

Record U.S. Drought of 2012 Poses Problems for Refiners and Motorists (Part 2)

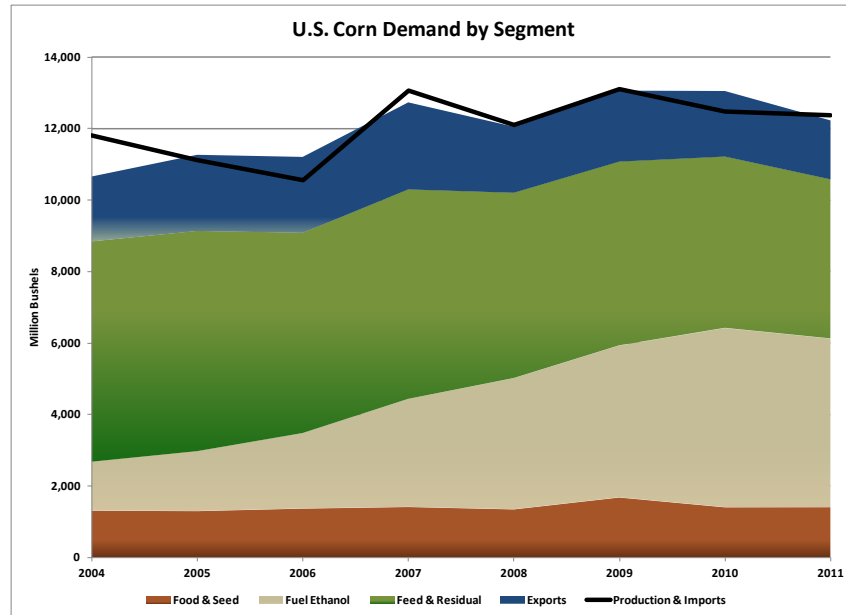
In Part 1 of this report, we discussed the growing extent of the devastating drought affecting much of the country's grain belt. The report concluded with a Muse forecast that this year's corn crop would probably total no more than 10 billion bushels. Now the USDA has issued their own [updated forecast](#) with a new target of 10.8 billion bushels. Part 2 explores some likely responses by the primary renewable fuels stakeholders (producers, refiners and blenders, and EPA) given the growing realization that U.S. corn production is likely to decline by 15 to 20 percent versus last year, resulting in the smallest harvest since at least 2006.

How do market forces establish a balance between the various sources and uses of corn in the U.S? Start with available supply which in any year is composed of three components: Production stemming from the current crop, remaining inventory left over from the previous crop (known as carry-out in corn markets), and imports. Of the three, imports are the least leveraging as the U.S. typically imports only about 15 million bushels per year. In fact, MY¹ 2008 represents the high watermark for imports over the last 15 years when 28 million bushels were brought in. Carry-out is a much larger contributor to supply as the marketplace tends to closely watch the psychologically important 1 billion bushel threshold. Only once in the past 15 years have stocks ended below the threshold when they finished at 958 million bushels following the MY 2003 crop. Indeed, over the same period, annual carry-out averaged well above the threshold at about 1.5 billion bushels. It should come as no surprise then that the largest contributing source of supply is annual production which has averaged 12.6 billion bushels over the past five years. Although production is much higher when compared to prior periods (for example, production averaged 10.5 billion bushels during MY's 2002 to 2006), volumes have fallen in the two years since peaking in MY 2009 at 13.1 billion bushels.

On the other side of the balance, USDA tracks three primary demand segments: Feed & Residual; Food, Seed, & Industrial (of which fuel ethanol demand is a major subset); and exports. From the chart below, it's clear that the accelerating growth in U.S. ethanol production has largely driven the overall growth in corn demand. Demand in the Food & Seed sub-category has been virtually flat while the Feed & Residual demand category (mostly attributed to livestock feed) has experienced a relatively shallow decline. The black line on the chart represents total supply and can be used to visualize the change in inventory from year to year.

¹ MY refers to a Market Year which tracks the crop cycle from the nominal start of the harvest on September 1 of a given year until ending on August 31 of the following year.

The chart also shows that total corn *demand* has exceeded 12 billion bushels every year since MY 2007. Compare this figure with the Muse corn *supply* forecast for MY 2012 which assumes that the year will start with 10 billion bushels of production and only 15 million bushels of imports. If correct, this total will represent 2.4



billion bushels less supply than MY 2011. Furthermore, inventories available for drawdown at the end of MY 2011 are projected to end somewhere between 1.0 to 1.2 billion bushels – a very low level by recent standards. Clearly a supply reduction of the magnitude Muse is forecasting means the market cannot support demand at prior levels for the next 12 to 18 months (assuming that next year’s harvest is more typical of the previous four or five years).

In order to balance available supply *and* leave a minimal working carry-out to start MY 2013, it’s our view that about 1.8 billion bushels of corn demand versus MY 2011 must be eliminated. Even so, ending stocks for MY 2012 would drop to 830 million bushels, resulting in a very uncomfortable stock to use ratio of 7.9 percent. The Muse forecast achieves this balance mostly by reducing exports 1.1 billion bushels versus the previous market year. Feed and residual demand in our forecast takes the next biggest drop at 0.5 billion bushels. The remainder comes from lower ethanol production.

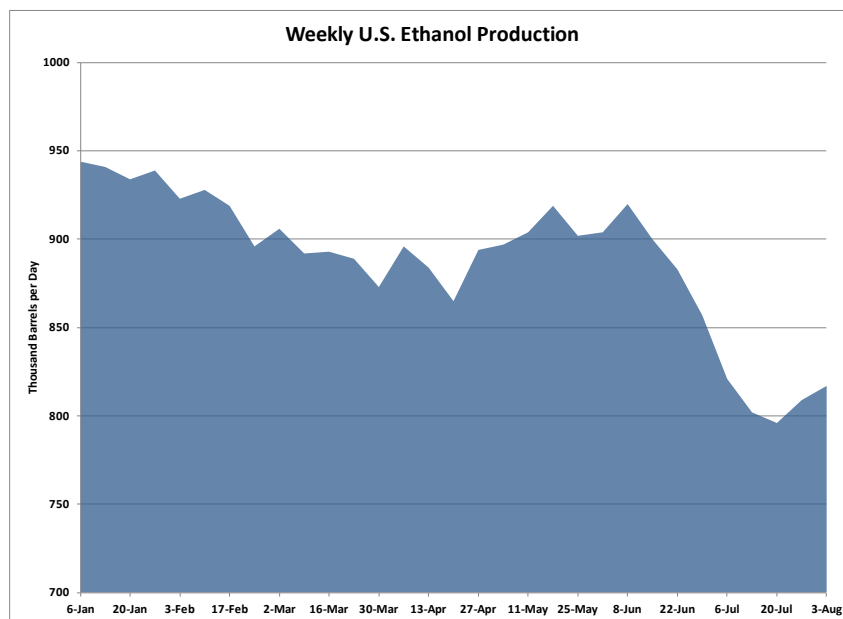
The reductions embedded in our forecast are so large as to be questionable whether or not they can be achieved. For example, the U.S. represents over 50 percent of global corn exports; therefore a 1.1 billion bushel reduction in corn exports from the U.S. would undoubtedly affect global coarse grain trade. However, the previously referenced USDA report forecasts global inventories to end the 2012/2013 market year at 135 million metric tons. If the U.S. reduces exports by our projected amount (equivalent to 25 million metric tons), the global stock to use ratio would remain above 12 percent which is probably adequate to see the market though the next 12 months or so. The reduction in feed and residual demand is also theoretically possible given the ongoing reduction in all types of livestock thanks to the combination of rapidly escalating feed prices and the elimination of adequate pasturage due to the drought.

The remaining cut in our forecast MY 2012 corn demand is due to lower ethanol production. We believe only about 4.55 billion bushels of corn from the current crop will be available to ethanol producers through the end of August 2013, at which time the new crop will begin to reach the market. Given that level of supply, total ethanol production over the same period would then be a little over 12.7 billion gallons (assuming a yield of 2.8 gallons of denatured ethanol per bushel of corn). If history repeats, perhaps another 200 million gallons of ethanol from non-corn sources, mainly sorghum, could be added to the supply base of conventionally produced ethanol. So, absent any more surprises to the downside, U.S. gasoline blenders should have about 12.9 billion gallons of domestic ethanol production at their disposal the next 12 months. Of the total, about one-third will be used to satisfy the remainder of this year's Renewable Fuel Standard (RFS) obligation and the rest against the 2013 RFS requirement (13.2 and 13.8 billion gallons, respectively).

Despite recession, margin volatility, and an array of powerful special interest groups opposed to the mandate, U.S. ethanol producers have done an excellent job of providing enough ethanol to satisfy the mandate every year since it was first imposed in current form in 2007. Indeed, this year started on pace to be no exception as the U.S. Energy Information Administration (EIA) [reports total ethanol production](#) of about 7.9 billion gallons through the end of July. By simple extrapolation, that pace projects out to 13.6 billion gallons by year end – plenty of volume to meet the mandated requirement of 13.2 billion gallons. In order to arrive at a more rigorous estimate of total ethanol blending, the production figure should also be adjusted by imports, exports, and stock changes. Although the EIA data referenced for this report is subject to revision, to date, sources indicate 370 million gallons of ethanol exports through the end of May, perhaps offset by 100 million gallons of imports through the end of July. Furthermore, ethanol stocks at the beginning of August are virtually unchanged versus the beginning of January, eliminating a big build of inventory through the first half of the year. So, even after accounting for the adjustments, the supply picture at the end of July suggests that there could be adequate ethanol on hand to meet the mandate.

A look at the weekly production data by EIA presents a less optimistic picture however. Ethanol production has dropped significantly since early June, bottoming out in late July before starting a slight rebound trend. (See chart below.) Projecting out the remainder of the year using the last two months as a trend results in a total U.S. ethanol production of about 12.9 billion gallons –not quite enough to satisfy the mandate. Further assuming imports cannot catch up to exports already shipped this year, the total available drops to about 12.6 billion gallons or about 600 million less than needed.

This more conservative projection for the remainder of 2012 should still prove to be manageable for refiners and blenders given the various means to ensure compliance with the RFS that they can employ. U.S. refiners and gasoline blenders, obligated parties in EPA terminology, can satisfy their individual RFS



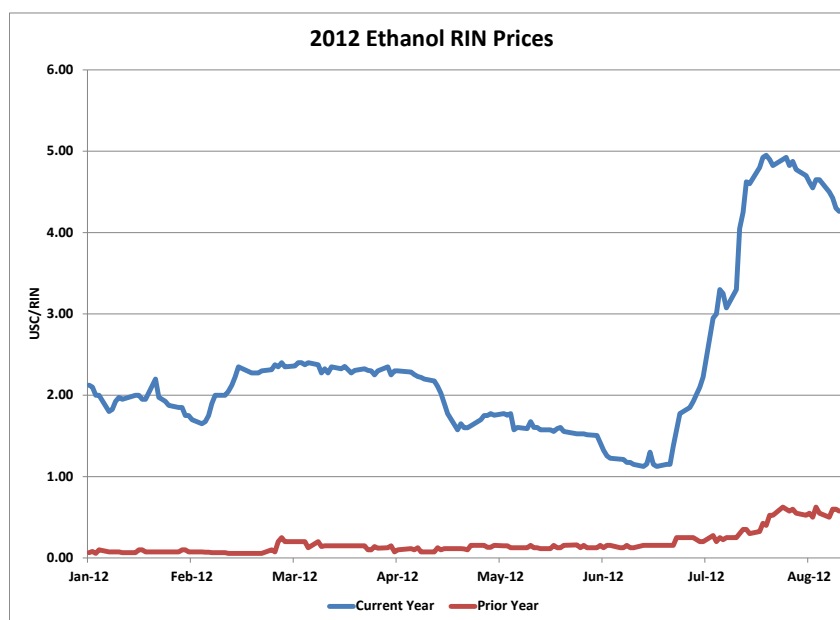
obligations through a combination of physically blending ethanol and/or purchasing surplus Renewable Identification Numbers (RINs) from other companies that have exceeded their requirement. The RINs are generated with every gallon of qualified ethanol that is produced by a registered facility and can only be separated after blending. Separated RINs can be: 1.) Retired by submitting them to EPA to demonstrate compliance, 2.) Bought from another company with an excess inventory of RINs, or 3.) Sold to someone who is short of their requirement. The RFS also has a provision allowing unused RINs from the prior year to be rolled over for use against a current year's requirement as long as the amount of prior year RINs used to achieve compliance is no more than 20 percent of the total needed. So despite the possibility ethanol production in 2012 may drop below the mandate, the additional compliance provisions in the RFS afford a cushion against a shortfall in physical volume.²

Fortunately, the EPA's official website maintains a page of tables that track the total number of RINs generated, retired, locked and available by year so it is fairly easy to envision how the obligated parties will deal with a projected shortfall of physical ethanol. The [2011 EMTS Data table](#) shows that 13.6 billion RINs were generated last year of which 10.1 billion were retired. The difference of 3.5 billion RINs are thus available to carry over for use in 2012. By factoring in the 20 percent carry-over limit, 2.6 billion of the total 3.5 billion RINs carried over from 2011 are available for use against the 2012 mandate. If 600 million prior year RINs are used to satisfy the 2012 requirement (12.6 billion gallons of ethanol blended + 0.6 billion RINs = 13.2 billion gallon mandate), perhaps as many as 2 billion RINs could be carried over for use against the 2013 requirement.

² As a last resort, an obligated party can carry over a deficit of up to 20 percent of the current year's obligation. By doing so however, the obligated party has to satisfy the subsequent year's obligation in addition to making up the previous year's deficit.

Another look at the EMTS table suggests how this rollover could happen. Last year's mandate called for 12.6 billion gallons of ethanol. The table shows however, that only 10.1 billion RINs were retired in 2011 even though producers generated 13.6 billion RINs. The resulting gap, which is roughly 20 percent of last year's obligation, implies that the mandate was likely met with 2.5 billion prior year RINs from 2010. In other words, the obligated parties rolled forward a huge surplus of 2011 RINs into this year by maximizing the accumulation and retirement of prior year (2010) RINs last year. How was this accomplished and could it happen this year as well? Analyzing the YTD 2012 market structure between current and prior year RINs provides some insight into the economic basis for the trading activity that resulted in the rollover of prior year RINs.

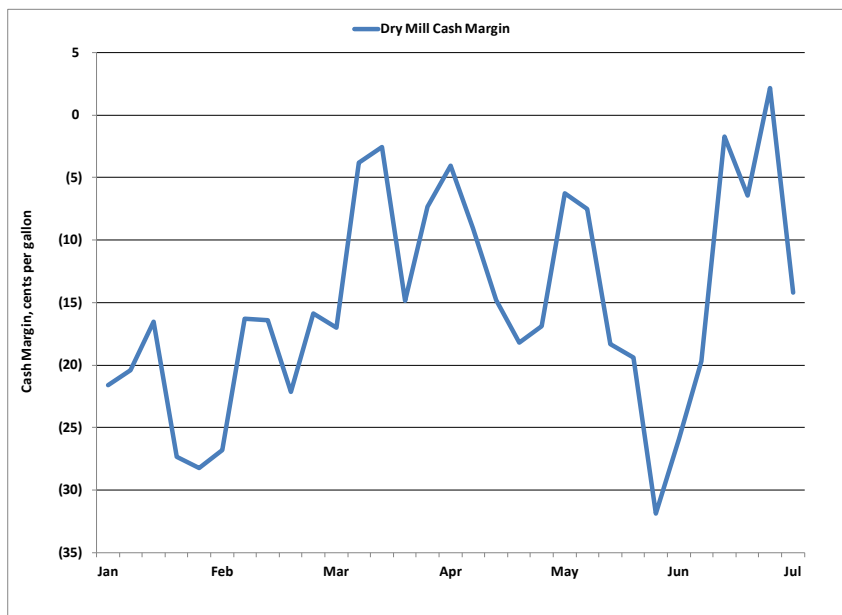
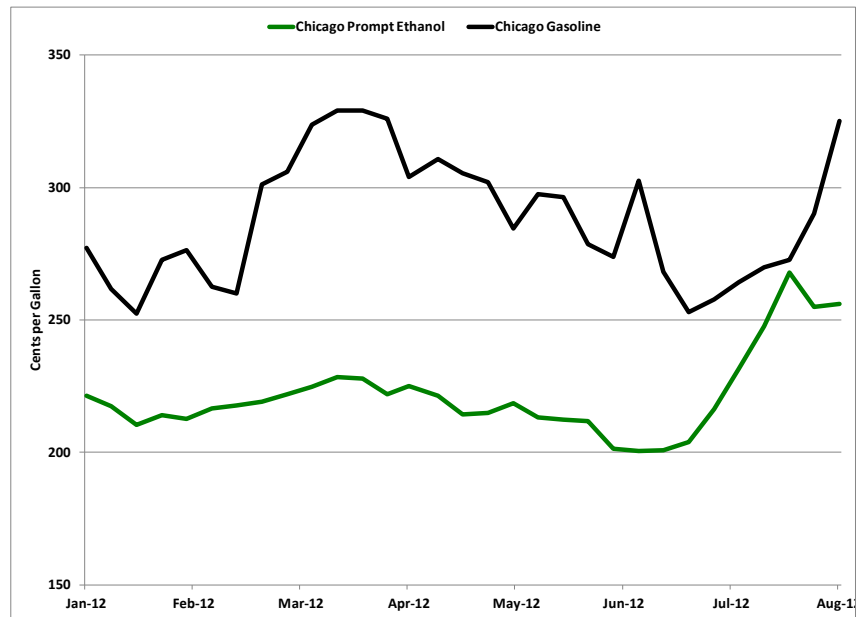
The chart to the right tracks the price in cents per RIN for both current year and prior year RINs. Early in the year when weekly ethanol production tracked closely with the pace needed to meet this year's expanded mandate, current year RINs were relatively cheap at about 2 cents per gallon. Owing to the abundance of RINs carried over from 2011,



combined with an expectation that production would continue to pace the mandate, prior year RINs were exceedingly cheap, averaging well below a half a cent per gallon. Ironically, current year RIN prices bottomed out in late June just about the time that USDA that 96 million acres of corn had been planted raising expectations for the largest crop in U.S. history. In July, as news spread about the extent and severity of the drought, RIN prices followed both corn and ethanol higher, increasing nearly five-fold for current year RINs. Prior-year RINs also ticked up, but not nearly to the same extent. The explanation for the growing spread between RIN's is probably related to the fact that there are many more prior-year RIN's available for purchase than can actually be used as opposed to current year RINs which are much more valuable in a tight market. This growing spread means obligated parties have a strengthening economic incentive to swap prior-year RINs for current year RIN's as part of their compliance strategy. By doing so, additional revenue is being generated at the same time a hedge against future scarcity is put in place.

The abundance of prior-year RINs will have wide-ranging effects on a number of markets. For instance, to the extent that abundant RIN's soften the perception of scarce ethanol supply, the prospect for more strengthening of ethanol prices in the near term is likely to be dampened. With gasoline prices trending higher, ethanol blending incentives which had largely vanished in July have strengthened once again. This creates a market paradox – that is to say at the very moment that demand for ethanol should be rationed in order to reduce the call on corn supply, the market structure is providing incentive to continue blending! A look at the chart below helps to visualize the situation just described.

The blender's incentive (indicated by the spread between the green and black lines) was very strong for much of the year before weakening in late June. Since the end of July, the incentive has widened back out as global petroleum markets have strengthened. Since gasoline prices typically moderate after Labor Day, the spread could weaken again but there is no way of knowing whether or not they might weaken enough to collapse the blending incentive.



If anything, the ethanol production margin has experienced even greater volatility. A cost analysis of a typical Midwestern ethanol dry mill supplying product to the Chicago market and shipping dried distiller's grains with solubles (DDGS) out by rail suggests that for much of the year, marginal production has probably

covered variable costs but only a portion of the total fixed costs. Since the expansion of the drought, volatility appears to have been amplified placing even more stress on the system. So long as revenue from the sale of ethanol, distiller's grains, and other co-products covers the producer's variable cost to purchase corn, fuel, etc. it's reasonable to expect them to continue to operate in an effort to contribute cash to cover their fixed costs (labor, overhead, etc.). The upshot of all this is that the RIN market is probably depressing ethanol prices enough to support continued blending for a while longer but not to the extent that production capacity would be shut down more quickly. In order for the capacity to start backing off at an accelerated rate, corn prices are likely to move even higher later this fall and into winter.

Looking ahead, elevated corn prices are likely to start eroding the overhang of inexpensive RINs over the next 12 to 18 months. Earlier, we forecast that the 2012 corn crop would yield about 12.7 billion gallons of ethanol supplemented by another 200 million gallons of supply from other sources. Current production trends indicate that perhaps 4 billion gallons of the new crop ethanol production will be used during the remainder of 2012. The balance will contribute to next year's forecast which calls for overall production of 13.4 billion gallons. We are discounting imports as an addition to supply since the most obvious potential source is derived from sugar cane in Brazil. This source of supply will more likely count towards the advanced fuel mandate. Available supply could be further reduced by perhaps 200 to 400 million gallons that will be needed for export or to restock inventories which are at the low end of the range on a forward cover basis. Putting all the numbers together means the RIN overhang could easily be reduced by another 600 to 800 million next year (13.4 billion production less 200 to 400 million to export/inventory equals 13.0 to 13.2 billion total blended versus a mandated requirement of 13.8 billion gallons).

The EPA is almost certainly working through their own balances to determine what if any action needs be taken vis-à-vis the mandate. Although there has been a [growing cacophony of calls](#) for EPA to waive the mandate, it appears that the system in place is adequate to manage the predicament at the moment. If history is a guide, then there is little to suggest that EPA will waver from enforcing the mandate. In the past, EPA has faced similar opposition to unpopular actions and conceded very little if anything. Recent incidents that come to mind include Governor Perry of Texas filing a waiver request in 2008 to suspend RFS2 which was denied. In another test, California unsuccessfully filed a lawsuit against EPA in 2001 which sought to overturn the requirement to add oxygenate to reformulated gasoline.³ Assuming that USDA issues no more gross downward yield revisions to the 2012 crop, EPA is not likely to modify the mandate until at least next summer and only if (a big if at that) prospects for the 2013 corn crop appears to be as poor as the current crop.

³ The oxygenate requirement was eliminated by Congress in 2007 with the passage of legislation that created RFS2.



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