

**IMPACT OF ENERGY MARKETS  
ON THE  
COST OF PRODUCTION**  
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**Impacts on Production Agriculture**  
Background

- Unprecedented crude oil price volatility starting in 1997 (Asian financial crisis).
- Oil has been driven by OPEC supply discipline.
- Natural gas market - - rising U.S. demand and stable to declining regional supplies.
- Oil and natural gas prices likely to remain at high for next several years.

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**Crude Oil**

- Crude Oil currently in \$90-140/barrel range. (volatile Market) (8 OCTOBER 2008 - - oil had dropped to \$82/Barrel)
- No new refining capacity built in U.S. over past 25 years. Environmental concerns, permitting, and costs are a major issue.
- Appears to be adequate crude oil supplies, but bottleneck is refining capacity. Exporting countries are sending refined product in addition to crude.
- Continued political unrest in southwest Asia (Afghanistan, Iraq, Iran, Syria) --certainly a major variable - - (major oil production region).
- Economic growth in developing countries in Asia such as China and India "fueling" demand for petroleum products.

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**Crude Oil Continued**

- Hurricanes "Katrina and Rita" and most recently "Ike" shut down nearly 30 percent of refining capacity in the U.S.
- Although this is short term (hurricanes) - flow of supplies to east coast and other regions have been reduced to a fraction of need (An immediate "spike" in retail gas prices).
- Consequences are increased price volatility, reduced supplies, increasing demand, and higher costs of production in all the vital sectors of the U.S. economy.
- Bottom line is higher retail prices as energy costs are "passed through". The exception, of course, is production agriculture.

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**Production Agriculture**

- Has been hit particularly hard by increased petroleum prices. Diesel fuel (farm fuel), has increased from \$1.40/gallon in 2004 to \$4.20/gallon in July, 2008 - nearly a 300 percent increase. Anhydrous Ammonia (NH3) at \$1,400/ton currently (September 2008).
- Current farm energy consumption
  - Direct energy: Includes diesel, gasoline, LP gas, natural gas and electricity
  - Indirect energy: Fertilizers, herbicides, pesticides, and machinery, repair parts, etc.

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**Production Agriculture Continued**

- In 2002, total energy consumed by U.S. farms (1.7) quadrillion Btu's)

Direct Energy:	
Diesel	27%
Electricity	21%
Gasoline	9%
LP gas	5%
Natural gas	<u>4%</u>
	66%
Indirect Energy:	
Fertilizer	28%
Pesticides/herbicides	6%
other related uses	<u>??</u>
	34%

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- Increase in energy costs are greatest for feed grain (corn, milo, barley, etc.) and wheat.  
Wheat – 52% of total operating costs
- Beef cattle operations have small energy expenses relative to crop producers.  
3-7% for cow-calf but impact on feed production costs.

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**Production Agriculture Continued**

- Other related uses (machinery production, repair parts, transportation, etc.) not contained in the total energy consumed equation.
- Figure 1 demonstrates energy consumption from 1965 – 2002.
- Appears consumption has declined from peak levels observed in late 1970's, but the use of the five direct energy sources has remained consistent since early 1990's.

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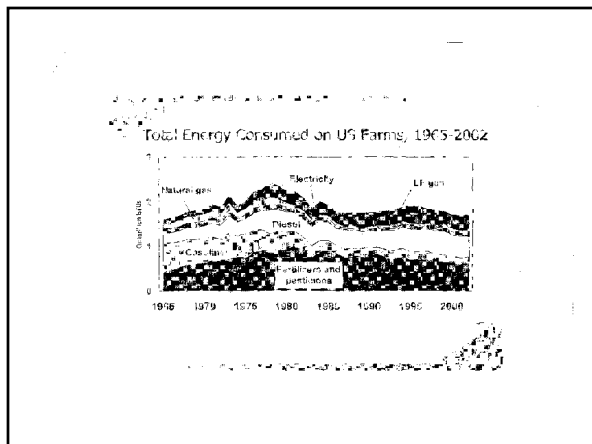
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**Production Agriculture Continued**

- Based on John Miranowski’s research, Iowa State University, 2004, it appears:
  - Direct energy accounts for 5 -7 percent of total farm expenditures.
  - Indirect energy accounts for 9 – 10 percent of total farm expenditures.

Assuming Miranowski estimate is reasonably accurate, what are the likely short-run impacts on key Colorado agricultural commodities?

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**Fertilizer/Herbicide Cost  
Selected Comparisons (2005-2008)  
Northern Colorado**

Dry Fertilizer (Bulk)	Size	January	
		2008 Price	2005 Price
0-0-60	Ton	\$1,000	\$335
11-52-0	Ton	\$1,450	\$400
46-0-0	Ton	\$1,100	\$450
Liquid (truckloads)			
32-0-0		650	280

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**Fertilizer/Herbicide Cost Continued**

Chemicals	Size	January	
		2008 Price	2005 Price
Atrazine 4-L	2.5 gal.	20.00	11.50
Roundup Weather max	2.5 gal.	81.00	38.50
Rodon 22-K	1 gal.	125.00	110.00
Alliance	2.5 gal.	15.50	10.50
Lorsban 4-E	2.5 gal.	45.00	40.00
Tilt	1 gal.	394.00	385.00 (2006)

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**Short Term Coping Strategies**

- Change tillage practices - - limited till system. May require investing in different tillage implements.
- Changing enterprises to less energy intensive crops. Move away from corn silage to alfalfa or other forages.
- Low-water-use irrigation - - more acres converted to energy reducing low-pressure systems. (35% of irrigated corn use low-pressure).

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**Short Term Coping Strategies**  
**Continued**

- Nitrogen management - - soil testing (While commercial nitrogen fertilizer is applied to nearly all corn acreage, less than 30% reported using a soil test.)
- Assessing market demand for other commodities with smaller direct and indirect energy requirements - - are there markets for oil based crops particularly related to the emerging bio-diesel/ethanol markets. (Bio-fuels have limited potential). (Currently Bio-fuel is cheaper than regular diesel fuel but there are problems using this fuel).
- Other sources of nutrients - - "green" crops and increased use of manure.

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**Short Term Coping Strategies**  
**Continued**

- Substitution of biotechnology for fertilizers, pesticides/herbicides emerging market.
- Downsizing acreage - - produce on most productive lands - - CRP opportunities and other governmental environmental programs.
- Substitution of labor for capital where possible rather than what we have observed over time.
- Wind power, solar energy are growing in popularity and cost effectiveness.

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**Conclusions**

- Agriculture is an important consumer of direct and indirect energy in crop and animal production.
- Producers do adjust to changes in real energy costs - - making changes relative to input use and production.
- Very vulnerable to energy supply disruptions particularly during planting or harvesting seasons.

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**Conclusions Continued**

- Agriculture is generally energy efficient relative to other sectors.
- Continued consumer demand for processed food items will also impact production agriculture. (Processing sector consumed 1.4 quadrillion Btu's in 2002.)
- Era of adjustment - - adjusting to a higher plateau of energy prices. Farmers and ranchers in the U.S. have excelled when the need to adjust is facing them.

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