

Is Ethanol Value Being Degraded?

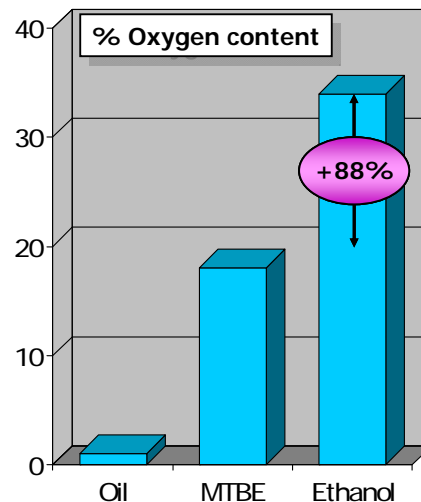
In recent weeks, there have been numerous articles in the media that convey a noticeably negative view of ethanol biofuel. For 2007, industry estimates are for production of ~6 billion gallons of ethanol and, while the frantic pace of investment has slowed, there is still a generally positive sentiment. Puzzled by this contradictory information we did an analysis to better understand the current situation.

First, we confirmed that corn grain is the feedstock of choice and is used for 96% of the ethanol produced: grain sorghum is the source of the other ~4%. The immediate thought is then that perhaps the negative media is focused on being anti-corn, rather than against ethanol *per se*. Exploring that idea further we did find some supporting evidence. For example, there are several recent articles in support of the so-called cellulosic ethanol, with requests to increase public financial support specifically for cellulosic ethanol. This is a peculiar situation since cellulosic ethanol is a commercial myth, with no production at present and no financially viable methods for production likely for at least ten years.

On the practical commercial front, there seems to have been a concerted campaign to convince the public that corn-ethanol was somehow a major factor behind increased food prices: yet it only takes a cursory analysis to see that any effect of corn is very small compared to other inflationary factors (e.g. check the price increase in fruit and vegetables), or price increases due to higher transport fuel costs. There has also been a regurgitation of the negative energy issue which had arisen a few years back, despite the fact that this myth has already been adequately dealt with by numerous scientific studies. Then, recently several news stories referred to a “glut” of ethanol which seemed surprising. Consequently, we analyzed what a “glut” might look like and compared to the real situation today. It quickly becomes apparent that there is a false belief that ethanol is primarily used as an alternative fuel. Use as an alternative fuel is less than ~6% of the total production, while 94% (5,640 million gallons) of ethanol is used as an oxygenate. The following chart shows the features of ethanol and the oxygenate value.

	Gasoline	Ethanol
Content	C ₆ -C ₁₂ hydrocarbon	CH ₃ CH ₂ OH
Vol Wt:lbs/gal	6.0 – 6.5	6.59
Octane: AKI	86-94	112-115
Boil pt °F	90-400	173
Energy/gal LHV	114,000	76,000
RVP (psi)	8-15	2.3
Air-fuel ratio	15	9
Source	Crude oil	Corn: Grain
Products	Gasoline formulations	Blends E10 to E85
Value-add benefit	--	Oxygenate

LHV = lower heating value. RVP = Reid vapor pressure
 AKI = Anti-knock Index = (R+M)/2 as on the pump.
 Ethanol AKI is much superior resulting in more power, acceleration, and cleaner burning gasoline.



Gasoline needs an oxygenate added for performance (higher AKI). Methyl, tert-butyl ether (MTBE) has been the traditional petroleum additive but is being phased-out due to toxicity and environmental concerns. Ethanol is a superior and safer oxygenate additive for gasoline.

Clearly, we can see that corn ethanol has 88% more oxygen than MTBE, and is a superior oxygenate combined with the environmental benefits gained from replacement of MTBE. In the features chart the energy density of ethanol is lower than gasoline but the oxygenate value (AKI) is much higher than gasoline. In practice, this means that low volumetric blends of ethanol (e.g. E10, or E15) provide large benefits that more than offset the slightly lower energy density.

The annual gasoline volume used in America is currently at ~140 billions gallons. If ethanol at E10 were used to improve the performance of all those gallons of ethanol and help lower the emissions of unburned gasoline, the market volume required would be 14B gallons, or 21B gallons at E15 blend levels. Why is it that anyone would think 6B gallons would be a “glut” when the potential market size, with clear benefits, is more than twice that volume?

It can be found that in some areas there is an increase in inventory for ethanol, which is apparently driven by temporary limitations in distribution and infrastructure. These hurdles are expected to be resolved as the overall blending industry grows, and any impact on volumes can hardly be classified as a “glut”. It is also curious that, in addition to domestic production, the Department of Trade statistics show the importation of over 350 million gallons of ethanol so far this year, into the USA. Are the media suggesting we draft some anti-dumping laws for ethanol?

The analytical numbers do not support the current media position of being negative on corn-ethanol. The benefits of replacing MTBE alone support a positive outlook for corn-ethanol. The market volume numbers do not fit with the idea of a “glut”, nor does the import of ethanol. Perhaps those who prefer a good myth to numerical facts should just write a headline that indicates their support for importing more oil from Venezuela, or Iran, converting it into MTBE and using that instead of a domestically-produced product that is safe for the environment, and facilitates rural self-development. How much corn-based ethanol we should have is really a choice for society to make, and there are many complex factors involved, so let’s have the facts first without the added confusion.

Dr. J. McLaren is the Founder and President of StrathKirn® Inc., a technical analysis and business consulting company focused on new technology applications and emerging markets, across the agriculture, biotechnology, and biofuel industries.