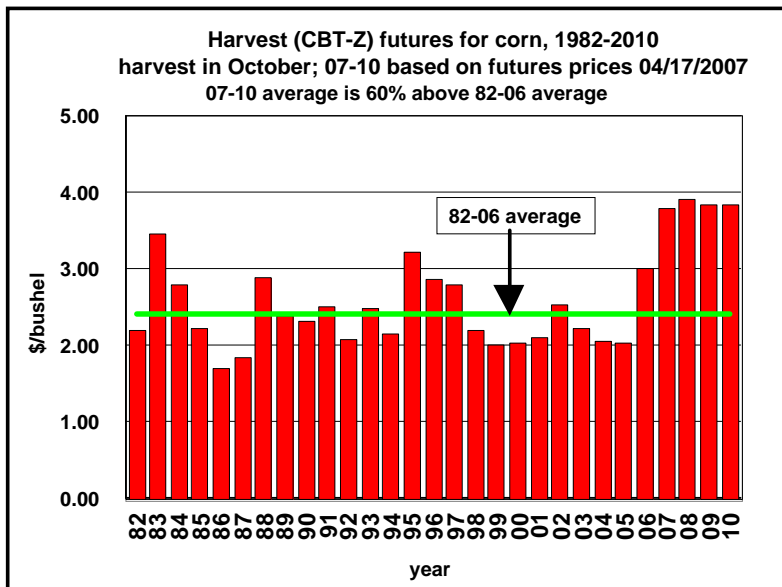
Ethanol Assumptions

- 2.75 gal ethanol/bu of corn
- 18 lb DDG/gal ethanol
- DDG valued at 1.0263 of corn price
- 0.038 MCF natural gas/gal of ethanol
- 0.05 gal gasoline added to a gal ethanol to make 1.05 gal
- Btu of ethanol (with denaturant) is 62.73% of gasoline
- 0.80 Kwh/gal ethanol at \$0.06/Kwh cost
- \$1.67/gal annual capacity is initial investment
- 6% loan interest rate
- \$0.51/gal subsidy (no state subsidies)
- \$0.2202/gal costs for non-corn, non-natural gas, and non-denaturant
- Natural gas and gasoline prices predicted with a statistical model using crude oil as determinant
- Ethanol price based on gasoline & subsidy & Btu adjustment

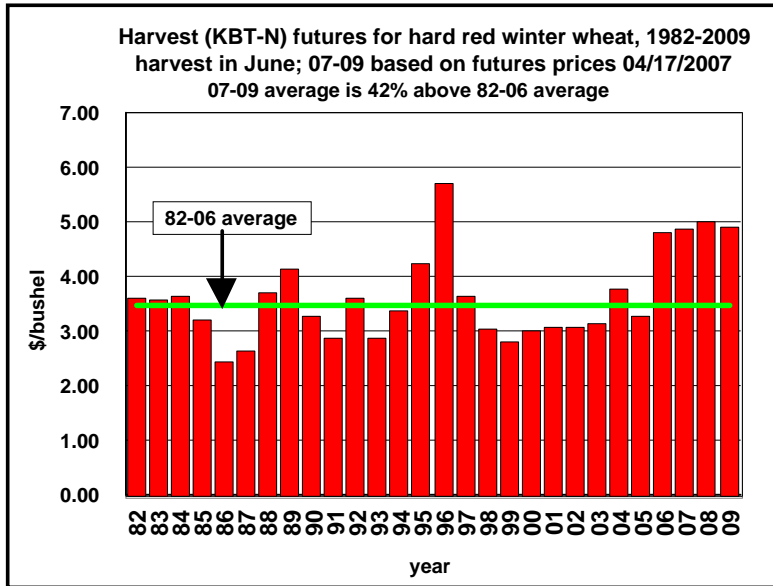
Ethanol Profitability...



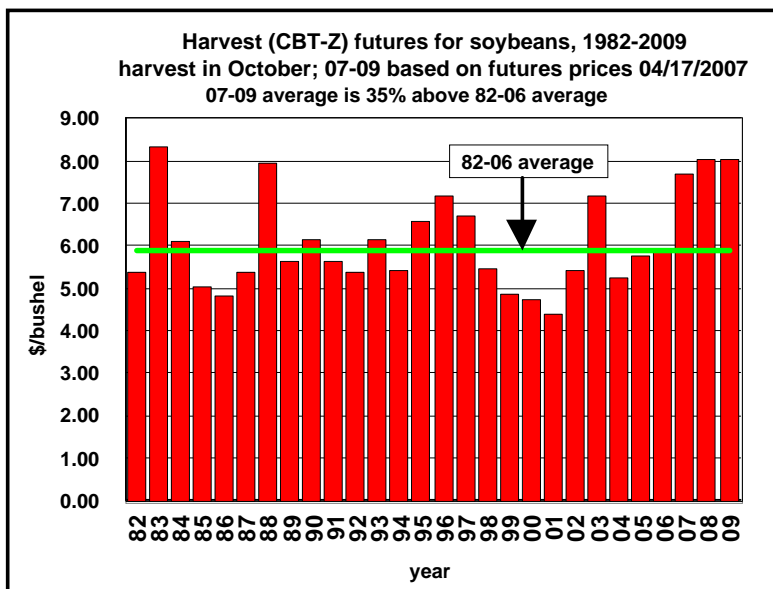
If mothballing costs are high, effective breakeven prices are higher



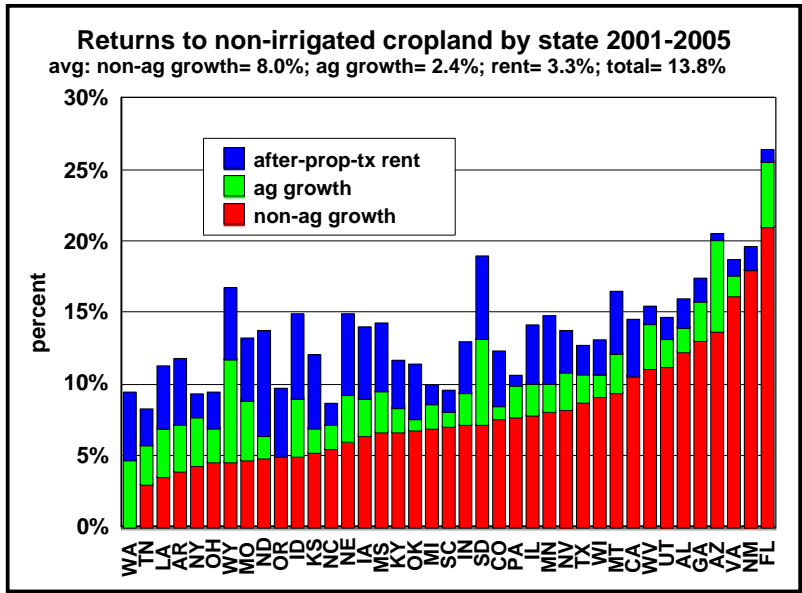
Unprecedented opportunity in corn production – even 4 years out!



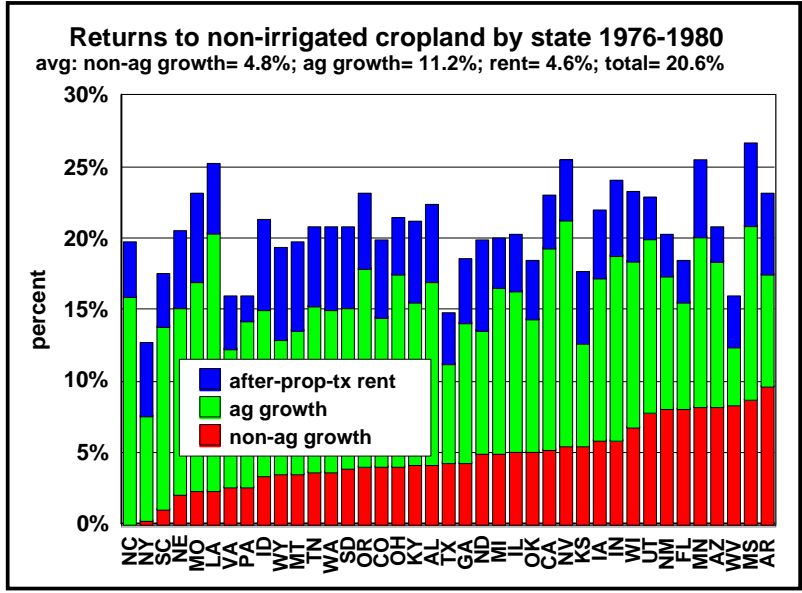
But, wheat will be impacted as well . . .



As will be soybeans . . . as acres are drawn to bio-fuel crops

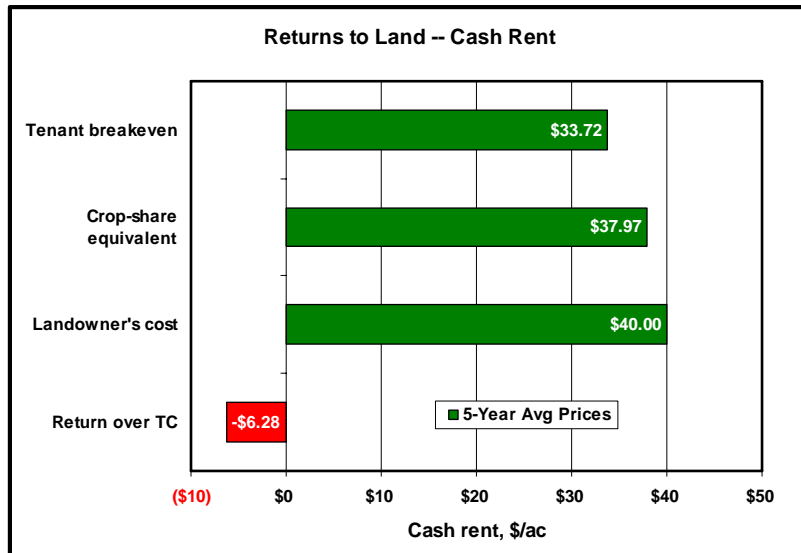


Non-ag growth much more important lately; total returns not especially high



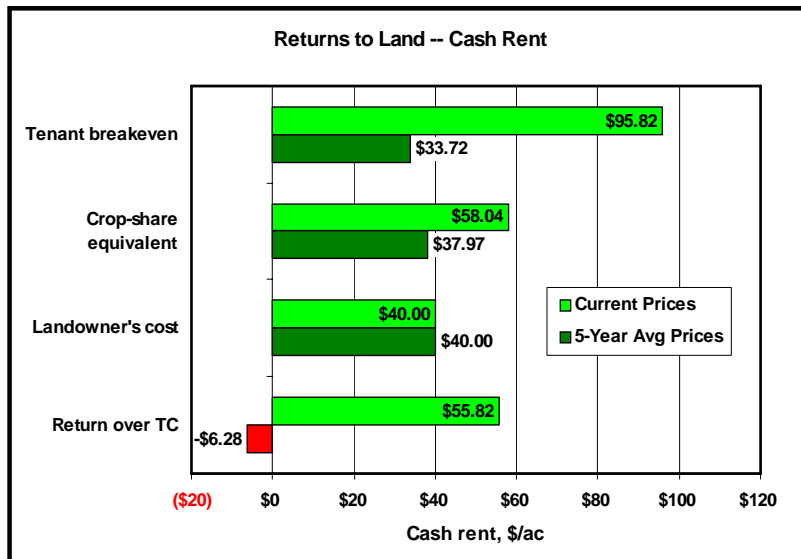
Dominated by growth in ag rents (inflation); total returns very high

Estimated cash rents for Central Kansas (5-year proj. prices, Aug 2006)



Based on KSU Farm Management Guides and KSU-Lease.xls
(available at www.agmanager.info)

Estimated cash rents for Central Kansas (2007, forward bids 3/12/07)



Based on KSU Farm Management Guides and KSU-Lease.xls
(available at www.agmanager.info)

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Department of Agricultural Economics K-State Research & Extension College of Agriculture Kansas State University

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Livestock and Hay Charts
December 13, 2006 by Jim Mottet

In The Cattle Markets
December 12, 2006 by Jim Mottet/LARC

Livestock Outlook Radio Program
December 11, 2006 by Jim Mottet/LARC

Factors Impacting Dairy Profitability in 2007 (revised)
December 11, 2006 by Kevin Dhuyvetter and Terry Kassens

Current Grain Outlook Newsletter
December 11, 2006 by Mike Woodworth

Seasonal Prices - Crops and Cattle (Excel spreadsheets)
December 3, 2006 by Kevin Dhuyvetter

Monthly NH3 and Diesel Price Forecasts
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Grain Outlook, presented at Kansas Commodity Classic
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Livestock Management Update
November 10, 2006 by Rodney Jones

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Machinery Decision Tools - Excel spreadsheets to evaluate costs of owning and operating balers, combines, tractors and sprayers.
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