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# Drobny Guest Research

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*Andres is on vacation, but obviously many of you are still working hard. Alan has been working the ethanol/corn story for some time now, and kindly agreed to write it up to share it with all of us. - David Berry*  
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## The Truth about Ethanol: Got Corn?

Alan Boyce\*

(\* followed by an anonymous peer review)

There is an ethanol investment boom beginning in this country. Bill Gates, Goldman Sachs, and Morgan Stanley are all notable investors in ethanol plants. For example, Morgan Stanley bought Aventine Renewable Energy LLC three years ago for approximately \$66 million. The company recently went public (symbol AVR) and currently sports a market capitalization in excess of \$1.2 billion. Meanwhile, the share prices of the five other publicly traded ethanol companies have increased between 150% and 300% in the last 12 months (although these stocks have come off recently).

Not surprisingly, the supply of ethanol in the U.S. is exploding. Brazil is widely talked about as the largest producer of ethanol. However, given my understanding of the current plans and development of ethanol production in the U.S., the U.S. may surpass Brazil's ethanol production at some point this year. Even though the Federal mandate requires that the U.S. produce 7.5 billion gallons of ethanol by 2012, I expect that the U.S. will likely reach that hurdle by December 2007!! By 2012, the U.S. may be producing 15 to 20 billion gallons of ethanol.

After all, it only takes roughly \$30 million in capital and approximately 12 months to construct an ethanol plant. Here is a hypothetical look at the economics of a standard ethanol plant. These estimates indicate why the supply of ethanol in the U.S. is increasing so rapidly.

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## Hypothetical Economics of Corn Ethanol (Standard Dry Mill Ethanol Plant – 55 million gallons per year)

	Calculations	Totals (Approximate)
Start Up/Building Costs	\$100 million total cost (financed 70%), total out of pocket is \$30 million	(\$30 million plus interest)
Small Producers Tax Credit (one time)	\$1.5 million	\$1.5 million one time
Ethanol Revenues	55 million gallons of ethanol at \$2.55 per gallon (CBOT Sept 06 Delivery)	\$140.25 million per year
Byproduct Revenues (Wet distillers grain)	500,000 tons at \$50 per ton	\$25 million per year
Blenders Tax Credit	Approx. 50 cents per gallon	\$27.5 million per year
Input Costs – using Corn (1 bushel of corn equals 2.8 gallons of ethanol)	19.6 million bushels of corn at \$2.42 per bushel (CBOT Sept 06 Delivery)	(\$47.4 million) per year
Other Operating and Transportation Costs	Approx. 80 cents per gallon	(\$44 million) per year
<b>Total Annual Income (Approximate)</b>		\$72.85 million (not including interest expenses)
Return on Capital	\$72.85mm/\$30mm	243% per annum

While these figures may vary, they provide a sense of how profitable an ethanol plant is in current market conditions. (Spot ethanol – ETHNNYPR Index -- actually trades at \$3.10 per gallon.) And, with the price of energy remaining stubbornly high, ethanol investment should remain extremely strong.

Yet, there are several developments that are worth looking out for:

1. In some instances, ethanol plants are being built for boom times without regard for tougher operating conditions. *Ethanol plants are being built where corn is grown. In my opinion, this is a mistake. Ethanol plants should be built where corn is consumed – near dairy farms – because the current transportation infrastructure in the U.S. is built to haul feedstock, not ethanol.* To re-invent the entire U.S. agricultural logistics chain will take a generation and incalculable capital. Co-location with dairy farms in California reduces production costs by ten cents per gallon as compared to making the ethanol in a Nebraska corn field.

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2. Ethanol plants should be constructed in optimal operating environments to maximize revenues from byproducts such as wet distillers grain (sold to CAFOs) and carbon dioxide (sold to beverage bottling plants). Approximately one-third the cost of the price of corn can be offset through the sale of these byproducts. A wet distillers grain model reduces the thermal energy required to make ethanol by over 30%.
3. Ethanol is competitive with gasoline as long as petroleum is greater than \$35 per barrel.
4. Import Tariffs – In 1980, Congress imposed a 54 cent per gallon import tax to protect U.S. corn farmers. (Ethanol costs roughly 80 cents per gallon to produce in Brazil vs. roughly \$1.20 in the U.S.) Cargill and others are transporting hydrous ethanol from Brazil to CAFTA countries (Dominican Republic, Guatemala, Panama and Nicaragua), which (provided the ethanol is produced with at least 50% Caribbean feedstock) are exempt from the tariff, dehydrating the ethanol into fuel, and shipping the fuel to the U.S. This CAFTA exemption is limited to 7% of total ethanol consumption in the U.S...
5. The price of inputs such as corn, wheat and barley should continue to rise because the capacity of US farmers to meet demand for corn is limited. A well run ethanol business should expect to use two thirds of its capital base for hedging purposes.
6. There are ongoing discussions between the U.S. government and Brazil on the gradual phase out of the tariff. This may be tied to a larger trade initiative leading to Brazil joining FTAA.
7. Ethanol from sugar cane is expanding quickly in many countries, especially Brazil. It should be noted that cane based ethanol produces more than twice as much ethanol per acre. Sugar cane production is tied to the local mill, thus eliminating the input price risk in the production equation.
8. Cellulosistic conversion technology is in the process of being transferred from the laboratory to the factory. Iogen and Dedini corporations both claim to be able to convert cellulose into fermentable sugars. If this proves cost effective, the biomass feedstock availability may increase by an order of magnitude. This will be especially valuable for sugar cane based biofuels production, given the existing logistics chains.

Needless to say, you should evaluate the risks of in ethanol plants or companies that have not addressed or considered these issues. The last time there was an ethanol boom in the 1970s, more than half of the ethanol producers went out of business.

Ok. So what is the trade?

In President Bush's State of the Union address, he stated he would like to eliminate 75% of the U.S. reliance on Middle East imports and he said that the easiest way to do that

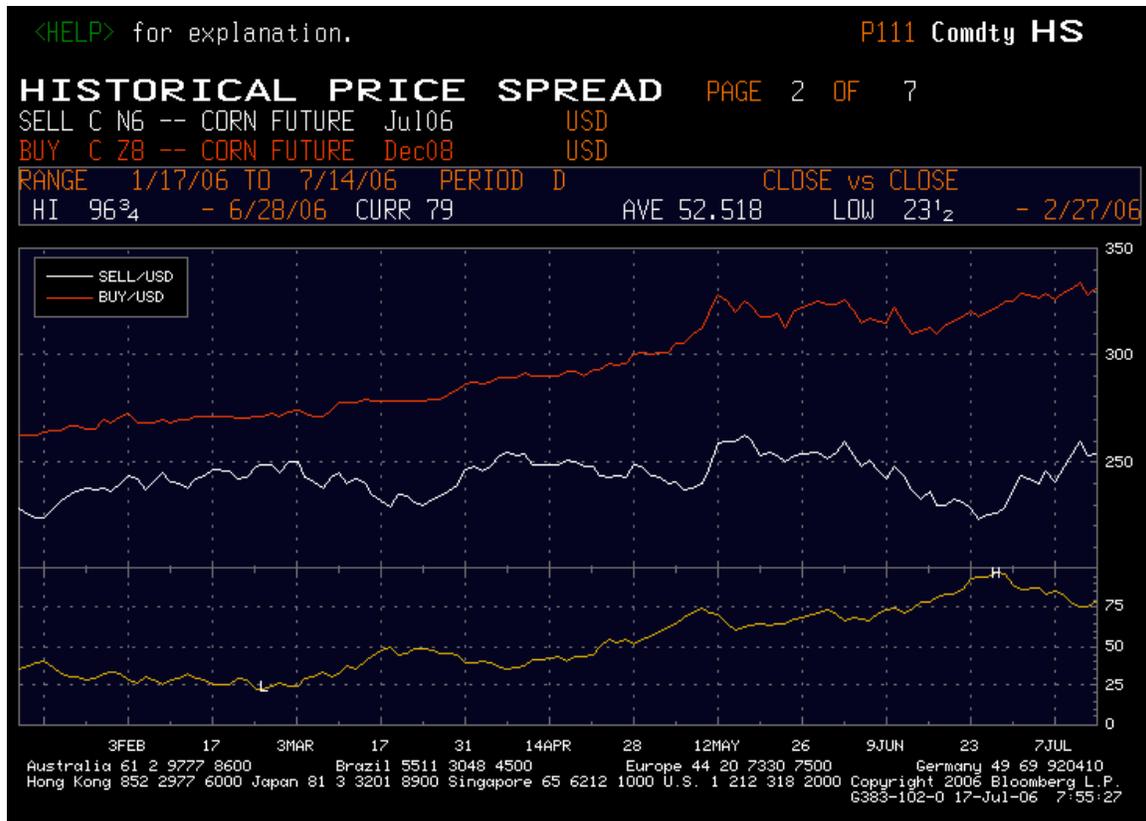


was to increase the production of ethanol. The idea is to increase the use of renewable fuels (mainly ethanol) to comprise 20% of all portable fuel in the US.

The U.S. is projected to consume 140 billion gallons of gasoline and 75 billion gallons of diesel this year. That would require production of approximately 45 billion gallons of ethanol. If this ethanol is all corn-based (technology and other feedstocks/biofuels may help reduce this number, but these methods are largely unproven and/or in their early stages), this would require approximately 15 billion bushels of corn per year. According to the National Corn Grower's Association, in 2005, the U.S. produced more than 11 billion bushels of corn – a record crop – but only 1.5 billion bushels were used by ethanol facilities. NCGA estimates that corn production can grow to 15 billion by 2015 but have earmarked only 6 billion bushels for ethanol demand.

The market is not so convinced that corn farmers will be able to meet demand. Take a look at December '08 corn. It trades at \$3.25/bu versus \$2.39/bu for September '06. There has been a sizable move in the past 6 months.

### Spread between July 06 Corn and December 08 Corn





Yet, relative to historic prices, December '08 corn priced at \$3.25/bu does not seem to reflect the extremely bullish prospects for corn demand based on current energy prices. Nor does it reflect any scarcity value in corn for other uses. When oil prices last reached record levels in the 1970's, the price of corn reached \$4.00 per bushel. The standard ethanol plant's production costs (according to our calculations above) rise only \$12 million with a 25% increase in the price of corn. The amount of farmland required to supply just one corn based ethanol plant is over 125,000 acres. If the corn is grown in a standard rotation, double the acres. One ethanol plant needs 50,000 to 125,000 dairy cows to eat the wet distillers grains. Adding an extra storage tank and pipes at a local gasoline blenders rack costs less than \$1 million. The farm and feed ends of this biofuels chain cost more than \$1.25 billion to purchase and build! Be mindful of the hard to replicate bits in the entire biofuels chain.

For the upcoming crop year, corn consumption for ethanol production will increase by over 600mm bushels, to levels greater than the corn export rate. At the same time, China has diminished its corn stocks and has ceased to be a corn exporter. China is currently the world's 3<sup>rd</sup> largest ethanol producer. China has mandated an E10 standard (10% ethanol in gasoline) in 8 provinces and the government is contemplating the same regulations for Shanghai, Beijing and Tianjin which will make them a significant corn importer given the expansion of domestic auto ownership.

The price of corn is becoming increasingly linked to the price of the energy commodities but it has not yet traded to that level. If corn were to trade in line with its value as a portable fuel, it would trade closer to \$7.50 per bushel! Do not take these figures lightly. Grain based ethanol plants will continue to be built until the marginal producer makes no money. The barriers to entry are very low.

The same logic can be applied to other ethanol feedstocks; wheat and barley. The simple process of trans-esterification can turn oil from soybeans, palm, canola and sunflower into biodiesel. Chickens, hogs and feeder cattle depend on significant amounts of corn and other feed grains. For animal feed operations to remain profitable, the price of animal protein must rise with feed prices.

The bottom line: corn prices and meat prices will be more linked to energy prices.

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*Peer Review by an anonymous member of the group:*

Well researched piece and very interesting data on the current state/prospects of the US Ethanol business. Also the impact of the coming fuel-versus food (or feed) trade-off is one which has not been widely appreciated. The trade is more or less what we've been doing the last 2 years, buying the longest dated available CBT corn contract. Shorting the nearby against it has pitfalls, of course you have to keep rolling it, involving regular transaction costs and weather considerations in successive delivery crop months. Also the contango in '08 is high now as interest rates have moved up as well as investors getting in to this very exposure over recent months. Then again people like me are maybe too close to the market to see the obvious – perhaps should just go in and BUY it.

Some mention of the future structure of the ethanol industry would also be interesting – will the oil/agrochem majors buy out all the independent plants and control the market in the future? That could be bearish for corn as they use their pricing power to buy in bulk/act as monopsonists, as they do in the developing world. The comparison between prospects/profits in bio-diesel as opposed to ethanol is also a major issue. So the bean oil/palm -- oil/cottonseed -- oil/canola/jatropha trades may have better risk reward than Dec'08 corn, and should be mentioned at least for comparison.

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