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The Mysteries of Natural Gas -A Looming Shortage?

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November 23, 2015

Four days ago, the Energy Information Agency (EIA) released their weekly natural gas (NG) storage report that trumpeted a RECORD! 4000 Bcf of NG in storage for this end of injection season. Disregarding the strange way they arrived at this nice round record number (going from 3 to 5 reporting regions in the U.S. the previous week that mysteriously resulted in more storage), 4000 Bcf is 5% higher than the prior 5 year average and precipitated a huge sell-off in the NG futures market to near 15 year lows. The following looks at some of the mysteries surrounding NG that is believed to be in an un-ending glut in the U.S., but in fact may be poised for a looming shortage.

Many of the mysteries start with the fact that NG is compressible, while its hydrocarbon cousin, oil, is not. As a result, measuring oil inventories, production, and consumption is a cakewalk compared to NG. A standard cubic foot of NG is measured at 14.7 psia (atmospheric pressure) and 60 deg F. Like all gases, NG is proportioned to PVT, or Pressure, Volume, and Temperature. Put NG in a transmission pipeline and its volume compresses by as much as 75X. Because of its compressibility, U.S. NG production, usage, and storage values are very hard to measure. It is why these measurements are always called estimates. These measurement difficulties allow biases to permeate the estimates which we believe is currently overstating production and inventories.

Start with the 4000 Bcf end of season (EOS) inventory estimate which the EIA keeps reminding us is an all-time record, reflective of a glut. It is 5% higher than the average of the last 5 years beginning in 2010. Yet demand is running 17% higher than in 2010. Logically, EOS should be proportional to this higher demand, or closer to 4500 Bcf. So why isn't the 4000 Bcf described more accurately as one of the lowest amounts of EOS storage relative to demand that the U.S. has ever had?

Another mystery surrounds the U.S. NG monthly production numbers that the EIA publishes two months in arrears. These numbers along with demand and other dispositions of NG should come close to netting out the resultant storage amounts. Yet, in order to come close to these amounts, the production numbers have become nonsensical. For instance, in their last report for the month of August, the EIA says that U.S. production was 2.5% higher than it was last April. This flies in the face of their weekly reports in which they reference independent measurements from Bentek, which show production peaking in April and declining ever since. Bentek is at least directionally aligned with our expected depletions associated with the rapid reduction in rigs in both oil and NG shale basins. Yet, we think even their estimates for U.S. NG production are high, for two reasons: First, the largest producing state (Texas) is reporting severe declines in production since last December. Though the state revises their historical data on a monthly basis, this declining trend is without question large and consistent with large declines of rigs in NG and oil (associated gas) shale basins. The second largest producing state and the source of the majority of NG production increases over the last few years is Pennsylvania where about 85% of the Marcellus gas is produced. Even they are now reporting declining production. Second, when we model the expected production from the NG rigs and associated gas from the oil rigs operating in the U.S., we get a decline of production that is closer to that seen in oil, which is around 5% from its peak, or about 40% more than Bentek.

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A bigger mystery is that regardless of which decline rate one believes (Bentek's slower one or a faster one like ours) no one is talking about the fact that for the first time in years, U.S. NG production is now less than it was a year ago. This trend will continue, where by the end of this winter, production will be about 4 Bcf/d less than the year before. All the while, demand will continue to grow with expanding Mexican exports, initiation of LNG exports, greater distribution in New England states, and power burn growth. By the end of winter, these items should contribute to growing demand of over 4 Bcf/d from the year before. Taken together, this potential 8 Bcf/d year over year difference could result in inventories being drawn down to below 1000 Bcf. That is, assuming we have a winter with normal temperatures.

While a lot has been written about the current El Nino and how it will result in a warmer than normal winter, the facts don't quite bear that out. This is the 20th El Nino since they were first recorded in 1951. The winters following the previous 19 El Nino's averaged in the 55% percentile of the warmest 120 recorded winters by NOAA. Statistically, that means the previously recorded El Nino's had about a coin toss chance of being either warmer, or colder than average.

The final mystery has to do with the economics of the NG industry. Having a better understanding of the mysteries above, why is the price of NG so low? Why would anyone sell their future production at these low prices? The answers to these questions start with the fact that a lot of parties have an interest in lower prices.

Storage operators want to buy NG at the lowest price possible. Having a bias towards reporting higher than actual inventories could help their cause. Speculators in the NG Futures market may be pressing prices lower through the use of high frequency algorithms as they use increased leverage (the CME cut margin requirements in half earlier this year) to accumulate large amounts of future production from panicked producers afraid that the price will fall even lower.

Over the next several months, it is probable that the supply/demand imbalances described above will become known and the price of NG will reverse upward. For every dollar increase in price, the value of the physical stored gas increases about \$4 billion. But the real money will be made in the futures market, where it is possible that as much as a year's worth of future U.S. production was sold in a panic at these low prices. For every dollar increase in price, that amount of NG would increase in value over \$25 billion while costing a little over \$5 billion to accumulate.

In the end, it will be a shame to see an industry in such a desperate need of a recovery, forfeit so much of it to someone else.

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